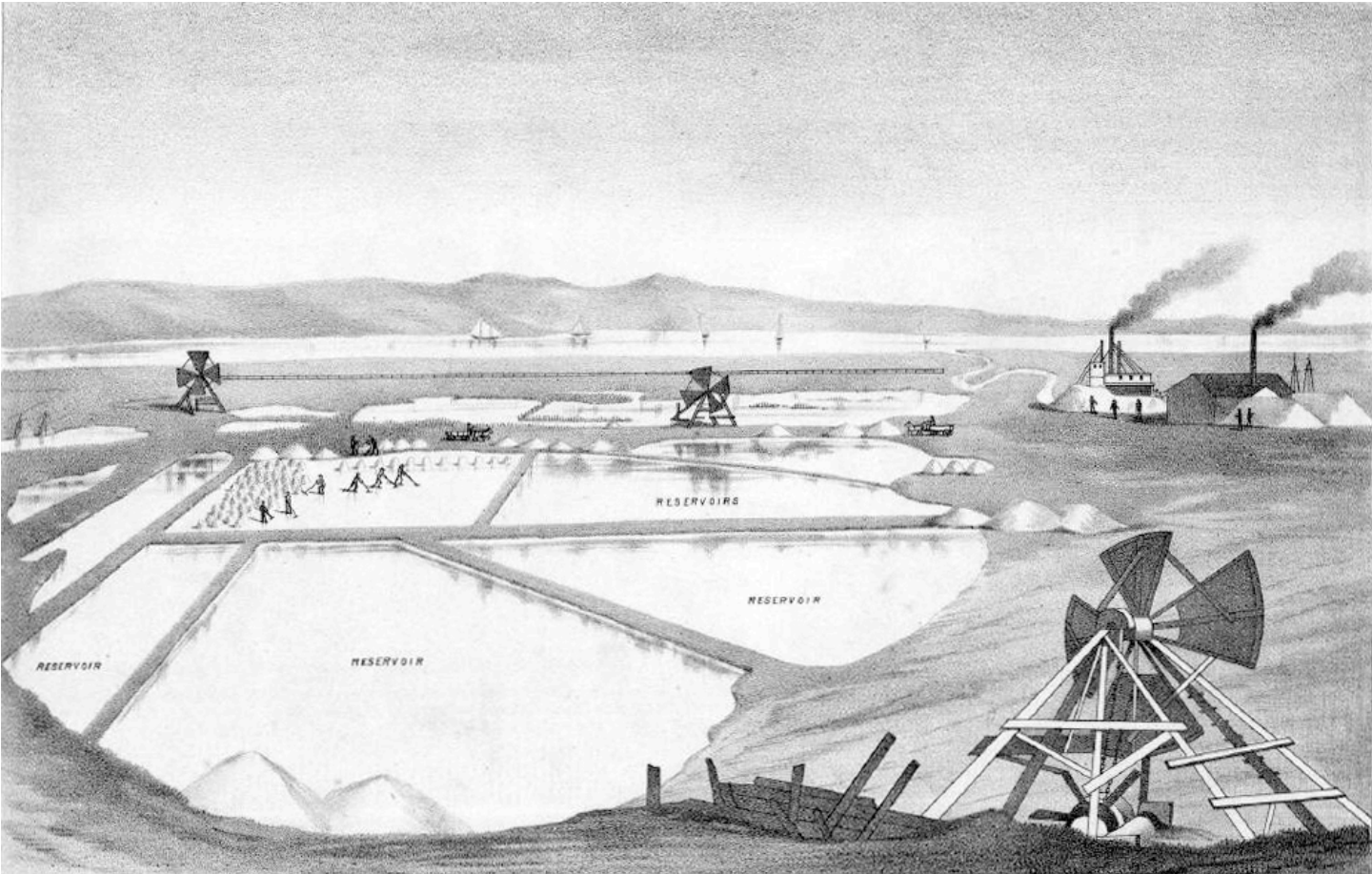
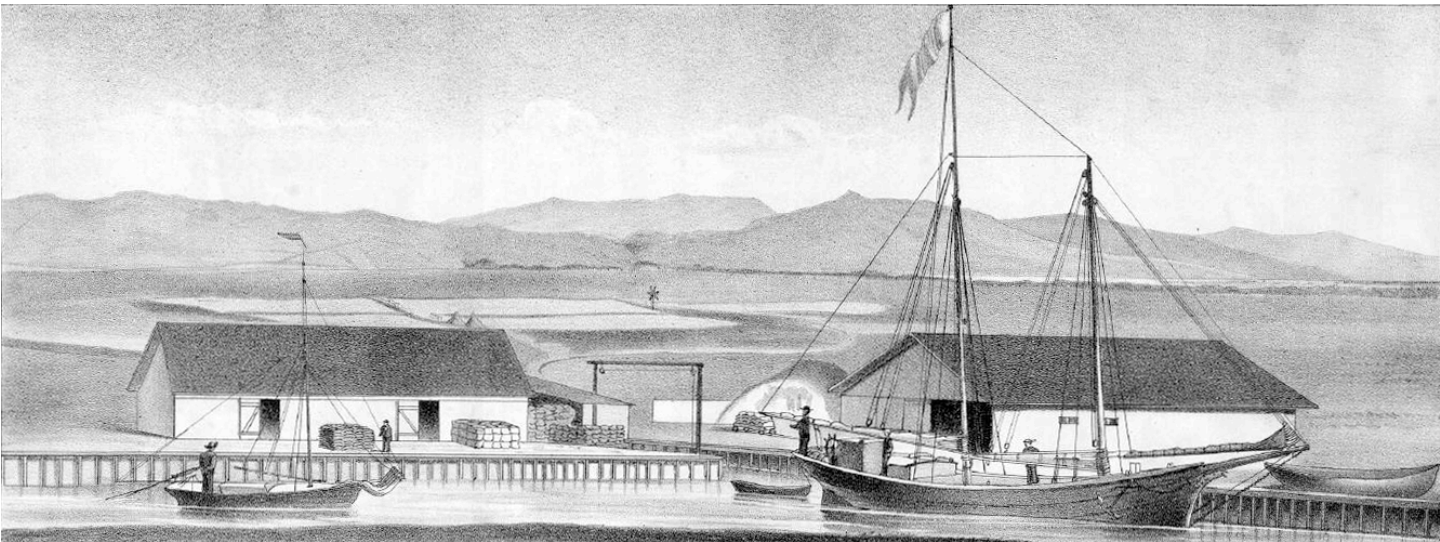


Appendix D: Salt Pond Historic Context



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3. HISTORIC CONTEXT OF THE SBSP RESTORATION PROJECT

3.1 Human History of Bay Marshlands, Pre-Salt Industry

People inhabited the project area at least 11,000 years prior to the arrival of European explorers in California in the 18th century. Archeological evidence suggests that the earliest of these populations in the Paleoindian period (12,000 to 9,000 years before present (YBP)) consisted of small subsistence economies, emphasizing the capture of big game. During the Archaic Period (9,000 to 4,000 YBP) these cultures diversified, reducing their emphasis on hunting and utilizing ecological habitats such as the coast littoral zone more intensively. Population densities increased through the Pacific Period (4,000 to 150 YBP) across California, requiring more dependable and productive food sources. Populations became more sedentary and established in larger villages. Many sites found within the Bay Area were settled by 4,000 YBP. Villages were often located near streams or other water bodies, including adjacent to the resource-rich bayshore and marsh habitats. Archeological excavations at these kinds of sites have found deeply stratified deposits of shellfish and other remains from repeated occupations over time (CDFG and FWS 2003).

Inhabitants in the project area at the time of European contact were the Ohlone (as they presently refer to themselves) or Costanoan (from the Spanish “Costano” for coastal people). The term “Costanoan” refers to an ethnographic grouping of people who shared similar cultural and linguistic traits, and does not refer to a politically unified entity. The Ohlone occupied the Coast Ranges surrounding the San Francisco and Monterey Bays and probably arrived in Central California sometime after 1,500 years ago (around 500 A.D.). Levy (1978) estimates the Ohlone population at about 10,000 at the time of European contact. After an initial exploration of the Bay Area in 1776, Spanish officials established several missions around the bay, as well as the military Presidio in San Francisco. The Spanish missionized the Ohlone people quickly and occupied nearly the entire coastal portion of the Ohlone territory in the latter part of the 18th century. Introduced diseases and lower birth rates drastically affected native population levels during this period. With mission secularization in 1821, after Mexico achieved independence from Spain and California became a territory of the Mexican republic, Ohlone and other mission Indians left the missions to work in surrounding areas, mostly as manual laborers on large individually-owned land grants called ranchos (Levy 1978).

3.2 Early Salt Development in Alameda County

The earliest known salt harvest in the Bay Area dates back to native Americans and later the Spanish missionaries who duplicated their methods of scraping crystallized salt off rocks or from naturally-occurring salt ponds along the bay margin. Some tribal groups produced their own salt by leaving twigs in these briny pools, on which the salt would crystallize and could be harvested; others collected and burned marsh plants to produce salty ashes that were then added to food. Mission San Jose, established by the Spanish in 1797, eventually produced enough salt to export moderate quantities of it to Europe (Sandoval 1988). None of these early salt harvesting methods involved manipulation of the landscape.

The first construction of levees to create artificial salt ponds is attributed to John Johnson in 1853, who established a homestead at Mt. Eden (just north of present-day Highway 92 and the Eden Landing project area boundary). Apparently responding to what he saw as demand for salt from the hide and leather tanning trade, Johnson “squatted” on a small tract of 14 acres that showed signs of being particularly saline, and enclosed the area with levees. His first harvest was measured at 25 tons and was shipped to San Francisco by schooner (Sandoval 1988) (Figure 1).

Gradually the Mt. Eden area along the Alameda County coast, stretching from San Leandro Creek south to Alvarado (present-day Union City), developed into a scattering of small salt producing operations, mostly run by Danish and German immigrant families. Levee-protected land holdings were most often small, comprising as little as 20 acres, and changed hands frequently (Figure 2). Initially, demand for salt was fairly low, mostly used for preserving both food and hides. Bay salt was generally considered to be a crude product, inferior to imported salt, and did not demand a high price. Through the 1860s several producers worked to improve the quality of the salt and soon reliance on imports began to decline as demand for local salt increased (Ver Planck 1958).

Demand also shifted with the discovery in 1859 of the Comstock Lode in Nevada, as salt was a primary compound used in the process for treating silver ores. With this increased demand for salt, foreign imports became expensive compared to the cheap local product. In 1868, Bay Area salt companies were producing 17,000 tons annually; by the end of the century production was close to 100,000 tons, and California was supplying salt to much of the west, as well as fisheries in Alaska and Siberia (Parker 1897). Most of the salt was still coming from small operators at this time; in 1900, only four companies were producing more than 10,000 tons per year (Ver Planck 1958) (Figure 3).¹

3.3 Conversion of Salt Marshes

Reclamation generally refers to the control and manipulation of water, most often moving it from rivers onto dry land. In the case of the bay margin, however, reclamation involved moving salt water *off* the land, draining the marshes, and then irrigating with fresh water in hopes of creating a more productive landscape. Marshes and swamps at this time in American history were generally considered to be a category of “waste lands,” along with deserts and other such uncultivable lands. In the latter half of the nineteenth century, the federal government passed a number of laws encouraging people to invest capital in these “waste” lands to make them productive and profitable (Cronon 1994; Langston 2003).

One of the earliest of these laws was the Arkansas Act of 1850, which granted “swamp and overflowed” lands to the states, anticipating that the states would sell these lands to private individuals who could afford to reclaim them and make them productive, as well as providing some measure of flood control. California instituted its first system for selling these lands in 1855, limiting sales to a maximum of 320 acres at a dollar an acre. There were no restrictions on the land if it was bought with cash; if bought with credit, at least 50 percent of the land had to be reclaimed within five years, otherwise title would revert to the state. It also allowed for the creation of swampland reclamation districts on a county basis,

¹ The four were Union Pacific, Carmen Island, Oliver Salt, and American Salt Company.

ensuring local control of implementation. These districts were formed to build the actual drainage works or, in some cases, to repay private individuals for money expended in reclamation efforts (Hundley Jr. 1992).

The state sale program did not produce many takers, even after state legislators raised the acreage limit to 640 acres (Manson 1888). After numerous attempts at improving the system, California passed an amendment in 1868 called the Green Act, named for sponsor Will Green from Colusa County. This law removed all acreage limitations from swampland purchases, allowing individuals to acquire enormous tracts of marshlands on credit. Within only two years of the bill's passage, the state had transferred over 790,000 acres of swampland to fewer than two hundred persons (Booker 2005).

Almost immediately after the Green Act was passed, in 1869 L. E. Beard petitioned Alameda and Santa Clara Counties to establish Reclamation District No. 82, covering 17,000 acres of marshlands in the east bay, and Reclamation District No. 95, including 10,000 acres of in the south bay (Figure 4). These entities were authorized to repay money expended by landowners on the reclamation of marshes within the district boundary, paid out of the state Swamp Land Funds allocated to each county from sale of marshlands. In his 1971 report to Leslie Salt Company on the history of bay reclamation, consulting engineer Claire Lopez reported that while large sums were expended on the construction of levees and dams within the two Reclamation Districts in their first few years, after 1873 "no further district work was recorded and the ventures appear to have failed" (Lopez 1971:4). It is not clear where these early constructions were exactly located, but it is likely that, without maintenance, they washed away.

3.4 Dumbarton Land and Improvement Company

The major player in marshland reclamation in the Bay Area was the Dumbarton Land & Improvement Company (DL&IC), incorporated September 21, 1891, with the stated purpose "to acquire, hold and own lands in the state of California by purchase, lease, bond, or otherwise, and to cultivate, reclaim, fill, drain, ditch, and otherwise improve same" (File SFB 4.2/1 1891). The company's charter also allowed for it to operate railways for transportation of passengers and freight. It appears to combine the holdings of one or more land speculators, most likely all acquired under the Swamp and Overflow Act twenty years earlier, under the single company name. A letter to Senator J. P. Jones in 1894, only two-and-a-half years after incorporation, described DL&IC as holding 19,000 acres in Alameda and Santa Clara Counties, reflecting 17 miles of shore frontage (File SFB 4.2/2 1894).²

Author William Ver Planck describes DL&IC as "a subsidiary of A. Schilling and Company" (Ver Planck 1958);³ while Mr. August Schilling was not on the Board of Directors at the time of incorporation, he was

² Several documents in the archive refer to DL&IC as owning land during the 1880s; it can only be presumed that these refer to holdings acquired prior to incorporation. Further research is needed to definitively trace these holdings back to their original owners.

³ A. Schilling & Co. was established in 1881 in San Francisco, selling spices, teas, and coffee, co-founded by Schilling and George Volkmann. Their San Francisco plant was destroyed by fire after the 1906 earthquake, but

clearly the main player behind DL&IC, as he signed all the company's correspondence. Despite his involvement with the salt industry for over 40 years, in addition to owning a successful spice company, Schilling's primary interest in marshlands from the start was for their development potential. Reclaiming marshland for agriculture was the first selling point, particularly for high-value dairies. The same 1894 letter to Senator Jones describes reclaimed marshland in nearby San Pablo and Suisun Bays as providing "the very best pasturage," and that "when protected from the overflow of tide waters, the land soon becomes, without much care or labor, meadow land yielding at all times luxuriant crops of green feed and with little cultivation, almost phenomenal crops of cereals, vegetables, and fruits" (File SFB 4.2/2 1894).

Schilling had other uses in mind besides agriculture, however. The 1894 letter also notes that Dumbarton Point (on DL&IC's property) was the "only point on the eastern shore of the Bay, south of Oakland, which is accessible to large vessels," and the only point at which the bay could be easily bridged south of San Francisco, giving it increased commercial value. The South Pacific Coast Railroad, established in 1880 and already very profitable, ran through DL&IC property, on its way to Alviso, San Jose, and Santa Cruz (MacGregor 1968) (Figure 5).⁴ Schilling became interested in a more industrialized future for this area of DL&IC's holdings, imagining a new shipping terminal for the busy South Bay.⁵ Between this and the agricultural potential, all the pieces were in place for DL&IC's vast marshland to become enormously profitable—once they could be reclaimed.

3.5 The South Bay and Drawbridge

During this same period, the South Bay was thriving. Alviso was a major shipping port on the bay, and San Jose was becoming increasingly important as a distribution point for produce grown between the Bay Area, Santa Cruz, and the Salinas Valley to the south. The Bayside Canning Company in Alviso was the third largest vegetable cannery in the world, behind Libby's and Del Monte, particularly specializing in tomatoes and asparagus. The vast marshlands surrounding the South Bay provided ample opportunities for fishing and game hunting, both for market and recreation purposes.

was rebuilt and reopened in January 1907. The company was acquired by McCormick in 1947 (<http://www.mccormick.com>).

⁴ Alfred Davis, co-owner of the SPCRR (his partner was Jim Fair, who made his fortune with the Comstock Lode discovery), owned Dumbarton Point in 1875; it is unclear when or why he sold to Schilling and/or DL&IC. Macgregor 1982:48.

⁵ In 1890, the year before DL&IC incorporated, The River, Harbor and Canal Dredging and Land Company of San Francisco proposed to dredge, widen, and straighten the Alviso slough to allow for more deep-water shipping there. A newspaper article described this company as "composed of some of the most prominent citizens of San Francisco. Furthermore—that they had absolute title to nearly 20,000 acres of marshland (about 12,000 acres being in Santa Clara County), controlling more than twenty miles of waterfront on the San Francisco Bay." These holdings appear to be the same as DL&IC's, hence the River, Harbor and Canal Dredging and Land Company may have been an earlier incarnation of the same landowners. Their proposal to dredge Alviso slough was approved by the San Jose Board of Trade, but the dredging equipment failed to function properly, and the project stalled out. The inventor of the dredging equipment, Albert Boschke, also turns up frequently in Schilling's subsequent plans for industrializing the South Bay. File SFB 4.10-1/4 1890; File SFB 4.13-1 1919.

Amongst those South Bay marshlands, the tiny outpost of Drawbridge sprang up in the late 1870s, developing around the bridge tender for the South Coast Pacific line, which crosses both Coyote and Mud Sloughs and the chunk of land between them, named Station Island.⁶ Gradually more buildings joined the bridge tender's cabin, mostly duck hunters' cabins; the first permanent resident was built in 1894. After 1897, Drawbridge became a scheduled stop on the rail line (changed to the Southern Pacific Railroad in 1899), rather than just a place the train passed through, and in 1902, the Sprung Hotel opened for business, catering mostly to fishermen and duck hunters. Most of the land was owned by DL&IC; individuals either purchased lots from the company directly, or simply "squatted" until the County Governments recognized their possession as ownership (Dewey 1989).⁷ The town reached its heyday in the 1920s, with a maximum size of roughly 90 cabins, and five passenger trains stopping daily.

3.6 DL&IC and Leslie Salt Company

The Dumbarton Land & Improvement Company's involvement with the Bay Area salt industry is inextricably linked to the Leslie Salt Company, so much so that at times it is difficult to tell the two companies apart. The first incarnation of Leslie Salt was called the C.E. Whitney Company, established around 1892; Whitney was doing dredging work for Schilling, probably on DL&IC-owned lands, and thought salt development could be brought to the west bay. In 1904, after C.E. Whitney had died, the name was changed to Leslie Salt Refining Company, run by several of the next generation of Whitneys.⁸ At about this time, another company, the Stauffer Chemical Company, acquired two of the three independent salt works in the west bay, the West Shore Salt Company and Redwood City Salt Company (Postel 1977).⁹ Soon after, in 1907, Schilling, Stauffer Chemical Company, and A.L. Whitney all formed Leslie Salt Company (dropping the word "Refining"), which consolidated Leslie and Stauffer salt holdings in the west bay under one name.¹⁰ The new company's stock was divided into thirds between the three parent companies (File SFB 4.5-1/2 1907 and File SFB 4.2/8 1909).¹¹

⁶ Oddly, neither of the slough crossings involved an actual drawbridge; both were equipped with swing bridges instead.

⁷ Drawbridge is located directly on the line between Alameda and Santa Clara Counties, contributing to its reputation as a haven for people interested in getting away from the law.

⁸ The name Leslie apparently came from an uncle of C. E. Whitney; Postel 1977:16.

⁹ The third was Greco Salt Company. The acquisitions took place in late 1905 or early 1906; Postel 1977:17.

¹⁰ The Board of Directors of the new Leslie Salt Co. consisted of Arthur L. and Albion H. Whitney, John Stauffer, George Volkmann, and Christian de Guigne; Postel 1977:17. Note that de Guigne and Volkmann were both also employees of A. Schilling & Co. (Volkmann was a co-founder and apparent managing partner; de Guigne was President of the company for at least part of its history).

¹¹ The exact relationship of Schilling, Whitney, and Stauffer Chemical seems to shift over the years, as correspondence in 1909 suggests that Whitney had trouble "carrying" his third interest and was bought out by Schilling. There is also reference to a Coast Investment Company, which seems to be another business co-owned by at least some of the DL&IC partners, which handled some of the financial dealings between the three companies. See File SFB 4.2-8, "Stock Transactions, Land Acquisition, 1907-1909."

In the meantime, DL&IC was still focused on the eventual development of their lands. In August 1905 the company President and Board of Directors received a report from Consulting Engineer Marsden Manson, specifically evaluating the potential values for their lands between Coyote Hills Creek to Alviso, including Dumbarton Point (File SFB 4.2/22 1905). This expanse covered 14,271 acres of marsh and tidal lands. Manson determined that the land was suitable for four usages: agriculture (specifically dairy and truck gardening); railroad terminal and shipping purposes; salt works; and resorts for hunting and fishing.¹² He again cited similar reclaimed lands near Novato and in Humboldt Bay that had been profitably improved for agriculture and higher values. Manson suggested the lands could all be reclaimed with construction of levees two to three feet above extreme high tide.

In October 1905, an agreement was drawn up between DL&IC and Whitney for the reclamation of land; Whitney would be in charge of building levees on land owned by DL&IC (File SFB 4.2-1/5 1905).¹³ At the same time, DL&IC successfully petitioned the counties to reactivate the long-dormant Reclamation District Nos. 82 and 95 (Lopez 1971). Over the next three years, there is much evidence in their correspondence and corporate minutes for major manipulation of the south bay landscape, building levees, draining the land, and attempting to convert marshland to rentable agricultural lands.¹⁴ Despite all this activity, it does not appear that the agricultural ventures were successful. In early 1908, Whitney wrote to Schilling stating that, “we now have something over 4,000 acres of land in Santa Clara County under levee, only 500 of which are rented” (File SFB 4.2-1/15 1908).¹⁵ It is not clear exactly why these agricultural efforts failed,¹⁶ but after 1908 they were essentially abandoned, and Lopez suggests that many of the unmaintained levees again washed out, returning some of the area back to its original overflowed marshland state (Lopez 1971).

3.7 Consolidation and Expansion of the Salt Industry

At the same time as DL&IC attempted to reclaim their marshlands for agricultural use, they were also actively pursuing increased solar salt production at a more industrialized scale than the Bay Area had previously seen. Schilling was the primary driving force behind this development, while Whitney was more focused on the agricultural side. In 1907, shortly after the consolidation of interests into Leslie Salt Company, Schilling traveled to Europe to research and purchase machinery to process and refine salt on

¹² Page 6 of Manson’s report notes “Drawbridge” station, with houses, houseboats, hotel, and artesian well, suitable for a resort. “Term leases are advised rather than sales.”

¹³ According to the agreement, Whitney paid costs of reclamation, with a 60/40 (DL&IC/Whitney) split of profits from (sale or) rental of reclaimed lands (sale if they had been bought jointly, would also be a 60/40 split).

¹⁴ Unfortunately research has not yet produced a map with the levees depicted, so their exact location is unknown.

¹⁵ Whitney wanted to find tenants to run cattle on the land for pasturage, as well as flooding 2,000 acres north of Dumbarton Point to get the evaporation process started for salt making. He worried that “we are getting started on new ventures with so many old ones still incomplete...”

¹⁶ One possibility is that the south bay is significantly different than Suisun, San Pablo, or Humboldt Bays in that it does not have a major river pouring through it, bringing a constant flush of fresh water and nutrients. Fresh water in the south bay was obtained primarily from artesian wells; pumping the groundwater may have caused early subsidence of the land, & the soils may not have been as rich as needed to support agriculture.

a large scale (File SFB 4.2/9 1907a). In May of the same year, a DL&IC representative (most likely Whitney) wrote to Mrs. E. O. Oliver in Mount Eden, describing Schilling's ambition to establish "what will certainly be the most extensive chemical plant on the Pacific Coast and, eventually, will probably be second to none in the United States, at least" (File SFB 4.2/9 1907b). He specifies that they were currently reclaiming 2,000 acres for this purpose on land adjoining California Salt Work's holdings, and intended to reclaim an additional 10,000 acres of Dumbarton land for salting.

At the same time that they were expanding their production capacity, DL&IC also appears to have been aggressively looking to buy out other salt companies in the Bay Area. Consolidation of the industry was driven by the few large companies, seeking to buy out smaller companies so as to make the whole market more efficient, in terms of reduced maintenance costs on fewer salt works, lower freight rates on shipping salt in bulk, improved packaging methods, and so forth.¹⁷ The 1907 letter to Mrs. Oliver suggests that the two companies should consolidate their interests so as to save time and money (i.e. refitting Oliver's existing salt works rather than building new ones): "I think your boys have better ability in the construction and operation than any one that I know of, and, together with our unexcelled marketing facilities, we should make a very strong combination" (File SFB 4.2/9 1907b).

DL&IC and Leslie were not the only companies seeking to buy out smaller operators. A year later, a transcribed memo from Schilling urges Whitney to get in touch with as many salt producers as possible, explaining, "From what I have heard it looks to me that Mr. Henshaw [president of the California Salt Company] has someone in the field to tie up salt producers on San Francisco Bay where it is practicable" (Ver Planck 1958).¹⁸ By 1924, the number of salt operators dwindled from roughly 30 separate operators to only a handful (Figure 6). California Salt Company and Continental Salt and Chemical Company were both successful at buying out smaller operators; in 1924, they in turn merged with Leslie to form the Leslie-California Salt Company. Leslie-California then acquired Turk Island Salt Company in 1927. Oliver Salt Company had similarly been absorbing neighboring salt producers through the 1910s, but was itself merged with Leslie-California in 1931 (Figure 7).

At that point, the only remaining salt company that had not been brought into the Leslie fold was Arden Salt Company, established in 1919 by none other than Schilling, producing salt from the lands surrounding Dumbarton Point.¹⁹ It is not clear from the historical records why Schilling chose to establish a separate company to operate these DL&IC-owned lands, rather than manage them under the

¹⁷ For instance, today's familiar cylinder-shaped container for salt was a Leslie innovation. Postel 1977:17.

¹⁸ Oddly, California Salt Co. obtained their land from DL&IC, or perhaps were only leasing it; actual ownership of land, as opposed to which company was operating salt ponds upon it at any given time, has been very difficult to trace consistently through these years of industry consolidation.

¹⁹ Note that the incorporation date for Arden is from Ver Planck; Claire Lopez describes Arden Salt Co. as originating in "the early 1900s" and operating on lands leased from DL&IC. A third version comes from Postel, who describes Schilling as converting his "marshland properties in the east bay from private game reserves to salt ponds," citing a telephone interview with Schilling's grandson, who claimed that "duck hunting was the original attraction to the east bay marshlands that became the Arden Company." Further research in archives might reveal more about the exact history of the company's origins.

Leslie corporate structure; it is possible that he felt this was the best arrangement, given his further industrial ambitions for the Dumbarton Point location (File SFB 4.2/20 1920).²⁰ Arden quickly expanded to become a major salt producer, and in 1929 acquired Alviso Salt Company, which owned all the land west of Alviso to Mayfield Slough (Ver Planck 1958).²¹

3.8 Further Industrial Ambitions

Despite all this intensification of salt production, Schilling apparently still considered salt production to be a temporary use of the land; Claire Lopez described it as “the most feasible and productive *interim* use and has protected and preserved these lands as a reserve for their properly planned, highest and best *ultimate* use”(Lopez 1971 and File SFB 4.2-6/4 1913).²² Schilling was still aiming for heavier industrial development of the South Bay, centered around his plans for a shipping and distribution terminal to be built at Dumbarton Point. Schilling’s earliest proposals for the project date back to 1909, and his own elaborate design for the terminal warehouse and associated system for the distribution of goods between ships and rail lines was patented on December 5, 1916 (File SFB 4.13-1 1916) (Figures 8, 9, and 10). In a package sent to Herbert Hoover at Stanford University in 1919 describing the proposed project, Schilling speculated that in a hundred years, the Dumbarton parcel “would be the most valuable piece of property for harbor industrial development in the world—for it is on the Pacific Ocean—the coming theater of the world...” (File SFB 4.13-1 1919).²³ He again suggested that Alviso Slough should be dredged, “locating industrial plants along the entire length of the channel” and making sites available for factories (SFB

²⁰ Even more odd, on January 3, 1920, Schilling wrote to Morton Salt Company stating that the DL&IC had “decided to dispose of our land interests about the bay of San Francisco,” inquiring whether Morton would like to acquire them. Morton, based in Chicago, responded five days later, saying that “our business lies chiefly east of the Rocky Mountains, and we would not, at this time, consider extending our interests to California.” There are no other indications of DL&IC attempting to sell off any of their holdings.

²¹ This parcel was purchased in 1924 by the Continental Salt and Chemical Co. from the Spring Valley Water Company. According to Ver Planck, the same backing interests owned both Continental and Alviso Salt, hence the property must have been transferred to Alviso ownership before Continental merged with Leslie. Also two historic maps at the Bancroft Library show ponds in place west of Alviso extending across to Mayfield Slough, 1920s: 1921 map shows lands under contract of sale from Spring Valley Water Co. to the Continental Salt & Chemical Co.; on the 1929 map, the same lands are owned by Alviso Salt Co. The maps cannot be copied, but are viewable at the Bancroft Library.

²² It is interesting that a 1913 report commissioned by DL&IC on their holdings, written by Consulting Engineer Otto Von Geldern, still advocated agriculture, specifically high-grade dairies, as the most productive and profitable use of the land; he suggested that salt or oysters were secondary uses that would not pay as well as agriculture. “If the marsh is not cultivable, there is no need of levee building or of any other improvements, because no one will be attracted to it and no one will live there...”

²³ From his correspondence, Schilling’s plans for Dumbarton Point and the South Bay is clearly linked to the construction and opening of the Panama Canal from 1904-14; it was anticipated to greatly increase shipping traffic to the San Francisco Bay. In a 1909 letter to J.J. Hill, associated with the Great Northern Railroad, Schilling described the Bay as “good ship-shelter, spacious, midway of the Coast, 160 miles from the shortest line between Panama and the ports of Japan and China.” File SFB 4.13-1 1909.

4.2/21 1925, at 10). This industrial activity would be centered on his Pacific Terminal Warehouse, which the State Railroad Commission had estimated would earn over 15 percent return even if it was “only fairly filled” (File SFB 4.13-1 1919).

Schilling identified only two obstacles to the development of his dream project, the first being the San Bruno Shoal, a shallow section of the Bay off Point San Bruno where mud deposits blocked shipping access to the South Bay. There are numerous pleas throughout the DL&IC’s archives from Schilling to the federal government to remove the shoal (File SFB 4.2/18 1911). The other was the City of San Jose’s sewer outfall, located at the northeast corner of New Chicago Marsh, on the boundary of DL&IC-owned lands. As early as 1910 this landscape feature was noted as a problem for reclamation and development of DL&IC lands, but apparently the company’s efforts to encourage the City to move the sewer outfall were unsuccessful (File SFB 4.2-1/12 1910; File SFB 4.2/21 1925).²⁴

In January 1925, Schilling commissioned yet another report on the Dumbarton land holdings in the South Bay, summarizing the company’s history in the area and considering its future industrial development.²⁵ The report described Whitney as having been the big advocate of agricultural developments, but despite a great deal of money spent, the results had been “very unsatisfactory.” In contrast, Schilling had devoted his energies to the possibilities of the salt industry, as well as the land’s ultimate uses in “higher industrial purpose.” However, he was now running the salt company as a separate enterprise (Arden), and the land holding purposes of the original DL&IC charter seemed to have dropped into the background. Accordingly, in 1929 the Dumbarton Land & Improvement Company was dissolved; according to the 1925 report, the land was all owned at that point by Schilling and Volkmann, rather than any of the other original partners.²⁶

The trend toward consolidation of the salt industry culminated with the merger of Arden Salt with Leslie-California Salt in 1936, bringing back together the original interests of the DL&IC into one company again (File SFB 4.2/1 1929). Up to that time, Leslie-California had been run by St. John Whitney as president, continuing the Whitney family’s connection to the Leslie company name, but after the merger, the newly reformed Leslie Salt Company was dominated by the Schilling family (Postel 1977). All former DL&IC holdings, including any remaining acres originally reclaimed for agriculture that had been

²⁴ Increasing soil subsidence in this area may have also contributed to the difficulty of development, but there is no indication of this in Schilling’s correspondence.

²⁵ File SFB 4.2/21, “Dumbarton Land: An outline containing what are believed to be the principal points of consideration in determining the true position of the large area of marsh land in relation to the future industrial development of the region surrounding the southern arm of the San Francisco Bay”; the report has no listed author.

²⁶ On page 2, the report describes the title chain as complicated, and not worth going into details, except that: “Since the original acquisition, several other parcels of land have been purchased and several separate companies came into existence, for convenience. At the start, Schilling and Volkmann, the Stauffer Chemical Co., and Mr. Whitney were the principal shareholders. Since then there have been many changes, with the result that all the land is now owned by Schilling and Volkmann, with the exception of a few shares of Dumbarton stock belonging to Mr. Lewis. As all the land is generally known as Dumbarton land, it is not necessary here to go into the details of ownership and the portions owned by each partner.”

abandoned and left idle or used primarily for duck hunting, were reclaimed and combined with the Alviso ponds to supply brine for increasing production at the company's Newark plant.

3.9 The 1940s and '50s, the Heyday of Leslie Salt Production

Leslie Salt continued to expand its output through the 1940s and '50s. Production in 1936 for the newly-reconstituted company was a little over 300,000 tons annually, with approximately 12,000 acres in production; within ten years volume had increased to 450,000 tons over 25,000 acres (Ver Planck 1958).²⁷ The salt was generated by four crude salt plants, each with their associated network of concentrating and crystallizing ponds, harvesting equipment, and washer. The largest of their plants was Newark No. 2, the site of the present-day Cargill operation. Newark No. 1 was bisected by the eastern approach of the Dumbarton Bridge, originally built as Arden Salt Company's No. 2 plant; the Baumberg plant was located southwest of Mt. Eden, on the former site of Oliver Salt Company. In 1940, Leslie acquired additional marshlands in the Redwood City area and began construction of a west bay salt plant and shiploading terminal; the first shipment of salt was made from the new plant in 1951 (Lopez 1971 and Postel 1977) (Figure 11).²⁸

Despite Leslie's dominance, there were still two much-smaller but still-operating salt companies in the Bay Area: American Salt Company, owned since the early 1860s by the Marsicano family and located north of Highway 92; and Oliver Brothers Salt Company, established by two younger members of the Oliver family after the old Oliver Salt Company was sold to Leslie-California in 1931. Oliver Brothers built a small plant in 1937, just south of Highway 92 close to the ruins of the old plant, and began producing salt again. It is unclear when exactly American Salt went out of business; Oliver Brothers was still producing salt in 1977 but closed its doors soon after.

During this same period (1940s and '50s), the tiny hamlet of Drawbridge was in serious decline. The same municipal sewage that had produced such headaches for DL&IC was seriously polluting the tidal waters and sloughs surrounding Station Island, and increased levees put in place by Leslie Salt's expansion were cutting the area off from the flushing action of the natural tides. More pollution meant fewer fish and shellfish, fewer ducks to hunt, and fewer tourists visiting the aging hotel. The levees also meant that boats could no longer get out to the open bay. In addition, groundwater pumping in the area was causing serious subsidence; Drawbridge literally was sinking into the swamp. To make matters worse, the San Jose Mercury News published occasional articles on Drawbridge, describing it as an abandoned ghost town; vandals followed the stories, breaking windows, stealing furniture, or shooting guns at the remaining buildings, even those with occupants still in residence (Dewey 1989).

²⁷ Leslie owned as much as 47,000 acres of marshland, but some portions could not be used for salt production, including fringes of remnant marshes along the bay front, and some small isolated tracts.

²⁸ Note that a fifth plant was built near Napa in the early 1950s, but unclear whether it ever went into production.

3.10 The Cycle Completes: The Move from Salt Production Toward Marshland Restoration

In the late 1950s and early '60s, Leslie Salt Company and the Schilling estate sold parcels of land that were then used to create Foster City entirely out of landfill (ironically, the fill material was dredged from the San Bruno Shoal, which DL&IC had worked so long to have removed). At the time, Leslie Salt was the single largest owner of undeveloped bay edge land other than the military, controlling 47,000 acres. After Foster City was completed, Leslie Salt continued making land deals, providing the property upon which the residential development Redwood Shores (and later Marine World) was built. August Schilling's original vision of a heavily industrialized landscape had failed to come to fruition, but it appears that Leslie Salt was still interested in developing some of their holdings into a new "highest and best use," residential properties.

However, during the 1960s the political winds changed, and with them came an increased focus on protecting and restoring the Bay. This in part was triggered by a U.S. Department of Commerce report published in the late 1950s, based on studies done by the Army Corps of Engineers, called the "2020 Plan," which advocated extensive filling of the bay to provide more land for development; the bay would have been "reduced to mere rivers flowing from the Sacramento-San Joaquin Delta and from Alviso at the southern end of the bay to the Golden Gate through miles of man-made, urbanized flatlands" (Scott 1985:315). Many citizens reacted to this plan by organizing the Save the San Francisco Bay Association to advocate for greater protection of the bay, as well as increased public access to it.²⁹

Resulting directly from these efforts, the San Francisco Bay Conservation and Development Commission (BCDC) was established in 1965, and made a permanent entity in 1968. The BCDC, among other actions, wrote rules prohibiting big bay-fill projects like Foster City and Redwood Shores. Soon after, in 1972, the Don Edwards San Francisco Bay National Wildlife Refuge was established on roughly 20,000 acres of former Leslie-owned land, although Leslie retained the mineral rights to produce salt from many of the ponds (see Figure 12).³⁰ It became increasingly clear that big bay-front real-estate developments were not going to be a thing of the future; it does not appear to be a coincidence that Leslie Salt Company, run by Schilling's heirs, decided to get out of the salt business soon after, even though the company's ability to produce salt had not been affected. Leslie sold its interests to Cargill in 1978, at which time its annual salt production was roughly a million tons.

Cargill continued production utilizing Leslie's pond system at roughly the same production levels for the next two decades. Initially, USFWS acquired title to some of the ponds, but not the salt production rights. This was followed in 2003 by the State of California's purchase of the project area lands for ecological restoration. The salt production rights were obtained as part of the 2003 acquisition. The development of the bay's marshlands toward a highest and best use, starting with reclamation for agriculture and salt

²⁹ In 1963, of the 276 miles of shoreline around the bay, only four miles were actually open to the public. Scott 1963:68-70.

³⁰ Leslie Salt was not supportive of the formation of either the BCDC or the Refuge; company President Coleman C. Johnson spoke out publicly against both, suggesting that establishment of the Refuge would force them out of business entirely. Booker 2005, Chapter 4.

production, has seemingly come full circle; now bay marshlands are increasingly valued for their ecological role in the life of the Bay, as well as for recreation use and open space, and the lands once envisioned as the largest industrial development on the Pacific coast will now be returning to a more natural state.

3.11 Summary of Salt Industry Development in the Mt. Eden Unit

The Bay Area's salt industry began its earliest development in the Mt. Eden unit, starting with John Johnson's levees in 1853. John Sandoval (1988) provides a thorough local history of many of the families in the early days of the Mt. Eden community. According to Ver Planck, roughly 28 different salt works were located within this unit from 1850-1910 (see Figure 6 for map). Due to the relatively large number of small operations, the area was broken up into a cluster of small ponds by levees (see Figure 3 for the levee contours as of 1907). The period from 1910 through the late 1920s represents a major consolidation of the industry down to only four or five operators; this was further reduced in the 1930s and '40s as Leslie became the only major operator. See Figures 13-16 for changes in salt producers in the Mt Eden unit (figures adapted from Lopez report, File SFB 4.7/1 1973).

3.12 Summary of Salt Industry Development in the Alviso Unit

The SPCRR line was built through the Alviso unit in the late 1870s, triggering the development of the town of Drawbridge. Numerous early attempts to reclaim lands in the Alviso unit between the 1890s and 1910s, including the efforts documented here by DL&IC in 1907-09, apparently failed. There is no indication that any of the levees or other landscape manipulations from these efforts remain, as they most likely washed away and reverted to natural marsh. All evidence points to the area being used primarily for duck hunting, fishing, and boating until the 1920s. There were only two salt companies operating in the Alviso unit: the Alviso Salt Company (associated with Continental Salt and Chemical Company), which operated on the land between Alviso and Mayfield Slough, and Schilling's Arden Salt Company, operating on DL&IC lands from Alviso east and north up toward Dumbarton point. Both companies appear to have built levees, developed salt ponds, and harvested salt from these lands during the 1920s; by 1929, many of the levees we still see in the Alviso unit today were most likely constructed. Arden acquired Alviso Salt in that same year, including its plant near the town of Alviso, which had only been used for one year. Leslie Salt became the sole operator in the unit after 1936, until Cargill's acquisition in 1978. See Figures 17-20 for changes in salt producers in the Alviso unit (figures adapted from Lopez report, File SFB 4.7/1 1973).

3.13 Summary of Salt Industry Development in the West Bay Unit

There were no early salt operators within the APE boundary of the West Bay unit; the only west bay producers—Greco Salt Co, Redwood City Salt Co., later consolidated by Stauffer Chemical Company, and the early Leslie Salt Refining Co.—all were located north and west of the boundary. Most of the land within the boundary was likely acquired from Morgan Oyster Co., but the corporate relationships are

unclear.³¹ Leslie Salt developed lands within the unit boundary into salt evaporation ponds during the 1940s, feeding into salt production at the nearby Redwood City crude salt plant. See Figures 21-24 for changes in salt producers in the West Bay unit (figures adapted from Lopez report, File SFB 4.7/1 1973).

³¹ File SFB 4.19/2 contains an unsigned agreement, dated June 24, 1916, proposing to merge the Redwood City Harbor Company (Schilling and de Guigne were both on the Board of Directors, along with the company's president George Merrill), Morgan Oyster Company, and Leslie Salt Company, and includes a map showing Morgan's lands around Redwood City; but Postel 1988 says Morgan sold to Pacific-Portland Cement in 1923. The Redwood City Harbor Company had built levees around all of their property by July 1929; the company was dissolved in July 1945 and all its assets transferred to Leslie Salt, which was the sole stockholder. File SFB 4.23.

4. HISTORIC PROPERTY TYPES

This historic context study has only included a very limited amount of on-the-ground reconnaissance, and hence has little new information about specific property types within the project area. Greater detail will require further reconnaissance and/or survey work. For existing information on archeological resources within the project area, please see Jones and Stokes 2001 and the South Bay Salt Ponds Initial Stewardship Plan, Draft EIR/EIS, 2003. Discussion here of property types is in very general terms.

4.1 Pre-1900

The early salt production process was very similar to today's, with bay water allowed to evaporate in concentrating ponds, formed by a series of dikes and levees, and eventually moved to smaller shallower crystallizing ponds, increasing salinity along the way (Figure 25). The Bay Area's relatively warm summers with almost no rain created perfect conditions for this process. Levees were most often built along the edges of existing sloughs and creeks, so their shapes trace the contours of the former natural landscape. Floodgates controlled the movement of water between ponds (Figure 26). The ponds take on distinctive hues as various species of algae and bacteria predominate in different salinity levels, producing bright greens and pinks in the water (Figure 27).³² Once ready for harvest, a crystallizer pond would be drained to remove the remaining liquid (Figure 28), called bittern, and the resulting salt was raked up and moved to dry ground where it could dry in large piles (Figure 29). Weathering through one winter rainy season hardened and whitened the salt, with rain washing away any remaining bittern. The final product was ground, sacked, and shipped.

Distinctive physical elements of the early salt production landscape, in addition to the levees and ponds themselves, include Archimedes screws or wind-powered water pumps (Figure 30). Originally designed by local saltmaker Andrew Oliver in the 1870s and based on a principle traced back to Archimedes in ancient Greece, the pumps were installed on a levee between two salt ponds; wind would turn the pump's blades, which were connected to a helix-shaped screw inside a wooden cylinder, raising the salt water up and over the levee and into the new pond (Leslie Salt Co. 1984) (Figure 31). Other elements of the salt

³² The "purple bacterium" that causes of the deep colors in the truly high-salt ponds is *Halobacterium halobium*. At low salinity and high oxygen tensions it functions as a "normal" heterotrophic prokaryote, and maintains pretty low population densities. When it gets into these high salinities, which few other microorganisms of any kind can tolerate, it develops huge populations which pretty well exhaust oxygen in the water even a few mm below the surface. Then it expresses the intense color, which is a very simple carotenoid-based alternative photosynthetic system, probably in fact ancestral to the biochemistry that is in common among all animal vision. Curiously, the functioning of that system is entirely dependent on the huge cellular blooms because it works by establishing a high proton concentration outside the cells, which is then used to drive ATP synthesis when the protons come back across the membrane. If the cells were more dilute, the protons would simply diffuse away and the system wouldn't work. W. Watt 2005.

industry include landings along the east bay shoreline for loading schooners with the harvested salt, with wooden piers and pilings, as well as refinery buildings and saltmakers' homesteads (Figure 32).

4.2 1900-1950

The property types associated with this time period are likely very similar to those from the earlier salt industry, as the technology did not undergo substantial changes. These would include levees, ponds, floodgates, and various industrial buildings and structures. Development and expansion of the electrical grid in the Bay Area brought electric towers and access boardwalks into the salt ponds (Figure 33). Comparing maps from 1907 and 1953 (Figure 11), it appears that Leslie may have removed some levees to consolidate small ponds into larger ones—but the general contours of the levees and other land forms seems to be remarkable consistent over the area's history.

The remains of two salt works in the Mt. Eden unit, Oliver Salt Company and Union City Salt Works, are still visible as extensive historic sites today. Property types at these sites include: wood pilings (Figures 34 and 35), electric poles and remnant Archimedes screws (Figure 36), remains of rail tracks (Figure 37), rusted metal tanks (Figure 38), shacks and hunting blinds (Figure 39), and the levees themselves (Figure 40).

4.3 Post-1950 Development

It is beyond the scope of this research to determine which property types may have been added to the system post-1950. Levees have been maintained, and perhaps some equipment has been upgraded, but it does not appear that large-scale changes have been made to the salt ponds configuration or infrastructure. Further surveys and consultation with Cargill regarding their maintenance practices would be needed to determine any specific property types from this era.

5. SECTION 106 PROCESS

Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and provide the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on federal projects prior to implementation. The regulations implementing Section 106 are promulgated by the Secretary of the Interior, as codified in Title 36 of the Code of Federal Regulations (CFR) Part 800 (as amended).

Federal agencies are responsible for initiating Section 106 consultation with tribal organizations and other interested individuals or parties. The State Historic Preservation Officer (SHPO) coordinates the state's historic preservation program and consults with agencies during Section 106 review.

To successfully complete the Section 106 process, federal agencies must:

- determine if Section 106 of NHPA applies to a given project and, if so, initiate the review;
- gather information to decide which properties in the project area are listed in the National Register of Historic Places, or may be eligible for listing;
- determine how historic properties might be affected;
- explore alternatives to avoid or reduce harm to historic properties; and
- reach agreement with SHPO, Indian tribes, and other stakeholders (and possibly the ACHP) on measures to deal with any adverse effects.

In order to be considered during Section 106 review, a property must either be already listed in the National Register of Historic Places or be eligible for listing. A property is considered eligible when it meets specific criteria established by the National Park Service. During the Section 106 process, the federal agency evaluates properties against those criteria and seeks the consensus of SHPO, Indian tribes, and other interested parties regarding eligibility. Cultural resources are typically considered eligible for inclusion in the National Register of Historic Places due to links with important persons, places or events in the past, as examples of artistic achievement, or because of the information they contain or may be likely to yield. Intensity of impacts to cultural resources is determined based on the importance of the information or associations the resources contain and their integrity.

When historic properties will be adversely affected by a federal action, the Section 106 process usually concludes with a legally binding agreement between the federal agency, SHPO, and consulting parties that establishes how the federal agency will mitigate for adverse effects.

5.1 Approach to Section 106 Process for the SBSP Restoration Project

Section 106 consultation for the SBSP Restoration Project was initiated on July 16, 2004, when USFWS, the joint-lead agency for the project under NEPA, sent a letter to SHPO requesting consultation as well as SHPO's comments on the Area of Potential Effects (APE) boundaries and the proposed approach for

consultation (Kolar 2004). The letter included maps identifying three separate APE boundaries, one for each of the three pond complexes within the SBSP Restoration Project area. USFWS also stated that it will accept the records search results completed by Jones and Stokes and reported in their *Cultural Resources Inventory Report for the Habitat Mitigation Planning Sites, San Francisco International Airport Proposed Runway Reconfiguration Program* (2001). This report provides background research on the entire SBSP Restoration Project area.

SHPO responded in a letter dated November 19, 2004, and confirmed that the proposed APE boundaries delineated by USFWS are adequate and meet the definition set forth in 36 CFR 800.16(d) (Donaldson 2004).

The SBSP Restoration Project is currently being integrated with the U.S. Army Corps of Engineers' (Corps) South San Francisco Bay Shoreline Study. The Shoreline Study covers a larger geographic area that includes the SBSP Restoration Project area, plus additional lands between the Eden Landing and Alviso pond complexes along the east side of the Bay, and lands between Redwood Creek and the west end of the Alviso pond complex along the west side of the Bay. Consequently, the approved APE maps cover a portion of the overall project area. Additional APE maps will be developed for the remainder of the project area and will be submitted to SHPO for approval. As joint-lead federal agencies for the integrated SBSP Restoration Project/South San Francisco Bay Shoreline Study, both USFWS and the Corps will consult with SHPO to complete Section 106 requirements.

5.1.1 Identification of Historic Properties

Based on the historic context and property type discussion presented in Sections 3 and 4, USFWS, the Corps and EDAW will develop an evaluation framework for identifying prehistoric and historic properties within the APE. The evaluation framework will be forwarded to SHPO for review. SHPO will provide comments on the adequacy of both the historic context and the evaluation framework for identifying historic properties.

5.1.2 Programmatic Agreement

USFWS proposes to consider many of the salt pond restoration activities under the 1997 Programmatic Agreement (PA) between the California SHPO and USFWS. Activities that do not meet the requirements of the PA will proceed through the standard Section 106 process as defined by 36 CFR 800. According to the terms of the PA, the following small projects are considered to have low potential to affect historic properties:

- revegetation;
- removal of plants using hand tools;
- routine maintenance of existing wetlands or ponds following previous routine practices;
- installing, replacing, maintaining, or enhancing bridges, fish screens, culverts, pumps, and other water control structures in existing non-native road surfaces, dikes, levees, or ditches where the structure itself is not a historic property or more than 50 years old;

- conducting data collection or installing monitoring equipment; and
- restoring stream channels within the active stream channel.

These small projects will be reviewed by USFWS cultural resources staff and summarized in an annual report to SHPO.

The PA also identifies projects that will require an archaeologist to conduct an on-the-ground inspection prior to proceeding with the activity. These projects include:

- Wetland restoration through excavation or change in water management, or removing or constructing water impoundment structures;
- Restoration of stream channels with heavy equipment; and
- Excavation for installing or removing dikes, levees, or pipes.

USFWS staff will document the inspections for these projects and submit them to SHPO in an annual report.

5.1.3 Section 106 Consultation

USFWS and the Corps, with assistance from EDAW, will consult with SHPO, Indian tribes, and other consulting parties (e.g., the Native American Heritage Commission, local governments and local historical preservation groups) throughout the Section 106 process. A preliminary list of consulting parties is presented in Tables 1 through 4. This consultation is intended to solicit input on potential concerns or interests in the project, and to seek consensus on how effects on historic properties should be addressed, in accordance with guidance provided by the ACHP for the implementation of Section 106.

USFWS, the Corps and EDAW will work with representatives from the various interested agencies and organizations to conduct a public outreach effort as part of the NEPA process. Public involvement will occur through public meetings and workshops, the SBSP Restoration Project website (www.southbayrestoration.org), the project newsletter, press releases and presentations, to ensure that the public stays informed about the project status and is involved in the planning process.

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7. LIST OF PREPARERS

The following Team members assisted in preparation of this document:

Laura A. Watt, EDAW

With:

Ellen Joslin-Johnck, EDAW Intern

David Blau, EDAW

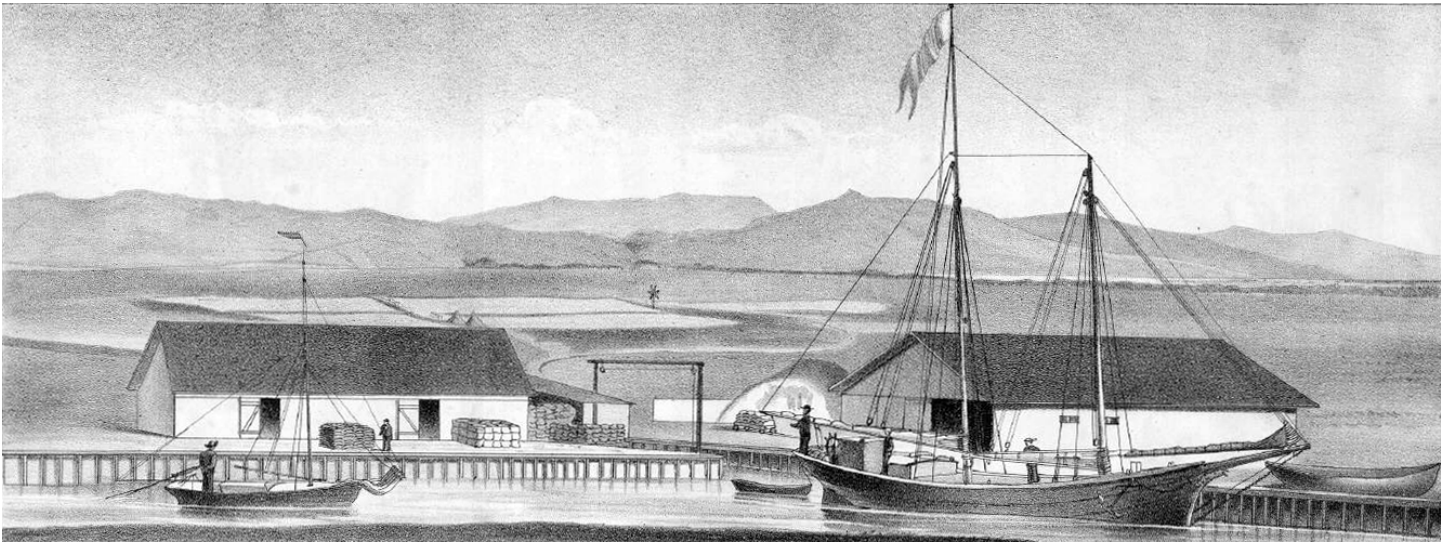
Marie Galvin, EDAW

Charlane Gross, EDAW

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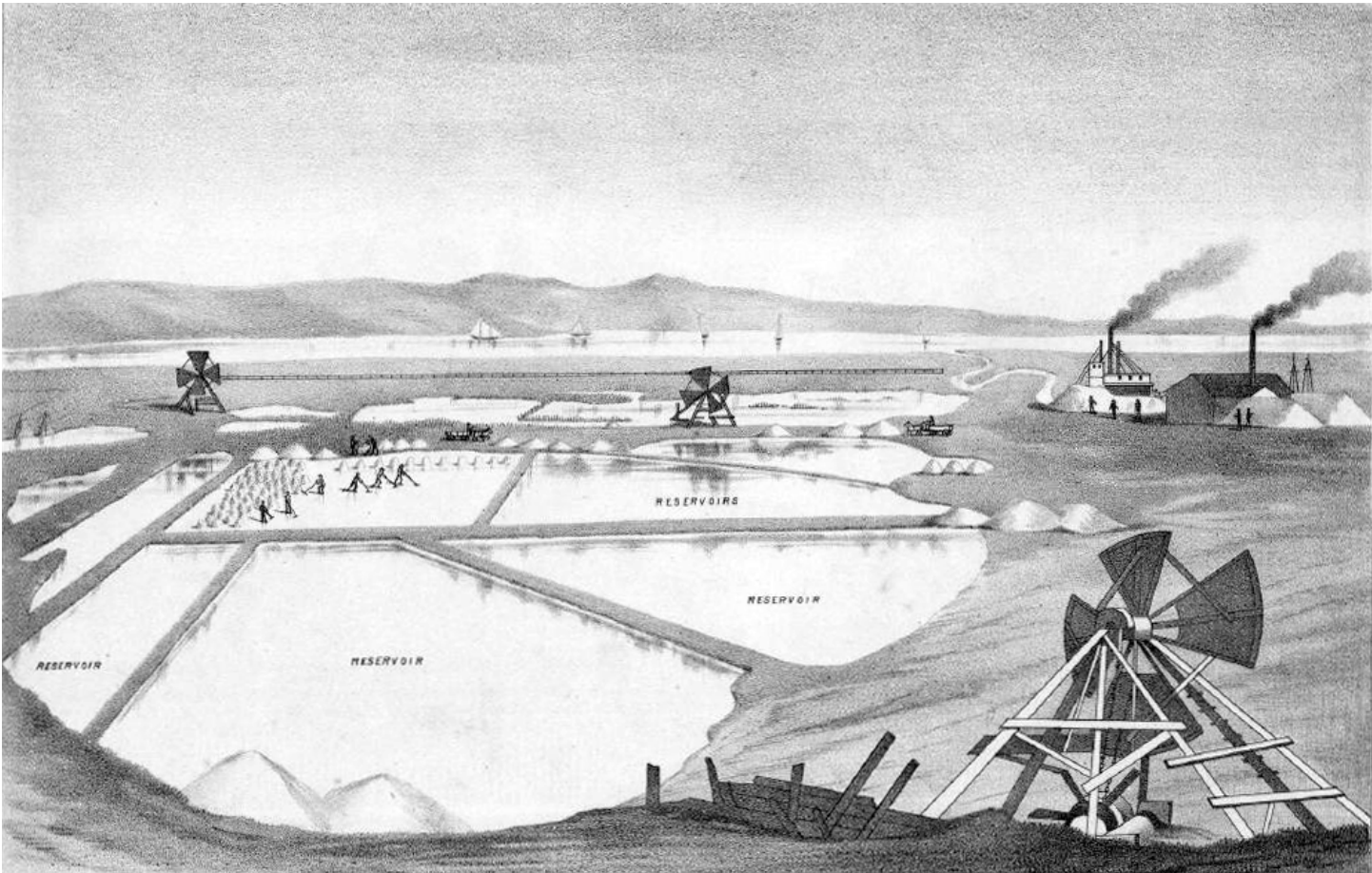
Source files for this report are located at EDAW:

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Source: Thompson & West Atlas of Alameda County, 1878

Figure 1: Johnson's Landing



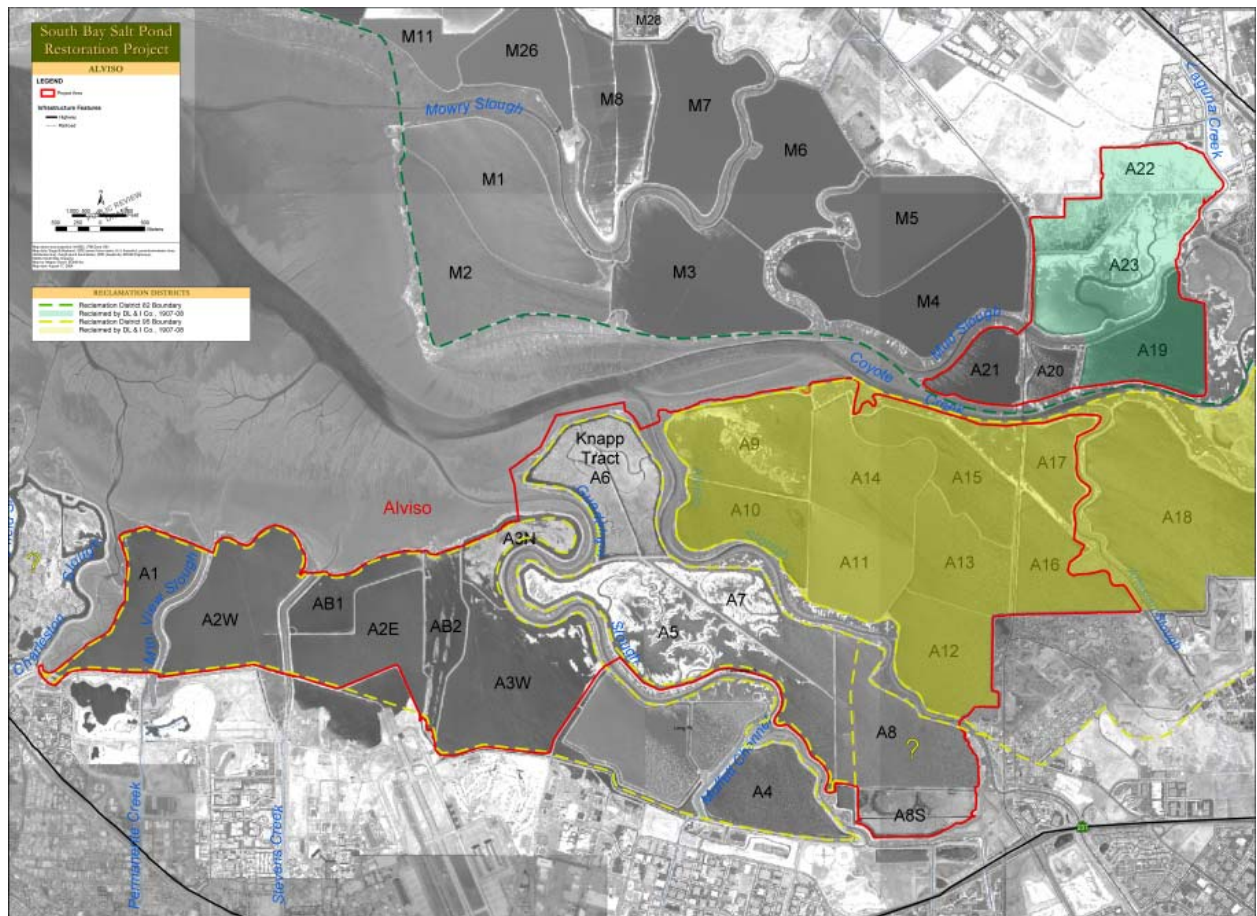
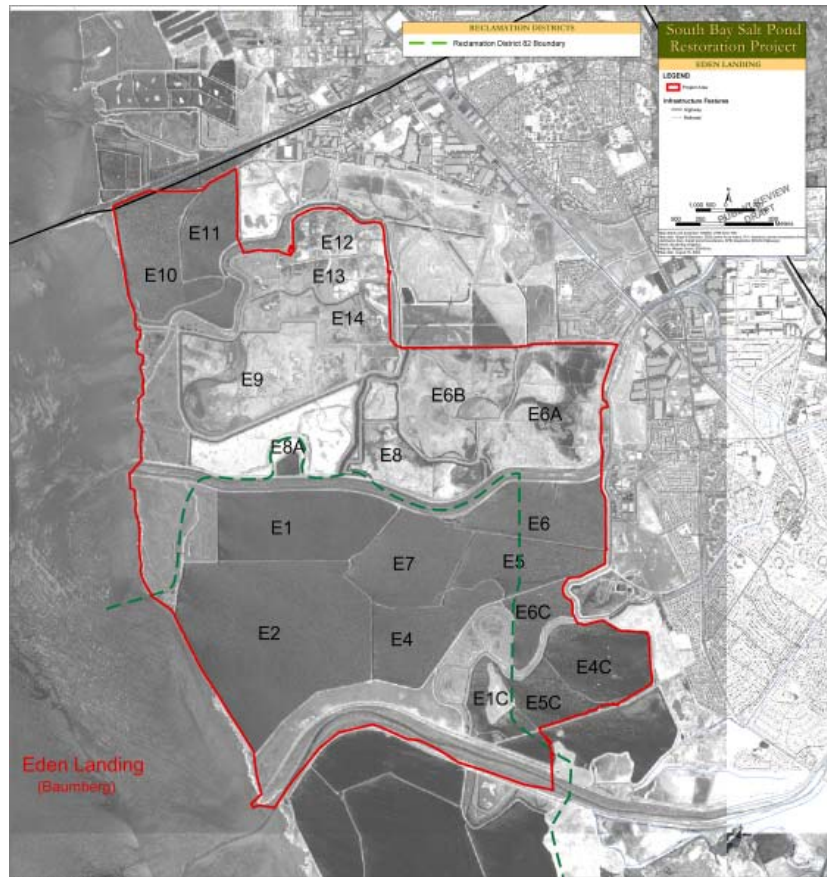
Source: Thompson & West Atlas of Alameda County, 1878

Figure 2: Alvarado Salt Works



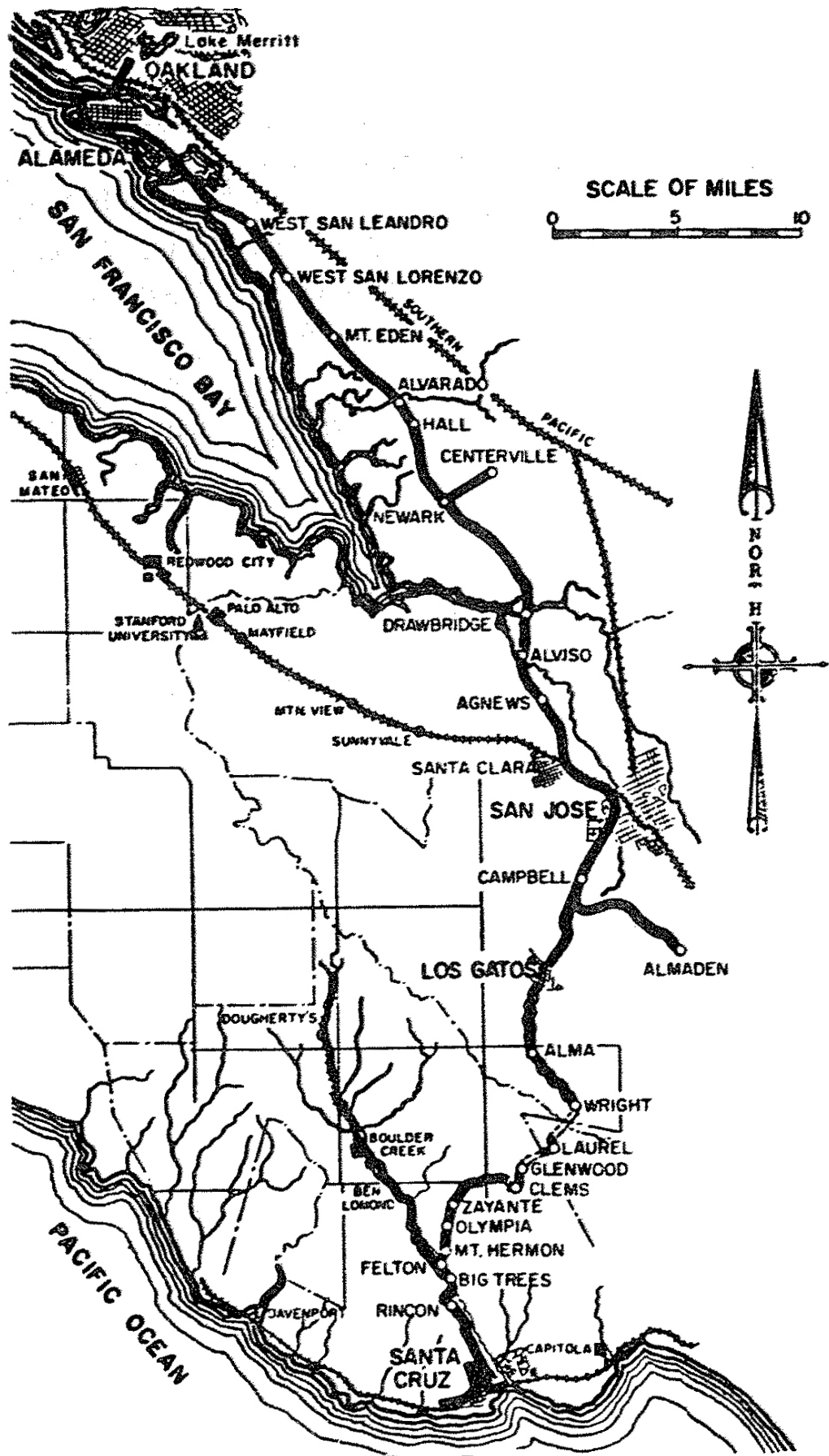
Source: U.S. Coast and Geodetic Society, 1907

Figure 3: San Francisco Bay



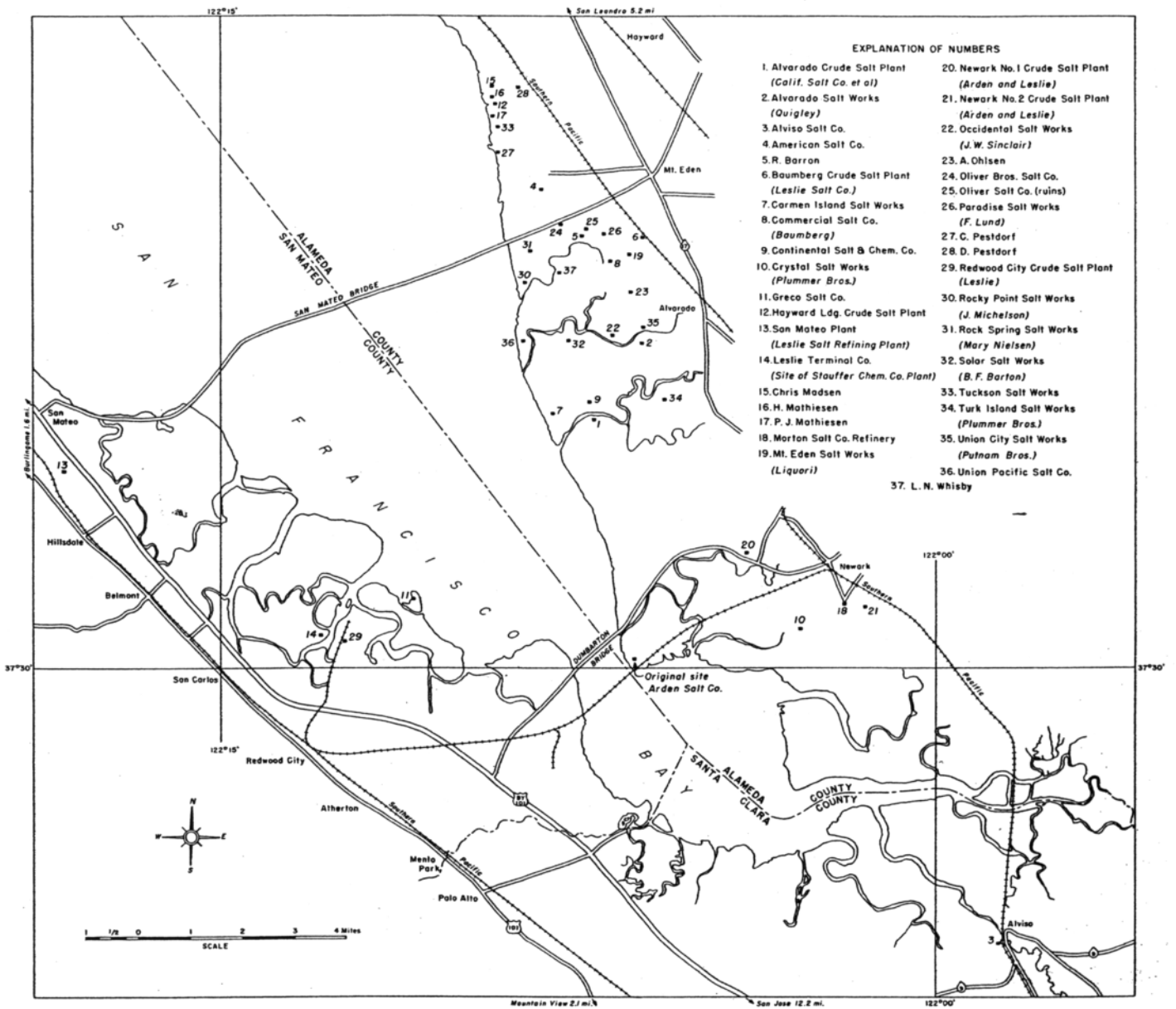
Source: Claire Lopez report, 1971

Figure 4: Reclamation Districts



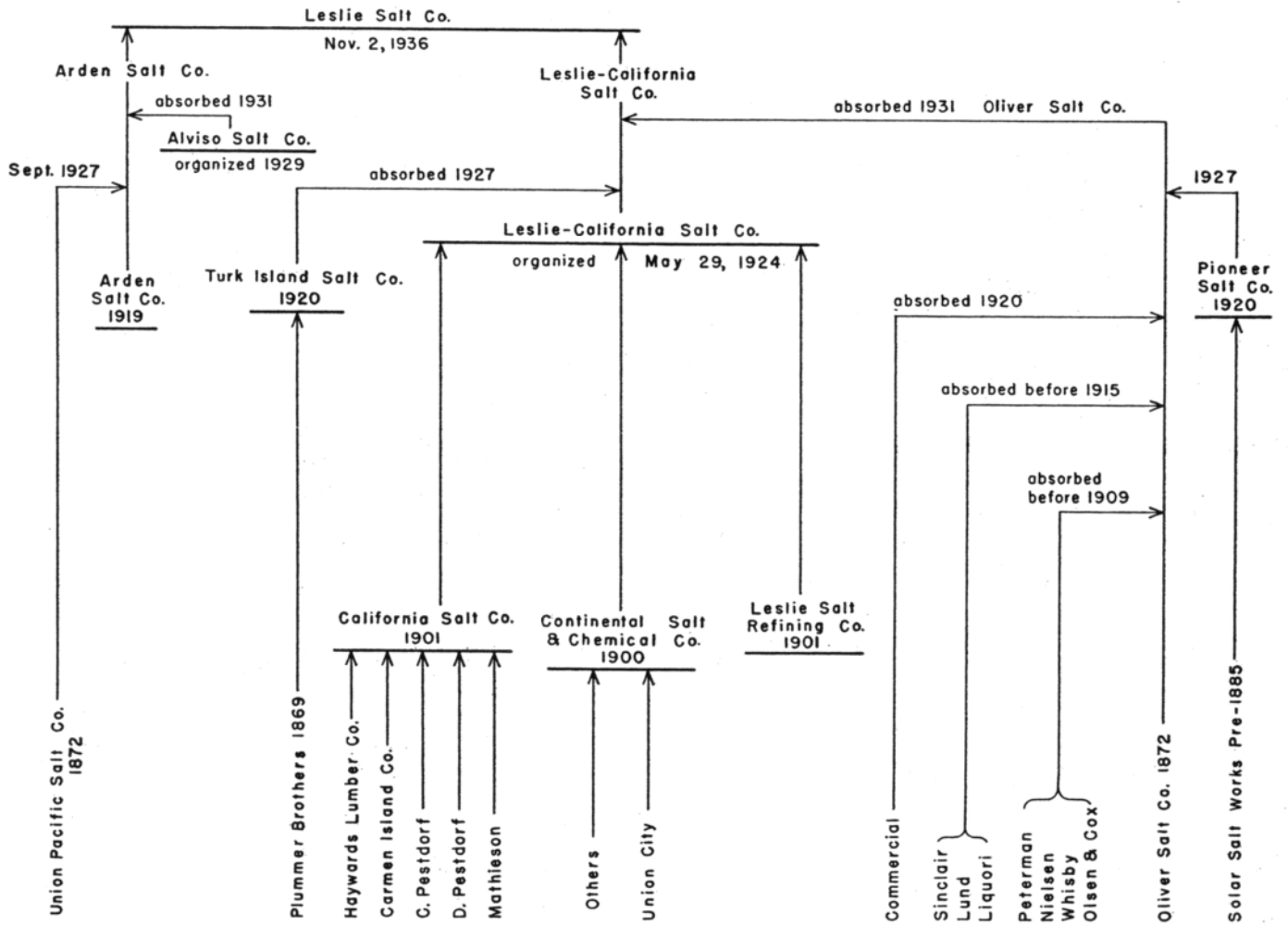
Source: McGregor, 1968

Figure 5: South Pacific Coast Railroad, 1886



Source: Ver Plank, 1958

Figure 6: Map of San Francisco Bay Showing Locations of Salt Works



Source: Ver Plank, 1958

Figure 7: Consolidation of San Francisco Bay Salt Industry

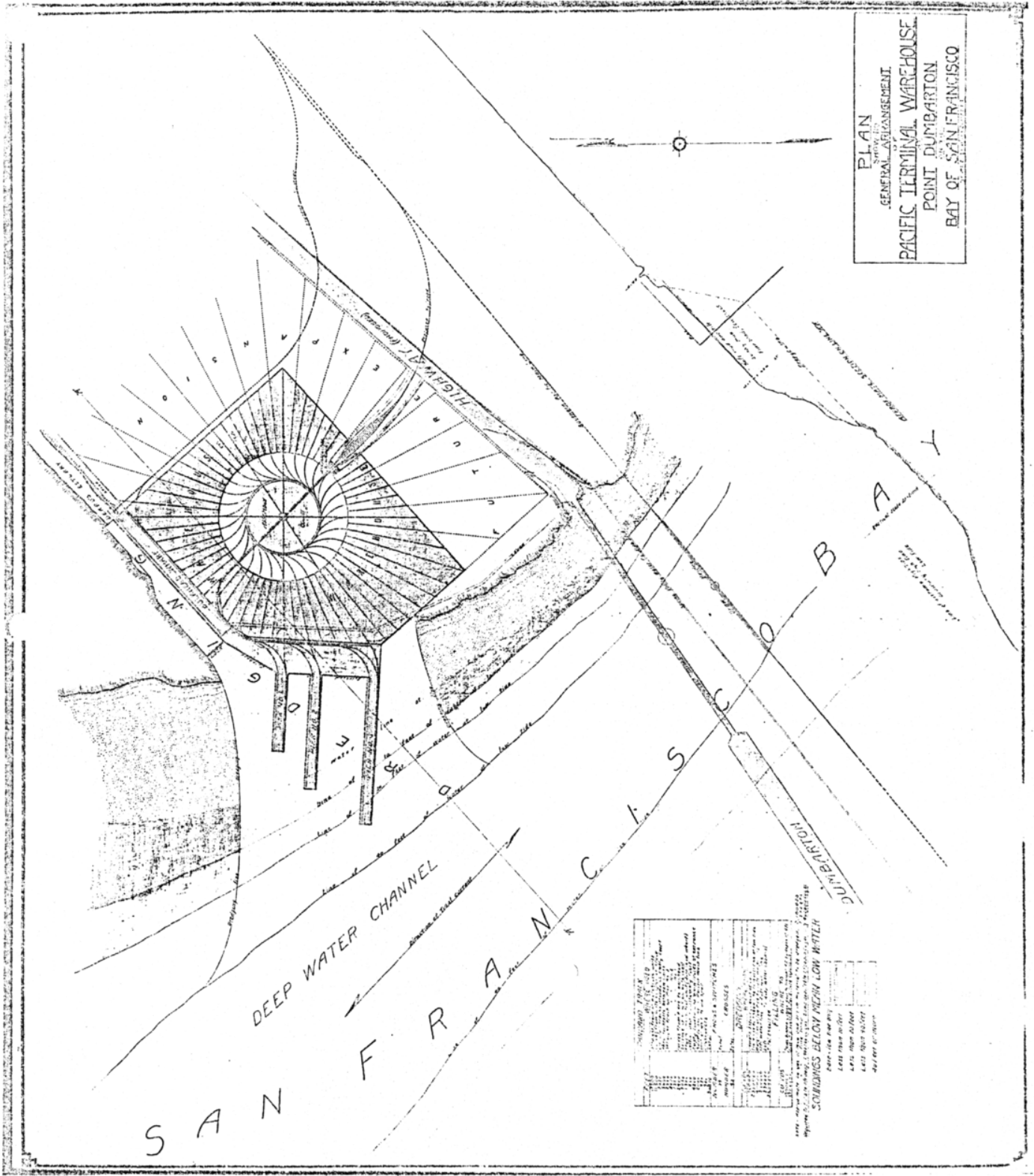


Figure 8: Plan of Pacific Terminal Warehouse

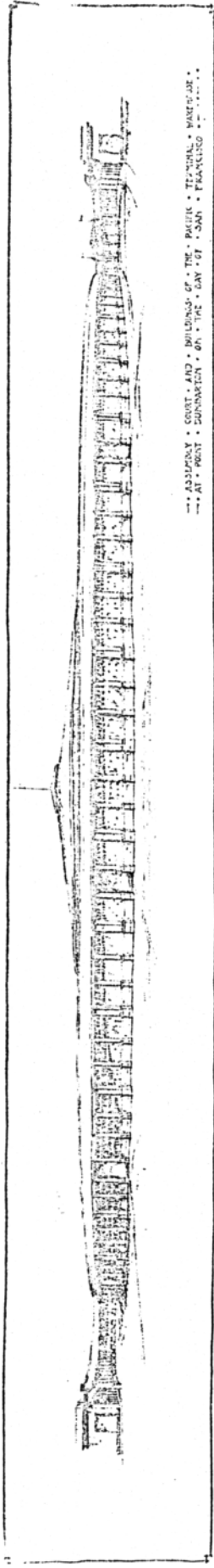
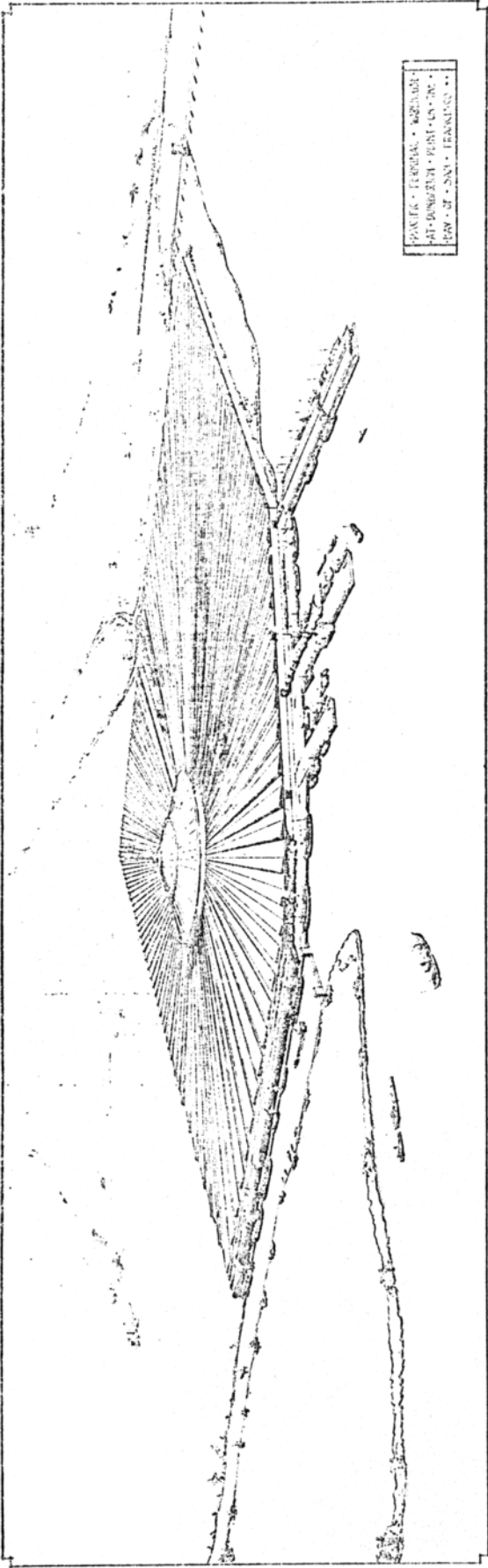


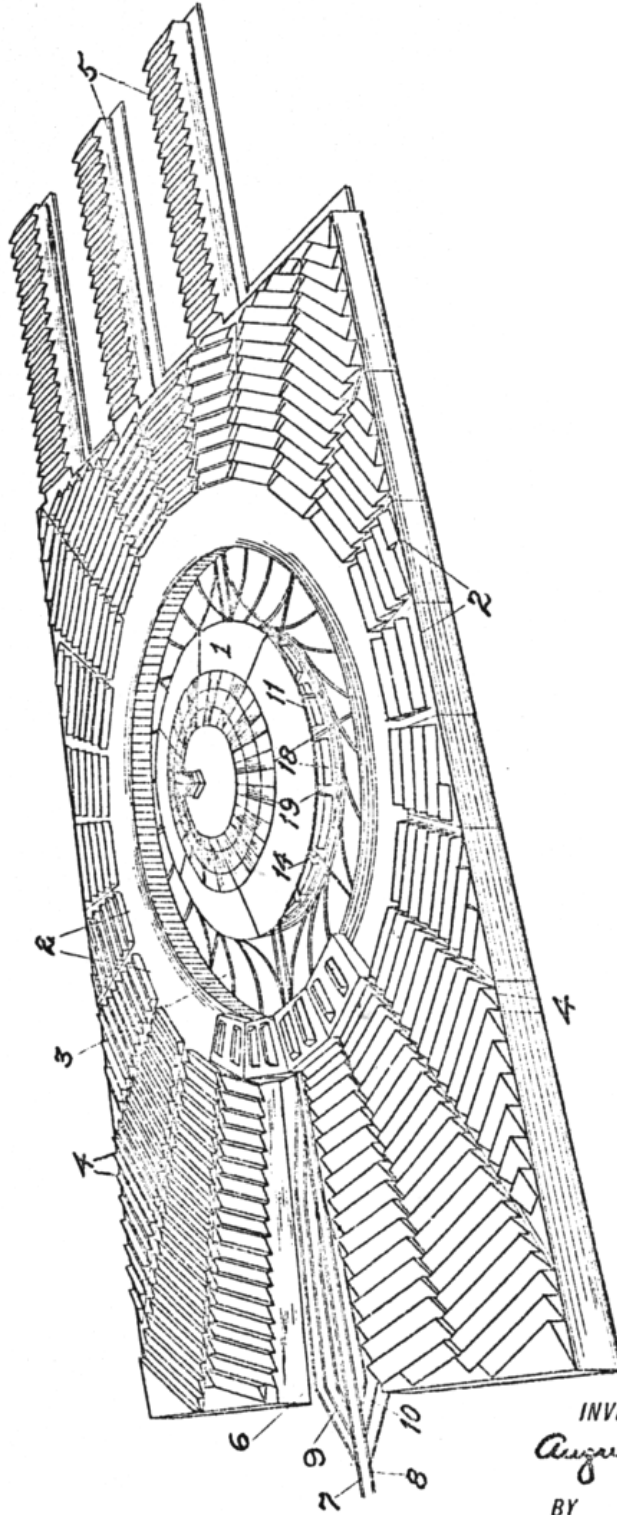
Figure 9: Perspectives of Pacific Terminal Warehouse

A. SCHILLING.
TERMINAL WAREHOUSE.
APPLICATION FILED AUG. 21, 1916.

1,207,226.

Patented Dec. 5, 1916.
6 SHEETS—SHEET 1.

FIG. 1.



WITNESS

Wm. F. Drew

INVENTOR

August Schilling








BY

Arthur J. Tamm
his ATTORNEYS

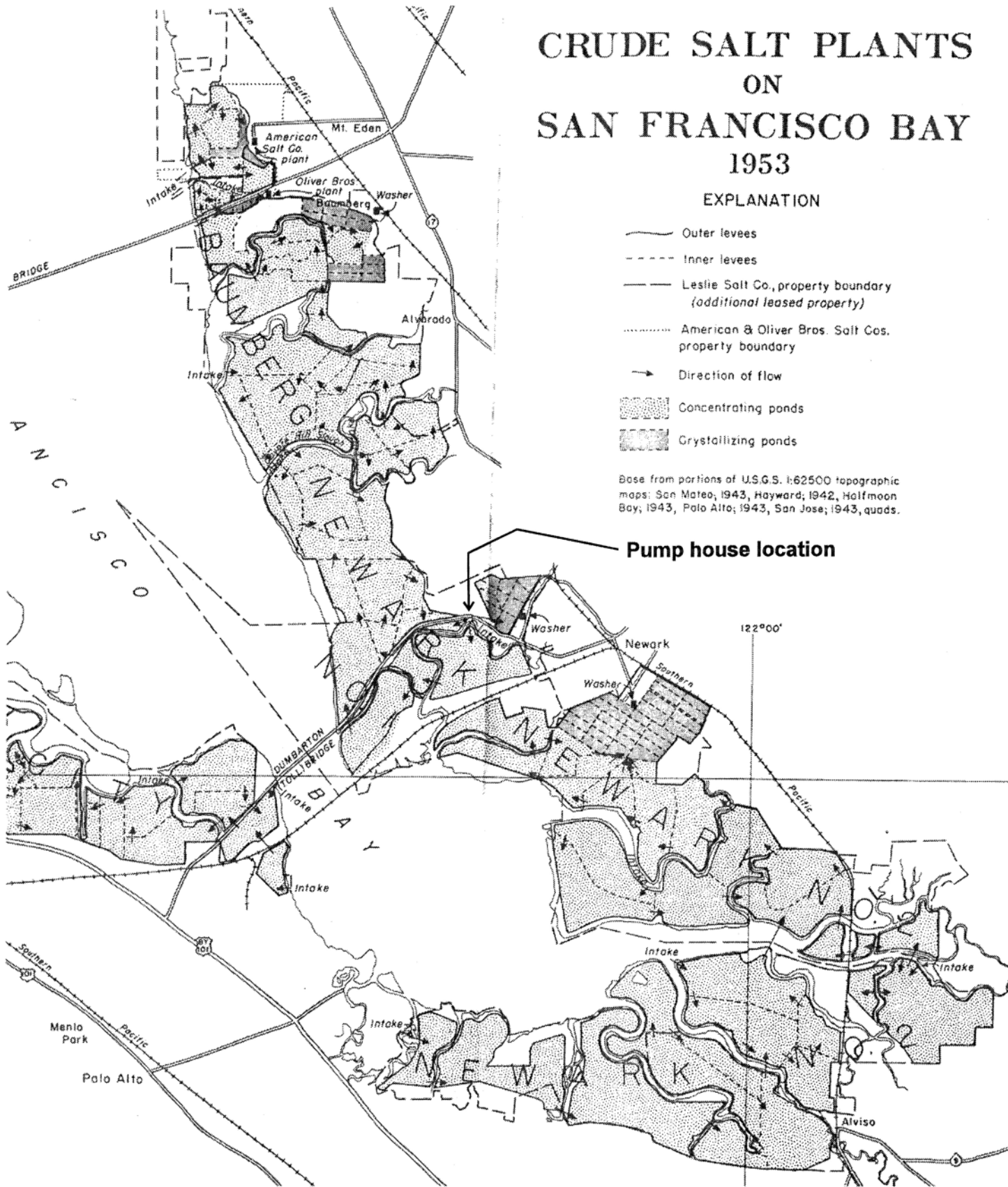
Figure 10: Perspective of Pacific Terminal Warehouse

CRUDE SALT PLANTS ON SAN FRANCISCO BAY 1953

EXPLANATION

-  Outer levees
-  Inner levees
-  Leslie Salt Co., property boundary
(additional leased property)
-  American & Oliver Bros. Salt Cos.
property boundary
-  Direction of flow
-  Concentrating ponds
-  Crystallizing ponds

Base from portions of U.S.G.S. 1:62500 topographic maps: San Mateo; 1943, Hayward; 1942, Halfmoon Bay; 1943, Palo Alto; 1943, San Jose; 1943, quads.



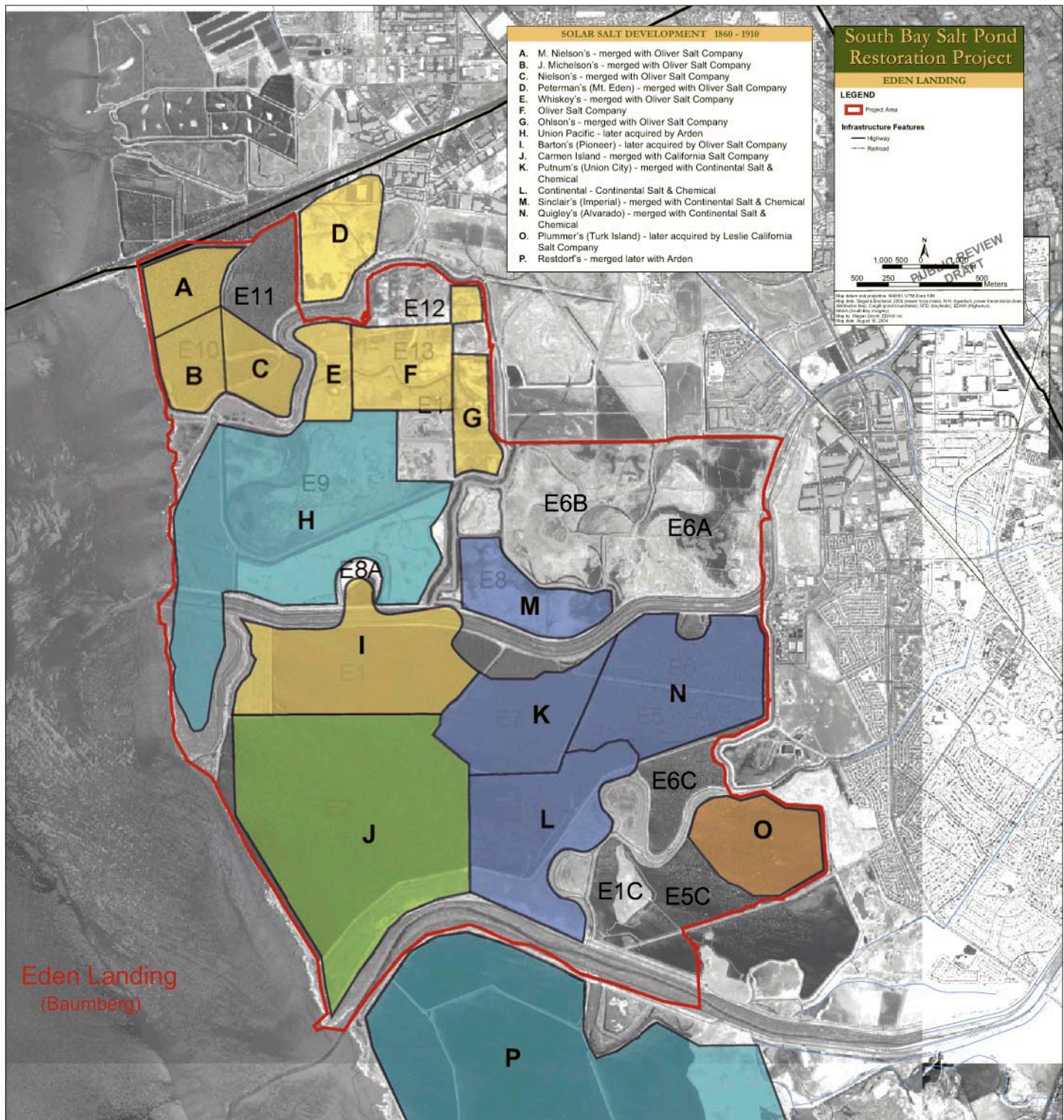
Source: Leslie Salt Company, 1953

Figure 11: Leslie Salt Company's Salt Operations



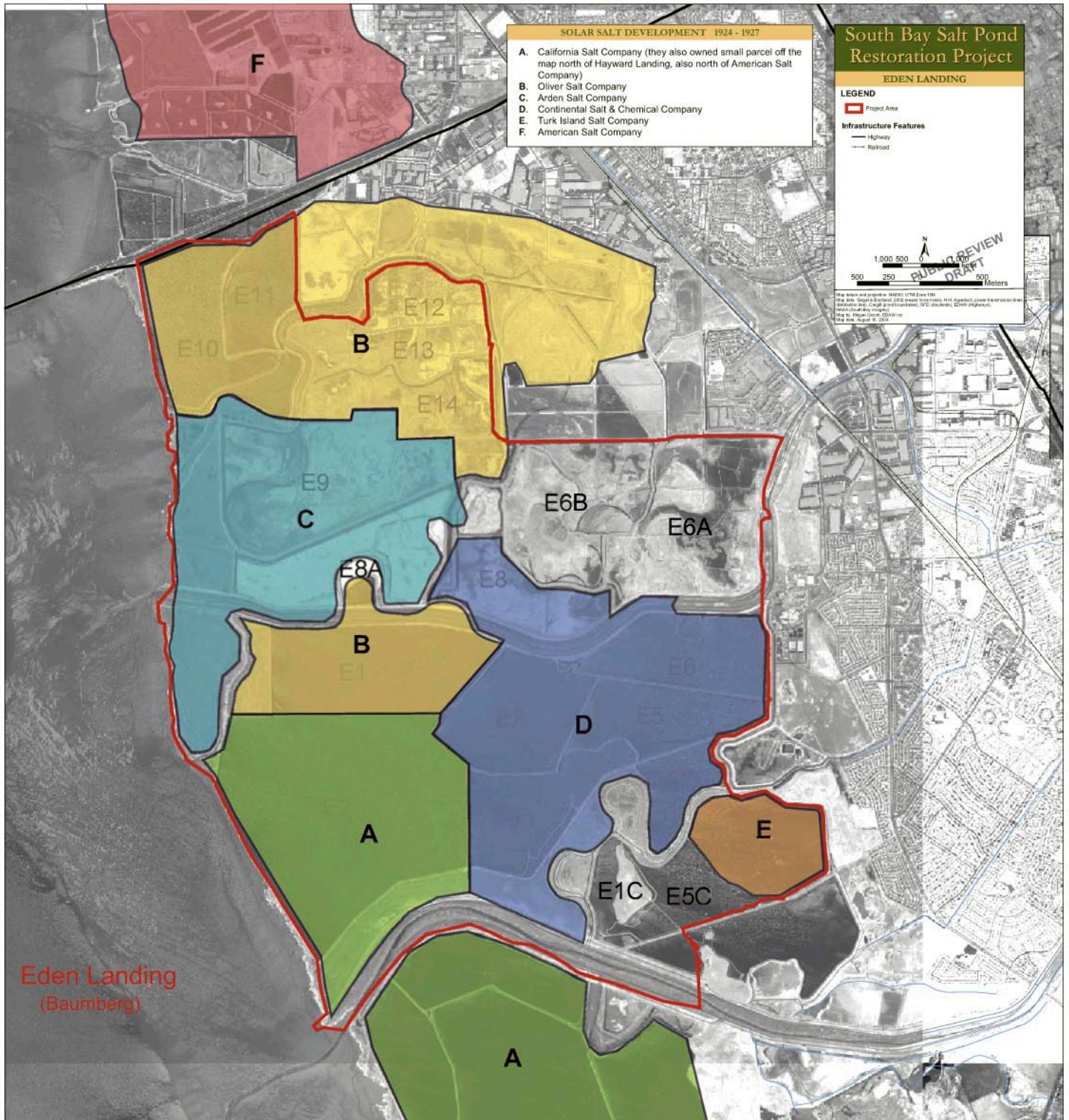
Photo: L. Watt, December 2004

Figure 12: Don Edwards San Francisco Bay
Wildlife Refuge



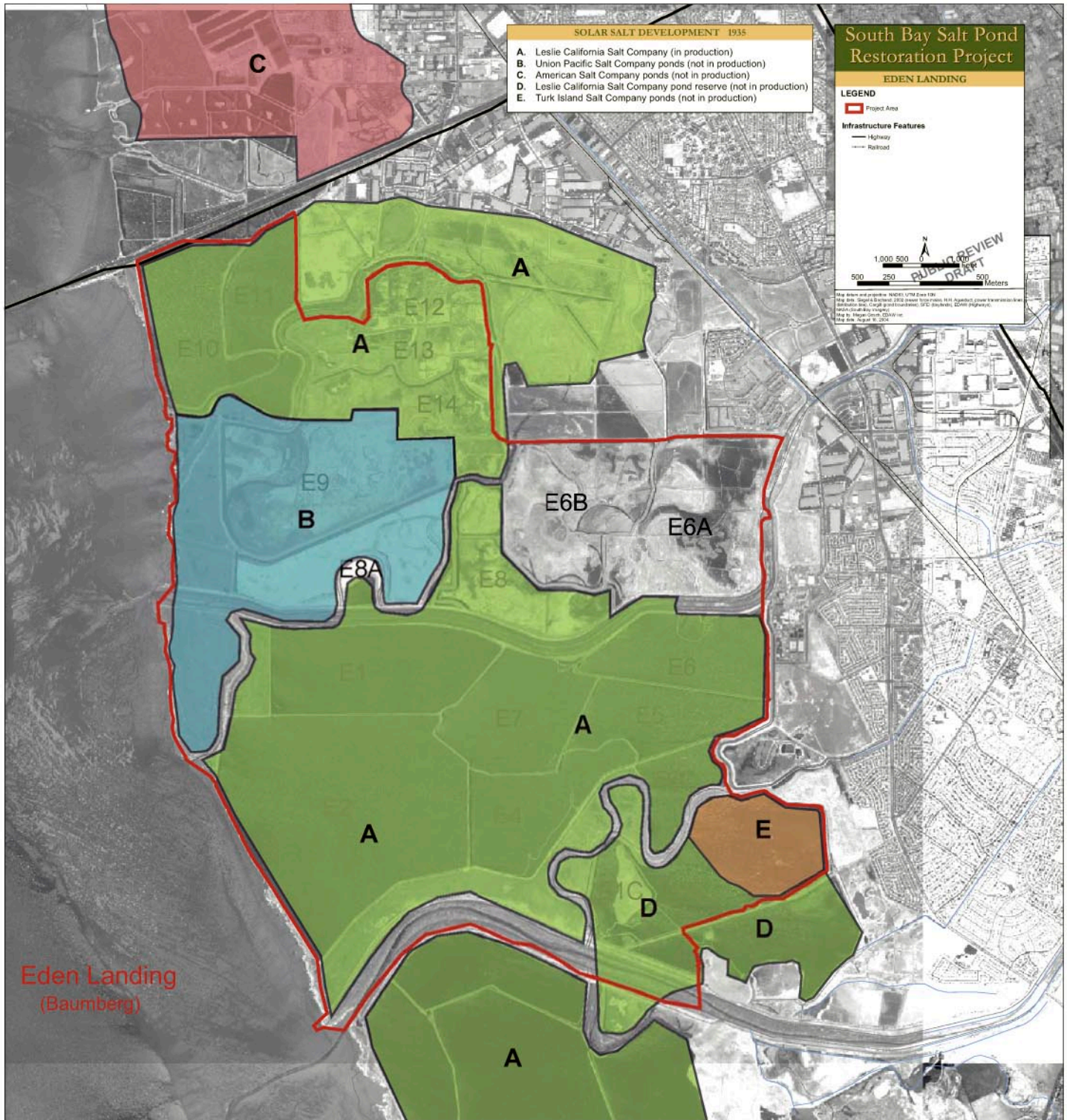
Source: Claire Lopez report, 1971

Figure 13: Solar Salt Development Eden Landing, 1860 - 1910



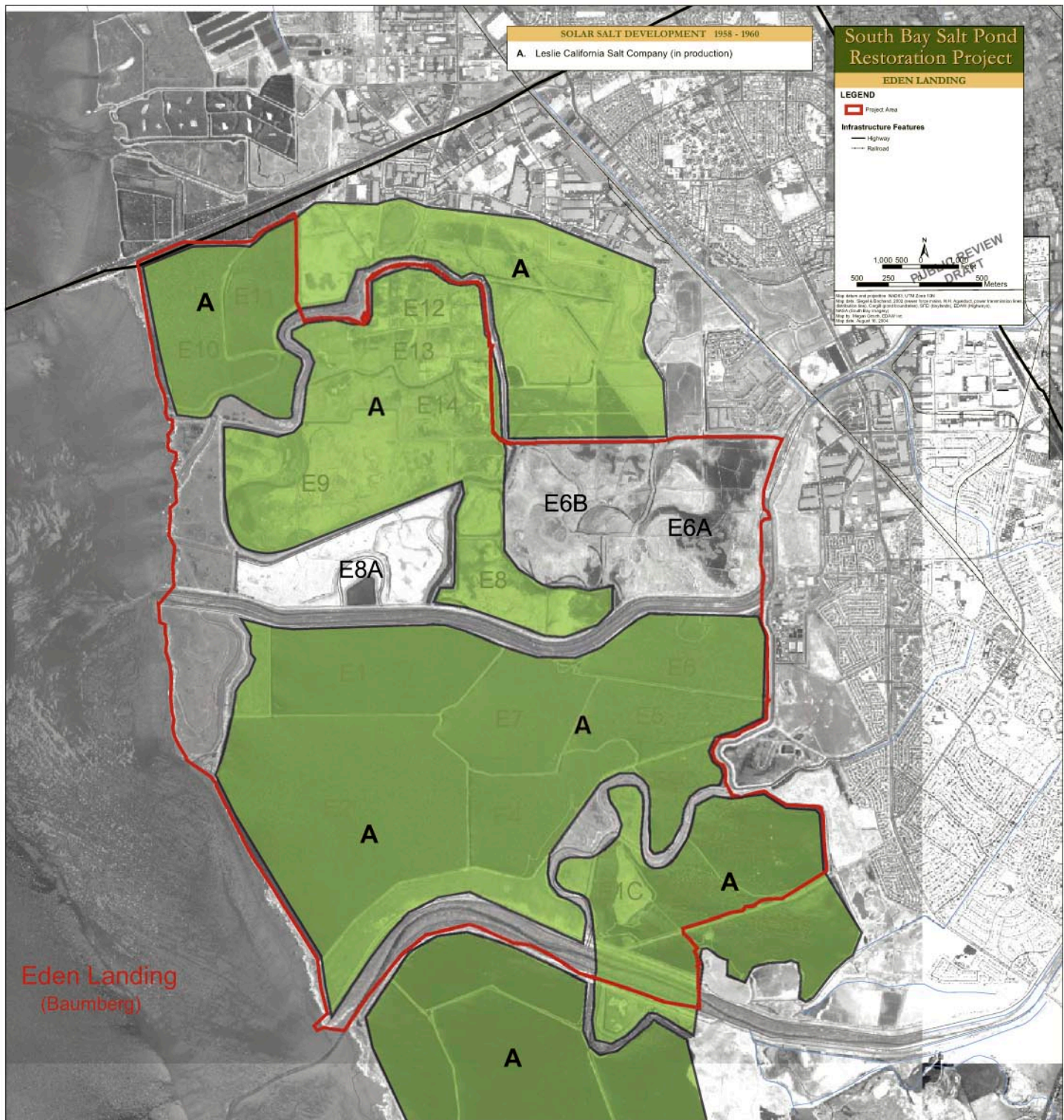
Source: Claire Lopez report, 1971

Figure 14: Solar Salt Development Eden Landing, 1924 - 1927



Source: Claire Lopez report, 1971

Figure 15: Solar Salt Development Eden Landing, 1935



Source: Claire Lopez report, 1971

Figure 16: Solar Salt Development, Eden Landing, 1958 - 1960

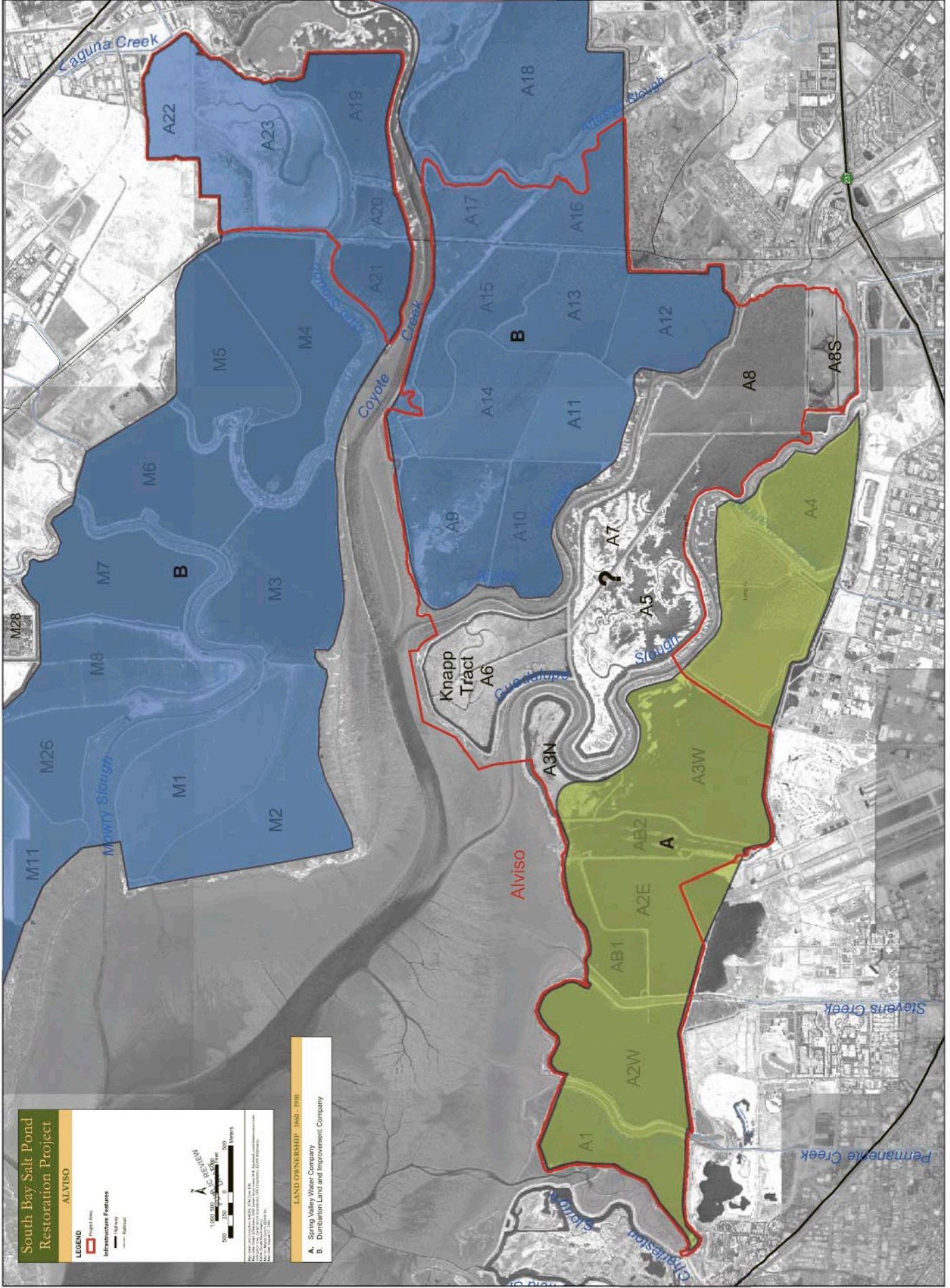


Figure 17: Solar Salt Development, Alviso, 1860 - 1910

Source: Claire Lopez report, 1971

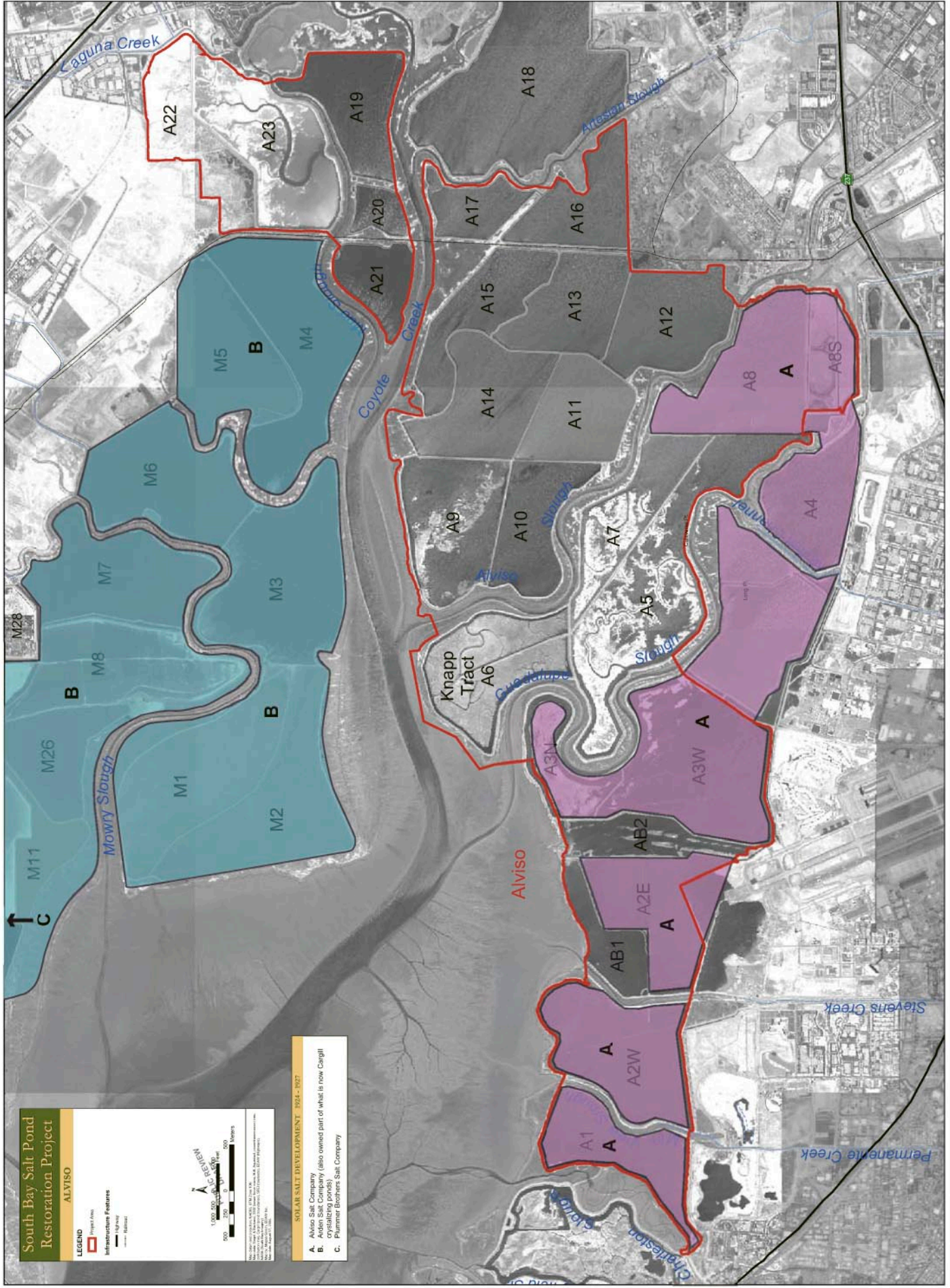


Figure 18: Solar Salt Development, Alviso, 1924 - 1927

Source: Claire Lopez report, 1971

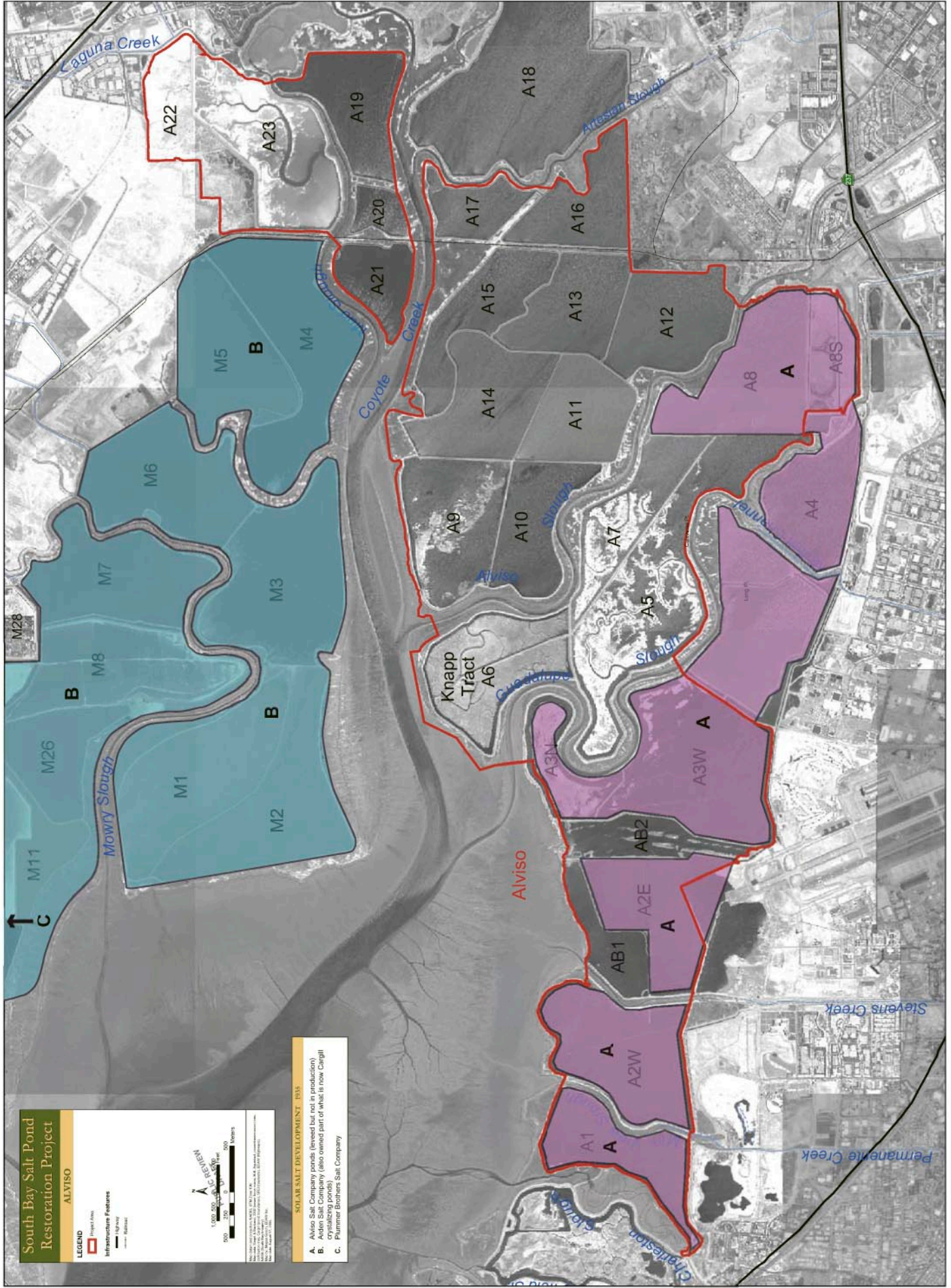


Figure 19: Solar Salt Development, Alvizo, 1935

Source: Claire Lopez report, 1971

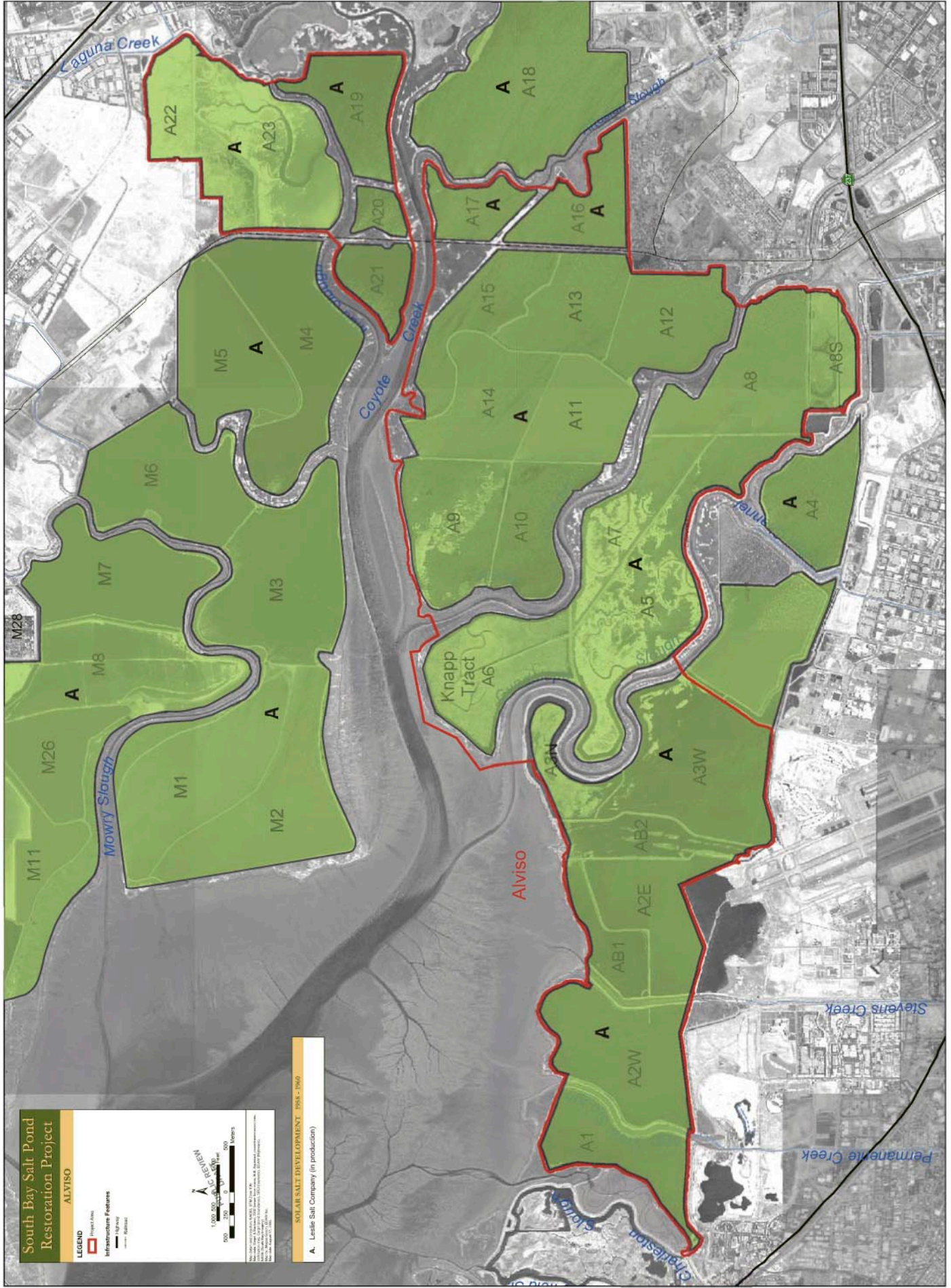
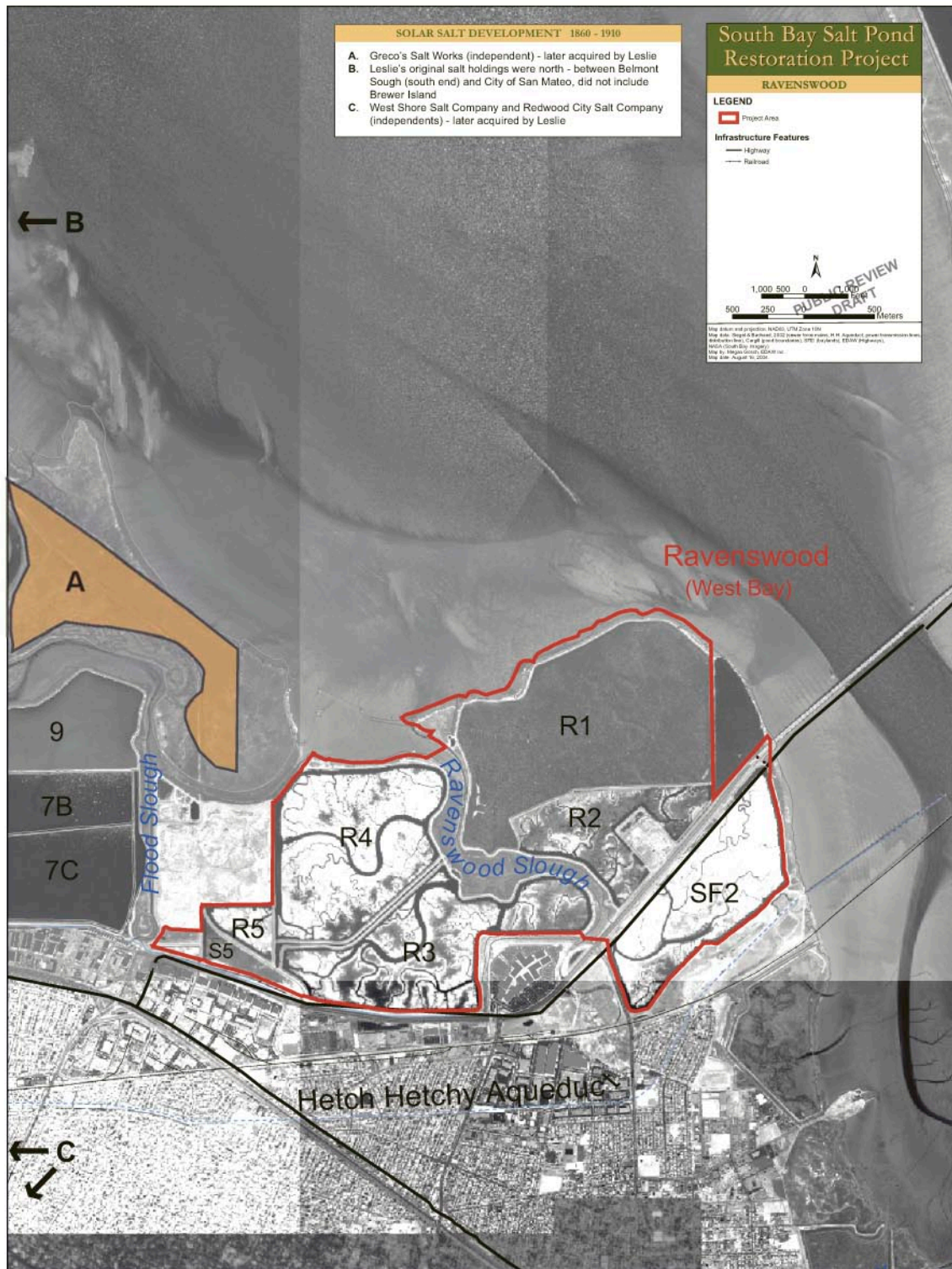


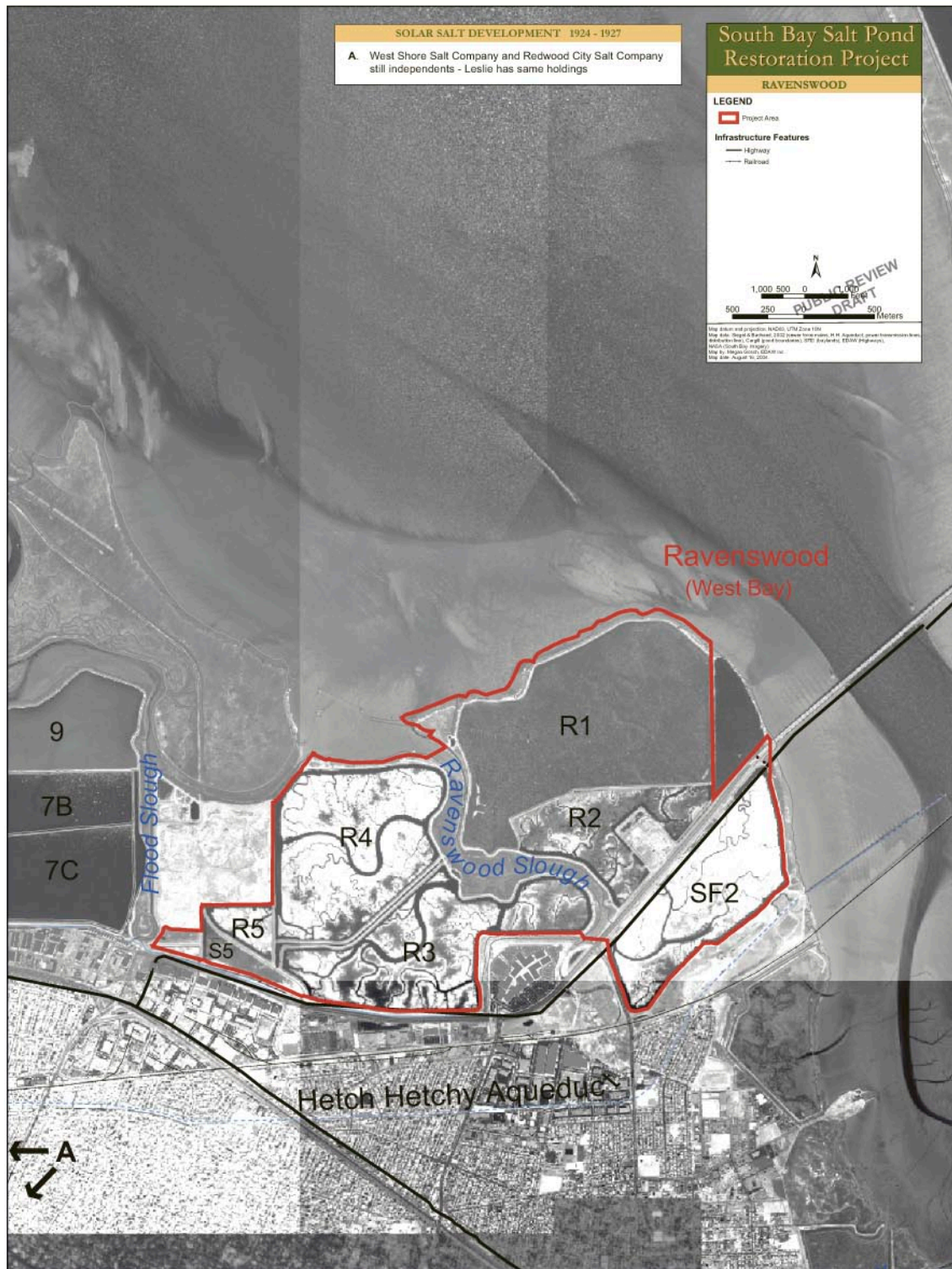
Figure 20: Solar Salt Development, Alviso, 1958 - 1960

Source: Claire Lopez report, 1971



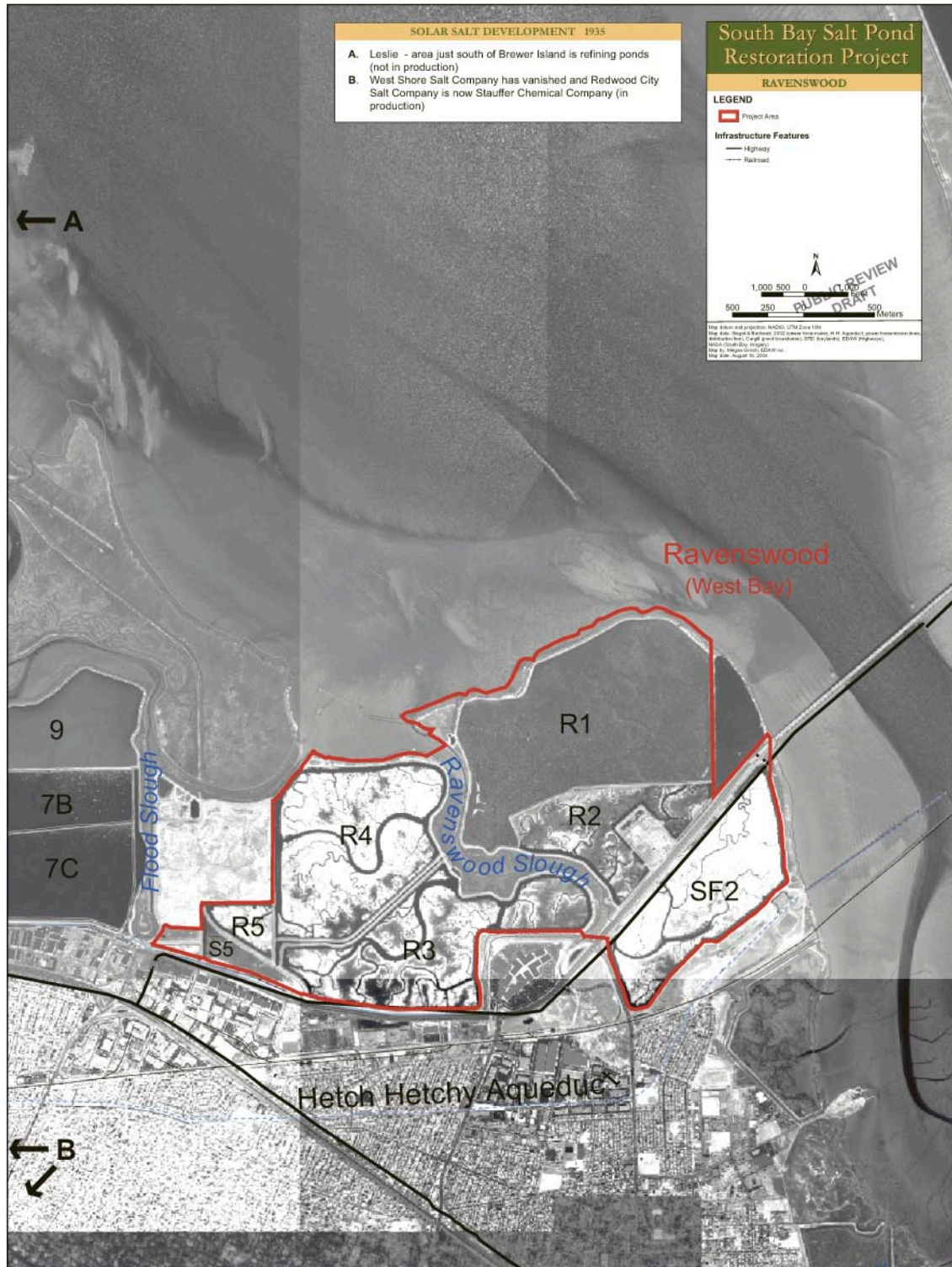
Source: Claire Lopez report, 1971

Figure 21: Solar Salt Development Ravenswood, 1860 - 1910



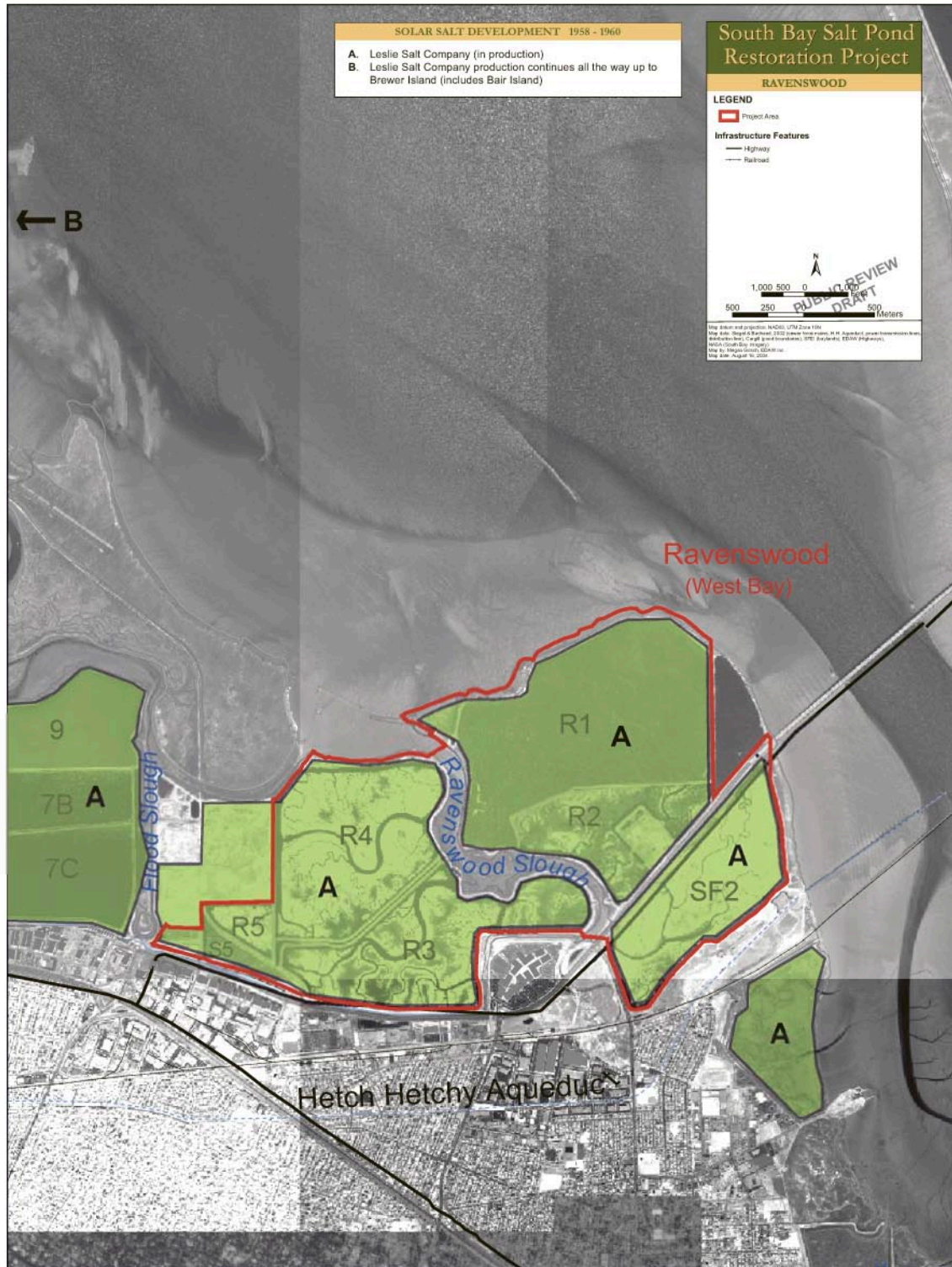
Source: Claire Lopez report, 1971

Figure 22: Solar Salt Development Ravenswood, 1924 - 1927



Source: Claire Lopez report, 1971

Figure 23: Solar Salt Development Ravenswood, 1935



Source: Claire Lopez report, 1971

Figure 24: Solar Salt Development Ravenswood, 1958 - 1960



Figure 25: Aerial View of Salt Ponds

Source: USGS



Photo: L. Watt, October 2004

Figure 26: Levee Gate, Union City Salt Works



Photo: L. Watt, October 2004

Figure 27: Pink Crystallizer Pond, Cargill Salt Works



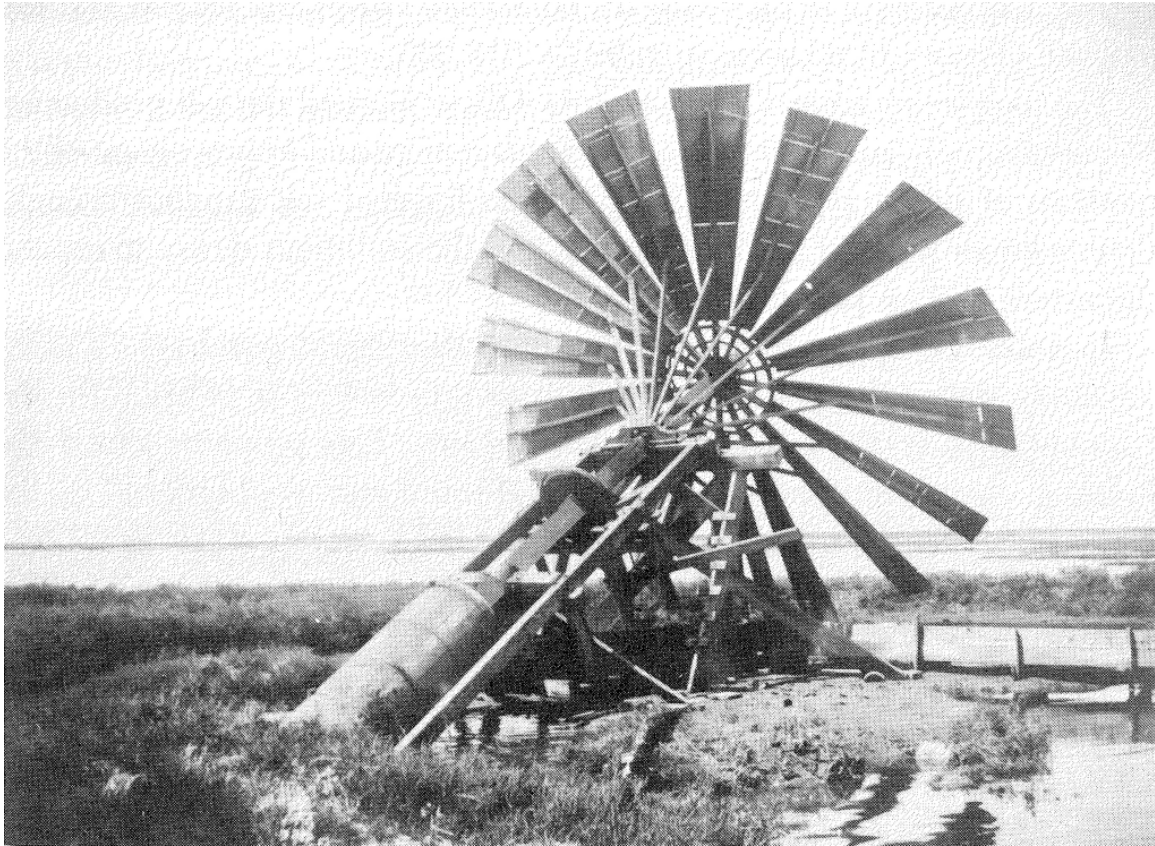
Photo: L. Watt, October 2004

Figure 28: Crystallizer Pond Ready to Harvest, Cargill Salt Works



Photo: L. Watt, October 2004

Figure 29: Harvested Salt, Cargill Salt Works



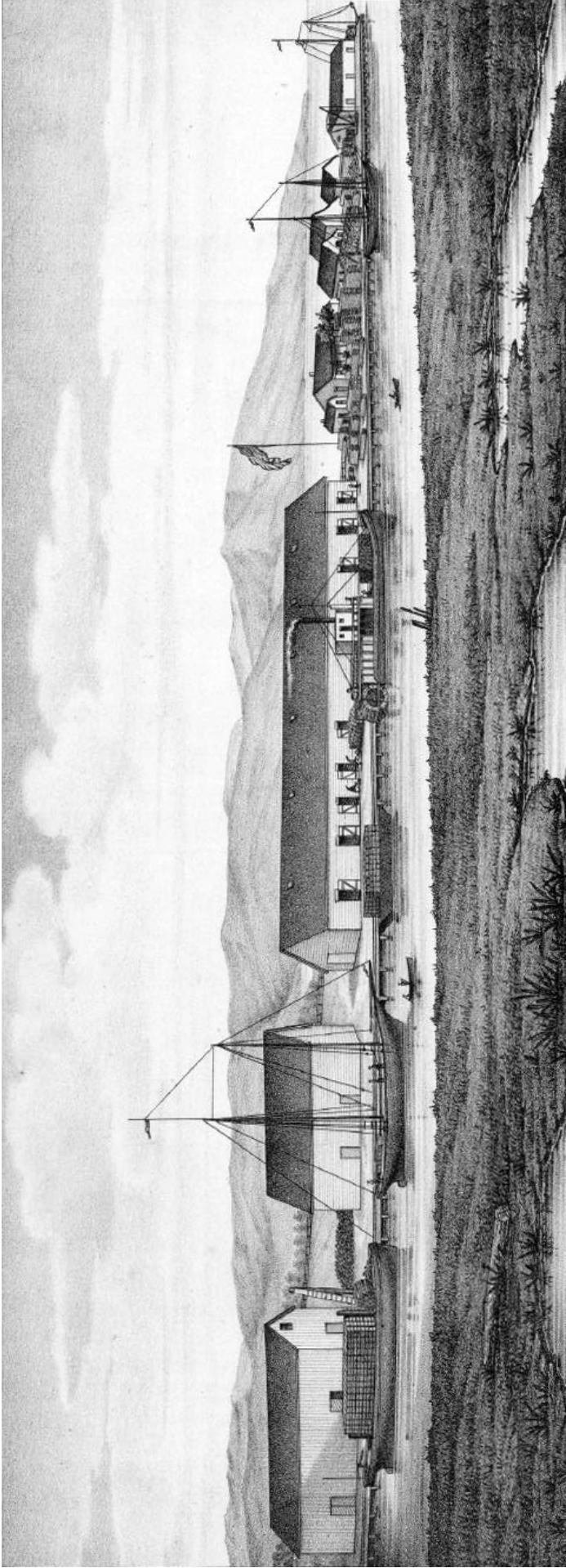
Source: Leslie Salt Company, circa 1900

Figure 30: Archimedes Screw Pump



Source: Leslie Salt Company, 1984

Figure 31: Archimedes Screw Pump



Source: Thompson & West Atlas of Alameda County, 1878

Figure 32: Roberts Landing



Photo: L. Watt, December 2004

Figure 33: Boardwalk, Don Edwards
San Francisco Bay Wildlife Refuge



Photo: L. Watt, October 2004

Figure 34: Pilings, Oliver Salt Works



Photo: L. Watt, October 2004

Figure 35: Pilings, Union City Salt Works



Photo: L. Watt, October 2004

Figure 36: Poles, Oliver Salt Works



Photo: L. Watt, October 2004

Figure 37: Old Tracks, Oliver Salt Works



Photo: L. Watt, October 2004

Figure 38: Metal Tanks, Oliver Salt Works



Photo: L. Watt, October 2004

Figure 39: Shack, Union City Salt Works



Photo: L. Watt, October 2004

Figure 40: Levee, Union City Salt Works