Chapter 2

Alternatives Considered in the Recirculated Environmental Impact Report/Supplemental Environmental Impact Statement

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INTRODUCTION

The 1997 DEIR/EIS fully describes the purpose and need, project background, public involvement, and alternatives screening process. These elements have not been modified. The lead agencies have decided to prepare this REIR/SEIS to evaluate additional alternatives as part of the CEQA/NEPA process. The primary purpose of this REIR/SEIS is to provide additional information relative to comments on the 1997 DEIR/EIS regarding the range of alternatives considered in that document.

Since publication of the 1997 DEIR/EIS, EBMUD and Reclamation have negotiated a draft proposed amendatory water service contract. The proposed contract was circulated for public review, and comments were received and reviewed by Reclamation and EBMUD. The applicable terms of this proposed amendatory contract are therefore used to define the alternatives addressed in this REIS/SEIS. These applicable provisions relate primarily to operating parameters for all of the Supplemental Water Supply Project alternatives, including the alternatives considered in the 1997 DEIR/EIS. These parameters are described below.

A description of alternatives analyzed in the 1997 DEIR/EIS is provided in the "Summary" of this REIR/SEIS. Full descriptions of Alternative 1, "No Action," Alternative 2, "Folsom South Canal Connection," and Alternative 3, "Joint Water Supply," are contained in the 1997 DEIR/EIS.

PROJECT OBJECTIVES

As stated in the 1997 DEIR/EIS, the objective of the Supplemental Water Supply Project is to allow EBMUD to make use of its water service contract with Reclamation for delivery of American River water, consistent with the conditions set forth in the Hodge Decision, so as to achieve all of the following:

- Maintain the high quality of EBMUD's raw and treated water supply.
- Increase system reliability by providing an alternate source of supply to EBMUD's Mokelumne River supply in case of a catastrophic event or scheduled major maintenance at Pardee Dam or Reservoir.
- Provide increased operational flexibility.
- Reduce customer deficiencies.
- Increase opportunities for protection and enhancement of Mokelumne River resources.
- Contribute to achieving EBMUD's planning objectives established as part of the Updated Water Supply Management Program (WSMP).

Reclamation recognizes the project objectives of EBMUD as listed above. Some of the alternatives evaluated in this REIR/SEIS may not fully meet all of EBMUD's objectives. These objectives are not to be construed as screening criteria for rejecting from consideration the alternatives described in the 1997 DEIR/EIS and in this REIR/SEIS but rather represent the goals of EBMUD for a supplemental water supply project. All alternatives presented in the 1997 DEIR/EIS and this REIS/SEIS will receive equal consideration for implementation.

ENVIRONMENTAL COMMITMENTS

The applicable environmental commitments described in the 1997 DEIR/EIS are also incorporated into these additional alternative descriptions. As in the 1997 DEIR/EIS, because these commitments are part of the project, they have not been specifically described as

mitigation measures in subsequent chapters of this REIR/SEIS. These commitments include:

- Erosion and sediment control plan.
- Storm water pollution prevention plan.
- Traffic control plan.
- Dust suppression plan.
- Fire control plan.
- Phase I and Phase II hazardous materials studies.
- Hazardous materials management plan.
- Channel and levee restoration plan.
- Hydrologic simulation modeling and scour analysis.
- Agricultural land restoration.
- Spoils disposal plan.
- Environmental training.
- Access point/staging area plan.
- Trench safety plan.
- Project planning, coordination, and communication plan.
- Project alternatives.
- Cultural resource discovery plan.

Details regarding each of these measures are provided in the 1997 DEIR/EIS. Each measure would be specifically tailored to the alternative selected.

PROJECT ALTERNATIVES

Alternative 4: EBMUD-Only Lower American River Delivery

This alternative is based on the City's and County's "Modified Proposal," dated June 8, 1999. In summary, the Modified Proposal provides the following (see details of the Modified Proposal in Appendix A):

1. EBMUD could divert at Site 5 when flows at the mouth of the Lower American River would be above the Hodge threshold (as proposed by the Sacramento Parties in Attachment 1 to the Modified Proposal, "Proposed Interpretation of the Hodge Threshold for Purposes of the Modified Proposal").
2. The City, County, and the Sacramento Environmental Water Caucus would support EBMUD banking water in groundwater basins in Sacramento and San Joaquin Counties at reasonable ratios (e.g., 2-3 acre-feet "put" to 1 acre-foot "take") subject to Sacramento Parties review of the details of the banking program.
3. The City, County, and the Sacramento Environmental Water Caucus would request Judge Hodge to amend his order to allow EBMUD to bank American River water (diverted only at Site 5 above the Hodge threshold) in Sacramento or San Joaquin County. The order would be specifically amended to allow EBMUD to sell water diverted from the American River to third parties as part of the conjunctive use program in Sacramento and San Joaquin. This would help EBMUD get a dry year supply from banked groundwater.
4. Sacramento County would work with its stakeholders to provide assurances that EBMUD could bank water in Sacramento County. This could include in-lieu storage in the Galt groundwater subbasin and in-lieu, and perhaps direct injection, in the South Sacramento County groundwater subbasin (including Zone 40).
5. Sacramento County would also work with stakeholders to provide EBMUD enforceable assurances that it would be able to withdraw agreed upon amounts of previously stored water from the subbasins under agreed upon conditions. This would be subject to adequate protections and improvements for Galt area and South Sacramento County groundwater users.
6. It is estimated that a total of 75,000 acre-feet of water could be withdrawn by EBMUD from a groundwater bank in the South Sacramento and Galt subbasins over a 3-year period. (See Attachment 2 to the Modified Proposal, "EBMUD Conjunctive Use in Sacramento County.")
7. The City, County, and Sacramento Environmental Water Caucus would support EBMUD storing water diverted from Site 5 above the Hodge threshold in an existing off-stream reservoir, e.g., Los Vaqueros, for EBMUD's direct use in dry years.

8. The City, County, and Sacramento Environmental Water Caucus would support all state legislation needed to allow American River water to be exported consistent with all requirements of the Modified Proposal.
9. The City, County, and Sacramento Environmental Water Caucus would support including funds in the 1999 Water Bond to help pay a portion of the costs for pumpback to Folsom South Canal and conjunctive use facilities in Sacramento and San Joaquin Counties (that could help provide EBMUD's dry year supply). Funds would be contingent on adherence by EBMUD and the Sacramento Parties to all of the conditions of the Modified Proposal.
10. EBMUD could take Pardee Dam and tunnel out of service for inspection and maintenance in a wet year by:
    a. Using 155 cfs of American River water diverted at Site 5; and
    b. Diverting Mokelumne River water from or below Pardee Reservoir and pumping it into the Mokelumne Aqueduct.
11. No EBMUD diversions from Nimbus. (See Attachment 3 to the Modified Proposal, "No EBMUD Diversion at Nimbus.")
12. EBMUD could not sell any water diverted from the American River to any third parties except as part of a conjunctive use program in Sacramento and San Joaquin Counties consistent with point number three above.
13. The diversion and pipe from Site 5 to the Folsom South Canal and Folsom South Canal extension would be sized for a maximum of 155 cfs.
14. Sacramento environmentalists would be included in all substantive negotiations on the Modified Proposal and there would be consultation with Bay Area environmentalists.
15. Operation of the American River and Mokelumne River supplies would be coordinated to ensure that there would be no indirect sale of American River water. (See Attachment 4 to the Modified Proposal, "Coordination of American River and Mokelumne River Operations.")
16. The benefits to EBMUD of the American River water supply would be limited to EBMUD's existing service area. It could not be used as a source of supply for an expansion of EBMUD's service area. (See Attachment 5 to the Modified Proposal, "Water Supply for EBMUD Service Area Expansion.")
17. There must be an adequate EIR and EIS analysis of the Modified Proposal.
18. EBMUD would provide $5 million for previously identified community enhancements (e.g., purchase of the Uruttia property, parkway improvements, etc.). (See Attachment 6 to the Modified Proposal, "American River Parkway Improvements.")
19. EBMUD would fully comply with City of Sacramento and County of Sacramento requirements to adequately mitigate project construction impacts.
20. EBMUD would provide $125,000 annually (adjusted for inflation) to the Lower American River Habitat Management Element. (Note: the City and County will each be making the same level of annual contributions.)
21. The City of Sacramento would agree to construct, operate, and maintain the facilities of the Modified Proposal that would be within Sacramento City limits.
22. Assurances that all conditions in the Modified Proposal (e.g., no Nimbus diversion, no diversions below the Hodge threshold, no sales to third parties, etc.) would be met. (See Attachment 7 to the Modified Proposal, "Assurances.")

Elements 2 through 7, 10, 12, 15, and 18 through 22 are subject to further negotiation between EBMUD and the Sacramento Parties.

The Modified Proposal as described above provides for the Sacramento Parties' support for a future groundwater banking project. Chapter 18 of this REIR/SEIS discusses such a future project at a programmatic level, commensurate with the level of detail available at this time.

Facilities

Essentially, this alternative combines many of the basic facility elements of Alternative 3, "Joint Water Supply," as described in the 1997 DEIR/EIS, with many of the basic operational concepts of Alternative 2, "Folsom South Canal Connection." Alternative 4 would involve the construction of a new intake on the lower American River at the Site 5 location, as described in the 1997 DEIR/EIS. This new intake would be sized to provide EBMUD up to 155 cfs of water. A new pipeline with a capacity of 155 cfs would be constructed from this new delivery point to the Folsom South Canal (FSC) along the alignment described in the 1997 DEIR/EIS. As described for Alternative 3 in the 1997 DEIR/EIS, Alternative 4 would also involve the construction of a second pipeline to convey water from the terminus of the FSC to the Mokelumne Aqueducts, represented by Alignment 2 of Alternative 2, as described in the 1997 DEIR/EIS. This pipeline would also have a capacity of 155 cfs.

Figure 2-1 displays facilities that would be constructed under this alternative.

New Delivery Facility. Under this alternative, EBMUD would construct a new delivery facility on the lower American River with an intake structure located in the lower American River consistent with Element 1 of the Modified Proposal. The intake would be located approximately 12,000 feet upstream of the Interstate 5 (I-5) American River Bridge. The intake would extend into the river roughly north of 23rd Street. The intake would be situated near the southern bank of the river, allowing construction of a shorter access bridge to the intake structure. The facility would be located in the portion of the river where the channel is deeper. Figure 2-2 shows the conceptual design of this facility, which would allow the delivery of up to 155 cfs to EBMUD. The facility would be similar in general design to the existing City intake facility at Fairbairn Water Treatment Plant (WTP). The intake facility would be approximately 100-125 feet long, 30-40 feet wide, and about 70 feet high. Pumps would be contained within the intake facility. The foundation would be pile-supported, with pile lengths of 60 feet or more. An upper level pump and motor deck would be constructed above the 100-year flood elevation. The pumps would discharge to a common manifold and a discharge line(s) that would be carried to the south bank of the river via an access bridge. The access bridge would likely be pier- and pile-supported and run from the levee to the intake structure.

The facility would include a fish exclusionary system and would be designed to meet California Department of Fish and Game (CDFG), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS) criteria.

A source of electrical power would be required to operate the new intake facility. Because of the industrial nature of the surrounding land uses, many options for power supply are available.

Intake to Folsom South Canal Pipeline Alignment. The approximately 66-inch-diameter pipeline with a capacity of 155 cfs, consistent with Element 13 of the Modified Proposal, would begin at the 23rd Street extension and parallel the western property line of an old landfill site, continue south to the Union Pacific Railroad (UPRR) tracks, cross underneath the railroad right-of-way, and parallel 23rd Street south to C Street (Figure 2-3a). From this point, the pipeline would follow C Street for approximately 5,000 feet, crossing under the Capital City Freeway (formerly Business 80) and continuing along C Street until turning into Elvas Avenue. The pipeline would follow Elvas Avenue east and south approximately 8,000 feet to the intersection with H Street, follow 57th Street south to the intersection with J Street, turn east on J Street for 700 feet, and then return to Elvas Avenue, heading south to the intersection of Elvas Avenue and Folsom Boulevard. Just north of this intersection, the pipeline would turn east, crossing under the existing railroad embankment. The pipeline would then pass through the California State University, Sacramento, campus to College Town Drive and then continue east to the area near the Fairbairn WTP. Portions of the pipeline would be constructed using trenchless and/or tunneling

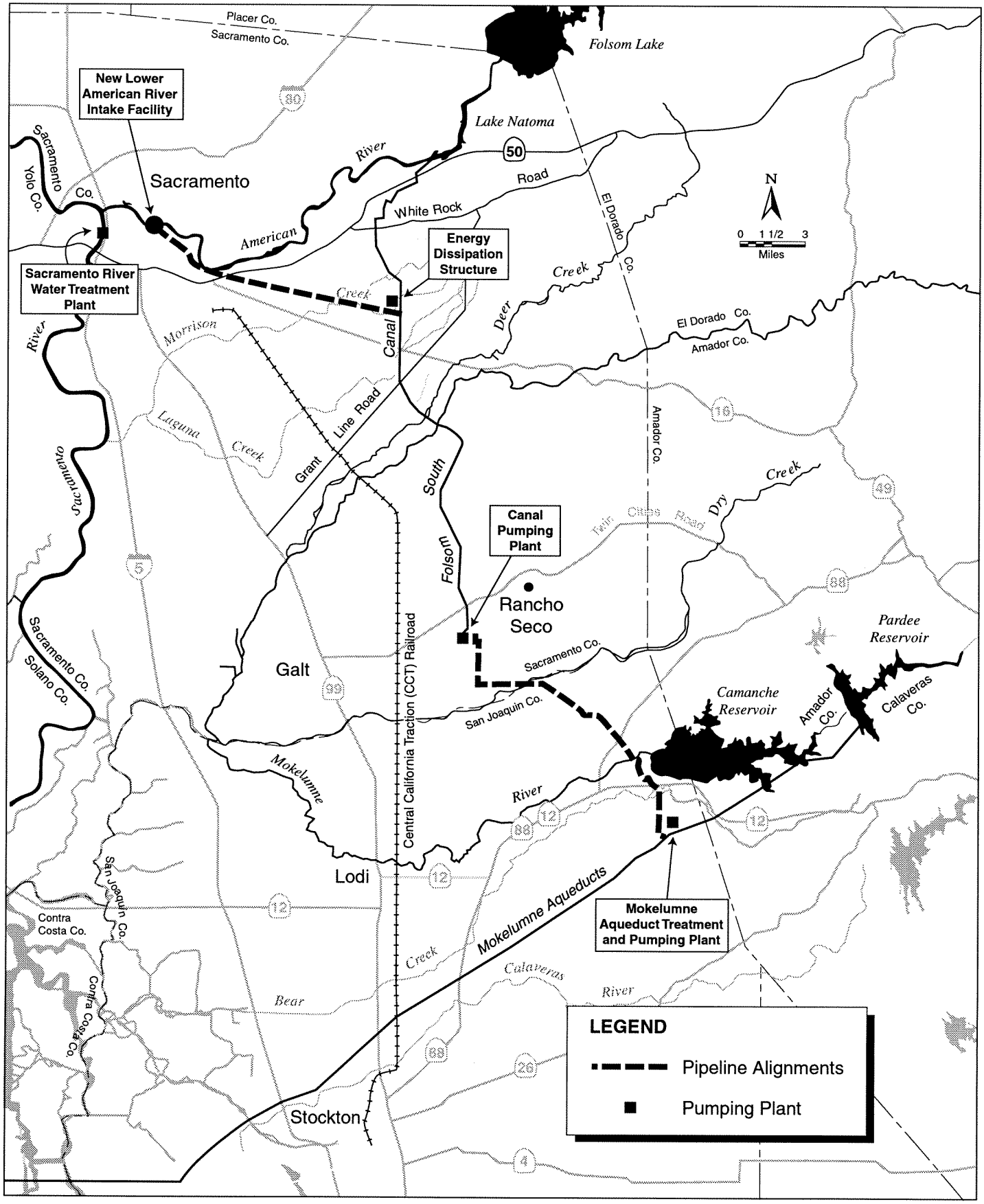

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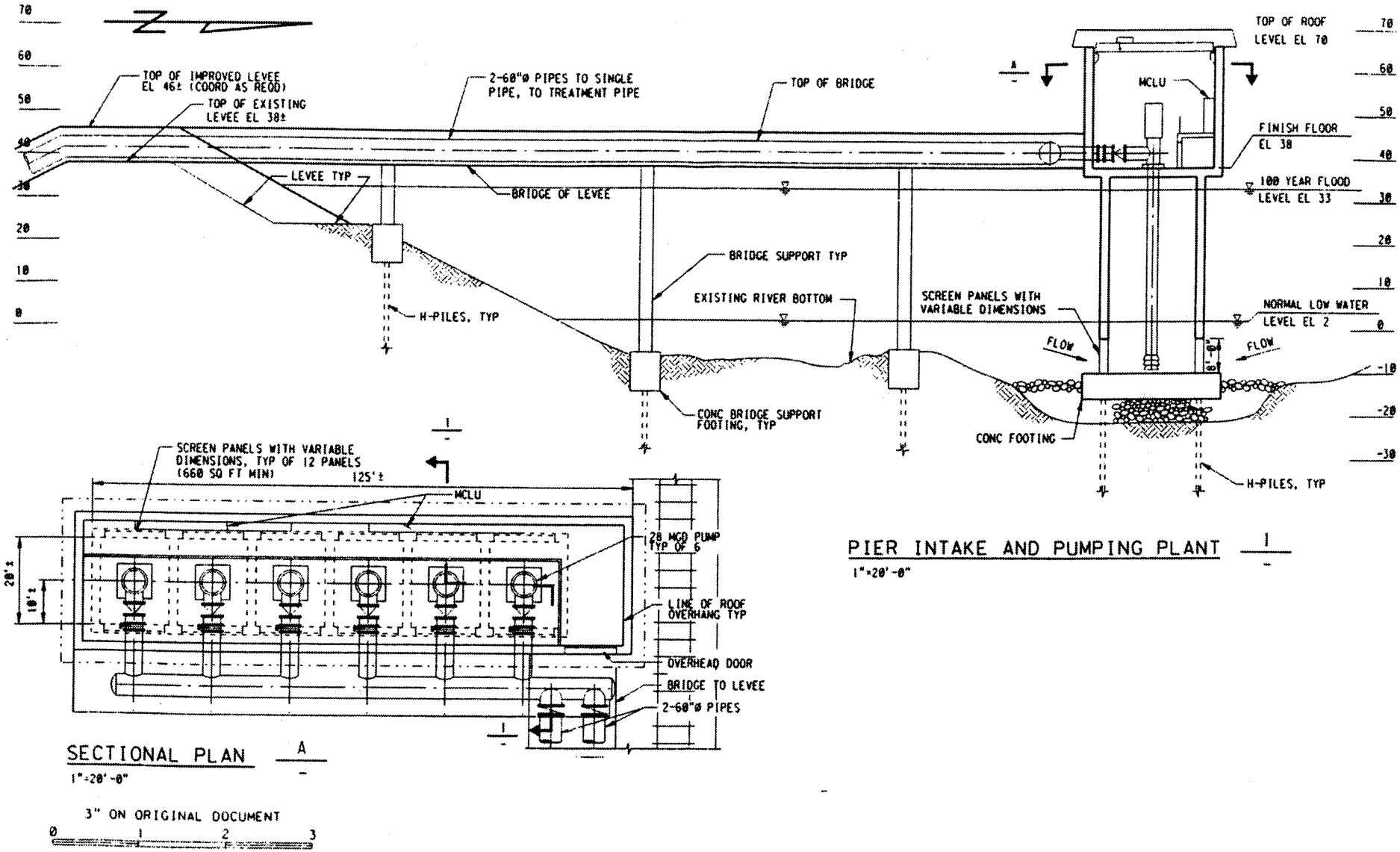
Figure 2-1
Alternative 4: EBMUD-Only
Lower American River Delivery Alternative



Graphic source: Montgomery Watson.

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Figure 2-2
Conceptual Design of Intake Pumping Plant

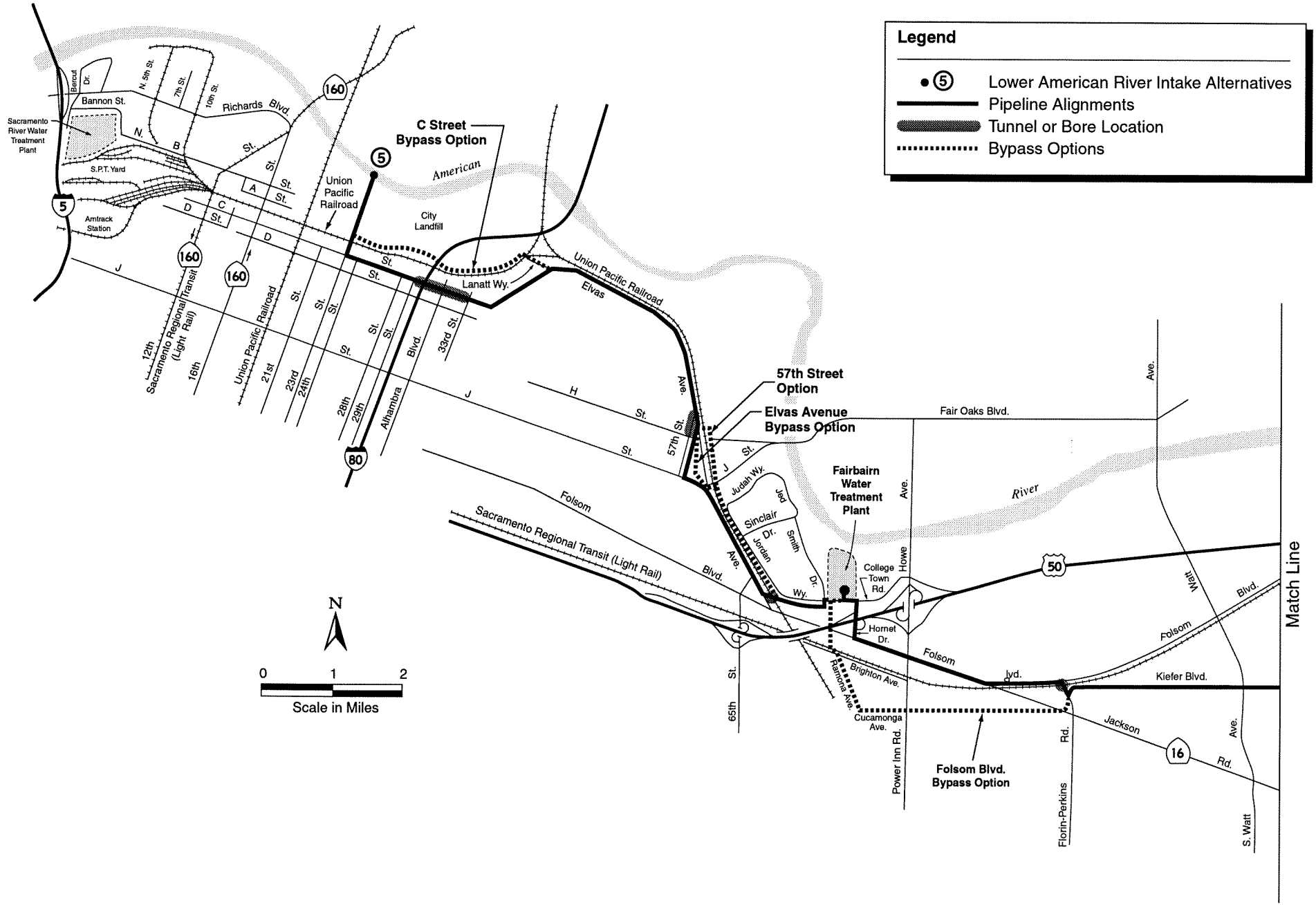

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Figure 2-3a
Alternative 4: Intake and Pipeline Locations

technology to minimize disruption to surrounding land uses and transportation and circulation. Figure 2-3a shows the locations of planned trenchless construction in the pipeline segment between the intake and California State University.

As shown in Figure 2-3a, from the area of the Fairbairn WTP, the pipeline would head east along College Town Road to Hornet Drive, then south along the east side of Hornet Drive to Folsom Boulevard. From this point, the pipeline would head east along Folsom Boulevard to just east of the intersection with Florin-PerkinsRoad. The pipeline then would turn south and cross the UPRR and Sacramento Regional Transit light rail tracks and intersect Kiefer Boulevard, where it would head east along Kiefer Boulevard to the FSC (Figure 2-3b). Near former Mather Air Force Base, the County owns a right-of-way for an extension of Kiefer Boulevard, but no road has yet been constructed between Happy Lane and Eagles Nest Road. This portion of the pipeline would be constructed on the north side of the existing right-of-way. A new energy dissipation structure at the FSC would allow water to flow into the FSC. The anticipated design of the energy dissipation structure is an impact-type stilling basin, with most features located below the ground surface. The basin would discharge flow directly into the FSC at reduced velocities.

Pipeline Alignment Options

C Street Bypass Option. The pipeline could include a C Street bypass option beginning at the intersection of 23rd and C Streets and extending north 600 feet under the UPRR crossing (Figure 2-3a). The bypass would extend 6,300 feet along the northern edge of the railroad right-of-way and pass under the Capital City Freeway to near Lanatt Way. The pipeline bypass would then cross south under the railroad tracks 1,100 feet to the Elvas Avenue intersection, where the pipeline would connect with the proposed Site 5 to Fairbairn WTP alignment described above. The C Street bypass option would cross or be sited immediately adjacent to an old landfill, the City landfill, and an undeveloped parcel bounded by the UPRR tracks and the Capital City Freeway and would avoid approximately 7,300 feet of construction within C Street east of 24th Street. The Sacramento Parties have indicated that this is their preferred option.

Elvas Avenue Bypass Option. The pipeline could also include an Elvas Avenue bypass option (Figure 2-3a) beginning at the intersection of Elvas Avenue and 57th Street and extending south-southeast on the eastern side of 57th Street to a point just south of J Street. The alignment would then extend east under the UPRR right-of-way and then southeast between the railroad tracks and Jordan Way to a connection with the proposed Site 5 to Fairbairn WTP alignment described above.

Folsom Boulevard Bypass Option. One option to the Fairbairn to FSC pipeline that could be implemented to avoid congested traffic conditions on Folsom Boulevard is available. This option would involve routing the pipeline west of the Fairbairn WTP along College Town Road approximately 500 feet and then extending the pipeline south approximately 3,500 feet under Interstate 50 (I-50), Folsom Boulevard, and the Sacramento Regional Transit Light Rail right-of-way to the intersection of Brighton and Ramona Avenues, which would be the location of the pumping plant under this option. The pipeline would then extend southeast in Ramona Avenue to the intersection with Cucamonga Avenue. The pipeline option would extend about 6,500 feet to the end of Cucamonga Avenue, crossing an abandoned Granite Construction aggregate mine area known as Granite Park. Approximately 200 feet west of the intersection of State Route 16 and Florin-Perkins Road, the alignment would turn northeast, cross State Route 16, and connect to Florin-Perkins Road north of the intersection. The pipeline would then extend within Florin-Perkins Road to the intersection with Kiefer Boulevard, where it would connect with the proposed Fairbairn to FSC pipeline alignment described above. The Sacramento Parties have indicated that this is their preferred option.

Folsom South Canal to Mokelumne Aqueducts Pipeline. The FSC connection pipeline would be constructed of approximately 70-inch-diameter pipe with a capacity of 155

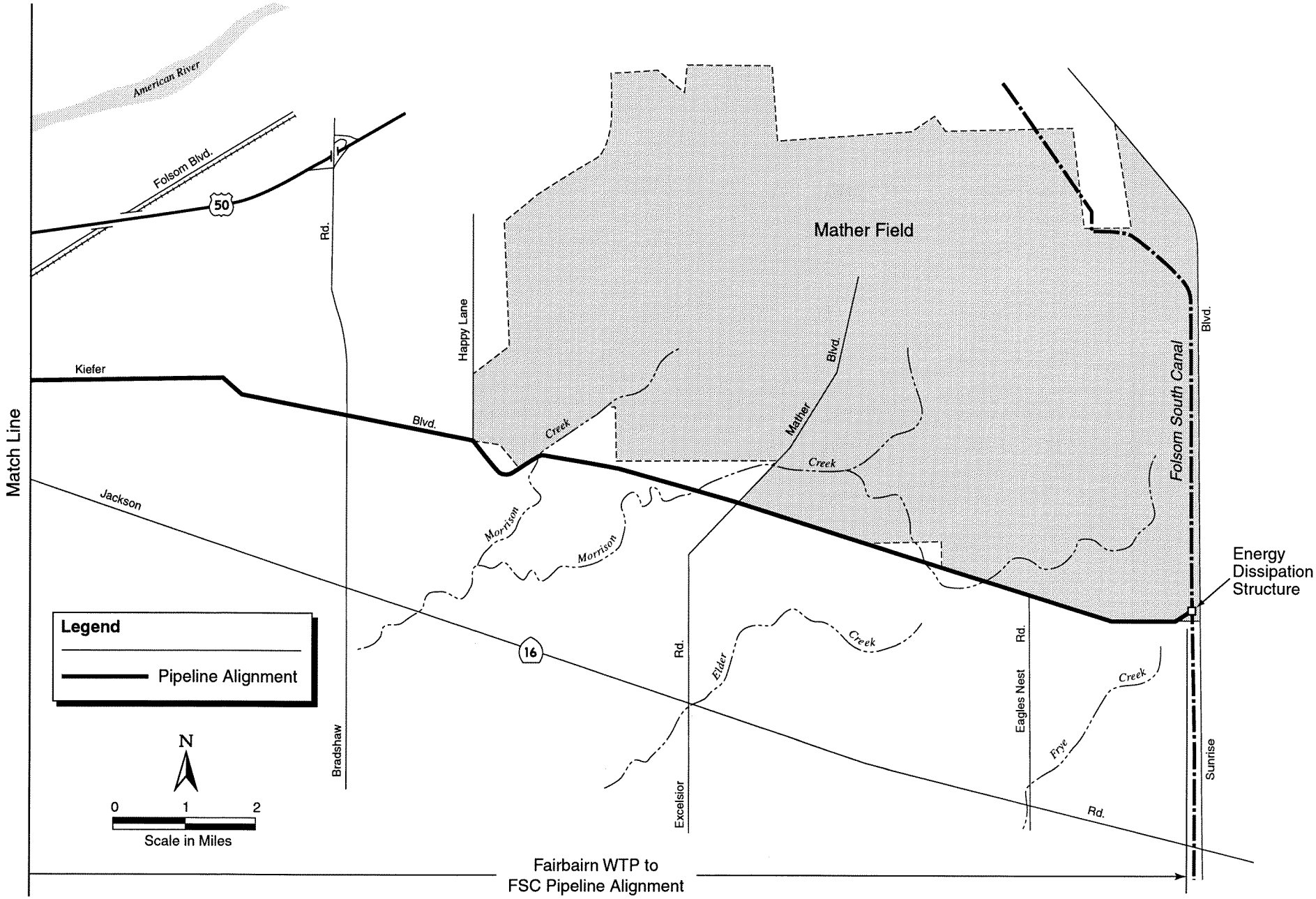

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Figure 2-3b
Alternative 4: Intake and Pipeline Locations (Continued)

cfs, consistent with Element 13 of the Modified Proposal, and would be buried beneath approximately 5 feet of cover material. The pipeline would be approximately 16.9 miles long and extend from a new turnout near the southern end of the FSC to the aqueduct pumping plant site at the Mokelumne Aqueducts (Figure 2-1). From the new turnout and canal pumping plant, the alignment extends east to Clay Station Road and then turns south, continuing along Clay Station Road to Angrave Road and east to Dry Creek. South of Dry Creek, the alignment continues southeast, generally adjacent to a Pacific Gas and Electric Company (PG&E) transmission line right-of-way, following the right-of-way to its intersection with Highway 88. The alignment continues southeast from Highway 88 to Buena Vista Road, paralleling the road, to EBMUD's property line. From Buena Vista Road, the alignment heads south, crossing the Mokelumne River, traversing EBMUD's Camanche Reservoir property to Highway 12, crossing Highway 12, and following the west side of Cord Road to Acampo Road. From Acampo Road, the alignment extends south 4,500 feet to the aqueduct pumping plant site.

Pumping Plants

Canal Pumping Plant. The canal pumping plant facility would consist of a steel-framed building with metal siding, a canal intake structure, pumps, a flow meter, site piping, surge-protection equipment, chlorine and lime storage and injection facilities, and an electrical substation designed to accommodate a pumping capacity of 155 cfs. Multiple pumps would be installed to allow for the pumping of a wide range of flows. Access to the canal pumping plant would be from Twin Cities Road along the east FSC maintenance road and/or from Clay Station Road along a new roadway east of the plant.

The canal pumping plant would operate on electricity and would require a new 69-kilovolt (kV) transmission line extension from a nearby existing transmission line, a new substation transformer, and a new substation with 69-kV metering. These facilities would likely be owned and operated by the Sacramento Municipal Utility District (SMUD). The new line would likely extend about 5,600 feet from an existing line on Highway 104 approximately 2.5 miles west of the town of Clay. The substation transformer and substation would be located on the pumping plant site.

Aqueduct Pumping Plant. The aqueduct pumping plant would be located at the end of the new pipeline where it connects with the Mokelumne Aqueducts. The pumps would be housed in a steel-framed building with metal siding. The pumping plant site would include site piping, pipeline isolation valve, pumps, chlorine and lime storage and injection facilities, and a small maintenance workshop. Plant facilities also would include a 7-million-gallon concrete tank with a diameter of approximately 172 feet and a height of approximately 42 feet (55 feet if covered). The reservoir would be supported by a reinforced concrete slab placed on grade. The pumping plant would be capable of pumping up to 155 cfs of water from the tank into the Mokelumne Aqueducts. Piping and controls would be arranged to provide flexibility for routing flow into the Mokelumne Aqueducts. Capability would be provided to either dedicate one or two aqueducts to the supplemental water supply or to blend the supplemental water supply with water from Pardee Reservoir in each of the aqueducts in similar proportion.

The aqueduct pumping plant would operate on electricity and would require a new transmission line extension from an existing line, a new substation transformer, and a new electrical substation. These facilities would be constructed according to criteria established by the electrical utility provider. A new 230-kV transmission line would extend east approximately 750 feet from an existing 230-kV line west of the aqueduct pumping plant site. The substation transformer and substation would be located on the pumping plant site.

Treatment Facilities. The treatment facilities under this alternative would be located at the site of the Mokelumne Aqueducts pumping plant described above. In addition to the pumping plant facilities, treatment structures on the site would include clarifier tanks, a chemical building, and solids handling facilities.

The total acreage required for this combined treatment and pumping facility is approximately 27 acres. The height of these facilities would be one to two stories. See Appendix B to this REIR/SEIS for a detailed description of the treatment process and graphic layouts of the treatment facilities.

Operations

EBMUD operates its current Mokelumne River system to provide adequate water supplies to its customers and minimize deficiencies. Water supply forecasts are used in the preparation of operations projections. The operations projection is updated throughout February, March, and April as more reliable information becomes available. The main parameters considered in the operations projection are the water supply forecast of projected runoff, water demand of other users on the river, water demand of EBMUD customers, and flood control requirements.

Under this alternative, EBMUD would be entitled to take delivery of up to 150,000 acre-feet per year of Central Valley Project (CVP) water at Site 5 provided that periods of such delivery would not cause or increase:

- Shortages to be imposed on Central Valley Project (CVP) water contractors on the American or Sacramento Rivers or Contra Costa Water District.
- Inability of the Contracting Officer to provide the flows to sustain the natural production of anadramous fish in accordance with Section 3406(b) of the CVP Improvement Act (CVPIA) and meet applicable Sacramento River, American River, and Delta water quality or flow standards.
- Inability to deliver CVP water under applicable law, including the Endangered Species Act.

These deliveries of up to 155 cfs would be limited to those periods when flows in the American River are at or above flows required by the Hodge Decision (1990).

In addition to these conditions, the Sacramento Parties' Modified Proposal adds an additional restriction that EBMUD would only be allowed to take delivery of water under the following conditions:

- EBMUD can divert only in years when the projected March-to-November unimpaired inflow to Folsom Reservoir is greater than 1,600,000 acre-feet.
- In December, January, and February following a March through November period when the unimpaired inflow into Folsom Reservoir is less than 1,600,000 acre-feet, EBMUD would not divert water until such time as, or after, water is being released from Folsom Reservoir for flood protection.

Information on both scenarios is provided where relevant in the following chapters.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 155 cfs of American River water from the new intake for direct use by its customers during periods when the flows required by the Hodge Decision are satisfied. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

For the Fairbairn intake option under this alternative, it is assumed that deliveries to EBMUD would be constrained by the same interpretation of Hodge Decision flow criteria as included in the City of Sacramento's Water Forum Agreement. Under this operational scenario, Hodge Decision flows would apply only to the Fairbairn WTP, rather than to the confluence with the Sacramento River. Implementation of this option would require the cooperation of the City of Sacramento and the County of Sacramento. This option is not part of the Sacramento Parties' Modified Proposal.

Construction Considerations

Subsequent to publication of the 1997 DEIR/EIS, EBMUD, the City, and the County

continued discussions of possible measures to reduce or eliminate construction-related effects. Based on these discussions, the following types of commitments were determined to be potentially feasible and implementable measures to reduce or mitigate short-term, construction-related effects. These measures would be implemented at a site-specific level, as appropriate, depending on the location of construction and surrounding land uses. The identified measures include:

- Temporary striping, signing, traffic lighting, and signals for residential and business areas affected by construction.
- Access and parking provisions for residences and business areas.
- Replacement of existing landscaping.
- Coordination with planned improvements (e.g., raised medians, turn lanes, street alignments) to minimize disruptions associated with two or more projects.
- Restricted work areas in residential areas, expressed as a maximum length of open trench for a given segment at any given time.
- Restricted work hours.
- Dust suppression and cleanup provisions (e.g., street sweeping, sidewalk cleaning, and debris removal) as needed.
- Establishment of a community ombudsman to handle ongoing public outreach and address construction concerns.
- Fact sheets and public updates to inform the community about progress of the project.
- Improvements to community facilities affected by construction.

It is impossible at this stage in project planning to definitively determine which of the above measures are feasible, practicable, and effective at each construction site. Therefore, the specific construction mitigation plan will be developed through additional community outreach and design after a project is approved.

New Lower American River Intake Facilities. Construction of these facilities would require installation of sheet pilings and dewatering of the construction location. Construction materials may be brought to the site by water or from the banks of the river. Some dredging of the site may also be required.

Intake to Folsom South Canal Pipeline. Construction of the pipeline would require 3 to 4 construction crews operating concurrently over an anticipated 24-month construction period. General construction, operation, and maintenance access to the project area would be via City and County streets, major highways in the area, and various lesser roads that parallel and traverse the alignment. The rate of pipeline installation is expected to range from 100 to 300 feet per day per crew. Select stream and roadway crossings would be constructed by tunneling. Pipeline construction would involve several steps, including pipe fabrication and transport to the job site, clearing of the right-of-way, and trench excavation followed by on-site stockpiling and hauling of excavated materials off site (described below), placement of bedding material, pipe laying, installation of backfill material, and surface restoration. Pipe and valves would be fabricated off site and transported to the construction site by truck and possibly by train.

To install the pipe, a bottom trench width providing approximately 24 inches of clear working space on both sides of the pipe would be excavated. The pipe would generally be installed 5 to 6 feet below finished grade, with greater depths possible at roadway, railroad, stream and river, and utility crossings. Equipment used to construct the pipeline would include scrapers, bulldozers, excavators, loaders, cranes, and compactors, as well as smaller equipment such as water and maintenance trucks.

Besides general construction guidelines and practices, the City and County maintain specific guidelines for construction activities within their jurisdictions (City of Sacramento Department of

Public Works 1989, City of Sacramento 1990, Sacramento County Department of Public Works 1992), particularly within streets and roadways. Construction of the project would comply with these guidelines. As described above, portions of this pipeline would be constructed using trenchless technology to minimize disruption to surrounding land uses and circulation patterns. These tentative locations are shown in Figure 2-3a. In areas within streets and roadways, the pipeline would be placed within a shored trench to minimize the width of construction area required. Construction would require up to 35 feet of vertical clearance for operation of trenching equipment. Where the pipeline would be constructed within city streets, the pipe is assumed to be installed in approximately the center of the roadway.

Required Right-of-Way. Where possible, the permanent pipeline right-of-way would be 80 feet wide, with an additional 50 feet of temporary right-of-way required for construction. Where construction would be located within city streets and roads, and space is more limited, construction would be restricted to the existing street or road right-of-way. A cross-section of a typical pipeline construction area within streets and roadways is shown in Figure 2-4.

Railroad and Roadway Crossings. The Intake to Folsom South Canal pipeline alignment would cross and be constructed within many roadways within the City and County. Minor roadways would generally be crossed by open-cut methods, and the roadway surface would be repaired immediately following construction. The pipeline may be tunneled under major highways to avoid disrupting traffic.

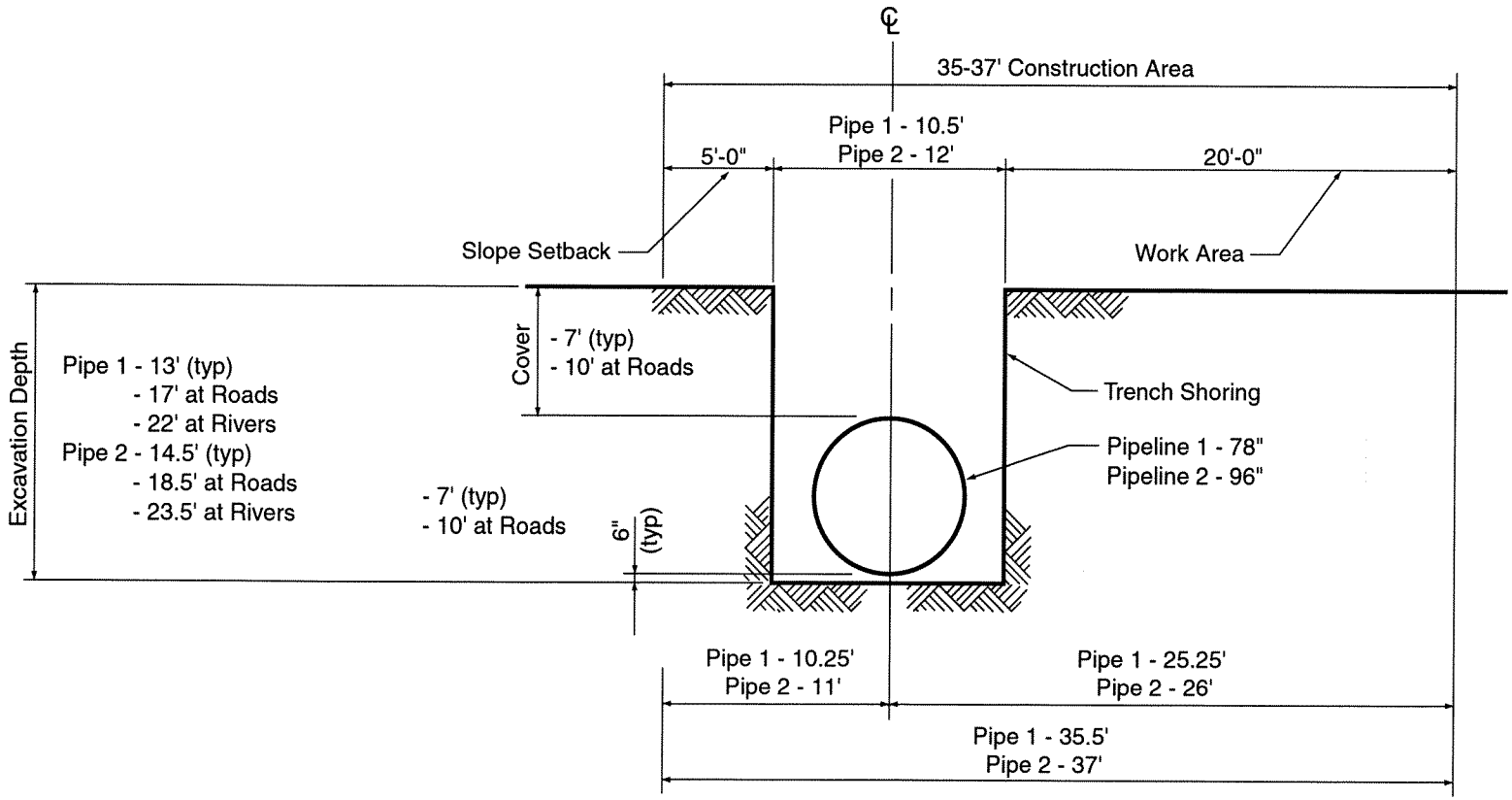
Access Roads and Staging Areas. Access roads and staging areas would be required for access to construction sites and to provide areas for material and equipment storage. The location of these facilities cannot be determined at this time. EBMUD would require that construction contractors identify such sites early in the construction planning process and would review the proposed locations to ensure that sensitive resources are not disturbed or affected. Contractors would be required to contain all activities within the approved sites.

Excavated Material. Excavation of native materials for pipeline trenches, pumping plants, and staging areas would produce excess material for disposal. Where feasible, displaced materials would be hauled to an appropriate off-site disposal location or spread across the right-of-way. Topsoil removed from the area to be excavated would be stockpiled and used to cover the pipeline right-of-way where feasible. The disturbed right-of-way would be reseeded with an appropriate seed mixture. To avoid altering local hydrologic conditions or flood flows, spoil materials would not be placed in sensitive habitat areas, such as wetlands, or in flood plains identified by the Federal Emergency Management Agency.

Folsom South Canal to Mokelumne Aqueduct Pipeline. Construction methods for this pipeline would generally be similar to those described for the Intake to Folsom South Canal pipeline. However, this pipeline would mainly be constructed in open terrain, with relatively small portions within streets or roadways.

River and Stream Crossings. As shown in Figure 2-1, the pipeline would cross several streams and rivers in Sacramento and San Joaquin Counties. Rivers and major streams crossed include Dry Creek and Mokelumne River. Construction at stream and minor river crossings would use open-cut methods during the dry season, when many minor streams and tributaries are dry or have low flows. If necessary, a temporary delivery channel would be constructed to redirect flows around the open-cut area during construction. Open trench work would be contained within the 130-foot construction easement, except for construction of a sedimentation basin, which would likely be about 1,000 square feet in area and built next to a creek bank just downstream of a stream crossing. Stream hydrology would be restored to its original condition immediately following construction.

Where necessary, major rivers would be crossed by tunneling the pipeline beneath the



Note:

For poor soils, excavation below the pipe will be 3 feet or to firm material.

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Figure2-4
Typical Shored Trench Pipeline Construction Cross Section

water channel to avoid disruption of flows. Tunneling is currently planned for the Mokelumne River. This construction method involves establishing an accessible, cleared area, approximately 0.5 to 1 acre in size at the driving side of the tunnel, for lay down and storage of pit construction and tunnel liner materials, mobilization of tunnel machinery and construction equipment, and temporary stockpiling of excavated tunnel material. Tunnel construction would entail creating driving and receiving pits, building an approximately 2,000-square-foot sedimentation basin, excavating the tunnel and installing a liner, and cleaning up and restoring the site after construction. These temporary activities would require easements in addition to the right-of-way easements described above.

Roadway Crossings. Many minor roadways and several major highways in rural Sacramento and San Joaquin Counties would be crossed. Roadway crossings would be constructed as described above for the Intake to Folsom South Canal pipeline, with tunneling performed at busy intersections and major highways.

Pumping Plants and Treatment Facilities. Most pumping plant and treatment facilities would be constructed aboveground. Portions of facilities to be located underground would be constructed by standard, open-cut construction methods. General construction, operation, and maintenance access to the project area would be via major highways in the area and various lesser roads that parallel and traverse the alignment. No existing facilities or structures would be removed during construction. Construction activities would include clearing and excavation, use of concrete forms, and backfilling. The 7-million-gallon tank for the aqueduct pumping plant would be constructed of concrete. A temporary cofferdam would be installed in the south end of the FSC to allow a new turnout structure to be built near the canal pumping plant.

Access Roads and Staging Areas. The locations of access roads and staging areas would be controlled as previously described for the Intake to Folsom South Canal pipeline.

Excavated Material. Excavated material would be used and disposed of as previously described for the Intake to Folsom South Canal pipeline.

Construction Schedule. Construction of all components of this alternative would require approximately 24 months if the following project components were constructed concurrently:

- New American River intake structure: construction would require between 12 and 18 months, depending on river flow and weather conditions.
- Intake to Folsom South Canal pipeline: construction would proceed at an average rate of 100 feet per day along Folsom Boulevard, 150 feet per day within other City and County streets, and up to 400 feet per day in construction areas outside roadways. Construction would require approximately 52 weeks over a 15-month span to complete.
- Treatment plant: construction would likely require two full construction seasons to complete.

Alternative 5: Sacramento River Delivery

This alternative combines many of the basic facility and operational elements of Alternative 3, "Joint Water Supply," as described in the 1997 DEIR/EIS, with elements of the basic facilities of Alternative 2, "Folsom South Canal Connection." Alternative 5 would involve the construction of a new intake on the Sacramento River immediately downstream of its confluence with the lower American River and near the location of the City's existing intake to the Sacramento River WTP. This new intake would be sized to provide EBMUD up to 155 cfs of water. A new pipeline with a capacity of 155 cfs would be constructed from this new delivery point to the FSC along the alignment described in the 1997 DEIR/EIS. As described for Alternative 3 in the 1997 DEIR/EIS, Alternative 5 would also involve the construction of a second pipeline to convey the water from the terminus of the FSC to the Mokelumne

Aqueducts, represented by Alignment 2 of Alternative 2, as described in the 1997 DEIR/EIS. This pipeline would also have a capacity of 155 cfs.

The information provided below is derived from the 1997 DEIR/EIS and modified as necessary to address differences between this alternative and those described in the 1997 DEIR/EIS.

Facilities

Figure 2-5 displays the facilities that would be constructed under this alternative.

New Delivery Facility. Under this alternative, EBMUD would construct a new delivery facility on the east bank of the Sacramento River adjacent to the City's existing intake facility. The City currently has plans to replace its existing intake with a new facility located approximately 400 feet to the south. The new intake facility would be similar in design to that described above for the EBMUD-Only Lower American River Delivery Alternative (Figure 2-2) and would allow the delivery of up to 155 cfs to EBMUD.

The facility would include a fish exclusionary system and would be designed to meet CDFG, NMFS, and USFWS criteria. A source of electrical power would be required to operate the new intake facility. Because of the developed nature of the surrounding land uses, many options for power supply are available.

Intake to Folsom South Canal Pipeline. The approximately 66-inch-diameter pipeline would pass from the new intake facility between existing structures to Jibboom Street. From here, the pipeline would turn north and then east onto Richards Boulevard to the intersection with Bercut Drive, from which point this alignment would be essentially identical to that described in the 1997 DEIR/EIS for intake Site 1. The pipeline would turn south on Bercut Drive and then east on Bannon Street (Figure 2-6), follow Bannon Street for approximately 2,400 feet, and then turn south onto North B Street. The pipeline would follow North B Street for approximately 4,500 feet and then turn south on 14th Street, cross under the existing railroad embankment, and continue one block to C Street. From this point, the pipeline would follow C Street and then follow the same alignment described above under Alternative 4, "EBMUD-Only Lower American River Delivery" (Figure 2-3b).

Pipeline Alignment Options. The potential pipeline options are the same as described for Alternative 4 (Figures 2-3a and 2-3b).

Folsom South Canal to Mokelumne Aqueducts Pipeline. The alignment of this pipeline is identical to that described for Alternative 4 (Figure 2-5).

Pumping Plants. The pumping plants required under this alternative for the FSC to Mokelumne Aqueducts pipeline are identical to those described for Alternative 4.

Treatment Facilities. Two options for water treatment are considered under this alternative (see Appendix B for a detailed description of treatment processes and graphic layouts of treatment facilities). For both options, the treatment facilities would be located at the Mokelumne Aqueducts pumping plant described above. In addition to the pumping plant facilities, treatment structures on the site would include clarifier tanks, a chemical building, an ozone generator, solids handling facilities, a clearwell, and pumping station. The total acreage required for this combined treatment and pumping facility is approximately 27 acres.

The height of the facilities would be one to two stories.

Operations

Under this alternative, EBMUD would be entitled to take delivery of up to a total of 133,000 acre-feet of CVP water in any year in which EBMUD's March 1 forecast of its October 1 total system storage, as revised monthly through May 1, is less than 500,000 acre-feet.

In addition, the entitlement shall not exceed a total of 165,000 acre-feet of delivered water in any consecutive 3-year period that EBMUD's total system storage forecast remains below

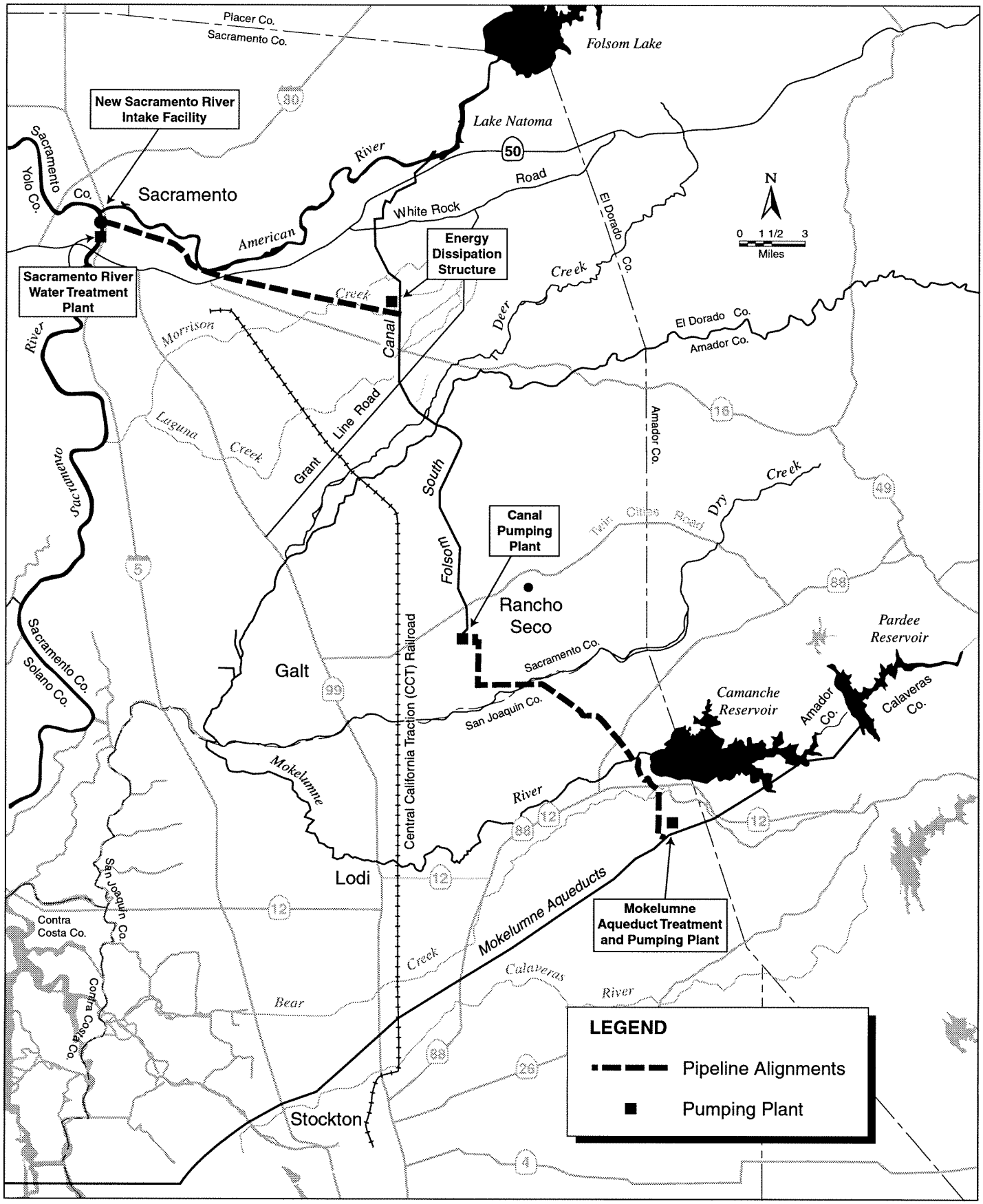

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Figure 2-5
Alternative 5: Sacramento River Delivery Alternative

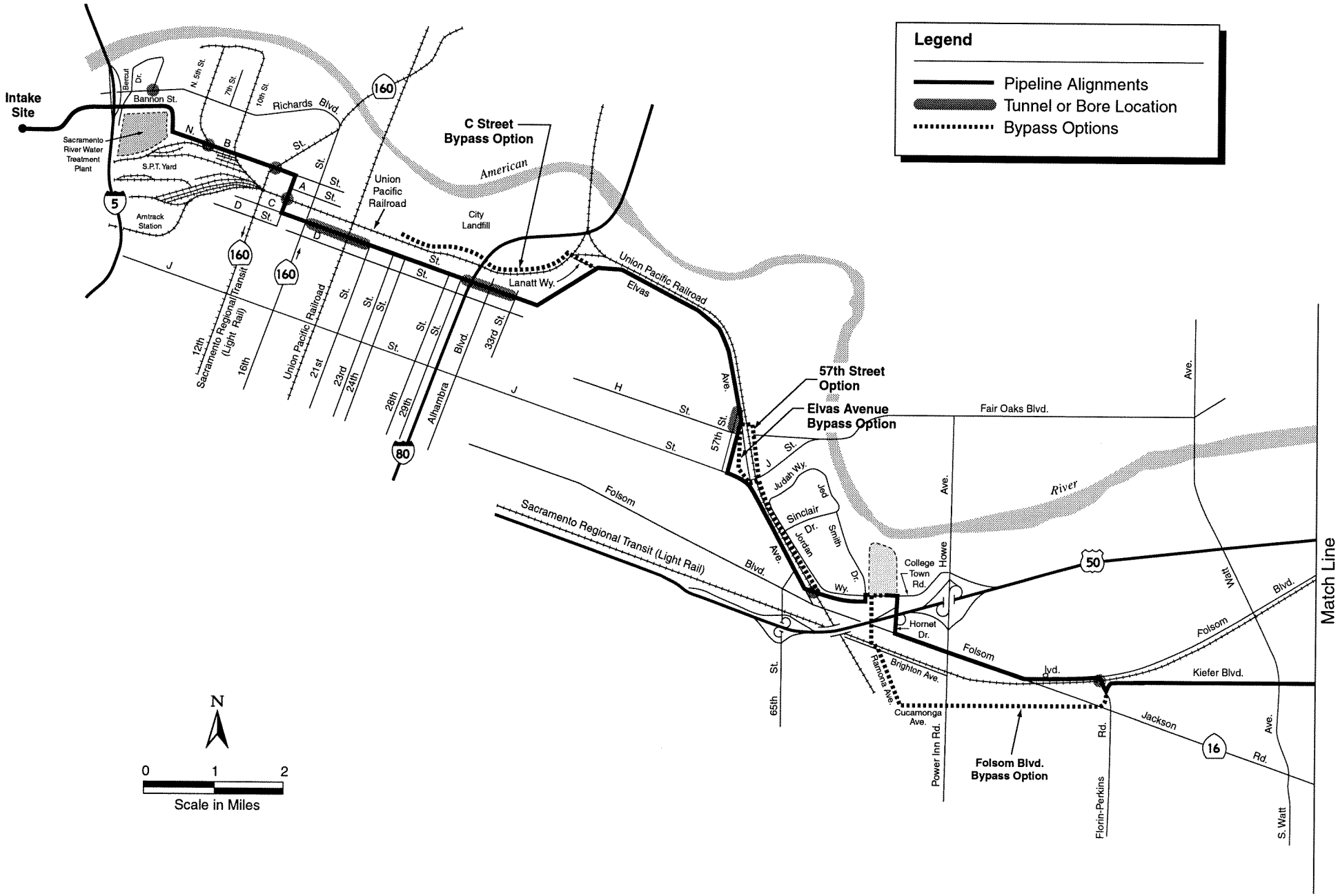

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Figure 2-6
Alternative 5: Intake and Pipeline Locations

500,000 acre-feet. Hodge Decision flows would not apply to this alternative, as the delivery of water would not occur on the lower American River.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 155 cfs of water from the new intake for direct use by its customers. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

Construction Considerations

Construction considerations are essentially identical to those described for Alternative 4, "EBMUD-Only Lower American River Delivery."

Construction Schedule. Construction of all components of this alternative would require approximately 24 months if the following project components were constructed concurrently:

- New Sacramento River intake structure: construction would require between 12 and 18 months, depending on river flow and weather conditions.
- Intake to Folsom South Canal pipeline: construction would proceed at an average rate of 100 feet per day along major roadways, 150 feet per day within other City and County streets, and up to 400 feet per day in construction areas outside roadways. Construction would require approximately 52 weeks over 15-month span to complete.
- Treatment plant: construction would likely require two full construction seasons to complete.

Alternative 6: Freeport East Delivery

This alternative is operationally similar to Alternative 5, "Sacramento River Delivery," described previously. Alternative 6 would involve the construction of a new intake on the Sacramento River upstream of the Freeport Bridge at the community of Freeport. This new intake would be sized to provide EBMUD up to 155 cfs of water. New pipelines with a capacity of 155 cfs would be constructed from this new delivery point to the FSC at approximately Grant Line Road and from the terminus of the FSC to the Mokelumne Aqueducts.

Facilities

Figure 2-7 displays the facilities that would be constructed under this alternative.

New Delivery Facility. Under this alternative, EBMUD would construct a new delivery facility on the east bank of the Sacramento River at Freeport. Figure 2-2 shows the conceptual design of this facility. The new intake facility would allow the delivery of up to 155 cfs to EBMUD. The facility would be similar in general design to the existing City intake facility at Fairbairn WTP. The pumping equipment would be contained within the intake structure. The intake facility would be approximately 100-125 feet long, 30-40 feet wide, and about 70 feet high. Pumps would be located inside the facility. The foundation would be pile-supported with pile lengths of 60 feet or more. An upper level pump and motor deck would be constructed above the 100-year flood elevation. The pumps would discharge to a common manifold and a discharge line(s) that would be carried to the south bank of the river via an access bridge. The access bridge would likely be pier- and pile-supported and run from the levee to the intake structure.

The facility would include a fish exclusionary system and would be designed to meet CDFG, NMFS, and USFWS criteria.

Intake to Folsom South Canal Pipeline. Under this alternative, a new pipeline would be constructed to connect the new intake facility to the FSC (Figure 2-7). This new pipeline would first travel north from the intake site, paralleling the western side of Freeport Boulevard, and under I-5 to the intersection with Meadowview Road. From this point, the alignment would turn east, following Meadowview Road, which becomes Mack Road, and would cross Highway 99. The alignment would continue east beyond that point to Power Inn Road, where it would

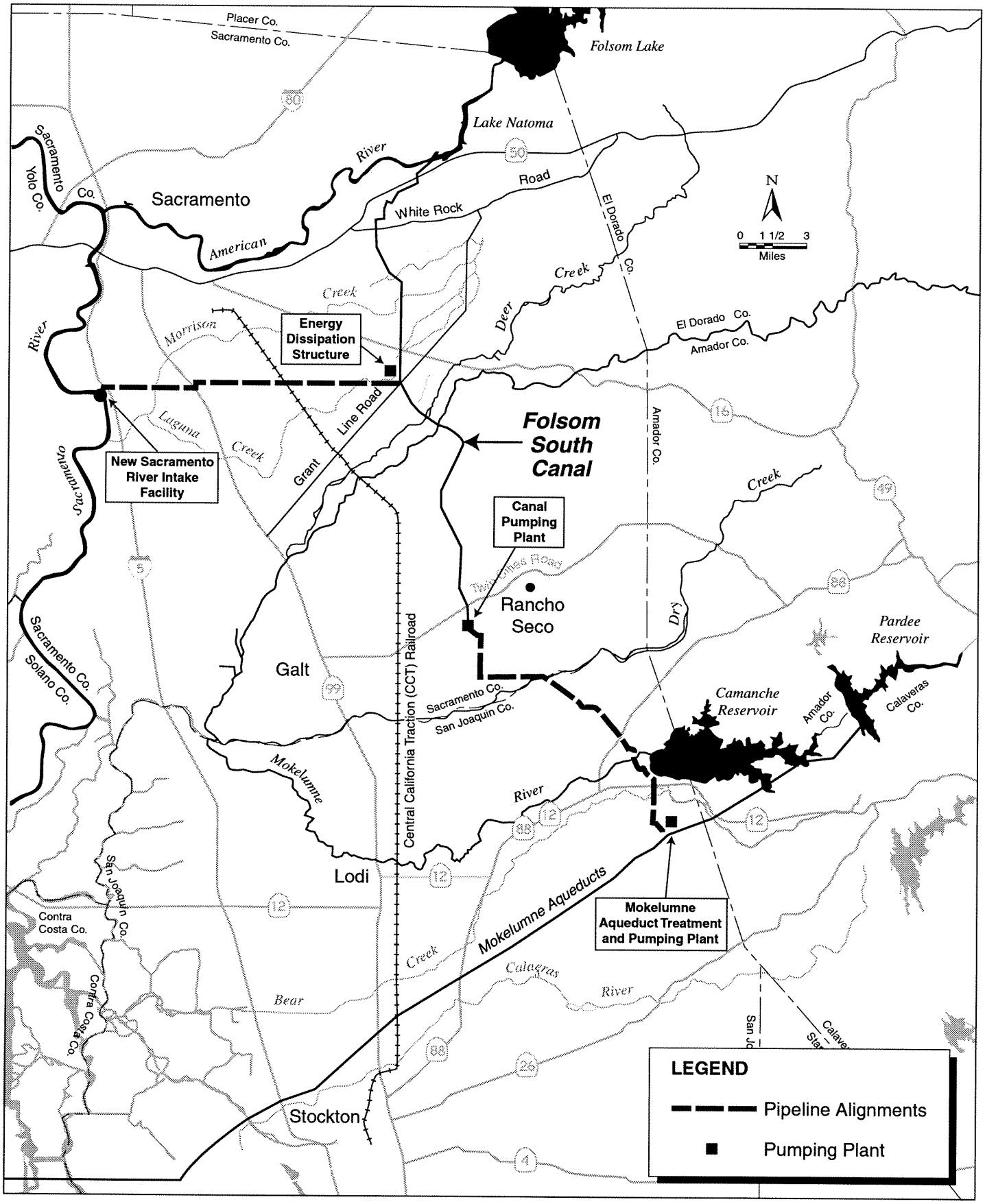

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Figure 2-7
Alternative 6: Freeport East Delivery

turn north to the intersection with Gerber Road. The alignment would then head east along Gerber Road and generally within the road right-of-way to Excelsior Road. At this point, Gerber Road ends. However, the right-of-way continues east, as does a gravel road. The pipeline would follow this alignment to the FSC, ultimately tying into the canal at approximately the existing EBMUD turnout location.

Folsom South Canal to Mokelumne Aqueducts Pipeline. The alignment of this pipeline is identical to that described for Alternative 4, "EBMUD-Only Lower American River Delivery."

Pumping Plants. Pumping facilities are the same as described for Alternative 4.

Treatment Facilities. Treatment options and treatment facilities for this alternative are identical to those described above for Alternative 5. See Appendix B for a detailed description of treatment processes and graphic layouts of treatment facilities.

Operations

Under this alternative, EBMUD would be entitled to take delivery of up to a total of 133,000 acre-feet of CVP water in any year in which EBMUD's March 1 forecast of its October 1 total system storage, as revised monthly through May 1, is less than 500,000 acre-feet.

In addition, the entitlement shall not exceed a total of 165,000 acre-feet of delivered water in any consecutive 3-year period that EBMUD's total system storage forecast remains below 500,000 acre-feet. Hodge Decision flows would not apply to this alternative, as the delivery of water would not occur on the lower American River.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 155 cfs of water from the new intake for direct use by its customers. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

Construction Considerations

Construction considerations would be similar to those described for Alternative 4, "EBMUD-Only Lower American River Delivery."

Construction Schedule. Construction of all components of this alternative would require approximately 24 months if the following project components were constructed concurrently:

- New Sacramento River intake structure: construction would require between 12 and 18 months, depending on river flow and weather conditions.
- Intake to Folsom South Canal pipeline: construction would proceed at an average rate of 100 feet per day along major roadways, 150 feet per day within other City and County streets, and up to 400 feet per day in construction areas outside roadways. Construction would require approximately 52 weeks over a 15-month span to complete.
- Treatment plant: construction would likely require two full construction seasons to complete.

Alternative 7: Freeport South Delivery

This alternative is operationally similar to Alternative 5, "Sacramento River Delivery," described previously. Alternative 7 would involve the construction of a new intake on the Sacramento River upstream of the Freeport Bridge at the community of Freeport. This new intake would be sized to provide EBMUD up to 155 cfs of water. A new pipeline with a capacity of 155 cfs would be constructed from this new delivery point to the Mokelumne Aqueducts.

Facilities

Figure 2-8 displays the facilities that would be constructed under this alternative.

New Delivery Facility. Under this alternative, EBMUD would construct a new delivery facility on the Sacramento River at

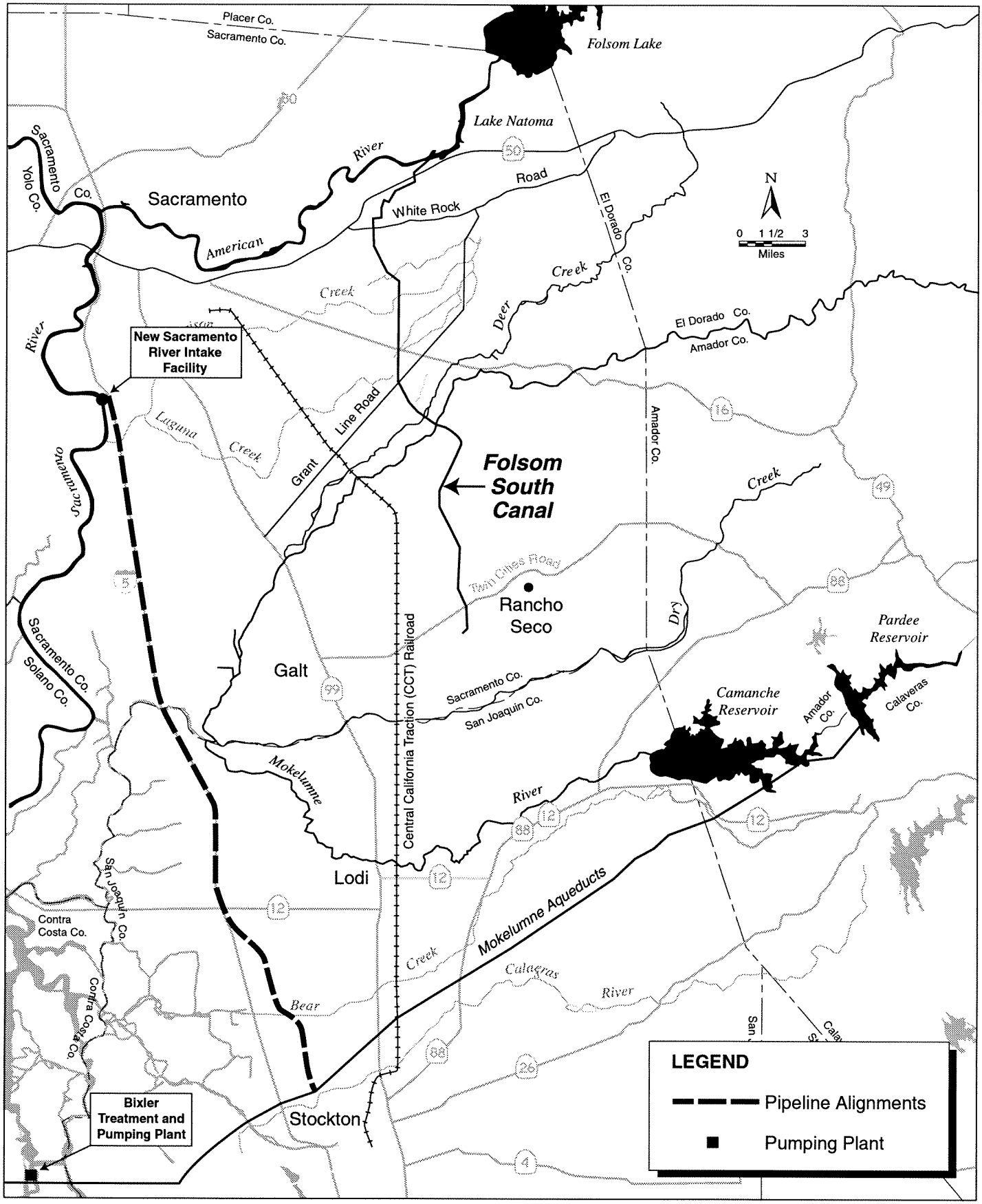

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Figure 2-8
Alternative 7: Freeport South Delivery

Freeport. Figure 2-2 shows the conceptual design of this facility. The new intake facility would allow the delivery of up to 155 cfs to EBMUD. The facility would be similar in general design to the existing City intake facility at Fairbairn WTP. The pumping equipment would be contained within the intake structure. The intake facility would be approximately 100-125 feet long, 30-40 feet wide, and about 70 feet high. Pumps would be located inside the facility. The foundation would be pile-supported, with pile lengths of 60 feet or more. An upper level pump and motor deck would be constructed above the 100-year flood elevation. The pumps would discharge to a common manifold and a discharge line(s) that would be carried to the southern bank of the river via an access bridge. The access bridge would likely be pier- and pile-supported and run from the levee to the intake structure.

The facility would include a fish exclusionary system and would be designed to meet CDFG, NMFS, and USFWS criteria.

Intake to Mokelumne Aqueducts Pipeline. Under this conveyance option, the pipeline from the intake facility would head east to intersect with I-5 (Figure 2-8). From this point, the pipeline would travel south generally following and immediately adjacent to I-5 on the eastern side of the freeway, although some deviations from this location may be necessary to avoid structures, facilities, and homes. The pipeline would continue following the I-5 alignment to approximately Peltier Road in San Joaquin County. From this point, the alignment would follow Thornton Road, which turns into Pacific Avenue within the City of Stockton, generally within the road right-of-way, to the Mokelumne Aqueducts at March Lane.

Piping and controls would be arranged to provide flexibility for routing flow into the Mokelumne Aqueducts. Capability would be provided to either dedicate one or two aqueducts to the supplemental water supply or to blend the supplemental water supply with water from Pardee Reservoir in each of the aqueducts in similar proportion.

Treatment Facilities. Treatment options and treatment facilities for this alternative are identical to those described above for Alternative 5. (See Appendix B for a detailed description of treatment processes and graphic layouts of treatment facilities.) However, under this alternative, untreated water would be placed in one or more of the existing Mokelumne Aqueducts at the tie-in location in Stockton. Untreated water would then be conveyed in the existing Mokelumne Aqueducts to the Bixler location, where the water would be removed from the aqueducts, treated as described above, including both treatment options under Alternative 5, and then placed back into the Mokelumne Aqueducts for conveyance to the EBMUD distribution system.

Operations

Under this alternative, EBMUD would be entitled to take delivery of up to a total of 133,000 acre-feet of CVP water in any year in which EBMUD's March 1 forecast of its October 1 total system storage, as revised monthly through May 1, is less than 500,000 acre-feet.

In addition, the entitlement shall not exceed a total of 165,000 acre-feet of delivered water in any consecutive 3-year period that EBMUD's total system storage forecast remains below 500,000 acre-feet. Hodge Decision flows would not apply to this alternative, as the delivery of water would not occur on the lower American River.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 155 cfs of water from the new intake for direct use by its customers. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

Construction Considerations

Construction considerations would be generally similar to those described for Alternative 4, "EBMUD-Only Lower American River Delivery." Construction techniques would also be similar. However, the location of the

treatment facilities within the Delta would require some special consideration because of the presence of unstable soils.

Construction Schedule. Construction of all components of this alternative would require approximately 24 months if the following project components were constructed concurrently:

- New Sacramento River intake structure: construction would require between 12 and 18 months, depending on river flow and weather conditions.
- Intake to Mokelumne Aqueducts pipeline: construction would proceed at an average rate of 100 feet per day within major roadways such as Pacific Avenue, 150 feet per day within other City and County streets, and up to 400 feet per day in construction areas outside roadways. Construction would require approximately 52 weeks over a 15-month span to complete.
- Treatment plant: construction would likely require two full construction seasons to complete.

Alternative 8: Bixler Delivery

This alternative is operationally similar to Alternative 5, "Sacramento River Delivery," described previously. Alternative 8 would involve the construction of a new intake in the Delta on Indian Slough adjacent to the Mokelumne Aqueducts at the location known as Bixler. This new intake would be sized to provide EBMUD up to 155 cfs of water. A new connection with a capacity of 155 cfs would be constructed from this new delivery point to the Mokelumne Aqueducts, and new treatment facilities would be constructed at or near the new delivery point.

Facilities

Figure 2-9 schematically displays the facilities that would be constructed under this alternative.

New Delivery Facility. The new intake facility under this alternative would be constructed on the bank at Indian Slough immediately adjacent to the Mokelumne Aqueducts. The intake facility would be located on an existing intake channel from Indian Slough. The intake pumping facilities would be housed in a building approximately 100 feet long, 40 feet wide, and 40 feet high.

The facility would include a fish exclusionary system and would be designed to meet CDFG, NMFS, and USFWS criteria. A source of electrical power would be required to operate the new intake facility. Many options for power supply are available.

Treatment Facilities. Two options for water treatment are considered for this alternative. (See Appendix B for a detailed description of treatment processes and graphic layouts of treatment facilities.) For both options, the treatment facilities would be located near the intersection of Bixler and Orwood Roads near the Bixler intake site. To meet primary and secondary drinking water standards, the water would be delivered from the new intake facility to the new treatment plant, treated, and then placed directly into the Mokelumne Aqueducts for conveyance to the EBMUD service area. Piping and controls would be arranged to provide flexibility for routing flow into the Mokelumne Aqueducts. Capability would be provided to either dedicate one or two aqueducts to the supplemental water supply or to blend the supplemental water supply with water from Pardee Reservoir in each of the aqueducts in similar proportion.

To provide a finished water quality similar to the current EMBUD supply, the water would be delivered from the new intake facility and passed through an advanced treatment process. Because the finished water from this process would be potable, it would not be placed back into the Mokelumne Aqueducts and mixed with untreated water. Instead, it would be conveyed in a separate pipeline within the existing Mokelumne Aqueducts right-of-way to connect to the EBMUD distribution system. In addition, the advanced treatment process would result in the creation of a brine reject stream that would require disposal. Because this brine would be more saline than Delta waters, it would need to be conveyed to Suisun Bay, where it could be

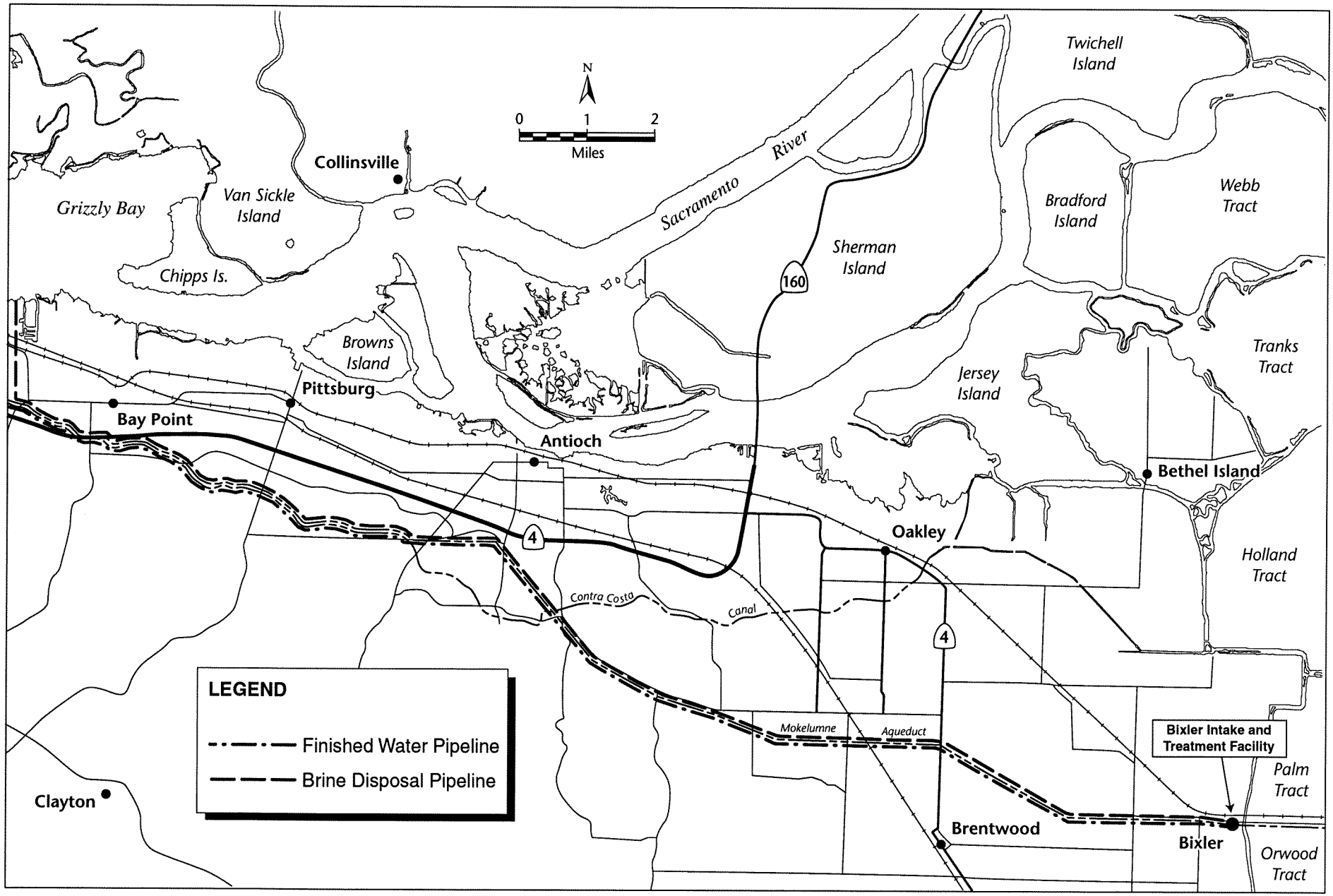

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Figure 2-9
Alternative 8: Bixler Delivery

discharged into waters of similar quality. Pumping plant facilities, treatment structures, and administration facilities would be located on the site. The height of these facilities would be one to two stories.

Operations

Under this alternative, EBMUD would be entitled to take delivery of up to a total of 133,000 acre-feet of CVP water in any year in which EBMUD's March 1 forecast of its October 1 total system storage, as revised monthly through May 1, is less than 500,000 acre-feet.

In addition, the entitlement shall not exceed a total of 165,000 acre-feet of delivered water in any consecutive 3-year period that EBMUD's total system storage forecast remains below 500,000 acre-feet. Hodge Decision flows would not apply to this alternative, as the delivery of water would not occur on the lower American River.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 155 cfs of water from the new intake for direct use by its customers. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

Construction Considerations

Construction considerations would be generally similar to those described for Alternative 4, "EBMUD-Only Lower American River Delivery." Construction techniques would also be similar. However, the location of the treatment and intake facilities within the Delta would require some special consideration because of the presence of unstable soils.

Construction Schedule. Construction of all components of this alternative would require approximately 24 months if the following project components were constructed concurrently:

- New Indian Sough intake structure: construction would require between 12 and 18 months, depending on river flow and weather conditions.
- Treated water and brine disposal pipelines: construction would proceed at an average rate of 100 feet per day along major roadways, 150 feet per day within other City and County streets, and up to 400 feet per day in construction areas outside roadways. Construction would require approximately 52 weeks over a 15-month span to complete.
- Treatment plant: construction would likely require two full construction seasons to complete.