1 Purpose and Need/Objectives

1.1 Introduction

The Contra Costa Water District's (CCWD's) mission is to "strategically provide a reliable supply of high quality water at the lowest cost possible, in an environmentally responsible manner." CCWD obtains its water supply exclusively from the Sacramento-San Joaquin Delta (Delta) and serves treated and untreated water to approximately 500,000 people in central and eastern Contra Costa County. CCWD strives not only to protect the quality of its source and delivered water, but to improve the quality of water delivered to its customers. Notwithstanding these efforts, Delta water quality at CCWD's intakes does not meet CCWD's water quality objectives at times, affecting CCWD's ability to consistently provide high-quality water to its customers. In addition, Federal and State drinking water regulations are becoming more stringent. CCWD is proposing the Alternative Intake Project to relocate some of CCWD's diversions to obtain better source water quality. The Bureau of Reclamation (Reclamation) is assisting CCWD in this action in a manner and to the extent consistent with the long-term renewal contract for Central Valley Project (CVP) water service between Reclamation and CCWD (Contract No. I75r-3401A-LTR1), water right permits issued to Reclamation for operation of the CVP, CVP operational requirements, and Section 103 [f][1][E] of Public Law 108-361.

An alternative intake could access higher-quality water than is currently available at CCWD's existing intakes during certain times of the year. CCWD's existing intakes are all located in the western Delta, where water quality can be diminished due to seasonal seawater intrusion into the Delta and other reasons. An intake in the central Delta would increase CCWD's flexibility to access source water of better quality.

The proposed action requires compliance with the California Environmental Quality Act (CEQA). The State CEQA Guidelines require that an environmental impact report (EIR) provide a clearly written statement of the purpose of and need for a proposed project. Section 15124(b) of the State CEQA Guidelines requires a statement of project objectives, including the underlying purpose of the project.

The Proposed Action would require Reclamation and CCWD to agree to a change in point of diversion of CVP water under Contract No. I75r-3401A-LTR1 and would require CCWD and Reclamation to petition the California State Water Resources Control Board (SWRCB) for necessary water right changes regarding point of diversion. CCWD and Reclamation each hold water rights and would both need to petition the SWRCB separately for permit modifications. Permits would be required from the U.S. Army Corps of Engineers (USACE). Actions by Federal agencies require compliance with the National Environmental Policy Act (NEPA), including preparation of an environmental impact statement (EIS) for actions that have the potential to "significantly affect the quality of the human environment” (42 USC 4332 C). NEPA regulations require a statement of “the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action” (40 CFR 1502.13). The statement of purpose and need is important because it explains why the proposed action is being undertaken and what objectives the action is intended to achieve. Moreover, the statement of purpose and need is critical in helping the lead agencies develop a reasonable range of alternatives to evaluate in the EIS and aids the decision makers in preparing findings or a statement of overriding considerations, if necessary.

This chapter summarizes the purpose and need/objectives of the Proposed Action.

1.2 Project Objectives

CCWD is committed to making financially responsible, cost-effective, and beneficial investments that ensure that customers receive high-quality water at all times. CCWD considers, among other factors, the recommendations and requirements of drinking water regulators, water industry standards of practice, and the preferences and concerns of its customers when evaluating the quality of water. Federal and State regulations combined with CCWD’s own water quality goals affect the planning, design, and operations of all CCWD water facilities.

The basic project purpose is to protect and improve the quality of water delivered to CCWD’s untreated- and treated-water customers. Key objectives of the project purpose are as follows:

1. **Improve Delivered Water Quality, Especially During Drought Periods.** Ensure delivery of high-quality water, particularly in late summer/fall months and during drought periods, when Delta source water quality is typically lowest.

2. **Protect and Improve Health and/or Aesthetic Benefits to Consumers.** Enable CCWD to consistently meet or exceed current and future Federal and State drinking water regulations and CCWD objectives to provide high-quality water and protect public health by reducing salinity and disinfection byproduct precursors.

3. **Improve Operational Flexibility.** Increase operational flexibility to help deliver high-quality water and maintain the benefits of the Los Vaqueros Project by enabling CCWD to extend the time periods during which Delta water of sufficient quality is available for: 1) filling Los Vaqueros Reservoir, and 2) direct use without the need for blending with higher-quality Los Vaqueros Reservoir water to meet delivered water quality goals.

4. **Protect Delivered Water Quality During Emergencies.** Help protect CCWD’s delivered water quality during emergency situations by enabling CCWD to avoid diverting water from areas of the Delta affected by a levee failure, chemical or hazardous spill, or other potentially catastrophic events.

1.3 Purpose and Need

The project purpose is to protect and improve the quality of water delivered to CCWD's untreated- and treated-water customers.

The need for this project derives from the following conditions:

- Delta water quality at CCWD's current intakes does not meet CCWD's Board-adopted water quality objectives during late summer and fall, as well as during drought periods.
- Future and more stringent Federal and State drinking water standards will be increasingly difficult to meet.
- Los Vaqueros Project benefits can be affected by periods of insufficient Delta water quality for reservoir filling or for direct diversion.
- Unforeseen events, such as levee failure, chemical and hazardous spills, and other events can seriously compromise water quality at CCWD's intakes.

1.4 Background

1.4.1 Delta-Only Water Supply

Since 1940, CCWD has obtained its water exclusively from the Delta, which is a primary source of fresh water for 23 million California residents. This water supply is subject to wide variations in salt and organic carbon concentrations, as well as other water quality parameters. Since its water source is subject to substantial variation, CCWD is taking, and will continue to take, strong proactive steps to protect and improve its untreated and treated water quality.

1.4.2 Delta Water Quality

Several factors affect water quality periodically at CCWD's Old River and Rock Slough intakes. California's continued population growth is increasing diversions of water from the Delta. Population growth is also increasing wastewater treatment plant outfall flows and stormwater runoff. Runoff and drainage from agricultural lands upstream and within the Delta also affect water quality at CCWD intakes. Long-term changes in any of these factors will influence water quality conditions in the Delta. Constituents that are of particular concern to drinking water are salinity, including chloride and bromide, and organic carbon.

1.4.2.1 Delta Salinity

The variation of water quality in the Delta with respect to both location and season is the result of tidal exchange with the San Francisco Bay, variations in freshwater inflow from the San Joaquin and Sacramento Rivers, export pumping by the CVP and the State Water Project (SWP), and agricultural and urban diversions and return flows. During dry conditions, seawater intrusion dominates and can result in increased salinity levels at

CCWD drinking water intakes. The lowest salinity concentrations in the Delta typically occur in spring and early summer (March through July). In late summer or early fall, salinities at CCWD intakes increase and typically exceed CCWD source water quality goals.

1.4.2.2 Bromide and Total Organic Carbon Levels

Drinking water is disinfected to kill bacteria, viruses, and other pathogens. Disinfectants are very active compounds; when added to a water supply, disinfectants not only kill bacteria and viruses, but also react with other chemicals in the water, including bromide and organic carbon. When disinfectants react with other chemicals, new compounds known as disinfection byproducts (DBPs) are created. Some DBPs have been linked to increased cancer risk and other health effects. Bromide and organic carbon are called DBP precursors because their presence is necessary for the formation of DBPs. An increase in DBP precursors results in a corresponding increase in DBPs in the drinking water supply. To reduce DBPs in the water it serves its customers, CCWD would need to decrease the amount of disinfectant it uses (which increases the risk of inadequate disinfection), modify treatment to increase removal efficiency of the DBP precursors, or it would need to access source water with lower levels of DBP precursors (which is what is proposed with the Alternative Intake Project).

1.4.2.3 Other Direct Effects on CCWD Customers

Taste and odor control also present significant challenges to CCWD. Even with the use of ozone and granular activated carbon (GAC) media filters, CCWD treatment plants still experience difficulty controlling periodic taste and odor episodes. Changes in Delta water quality are, at times, noticeable and objectionable to CCWD customers. In addition to adverse impacts on taste, elevated sodium and other mineral concentrations can adversely affect agricultural, industrial, and commercial operations, and can result in a health risk for some individuals. Poorer water quality increases the use of home water purifiers or purchased bottled water (increasing the costs to consumers), reduces the life of appliances and plumbing facilities, increases costs to industrial users by reducing the life of industrial facilities through corrosion or increasing the capital and operating costs of equipment to treat the water, increases water use of industrial customers (fewer cycles), is more costly to treat in order to meet drinking water regulations, and decreases opportunities for water recycling.

1.4.3 CCWD Water Quality Objectives

The CCWD Board of Directors has adopted water quality objectives[1] for its source water and treated water. The main constituents of concern to CCWD are chloride, bromide, and TOC. These constituents pose both taste and odor concerns, as well as public health risks related to the formation of DBPs. Water quality in the Delta at CCWD intakes does not meet CCWD's water quality objectives for extended periods each year. During these times, CCWD uses the higher-quality water stored in Los Vaqueros Reservoir to blend

[1] CCWD first adopted treated water quality objectives in 1993. In 1998, source water quality objectives were adopted. Objectives for both source and treated water were updated in August 2002. See Sections 2.3.2 and 2.3.3 for the current CCWD Board-adopted objectives for source water and treated water, respectively, and background on their development.

with the directly diverted Delta water to meet CCWD's water quality objectives. Using Los Vaqueros Reservoir, CCWD is currently able to meet its water quality objectives most of the time and current drinking water regulations all of the time. However, even with the source blending benefits of the Los Vaqueros Project, CCWD expects to exceed its water quality objectives during some extended periods of high salinity in the Delta and expects these periods to occur more frequently in the future as Delta conditions change. CCWD develops its facilities and operations to cost-effectively meet both treated and source water quality objectives to the extent practicable. CCWD aims to keep constituents of major health concern at the lowest levels that are technically feasible, and not merely at levels to meet existing regulatory limits. To better meet regulatory requirements and its Board-adopted objectives under all potential future conditions, CCWD must improve the quality of both its source and delivered water.

1.4.4 Future Drinking Water Standards

CCWD's source water quality ultimately influences the quality of its treated water and its ability to meet drinking water standards and CCWD treated water quality goals. The U.S. Environmental Protection Agency (EPA) and California Department of Health Services (DHS) are the primary regulatory agencies charged with setting and enforcing drinking water standards. In response to the Safe Drinking Water Act of 1986 and the Federal Safe Drinking Water Act Amendment of 1996, EPA has promulgated recommended goals and maximum contaminant levels (MCLs) for close to 200 constituents with purported health risks. In January 2006, EPA promulgated the Stage 2 Microbial and Disinfection Byproducts (MDBP) Rules. These regulations, which significantly revise previously adopted regulations for microbial pathogens and DBPs, have a number of new requirements, including new requirements for removal of *Cryptosporidium* while limiting DBPs to yet lower levels.

The trend in increasingly more restrictive water quality requirements necessitates that CCWD continue to strive to improve the quality of water it diverts so, in turn, CCWD can improve the quality of water delivered to its customers.

1.4.5 CALFED Water Quality Goals

CALFED has adopted a general target of "continuously improving Delta water quality for all uses, including in-Delta, environmental, and agricultural uses" (CALFED 2000 [Programmatic Record of Decision, page 65]) and a specific target of "providing safe, reliable, and affordable drinking water in a cost-effective way, to achieve either: (a) average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 micrograms per liter (μg/L) bromide and 3.0 milligrams per liter (mg/L) total organic carbon, or (b) an equivalent level of public health protection using a cost-effective combination of alternative source waters, source control and treatment technologies." The bromide and organic carbon goals (50 μg/L bromide and 3.0 mg/L total organic carbon) are based on a future 5-μg/L bromate standard for treated water and source water quality needs based on existing treatment technology. The equivalent level of public health protection goal was proposed in recognition that it is not currently possible to meet a 50-μg/L bromide target in the Delta without significant redirected impacts to water supply reliability and ecosystems. Bromide concentrations in the Delta consistently do not meet the CALFED target. Organic carbon concentrations are closer to the target but frequently exceed it.

1.4.6 CALFED's Delta Improvements Package and October 2004 Authorization Legislation

The California Bay-Delta Authority (CBDA) is a consortium of State and Federal agencies, including Reclamation, working to improve the Delta and implement the CALFED Bay-Delta Program. CCWD is working with CBDA to improve drinking water quality through a package of projects that address all elements of the CALFED Program (water quality, water supply reliability, ecosystem restoration, and levee integrity). The Alternative Intake Project is part of this overall Delta Improvements Package. Major water supply reliability and ecosystem restoration elements of the Delta Improvements Package are scheduled to move forward over the next several years. The *Regulatory Commitments—User Contributions Statement of Principles* (CALFED 2005) included the Alternative Intake Project as a project supported for implementation, subject to environmental review and permitting as required by law, as part of the balanced package of projects to move forward. That document also recognized the need for water quality projects to keep pace and move forward as part of a balanced implementation of the CALFED Program.

Section 103 [f](1)[E] of the Federal CALFED authorization legislation (Public Law 108-361) passed in October 2004 states:

> Funds may be expended for design and construction of the relocation of drinking water intake facilities to in-Delta water users.

Federal participation in the Alternative Intake Project is provided under this authority. In addition, actions on the Alternative Intake Project would be consistent with the Delta Improvements Package and coordinated on a timeframe consistent with the permanent operable barriers program in the south Delta.

2 Project Background

This Chapter provides an overview of CCWD's background, existing facilities and operations, development of water quality goals, and ongoing actions for improving water quality. Much of the information presented herein has application with respect to the affected environment and environmental consequences analyzed later, and provides an overall context to CCWD's mission and objectives, and CCWD's and Reclamation's project purpose and need/objectives and Proposed Action.

2.1 CCWD Background

CCWD is a public agency formed in 1936 by local California residents. CCWD serves treated and untreated water to approximately 500,000 people in central and eastern Contra Costa County. CCWD provides retail treated water to Clayton, Clyde, Concord, Pacheco, and Port Costa, and parts of Martinez, Pleasant Hill, and Walnut Creek from the Bollman Water Treatment Plant (WTP) in Concord. In addition, CCWD sells wholesale treated water to the city of Antioch and the California Cities Water Company in Bay Point. CCWD treats water at the Randall-Bold WTP in Oakley for delivery to the Diablo Water District and the city of Brentwood. CCWD sells untreated water to the cities of Antioch, Martinez, and Pittsburg, Diablo Water District in Oakley, and the California Cities Water Company in Bay Point, as well as 22 major industrial customers and a number of smaller industrial customers.

CCWD is a Central Valley Project (CVP) contractor, historically relying almost entirely on Reclamation to supply its water from the Sacramento-San Joaquin Delta. CCWD is authorized by Reclamation to divert up to 195,000 acre-feet per year (af/yr) through the Rock Slough and Old River intakes, with a reduction in deliveries during water shortages. CCWD's Los Vaqueros water rights allow up to 95,850 af/yr to be diverted from the Old River intake into storage in the Los Vaqueros Reservoir during certain periods. CCWD has additional water rights of its own for up to 26,780 af/yr from Mallard Slough. CCWD's operations are governed in part by biological opinions for the protection of threatened or endangered species. CCWD recently executed a renewed long-term CVP contract for the CCWD service area, consistent with Reclamation authority and all applicable State and Federal laws, including the Central Valley Project Improvement Act (CVPIA) (H.R. 429, Public Law 102-575) (Bureau of Reclamation 2005). Additional information on CCWD water rights and contracts is presented in Section 4.2, "Delta Water Resources."

2.2 CCWD Facilities and Operations

CCWD's existing facilities and operations, including Delta water intakes, untreated water distribution and pumping facilities, reservoirs, WTPs, and treated water distribution facilities, span across eastern Contra Costa County. CCWD maintains three Delta intakes at Old River near State Route (SR) 4, Rock Slough, and Mallard Slough. CCWD’s major water storage facility is the Los Vaqueros Reservoir, with 100,000 af of storage. CCWD operates three much smaller reservoirs: Martinez and Contra Loma (owned by Reclamation) and Mallard (owned by CCWD), with a combined usable storage of about 4,030 af. CCWD treats water at the Bollman WTP and the Randall-Bold WTP.

The most prominent features of CCWD’s conveyance system are: 1) the 48-mile-long Contra Costa Canal, which delivers water from Rock Slough and Old River to two CCWD WTPs; to WTPs owned and operated by the cities of Antioch, Pittsburg, and Martinez; to the WTP owned and operated by California Cities Water Company (Bay Point); and to a number of large industrial and irrigator customers; 2) the Old River, transfer, and Los Vaqueros pipelines, which convey water from the Old River intake to the Los Vaqueros Reservoir and to the Contra Costa Canal; and 3) the 21-mile-long Multi-Purpose Pipeline, completed in 2003, which allows CCWD to serve customers in Central Contra Costa County from the Randall-Bold WTP (jointly owned with the Diablo Water District). The Multi-Purpose Pipeline project alleviated capacity constraints in the Contra Costa Canal, facilitates conveyance of water supplies to the year 2040, and improves CCWD’s ability to respond to emergency needs.

All of CCWD’s intakes are subject to variations in water quality caused by salinity intrusion, Delta hydrodynamics, and discharges into the Delta and its tributary streams from both point and nonpoint sources. CCWD collects substantial water quality data from the Delta, runs operations and water quality models, operates state-of-the-art WTPs, and employs a multidisciplinary staff charged with maximizing the quality of water delivered to CCWD customers. The Old River intake is used most frequently because it has the best quality water and fish screens. Rock Slough is used as CCWD’s secondary option for diversion, and relatively minor diversions are made from Mallard Slough in most years because salinity levels are frequently high at this intake. Each of these intake facilities is discussed in detail below along with other CCWD facilities most relevant to the project purpose.

CCWD operates its intake facilities based on a long-term goal of delivering water with chloride concentrations of 65 milligrams per liter (mg/L) or better to its customers given physical limitations of the existing infrastructure and consistent with environmental regulations and permit conditions. (CCWD’s water quality goals are described in further detail in Section 2.3, “Drinking Water Standards and CCWD Water Quality Goals”). Water from the Mallard Slough intake exceeds this value throughout most of the year, and water from the Old River and Rock Slough intakes exceeds this value during periods of low Delta inflows, generally July until January. Consequently, CCWD meets its delivered chloride goal by using high-quality water from Los Vaqueros Reservoir to blend with Delta water when Delta chloride concentrations are above 65 mg/L. Exhibit 2.2-1 shows recent historical chloride concentrations from Rock Slough, Old River, and CCWD delivered water.

2.2.1 Los Vaqueros Reservoir

In 1998, CCWD completed construction of the Los Vaqueros Project, which includes the Los Vaqueros Reservoir and associated facilities, such as the Old River intake and Old River, transfer, and Los Vaqueros pipelines. The Los Vaqueros Project provides CCWD with the ability to store up to 100,000 af of water. The primary purposes of the Los Vaqueros Project are to improve the quality of water supplied to the approximately 500,000 people served by CCWD, to minimize seasonal water quality changes in delivered water, and to improve the reliability of the emergency water supply available to CCWD. CCWD uses the Old River intake near SR 4 to capture Delta flows when water quality is high, transfers the higher-quality water into the Los Vaqueros Reservoir, and later blends the stored reservoir water with supplies directly obtained from the Old River intake and Rock Slough intake when Delta water quality does not meet CCWD objectives. The Los Vaqueros Reservoir is located approximately 8 miles south of Brentwood in southeastern Contra Costa County.

The Los Vaqueros Reservoir is typically filled from the Old River intake during spring, when Delta water quality is high[1]. The Los Vaqueros Project Biological Opinions restrict CCWD from filling the reservoir for 75 days and restrict CCWD from all diversions for 30 days (concurrent with the 75-day filling restriction) each spring for the protection of sensitive fish species during these periods. During the 30-day “no fill” period in which all Delta diversions are restricted, CCWD uses water from the Los Vaqueros Reservoir to serve its customers.

Water stored in Los Vaqueros Reservoir is typically used to blend with Delta water during late September through early January. In early fall, Delta outflow requirements are reduced and high-salinity water often intrudes into the Delta, even in wet years. October and November are usually the months of highest salinity in the Delta. During that time, chloride concentrations can exceed 150 mg/L at Old River, and releases from Los Vaqueros Reservoir are blended with Delta diversions to achieve CCWD’s delivered chloride goal of 65 mg/L. In drought years, blending water from Los Vaqueros Reservoir can be needed for extended periods during the year.

2.2.2 Old River Intake, Pump Station, and Conveyance Facilities

Old River forms the western boundary of San Joaquin County and is a tidally influenced channel of the Delta flowing either north to the San Joaquin River or south toward the State and Federal pumping facilities, depending on tidal forces and State and Federal pumping operations. The Old River intake and pump station (intake) is located on the west bank of Old River on Byron Tract near SR 4 and the Town of Discovery Bay. The 16.8-acre site is owned by CCWD. The intake has a diversion capacity of 250 cubic feet per second (cfs). The Old River intake consists of a screened intake, pump station/wet well, vertical turbine pumps, surge tanks, and conveyance piping.

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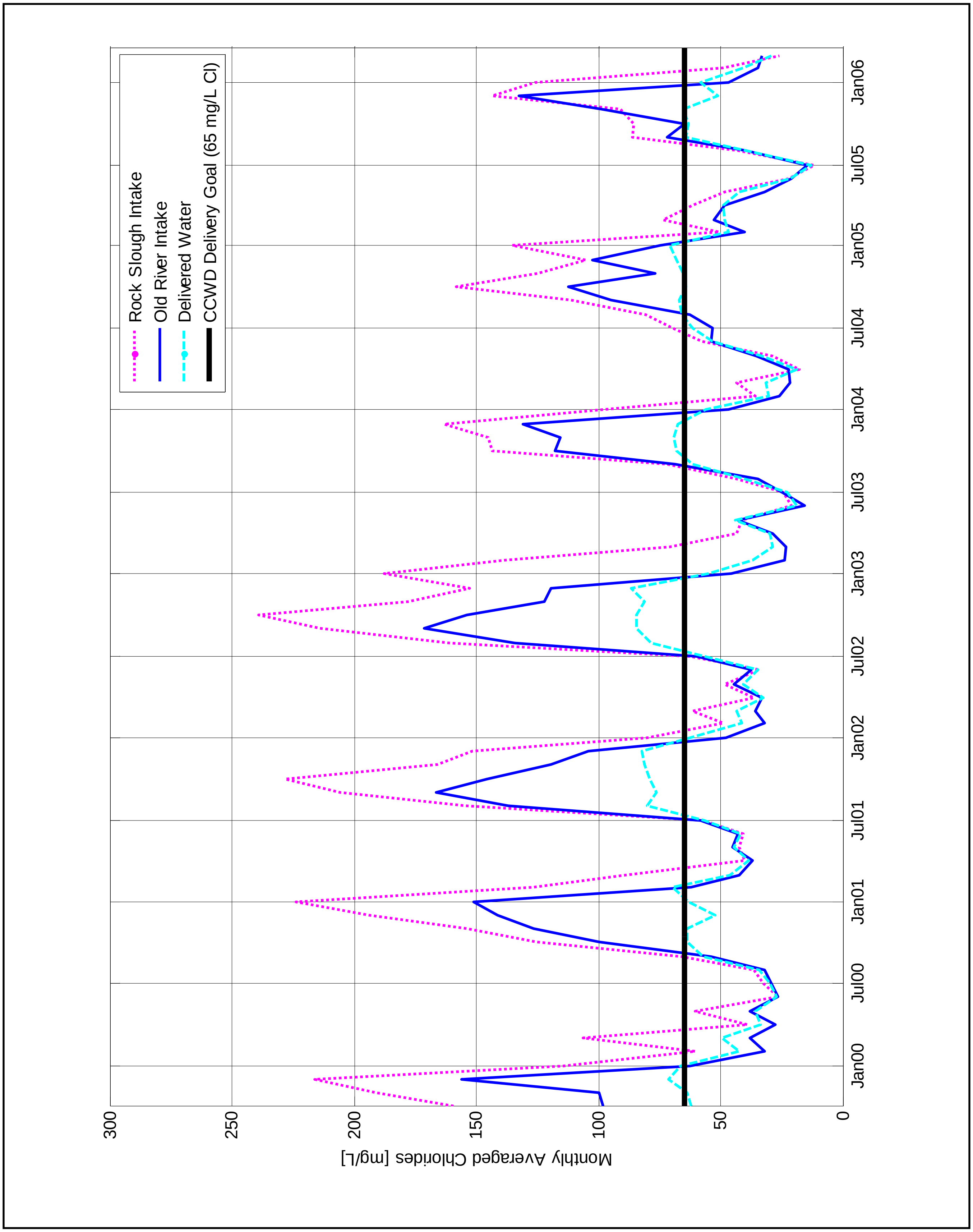
[1] The filling of Los Vaqueros Reservoir varies from year to year based on water quality conditions, but generally occurs between January and June when chloride concentrations at CCWD’s Old River intake are less than 50 mg/L.



Source: CCWD Data

Chloride Concentrations at CCWD Intakes and in Delivered Water

EXHIBIT 2.2-1

EDAW

The Old River intake has been CCWD's primary source of water since construction was completed in 1997. Water from the Old River intake is pumped to the Los Vaqueros Transfer Facility, from which it is pumped either to the Los Vaqueros Reservoir (up to 200 cfs through the Transfer Pipeline) or to the Contra Costa Canal (up to 250 cfs through the Los Vaqueros Pipeline). The transfer facility is also used to route water released from the Los Vaqueros Reservoir to the Contra Costa Canal. Buried pipelines connect the Old River pump station, the transfer facility, the Los Vaqueros Reservoir, and the Contra Costa Canal.

2.2.3 Contra Costa Canal and Rock Slough Intake

Construction of the Contra Costa Canal was completed by Reclamation in 1948. The canal is owned by Reclamation and operated by CCWD. The canal is the primary conveyance facility for CCWD's untreated water supply, which carries water from Rock Slough and Old River intakes or the Los Vaqueros Reservoir for deliveries throughout CCWD's service area. The canal delivers water from both Rock Slough and Old River to CCWD's two WTPs; to WTPs owned and operated by the cities of Antioch, Pittsburg, and Martinez; to the WTP owned by California Cities Water Company (Bay Point); and to a number of large industrial and irrigator customers.

The Contra Costa Canal is approximately 48 miles long, with the major deliveries within the first 19 miles, which run from Rock Slough to the Shortcut Pipeline near the Bollman WTP. This portion of the canal is divided into nine reaches. The first two reaches are unlined and run from Rock Slough to Pumping Plant 1. The remaining seven reaches are concrete lined, with capacities ranging from approximately 22 cfs to 350 cfs. Four pumping plants, within the first 7.1 miles of the canal, lift water 124 feet to flow the remaining length of the main canal by gravity. The Ygnacio Relift Pump Station diverts water from the main canal into the 5-mile Ygnacio Loop. The canal has several in-line siphons, culverts, and check structures, as well as a 0.25-mile-long tunnel.

The Rock Slough intake is located at the eastern terminus of the Contra Costa Canal. This intake has a capacity of 350 cfs and is currently unscreened.[2] In general, the water quality at the Old River intake is superior to the water quality at Rock Slough (see Exhibit 2.2-1). The Old River intake, however, does not have sufficient capacity to meet CCWD demands at all times. Therefore, Rock Slough continues to be an important component of CCWD's system.

2.2.4 Mallard Slough Intake

The Mallard Slough intake is located within a dredged intake channel that extends 3,000 feet south of Suisun Bay. The Mallard Slough intake facilities were recently upgraded to include a fish screen, a pump station with a capacity of 60 cfs (40 cfs normal operations), and a pipeline to the Contra Costa Canal in Bay Point. The pump station serves two purposes: (1) during periods of high Delta outflow, it delivers 40 cfs of untreated water to CCWD via the new 8,000-foot-long, 36-inch-diameter pipeline to the canal; and (2) in the event of earthquake damage to the eastern end of the Contra Costa Canal, it can deliver up to 60 cfs of untreated water to the western end of the canal for use by CCWD.

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[2] See Section 2.5.5 below regarding screening of the Rock Slough intake.

The Mallard Slough intake is operated primarily in late winter to early summer, typically January through June, during periods of high runoff. As freshwater flows into Suisun Bay from the Sacramento and San Joaquin Rivers, salinity levels at the intake are decreased, providing sufficient untreated water quality for CCWD's use. However, Mallard Slough diversions are unreliable most of the year because of high salinity in the San Joaquin River at the point of diversion. Water quality conditions have restricted diversions from Mallard Slough to approximately 3,000 af/yr on average.

2.2.5 Bollman and Randall-Bold Water Treatment Plants

The Bollman WTP was constructed in 1968, and the Randall-Bold WTP was constructed in 1992. The Bollman WTP has been improved since its construction to enhance water quality, safety, and reliability. Under its current configuration, the Bollman WTP includes sedimentation, ozonation, and filtration. The Randall-Bold WTP is able to produce high-quality treated water through ozonation and direct filtration. An additional sedimentation unit process is being constructed to improve water quality and reliably meet capacity needs. To guide WTP operations and future improvements, CCWD recently completed its 2003 *Water Treatment Plant Master Plan* (Carollo Engineers 2003).

2.3 Drinking Water Standards and CCWD Water Quality Goals

Two of CCWD's goals in meeting its mission are to:

- ensure that all CCWD activities meet or surpass all applicable laws and regulations, and
- ensure high-quality water for current and future needs.

The current and future drinking water regulatory climate and CCWD's process for developing water quality goals and objectives for treated and source water are provided below.

2.3.1 Drinking Water Standards

CCWD's source water quality ultimately influences the quality of its treated water and its ability to meet drinking water standards and CCWD treated water quality goals. The U.S. Environmental Protection Agency (EPA) and California Department of Health Services (DHS) are the primary regulatory agencies charged with setting and enforcing drinking water standards. Historically, these agencies have set minimum requirements, which designate the lowest water quality acceptable. Minimum requirements cover constituents that have adverse health impacts and constituents that are aesthetically displeasing (e.g., objectionable taste, cloudy or colored, staining of laundry or fixtures, etc.).

In response to the Safe Drinking Water Act of 1986 and the Federal Safe Drinking Water Act Amendment of 1996, EPA has promulgated recommended goals and maximum contaminant levels (MCLs) for close to 200 constituents with purported health risks. EPA's recommended goals define the levels at which the health risk is considered to be zero. These goals are not necessarily technically or economically achievable. EPA's

MCLs correspond to the minimum acceptable health risk. MCLs are required to reflect what can feasibly be achieved, recognizing technological and economic constraints.

Water purveyors are continuously challenged by the establishment of new and stricter regulations. The most important recent water quality regulations relevant to CCWD are EPA's Microbial/Disinfection Byproduct (DBP) Rules, promulgated in 2001, 2003, and 2006. The overall goal of this group of regulations is to balance the risks from microbial pathogens with those from carcinogenic DBPs. The most recent changes to these rules were the promulgation of Stage 2 Microbial and Disinfection Byproducts (MDBP) Rules[3] in January 2006. These rules include new requirements for treatment efficacy and *Cryptosporidium* inactivation/removal (proposed), as well as new standards for DBPs, disinfectants, and potential contaminants. In addition to Federal requirements, regulatory requirements have been established by DHS in accordance with the California Safe Drinking Water Act and Related Laws, referred to as the "blue book." In many cases, the State regulatory requirements and goals are more stringent than the Federal requirements.

Proposed future reductions in the allowable level of the DBP bromate are of particular interest to CCWD. Bromate is formed when bromide, a component of seawater found in Delta source water, is exposed to disinfectants during treatment. In the future, the bromate MCL of 0.010 mg/L is also likely to be lowered to 0.005 mg/L. EPA considered reducing the bromate MCL 0.005 mg/L as part of the Stage 2 Microbial Disinfection Byproducts Rules but concluded that many systems using ozone to inactivate microbial pathogens would have significant difficulty maintaining bromate levels at or below 0.005 mg/L. EPA will review the bromate MCL as part of the 6-year regulatory review process and may reduce it at that time. The simultaneous requirements of continuing to tighten the microbial standards while lowering the DBP concentrations (which increase with level of disinfection) will make it more difficult for CCWD to meet both competing sets of regulation. Source water quality protection and improvement is a critical step to ensure that treated water quality objectives can be met with reasonable costs to CCWD customers (Contra Costa Water District 2002).

CCWD's strategy for responding to new regulatory challenges is twofold. First, modifications of operational procedures or improvements to existing treatment facilities are implemented as necessary on an ongoing basis to ensure compliance with near-term (within the next 3 years) regulatory requirements. Second, planning and design of CCWD's major capital facilities incorporate future (within the next 10 years) regulatory requirements to the degree possible. Thus, major facilities that often take 5 or more years to plan, design, and construct will contain the capability and flexibility necessary to keep pace with regulatory requirements in a cost-effective manner.

The trend in increasingly more restrictive water quality requirements necessitates that CCWD continue to strive to improve the quality of its source water so, in turn, CCWD can improve the water quality delivered to its customers. A comprehensive strategy is

[3] The Stage 2 MDBP Rules were signed on December 15, 2005 and published in the *Federal Register* on January 4 and 5, 2006. They include the Stage 2 Disinfection Byproduct Rule and the Long Term 2 Enhanced Surface Water Treatment Rule.

required to ensure that CCWD water sources, facilities, and operations anticipate and meet future regulatory requirements. This strategy is discussed in more detail in Section 2.4, "CCWD Comprehensive Water Quality Strategy."

2.3.2 CCWD Source Water Quality Objectives

Source water refers to the water available at CCWD intakes. Concerns associated with CCWD's source waters include the following:

- *Salinity.* Salinity is a measure of the dissolved salts in water and includes chloride and bromide (see next bullet). High salinity adversely affects drinking water taste, landscape irrigation, and industrial and manufacturing processes. CCWD uses chloride as its main salinity indicator.
- *Bromide.* Seasonally high bromide levels increase DBP formation. Trihalomethane and haloacetic acid formation can limit the chlorine or chloramine dose that may be applied. Bromate formation during ozonation at the two WTPs can limit the ozone dose that may be applied. This may be a particular concern during drought years, when salt water intrusion in the Delta increases.
- *Total organic carbon.* High total organic carbon (TOC) levels (at times greater than 4 mg/L) lead to increased production of DBPs, and high coagulant doses are needed to reduce TOC to acceptable levels.
- *Turbidity.* High turbidity in source water results in sedimentation problems in storage and conveyance facilities upstream of the WTPs and increases treatment costs.
- *Variability.* The high variability of Delta water quality (total dissolved solids [TDS], TOC, turbidity, temperature, pH, etc.) increases the effort and cost required to maintain the production of high-quality water at the WTPs.
- *Pathogens.* Pathogens include total coliform and fecal coliform, and high levels would suggest contamination in the untreated water.
- *Taste- and odor-causing compounds.* Taste- and odor-causing compounds are a particular concern because taste and odor problems can be noticeable and objectionable to CCWD customers.
- *Algae.* Algae contribute to taste and odor problems, present an aesthetic issue, and interfere with treatment processes. Algal toxins are being reviewed by EPA for inclusion in future regulations.

In 1998, the CCWD Board adopted long-term water quality objectives for source water to complement the water quality objectives for treated water adopted by the CCWD Board in 1993. These source water quality objectives were updated by the CCWD Board in 2002 (Contra Costa Water District 2002). Source water quality objectives help ensure that the treated water quality objectives can be met at reasonable cost under future drinking water regulations. In particular, future regulations are anticipated to require higher levels of disinfection and lower levels of DBPs. The source water quality objectives help ensure that cost-effective means will be available to meet or exceed regulatory requirements in the long term (until about 2020) and to best serve the public in terms of health protection. Table 2.3-1 shows CCWD's source water quality objectives and the historical range of the water quality parameters they address.

Table 2.3-1
CCWD Source Water Quality Objectives

Parameter	Historical Range (and Average)		CCWD Objective
	Rock Slough Intake[1]	Old River Intake[2]	
Salinity			
Chloride (mg/L)	10–275 (94)	10–207(64)	50(65)[3]
Disinfection Byproduct Precursors			
Bromide[4] (μg/L)	50–810 (270)	60–650 (200)	50
TOC[4] (mg/L)	1.7–40 (4.6)	1.1–14 (4.0)	<3.0
Microbiological			
Cryptosporidium (oocyst/100 L)	No Data[5]	No Data[5]	0.075

Notes:
L = liter
mg/L = milligrams per liter
μg/L = micrograms per liter

1 From 1991 to 2003 (chloride based on daily measurements, bromide and TOC based on monthly measurements)
2 Bromide/TOC monthly data from 1994 to 2003, chloride daily data from 11/97 to 7/2004
3 CCWD's source water quality goal is 50 mg/L based on CCWD's need to fill the Los Vaqueros Reservoir and be able to meet 65 mg/L delivered water goal for CCWD's customers
4 Non-detect data assumed at detection limit for averaging purposes
5 No data have been collected at Rock Slough and the Old River Intake; however, historical data collected at CCWD's treatment plants since 1991 indicate a consistent non-detection of *Cryptosporidium*

2.3.3 CCWD Treated Water Quality Objectives

CCWD initially established specific water quality objectives for treated water in 1993, and updated these objectives in 2002 to meet or exceed the State and Federal water quality regulations scheduled for promulgation over the succeeding 10 years (Contra Costa Water District 1993, 2002). The water quality objectives are based on consideration of current and anticipated regulatory requirements, achievability, and costs. These include anticipated changes to the Disinfectant Byproducts Regulation and to the Long-Term Enhanced Surface Water Treatment Rule. CCWD has aimed, in its treated water quality objectives, to provide its customers with the highest water quality that is reasonably achievable. This ensures that constituents of major health concern are kept to the lowest levels that are technically feasible and not merely at levels to meet existing regulatory limits. The water quality objectives guide CCWD operations and future decisions about capital investments in facility improvements. The qualitative treated water quality objectives are to produce drinking water that:

- is aesthetically pleasing to the consumer,
- is in alignment with existing and projected regulatory goals except where economically or technically infeasible, and

- meets or exceeds minimum regulatory requirements at all times.

In addition to maintaining these objectives, CCWD strives to have no reportable DHS violations and no exceedances of the MCL for substances listed in its Annual Water Quality Reports. Table 2.3-2 lists CCWD's treated water quality objectives and the corresponding regulatory limits.

Table 2.3-2
CCWD Treated Water Quality Objectives and Regulatory Standards

Parameter	Units	Current Treated Water Quality	CCWD Objective	EPA Drinking Water Standard
Chloride	mg/L	30-80	65	250
Turbidity	NTU	<0.1	0.10	0.3
TOC	% reduction	25-45	30-45	25-45
Odor as MIB/geosmin	Ng/L	0-14	6	NS
Total coliform	number of +	<1%+	<1%+	<5%
Fecal coliform	Presence/absence	ND	ND	None
Giardia	Cysts	ND	ND	3 log removal
Virus	Viruses	ND	ND	4 log removal
Cryptosporidium	Cysts	ND	ND	N/A[a]
THMs	µg/L	40 [b]	20 [c]	80
HAAs	µg/L	30	20 [c]	60
Bromate	µg/L	10	5	10
Chloramine	mg/L	2.7	>0.2 and <3.0	>0.5 and <4.0

Notes:
mg/L = milligrams per liter
ND = non-detection
N/A = not applicable
NS = no standard
Ng/L = nanograms per liter
µg/L = micrograms per liter

[a] Based on EPA's Long Term 2 Enhanced Surface Water Treatment Rule, assuming source water falls into first bin (untreated water concentration less than 0.075 oocysts/L)
[b] Systemwide running average
[c] Individual sample tap running average

Source: "Water Quality Objectives," CCWD Board Agenda Item #5, August 7, 2002; EPA 2002

2.4 CCWD Comprehensive Water Quality Strategy

CCWD is implementing a comprehensive water quality strategy to protect and improve source and treated water quality for its customers. CCWD's multi-pronged approach includes seeking improved water quality sources, reducing impacts of Delta agricultural drainage on source water quality, participating in collaborative research on advanced water treatment of Delta water, and supporting regulatory and legislative initiatives for improving drinking water quality and source water protection. Since 1992, CCWD has spent over $850 million on capital improvements, including $450 million on the Los

Vaqueros Project, as well as over $200 million on projects directly related to improving water quality and the security of CCWD's water delivery system (such as improvements at both Bollman and Randall-Bold WTPs, construction of the Multi-Purpose Pipeline, improvements at Contra Loma Reservoir, and other CCWD projects). CCWD has established a program through its 2003 Water Treatment Plant Master Plan to guide current and future facility improvements to improve water treatment (Carollo Engineers 2003). CCWD's 10-year Capital Improvement Program for fiscal years 2006-2015 includes $111 million in capital projects related to water treatment facilities improvements (Contra Costa Water District 2005). Using CALFED funding, CCWD began a comprehensive program in 2000 to identify the significant sources of water quality degradation associated with local nonpoint source discharges near CCWD's intakes at Rock Slough and Old River. CCWD began to implement projects in 2004 to address these sources using the results of these studies. Major elements associated with this program include modification of agricultural drainage facilities on Veale Tract and Byron Tract (CALFED Rock Slough and Old River Water Quality Improvement Projects) and replacing the unlined Contra Costa Canal with a pipeline (Contra Costa Canal Encasement Project) to prevent seepage and runoff from entering CCWD's water supply. A key component of CCWD's comprehensive strategy is its involvement in numerous related actions to improve source and treated water quality. CCWD is undertaking some of these actions itself, while it is involved in numerous multi-stakeholder and regional activities attempting to improve water quality. These actions and projects are described below.

2.4.1 CCWD Water Quality Projects/Actions

2.4.1.1 Alternative Intake Evaluations

CCWD has a long history of evaluating alternative intake sites in the Delta. A total of 14 alternative intake sites were investigated in the early 1990s as part of the original Los Vaqueros Project environmental documentation (Contra Costa Water District 1992; Contra Costa Water District and Bureau of Reclamation 1993). Middle River alternatives had substantially better source water quality but were infeasible because of the additional costs associated with adding expanded intake and conveyance facilities to a reservoir. Alternatives to the Los Vaqueros Project included a stand-alone Middle River intake (without reservoir storage), but this alternative was excluded due to a number of factors including high cost and minimal water supply reliability during emergencies.

2.4.1.2 CALFED Rock Slough and Old River Water Quality Improvement Projects

Agricultural drainage from Veale Tract discharges into Rock Slough, near one of CCWD's three drinking water intakes, through a centralized drainage system. This drainage is high in salinity, organic carbon, and nutrients, relative to the ambient water in Rock Slough. The CALFED Rock Slough Water Quality Improvement Project moves the discharge 2 miles from its present location to an area on the south side of Veale Tract where local currents convey the drainage farther away from Rock Slough. This new discharge location also has higher flows that dilute the drainage to ensure that there are no redirected impacts on other water users or to the ecosystem. The new drainage system at Veale Tract is operational, and discharges into Rock Slough from Veale Tract have ceased.

The CALFED Old River Water Quality Improvement Project involves constructing a new pump station to provide a longer outfall for the agricultural drainage from Byron Tract into Old River, near CCWD's Old River intake. The new Byron Tract agricultural drainage outfall extends an additional 150 feet to the centerline of Old River, where dilution flows effectively eliminate detection at CCWD's intake. The Byron Tract drainage outfall was completed in December 2004. Construction of the pump station to finish the project was completed in late 2005.

It is anticipated that the CALFED Rock Slough and Old River Water Quality Improvement Projects will reduce salt loadings at CCWD's intakes from these agricultural drainage sources by about 90–100%.

2.4.1.3 Contra Costa Canal Encasement Project

The Contra Costa Canal Encasement Project is being pursued by CCWD to protect and improve water quality in the unlined Contra Costa Canal from nonpoint source degradation. The project also improves flood control and public safety and ensures compatibility with adjacent land use. Historical land use adjacent to the canal was predominantly agricultural but is rapidly changing. Future land uses will include residential and commercial development, and extensive wetlands restoration projects, including the CALFED Dutch Slough Tidal Restoration Project.

The unlined portion of the Contra Costa Canal will be modified by replacing the existing canal with a buried pipeline within Reclamation's right-of-way or immediately adjacent to it. These modifications will effectively isolate the canal from groundwater and surface water runoff. Improvements in water quality will result in reduced formation of regulated DBPs in drinking water. The project will also improve water operations of the CVP and State Water Project (SWP) because the project area includes a water quality compliance location at Pumping Plant No. 1 (reducing local degradation allows the export projects to use less water to meet existing water quality requirements).

This project is currently in the preliminary design phase. Construction is anticipated to start in September 2007and will be completed within 5 years.

2.4.2 Regional Multi-stakeholder Water Quality Projects/Actions

2.4.2.1 CALFED Delta Region Drinking Water Quality Management Plan

CCWD partnered with the City of Stockton and Solano County Water Agency to develop a plan for managing the quality of water that all three agencies deliver to their customers. The partnership received a $250,000 grant from CALFED to fund the first phase of this work. The plan focuses on improving water quality to meet urban customers' drinking water needs. Some of the methods for improving water quality identified in the plan include relocating intakes to locations with better water quality, using advanced treatment processes to remove organic carbon and reduce formation of potentially harmful DBPs, and protecting source water to prevent contamination.

2.4.2.2 Joint Study to Identify Projects of Mutual Benefit to Sacramento Regional County Sanitation District and Water Agencies

The Sacramento Regional County Sanitation District and several urban water agencies, including CCWD, are conducting a study with the goal of identifying reasonable and feasible projects that improve water quality near drinking water intakes. Candidate projects at this time are broad concepts without specific implementation plans and will need considerably more development.

2.4.2.3 Central Valley Drinking Water Policy

The Central Valley Regional Water Quality Control Board (CVRWQCB) passed a resolution supporting the development of a drinking water policy for the Delta and upstream tributaries on July 9, 2004. The Central Valley Drinking Water Policy is an ongoing CALFED project led by the CVRWQCB that could potentially lead to new water quality standards or regulatory requirements. That multi-year effort is not expected to produce any substantive regulatory changes until 2009 at the earliest.

2.4.2.4 SWRCB Water Quality Control Plan Periodic Review

The SWRCB, as part of its periodic review of the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta WQCP), is exploring potential revisions to Delta standards. In comments provided to the SWRCB in February 2005 during the periodic review of the current Delta WQCP, CCWD proposed implementation of a new drinking water quality objective for bromide. The SWRCB is currently reviewing the collected public comments and will formulate and implement a revised WQCP over the next several years.

2.4.2.5 Advanced Treatment Demonstration Project

CCWD is leading a partnership with the EPA, the American Water Works Association Research Foundation, and the other Bay Area water agencies that utilize Delta water to study combinations of disinfectants that reduce the formation of harmful DBPs. The study also involves a side-by-side comparison at the demonstration scale (0.5 million gallons per day [mgd]) of two leading ultraviolet (UV) technologies to test lamp fouling rates with Delta water and sensor reliability. The other Bay Area agencies in the study include the Santa Clara Valley Water District, Alameda County Water District, Zone 7 Water District of Alameda County, Solano County Water Agency, and the cities of Napa and Fairfield. The final report is expected by early 2007. Results of this research will provide CCWD and other water agencies with information that will assist with future investment decisions related to advanced treatment and other water quality improvement projects.

2.5 Other Related Delta Actions/Projects

The Delta is an area of competing interests that serves as a drinking water source to two-thirds of the state’s residents, an agricultural irrigation supply, habitat for fisheries and other wildlife, and a recreation area. There are numerous other projects and CALFED actions under development in the Delta with multiple project purposes (e.g., supply reliability, ecosystem restoration, recreation enhancement, agricultural water quality improvement, etc.). Some of these projects that have the potential to affect Delta drinking water quality or CCWD facilities are discussed below.

2.5.1 CALFED Los Vaqueros Reservoir Expansion Project

Reclamation, in cooperation with CCWD and California Department of Water Resources (DWR), began Federal feasibility studies in 2003 of the potential expansion of the Los Vaqueros Reservoir from the existing capacity of 100 thousand acre-feet (TAF) to a capacity of up to 500 TAF. The CALFED Bay-Delta Program's long-term plan recognized that expanding the Los Vaqueros Reservoir could help to restore ecological health of the San Francisco Bay/Delta system and improve water management for beneficial uses and is included as one element of the CALFED Storage Program. The two primary objectives are to develop lower cost replacement water supplies for a fisheries protection program such as the long-term Environmental Water Account (EWA) program or an equivalent program and to increase water supply reliability for Bay Area water agencies. To the extent possible through the pursuit of the primary objectives of water supply reliability and environmental water, a secondary objective of improving the quality of water deliveries to Bay Area water agencies in the study area will also be examined. Currently, a feasibility report is being developed following established Federal planning principles and practices. Reclamation is the lead agency for NEPA compliance and, in conjunction with CCWD (the lead agency under CEQA, will prepare a joint EIS/EIR for the Los Vaqueros Reservoir Expansion Project). The Draft EIS/EIR and Feasibility Report are anticipated to be completed in 2007. This timeline will enable participating agencies to incorporate other Delta actions, including the Proposed Action, into the Los Vaqueros Expansion planning process.

CCWD's Proposed Action under the Alternative Intake Project neither commits CCWD to move forward with the future expansion of the Los Vaqueros Reservoir nor precludes the future expansion of the Los Vaqueros Reservoir. Rather, CCWD's Proposed Action can be complementary to an expanded Los Vaqueros Reservoir, just as it would be complementary to and improve operational flexibility of the existing Los Vaqueros Project.

2.5.2 Franks Tract Project Feasibility Studies

A potential CALFED project is located at Franks Tract in the north central Delta. Franks Tract flooded in 1936 and again in 1938 as the result of a levee breach. Preliminary water quality modeling studies conducted by DWR and its consultants have demonstrated that reconfiguring Franks Tract could potentially reduce the extent of salt penetration and salinity increases in portions of the Delta (primarily Old River south of Franks Tract and north of Tracy). The Federal CALFED legislation authorizes Franks Tract for feasibility studies. Federal feasibility studies have not yet been initiated, but preliminary efforts are underway to evaluate the potential to create water quality, water supply, ecosystem, and recreational benefits at Franks Tract. Project components for water quality purposes could include modification of remnant levees and construction of tidal gates to inhibit salt trapping and mixing. The water quality benefits of Franks Tract are not yet fully understood, but preliminary investigations undertaken by CCWD suggest that Franks Tract and the Proposed Action under the Alternative Intake Project could be complementary actions.

2.5.3 Freeport Regional Water Project

East Bay Municipal Utility District (EBMUD), Sacramento County Water Agency (SCWA), and Reclamation agreed to jointly pursue the development of the Freeport Regional Water Project (FRWP) to divert water from the Sacramento River. The Freeport Regional Water Authority (FRWA), a joint powers agency formed under State law by EBMUD and SCWA, proposed the FRWP to construct and operate a water supply project to meet regional water supply needs of EBMUD and SCWA. The FRWP facilities include an intake structure on the Sacramento River near Freeport, conveyance facilities located in central Sacramento County, a terminal facility located at a point of delivery to the Folsom South Canal (FSC), and pump stations and pipelines to convey water from the FSC to EBMUD's Mokelumne Aqueduct (Freeport Regional Water Authority 2003).

As settlement of disputes regarding the FRWP, CCWD, FRWA, EBMUD, and SCWA entered into an agreement in January 2004 that provides for the wheeling of up to 3,200 af annually of CCWD's water through the FRWA and EBMUD facilities into the Los Vaqueros Reservoir. The purpose of this agreement is to ensure that the water quality objectives for CCWD can continue to be met by offsetting the water quality degradation that is expected at CCWD's intakes from the implementation of the FRWP. In conjunction with the settlement, an intertie will be constructed to connect the CCWD Los Vaqueros Pipeline to the EBMUD Mokelumne Aqueduct. The intertie would also function as an emergency connection between EBMUD and CCWD, enabling both the agencies to share water resources in the event of an emergency. The CCWD-EBMUD intertie is in design with construction expected to begin in summer 2006.

2.5.4 South Delta Improvements Program

DWR and Reclamation are responsible for implementing CALFED's South Delta Improvements Program (SDIP). Actions contemplated as part of the SDIP include providing for more reliable long-term export capability by the State and Federal water projects, protecting local diversions, and reducing impacts on San Joaquin River salmon. Specifically, the CALFED actions in the SDIP include placement of a permanent fish barrier at the head of Old River, three permanent operable barriers in south Delta channels to protect water quality and levels for agricultural diversions, dredging of some Delta channels to improve conveyance, and increasing permitted diversions from Clifton Court Forebay to 8,500 cfs. The program's Draft EIS/EIR was released on November 10, 2005.

2.5.5 Rock Slough Fisheries Mitigation Actions

The CVPIA includes a requirement for Reclamation to develop and implement a program to mitigate fishery impacts resulting from the operation of the Contra Costa Canal Pumping Plant No. 1 (Public Law 102-575 Sec 3406[b][5]). This program may include a fish screen at Rock Slough, modified operations, or other measures to mitigate fishery impacts. The timing and elements of the program and any changes to environmental requirements associated with it are highly uncertain, and no funding has been appropriated for its development and implementation. Because of the uncertainty of the timing and form that this mitigation program might take, the analysis of the Alternative Intake Project in this EIR/EIS has conservatively assumed no fish screen at Rock Slough or other measures under future conditions pursuant to this requirement.

2.5.6 Bay Area Regional Desalination Feasibility Study

The Bay Area Regional Desalination project includes CCWD and three other Bay Area water agencies. The regional project may consist of one or more regional desalination facilities with an ultimate capacity of up to 65 mgd. Three viable sites have been identified and the agencies are currently conducting a feasibility study to more closely define the project facilities and the institutional framework to share the costs and benefits of the project.

2.5.7 San Joaquin River Water Quality Management Group

The San Joaquin River Water Quality Management Group is a group of stakeholders coming together to develop cooperative solutions to achieve the water quality objectives in the San Joaquin River, specifically salinity at Vernalis and dissolved oxygen in the Stockton Deep Water Ship Channel. The group is studying multiple strategies for realizing these goals, and is in the process of drafting formal recommendations to Reclamation and DWR. CCWD supports these efforts as part of the overall improvement of Delta water quality. However, because of Delta hydrodynamics, changes in San Joaquin River water quality are not expected to result in drinking water quality improvements at CCWD intakes, but will primarily benefit local agricultural water users in the south Delta.

3 Alternatives, Including the Proposed Action

Chapter 3 documents compliance with CEQA and NEPA requirements for alternatives analysis and the alternatives development process, and describes the five alternatives evaluated in detail in this EIR/EIS.

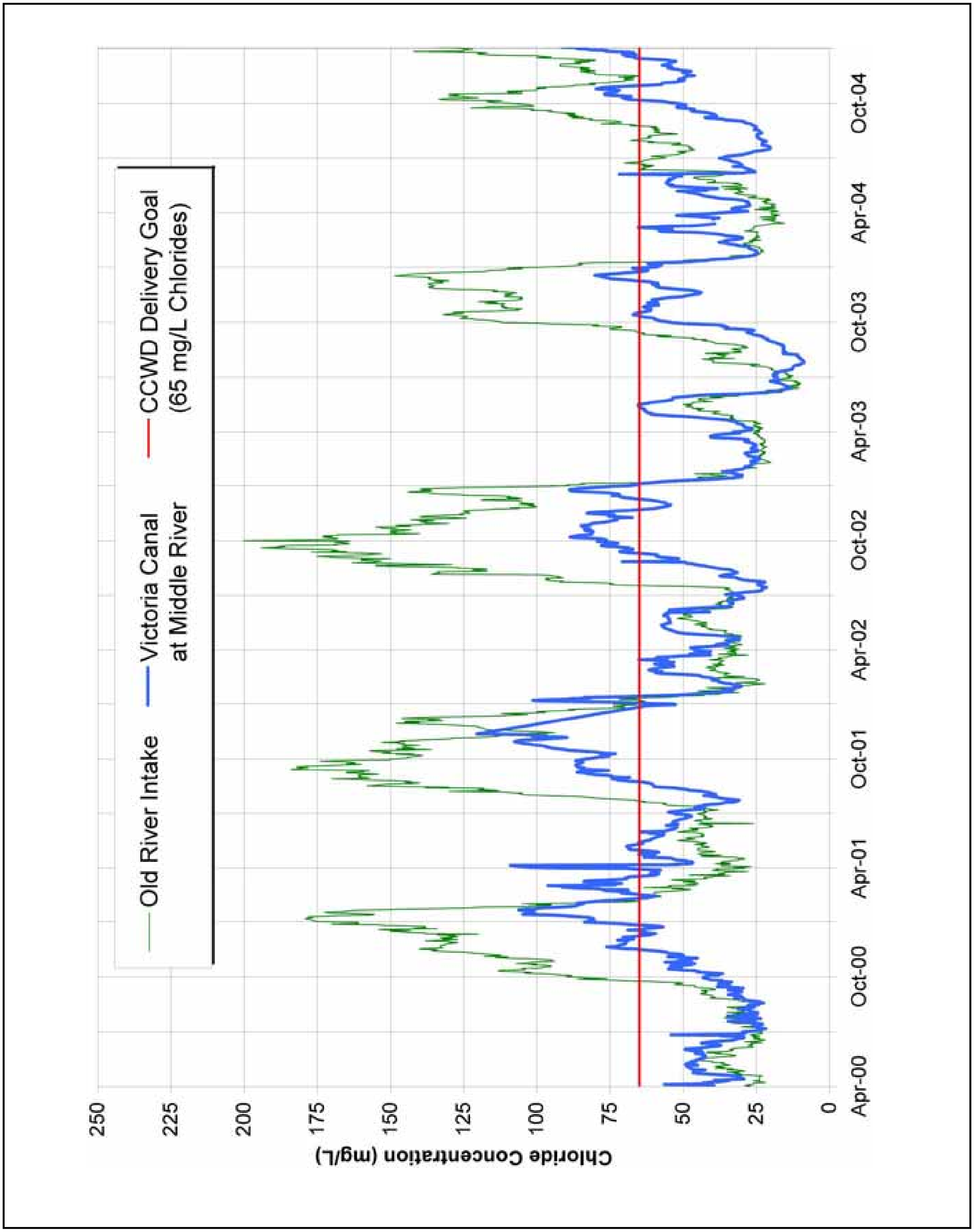
3.1 Overview of the Alternatives Evaluated in This EIR/EIS

The following five alternatives are evaluated in detail in this EIR/EIS:

- No-Action Alternative,
- Alternative 1: Alternative Intake with Direct Pipeline Route (Proposed Action),
- Alternative 2: Alternative Intake with Indirect Pipeline Route (Indirect Pipeline Alternative),
- Alternative 3: Alternative Intake with Modified Operations (Modified Operations Alternative), and
- Alternative 4: Desalination Alternative.

The No-Action Alternative would entail CCWD continuing to operate and maintain its existing facilities to maximize delivered water quality consistent with environmental regulations and permit conditions. In the near term, there would be no substantive or predictable operational changes implemented under the No-Action Alternative. Under future levels of demand, the No-Action Alternative includes the expansion of the Old River pump station to a capacity of 320 cubic feet per second (cfs) consistent with the CCWD Future Water Supply Implementation EIR (CCWD 1998). The No-Action Alternative also includes three reasonably foreseeable future CCWD projects, discussed in Section 3.3, "No-Action Alternative."

Alternative 1, the Proposed Action, would protect and improve delivered water quality for CCWD customers by enabling CCWD to relocate some of its existing diversions to Victoria Canal, a Delta location with better source water quality than is currently available at its Old River and Rock Slough intakes. Exhibit 3.1-1 illustrates the better water quality available at Victoria Canal during key periods. The alternative intake would divert up to 250 cfs from a new intake on Victoria Canal. Although it would change the location (and quality) of some of CCWD's existing diversions, the Proposed Action would not increase CCWD's total Delta diversion capacity (rate or average annual quantity) and would not change CCWD's demands or the quantity of water delivered to



Source: CCWD Data

Comparison of Chloride Concentrations at Old River Intake Versus Victoria Canal

EXHIBIT 3.1-1

its service area each year; under current conditions, no more than 250 cfs would be diverted from the combined Old River intake and new alternative intake.

The Proposed Action includes a new, screened water intake and pump station located along the lower third of Victoria Canal on Victoria Island in the central Delta, and a pipeline that would extend 12,000–14,000 feet from the new intake directly across Victoria Island and beneath Old River and tie into CCWD's existing Old River conveyance system on Byron Tract. The Proposed Action would involve adding a new point of diversion to certain existing water rights held by CCWD and by Reclamation. CCWD would not seek to increase its water rights, Central Valley Project (CVP) contract amounts, or permitted Los Vaqueros Reservoir filling rates through this action.

Alternative 2, Indirect Pipeline Alternative, is the same as the Proposed Action except that the pipeline route from the new intake to the Old River pump station would be indirect, following existing drainages on Victoria Island. This longer pipeline route could help minimize disruptions to existing agricultural operations on Victoria Island during construction. It is envisioned that the pipeline would extend northward from the proposed intake structure location parallel to an existing agricultural access road to below State Route (SR) 4, then westward and parallel to the highway to the Old River levee. The alignment would be approximately 17,000–20,000 feet long. CCWD operations would be the same as under the Proposed Action.

Alternative 3, Modified Operations Alternative, would involve modifying CCWD permitted operations to enable CCWD to shift additional pumping from Rock Slough to the screened intake at Victoria Canal. Delta fisheries, including threatened and endangered species, could benefit because fish mortality is reduced with screened diversions compared to unscreened diversions. Under this alternative, CCWD would apply to change its permits to allow diversion of up to 320 cfs through the Old River conveyance system using the existing 250-cfs Old River intake and the proposed 250-cfs alternative intake in combination. Rock Slough would continue to provide a portion of CCWD supply, but would be used less frequently in the near term than under the Proposed Action. There would be no increase in CCWD's average total annual quantity diverted. The physical features of the alternative would be the same as those of the Proposed Action.

Alternative 4, Desalination Alternative, would protect and improve water quality for both untreated- and treated-water customers by providing high-quality desalinated water to customers served by Bollman Water Treatment Plant (WTP) and reducing overall demands on the Contra Costa Canal. The reduced demands on the canal would in turn reduce diversion quantities from the Rock Slough and/or Old River intakes, and would reduce the quantity of blending water required from the Los Vaqueros Reservoir to meet delivered water quality goals. This would allow the Los Vaqueros Project to be used more effectively to provide high-quality water to the remaining untreated- and treated-water customers.

This alternative would include a new brackish water desalination plant with a treatment capacity of approximately 70 million gallons per day (mgd) and associated infrastructure for conveyance of brackish water and concentrate disposal. These facilities would convey and treat water diverted through a screened intake at CCWD's existing Mallard Slough plant located in the western Delta/Bay vicinity.

3.2 Alternatives Development

3.2.1 CEQA and NEPA Requirements

CEQA and NEPA require consideration of a range of alternatives to a proposed action that would feasibly attain most of the basic project objectives and accomplish the project purpose and need while avoiding or minimizing environmental impacts. The purpose of including alternatives in an EIR/EIS is to offer a clear basis for choice by the decision makers and the public whether to proceed with the proposed action or project. An EIR/EIS must also consider the no-project and future no-action alternative and any reasonable alternative(s) that could meet the project purpose and need.

Pursuant to Section 15126(d) of the State CEQA Guidelines, an EIR must describe and evaluate a reasonable range of alternatives that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the significant impacts of the proposed project. The State CEQA Guidelines state that the range of alternatives to be evaluated in an EIR is governed by the "rule of reason," whereby the EIR describes and evaluates those alternatives necessary to permit a reasoned choice and to foster informed decision-making and public participation (Section 15126.6[f]). Consideration of alternatives focuses on those that can either eliminate significant adverse environmental impacts or reduce them to less-than-significant levels; alternatives considered in this context may include those that are more costly and those that could impede to some degree the attainment of all the project objectives (Section 15126.6[b]). CEQA does not require the alternatives to be evaluated to the same level of detail as the proposed project.

According to the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1502.14), the alternatives section of an EIS is required to rigorously explore and objectively evaluate all reasonable alternatives, including the no-action alternative. The discussion of alternatives must include sufficient information to permit a reasoned choice of the alternatives as far as environmental aspects are concerned. For alternatives eliminated from detailed study, the EIS must include a brief discussion of the reasons for their elimination. NEPA does not require alternatives to offer some environmental benefit over the proposed action; however, neither does it discourage consideration of alternatives with lesser effects. NEPA requires substantial treatment of the alternatives so that their comparative merits may be evaluated (40 CFR 1502.14[b]).

3.2.2 Alternatives Screening

Many alternatives for improving delivered water quality to CCWD customers have been postulated and/or examined by CCWD and others during the past decade (Contra Costa Water District 2005, 2003, 2000, 1998, 1992; CALFED 2004, 2000; California Department of Water Resources 2005). CCWD's previous alternatives analyses conducted in the early 1990s to improve water quality and emergency supply is particularly relevant (Contra Costa Water District 1992).

An alternatives screening analysis (see Appendix B, "Alternatives Screening") was prepared for this project to comply with CEQA, NEPA, and Clean Water Act Section 404(b)(1) requirements. The alternatives screening analysis fulfills the requirements for developing alternatives for analysis in this EIR/EIS. A two-stage alternative screening methodology was employed using specific criteria developed for the project purpose and need/objectives. The alternative development process was structured so that potential alternatives were systematically identified and then compared to these criteria to ascertain their ability to meet the project purpose and need/objectives. Alternatives passing the first-stage screening were carried forward for more rigorous description and screening in the second stage of the screening process. Alternatives passing the second-stage screening were carried forward into this EIR/EIS for detailed analysis of environmental impacts.

A wide array of alternatives for meeting the project purpose and need/objectives were considered. Nearly twenty specific alternatives were identified. The alternatives were screened against the following criteria, which are described in detail in Appendix B:

- Water Quality Criterion: An alternative, either individually or in combination with other possible alternatives, must be capable of improving delivered water quality to treated- and untreated-water customers, especially during drought periods; protecting and improving health and/or aesthetic benefits to customers; improving operational flexibility; and protecting delivered water quality during emergencies;

- Regulatory Criterion: An alternative, either individually or in combination with other possible alternatives, must not have any permits or agency approvals that cannot be reasonably obtained given considerations of logistics or existing technology;

- Institutional Criterion: An alternative, either individually or in combination with other possible alternatives, must not have any legal, ownership, public policy, or social constraints that cannot be reasonably solved given considerations of logistics or existing technology;

- Technical and Operational Criterion: An alternative, either individually or in combination with other possible alternatives, must not have any unreasonable engineering or operational problems, involve questionable or untested technologies, or depend on a site or resource that is unreliable; and

- Cost Criterion: An alternative, either individually or in combination with other possible alternatives, must be developed, constructed, and operated in a financially responsible and cost-effective manner with a commensurate improvement in delivered water quality to CCWD customers;

3.2.3 Alternatives Considered

Reasonable alternatives for meeting the project purpose/need and objectives fall into three general groups as follows:

- Group A. Protect/Improve Source Water at Existing Intakes

A1. Point-Source and Nonpoint-Source Discharge Reduction: Provide treatment of discharges or relocate discharges to reduce impacts of discharges on water quality at existing CCWD intakes.

A2. Increased Water Quality/Regulatory Standards in Delta: Establish new water quality standards/regulatory requirements that would improve water quality at existing CCWD intakes.

A3. Modifications to Delta Water Supply Management and Operations: Implement new operational strategies that would improve water quality at existing CCWD intakes.

A4. Delta Levee Improvements: Improve levees to protect against salinity intrusions during levee failures.

A5. Delta Hydraulic Improvements: Improve Delta hydraulics with tidal control gates, barriers, levee modifications, etc. to improve water quality at existing CCWD intakes.

- Group B. Obtain New/Alternative Source Water

B1. Regional Water Management/Intertie with Untreated- or Treated-Water Sources: Construct an intertie with one or more other Bay Area water agencies to access non-Delta or treated water sources.

B2. Relocation of Some CCWD Diversions to New Intake: Install an alternative CCWD intake at a location with better water quality.

B3. Supplemental Water Conservation and Reclamation: Reduce water demands, via implementation of supplemental conservation and reclamation activities, to minimize CCWD's need to divert Delta water during dry months, and/or to reduce demand for water from Los Vaqueros Reservoir to be used for blending.

B4. Bottled Water: Provide CCWD water customers with bottled water during periods when water quality objectives cannot be met.

B5. Sierra Source Supply: Obtain and access a Sierra source supply.

B6. Groundwater Management/Conjunctive Use: Access groundwater that has better water quality than Delta source water.

B7. Water Transfers/Exchanges: Implement agreements for water transfers/exchanges to access higher quality water.

- Group C. Enhance Existing Water Treatment

C1. Supplemental Treatment at CCWD's WTPs: Install a combination of treatment processes (e.g., granular activated carbon [GAC] and new ultraviolet [UV] treatment) at CCWD's existing WTPs.

C2. Desalination Plant: Install desalination treatment processes at the Bollman or Randall-Bold WTPs or participate in a regional desalination plant with other Bay Area water agencies.

C3. Home Water Treatment Devices: Provide CCWD treated-water customers with point-of-use devices.

3.2.4 Alternatives Not Carried Forward for More Detailed Evaluation in the EIR/EIS

Appendix B, "Alternatives Screening," provides a detailed discussion of the results, by alternative, of the first- and second-stage alternatives screening. Tables 3.2-1 and 3.2-2 summarize these results. As noted previously, a wide range of alternatives was considered including alternatives that might improve source water quality at existing intakes, alternatives that involved obtaining new sources of drinking water, and alternatives that involved enhancing existing water treatment. Most of the alternatives were not carried forward for more detailed evaluation because they did not meet the project purpose and need/objectives; were not potentially practicable; and/or did not meet the screening criteria, which included water quality, regulatory, institutional, technical and operational, and cost criteria. Alternative B-2, Relocation of Some CCWD Diversions to New Intake, included consideration of relocating each of CCWD's intakes at multiple locations. Ultimately, an intake in the lower third of Victoria Canal was selected for evaluation because, when all screening criteria were considered, it was the most practicable, least costly, and least environmentally damaging intake location for meeting the project purpose and need/objectives.

As shown in the tables, all the alternatives listed in Section 3.2.3 were not carried forward for more detailed evaluation in the EIR/EIS, with the exception of the No-Action Alternative and Project Alternatives B2 and C2.

3.2.5 Alternatives Carried Forward for Detailed Evaluation in the EIR/EIS

The No-Action Alternative and Project Alternatives B2 and C2 were carried forward for analysis in this EIR/EIS as follows:

- No-Action Alternative;
- B2, Relocation of Some CCWD Diversions to New Intake, in three configurations:
  - B2-2, Alternative Delta Intake – Direct Pipeline Route, carried forward as Alternative 1, Alternative Intake with Direct Pipeline Route (Proposed Action),
  - B2-3, Alternative Delta Intake – Indirect Pipeline Route, carried forward as Alternative 2, Alternative Intake with Indirect Pipeline Route (Indirect Pipeline Alternative),

- B2-4, Alternative Delta Intake – Alternative Project Operations, carried forward as Alternative 3, Alternative Intake with Modified Operations (Modified Operations Alternative); and

- C2, Desalination Plant, in one configuration, C2-1, CCWD-Only Desalination Plant, carried forward as Alternative 4, Desalination Alternative.

Table 3.2-1
Stage 1 Screening Summary

Alt #	Conceptual Alternative Description	May Substantially Meet Project Purpose and Need/ Objectives?	Potentially Practicable?[1]	Moved to Stage 2 Screening for Additional Analysis?
Group A. Protect/Improve Source Water at Existing Intakes				
A1	Point-Source and Nonpoint-Source Discharge Reduction	Y	Y	Y
A2	Increased Water Quality/Regulatory Standards in Delta	Y	N	N
A3	Modifications to Delta Water Supply Management and Operations	Y	N	N
A4	Delta Levee Improvements	N	N	N
A5	Delta Hydraulic Improvements	Y	Y	Y
Group B. Obtain New/Alternative Source Water				
B1	Regional Water Management/Intertie with Untreated- or Treated-Water Sources	Y	Y	Y
B2	Relocation of Some CCWD diversions to New Intake	Y	Y	Y
B3	Supplemental CCWD Water Conservation and Reclamation	N	N	N
B4	Bottled Water	Y	N	N
B5	Sierra Source Supply	Y	N	N
B6	Groundwater Management/Conjunctive Use	N	N	N
B7	Water Transfers/Exchanges	N	Y	N
Group C. Enhance Existing Water Treatment				
C1	Supplemental Treatment at CCWD's Water Treatment Plants	N	Y	N
C2	Desalination Plant	Y	Y	Y
C3	Home Water Treatment Devices	N	N	N

[1] Potentially meets CWA Section 404(b)(1) Guidelines for practicability (i.e., available and capable of being done taking into account cost, existing technology, and logistics, in light of overall project purposes [40 CFR 230.10(a)(2)]).

Table 3.2-2. Second-Stage Screening Results

ALTERNATIVE	SCREENING CRITERIA								SCREENING SUMMARY
	Meets Water Quality Criteria								
	Improves Water Quality, Especially During Drought Periods	Protects/ Improves Health/ Aesthetic Benefits to Customers	Improves Operational Flexibility	Protects Water Quality During Emergencies	Meets Regulatory Criterion	Meets Institutional Criterion	Meets Technical and Operational Criterion	Meets Cost Criterion	Alternative Carried Forward Into EIR/EIS
Group A. Protect/Improve Source Water at Existing Intakes									
A1. Point-Source and Nonpoint-Source Discharge Reduction	Partial	Partial	No	No	Maybe	No	Maybe	No	
A5. Delta Hydraulic Improvements	Maybe	Maybe	No	No	No	No	No	No	
Group B. Obtain New/Alternative Source Water									
B1. Regional Water Management/Intertie with Untreated- or Treated-Water Sources									
B1-1. EBMUD Intertie	Yes	Yes	Partial	Partial	Maybe	No	No	Maybe	
B1-2. South Bay Aqueduct Intertie	Maybe	No	No	No	Maybe	No	No	No	
B2. Relocation of Some CCWD Diversions to New Intake									
B2-1. Alternative Delta Intake - Canal Conveyance	Yes	Yes	Yes	Partial	Yes	Yes	No	Yes	
B2-2. Alternative Delta Intake - Direct Pipeline Route	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	X
B2-3. Alternative Delta Intake - Indirect Pipeline Route	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	X
B2-4. Alternative Delta Intake - Alternative Project Operations	Yes	Yes	Yes	Partial	Maybe	Yes	Yes	Yes	X
Group C. Enhance Existing Water Treatment									
C2. Desalination Plant									
C2-1. CCWD-Only Desalination Plant	Yes	Yes	Yes	Partial	Maybe	Maybe	Yes	Maybe	X
C2-2. Desalination Plant with Regional Partners	Maybe	Maybe	Yes	Partial	Maybe	No	Maybe	No	

Key:
Yes: Meets the criterion
Partial: Meets some but not all of the criterion
Maybe: May or may not meet the criterion depending on how the project is implemented, and/or further analysis is necessary to determine whether criterion is met
No: Does not meet the criterion

3.3 No-Action Alternative

The No-Action Alternative must always be evaluated in an EIS. The No-Action Alternative represents a projection of current conditions to reasonably foreseeable future conditions that could occur if no action alternatives are implemented. Simply put, the No-Action Alternative represents the future without the proposed project. Reclamation recommends several criteria for including proposed future actions within the No-Action Alternative. To be included in the No-Action Alternative, proposed actions should be: 1) authorized; 2) approved through completion of NEPA, CEQA, and ESA compliance processes; 3) funded; and 4) permitted.

Under this alternative, CCWD would continue to operate and maintain its existing facilities to maximize delivered water quality given physical limitations of the existing infrastructure and consistent with environmental regulations and permit conditions. In the near term, there would be no substantive or predictable operational changes implemented under the No-Action Alternative. Under future levels of demand[1], the No-Action Alternative includes the expansion of the Old River pump station to a capacity of 320 cfs consistent with the CCWD Future Water Supply Implementation (CCWD 1998) (see Chapter 2, "Project Background," for a more detailed description of CCWD's existing facilities and operations and Appendix C-2, "Water Resources Modeling Methodology," for a more detailed description of CCWD current and future operating assumptions).

The No-Action Alternative would include CCWD's Old River Water Quality Improvement Project and the Rock Slough Water Quality Improvement Project, both of which have recently been completed; and the EBMUD Intertie with the Freeport Regional Water Project (FRWP), which is currently in design with construction anticipated in mid-2006 depending on the overall FRWP schedule. These projects, described below, would also be included in background conditions for each of the action alternatives:

- The CALFED Old River Water Quality Improvement Project involved constructing a new pump station to provide a longer outfall for the agricultural drainage from Byron Tract into Old River, near CCWD's Old River Intake. The purpose of the project is to improve the quality of water (with respect to salinity, organic carbon, turbidity, nutrients, and pathogens) diverted at CCWD's existing Old River intake structure.

- The CALFED Rock Slough Water Quality Improvement Project moved the discharge 2 miles from its previous location to an area on the south side of Veale Tract, where local currents convey the drainage farther away from Rock Slough. The purpose of the project is to improve the quality of the water (with respect to salinity, organic carbon, turbidity, nutrients, and pathogens) diverted at CCWD's Pumping Plant No. 1 at Contra Costa Canal (west of Rock Slough).

[1] Future conditions level of development is 2020, consistent with OCAP studies completed by DWR and Reclamation.

- The EBMUD Intertie with the FRWP involves constructing an intertie to connect the EBMUD Mokelumne Aqueduct to the CCWD Los Vaqueros Pipeline for the wheeling of up to 3,200 af annually of CCWD's water through the Freeport Regional Water Authority (FRWA) and EBMUD facilities into the Los Vaqueros Reservoir. The purpose of this agreement is to offset the water quality degradation that is expected at CCWD's intakes from the implementation of the FRWP.

3.4 Alternative 1, Proposed Action

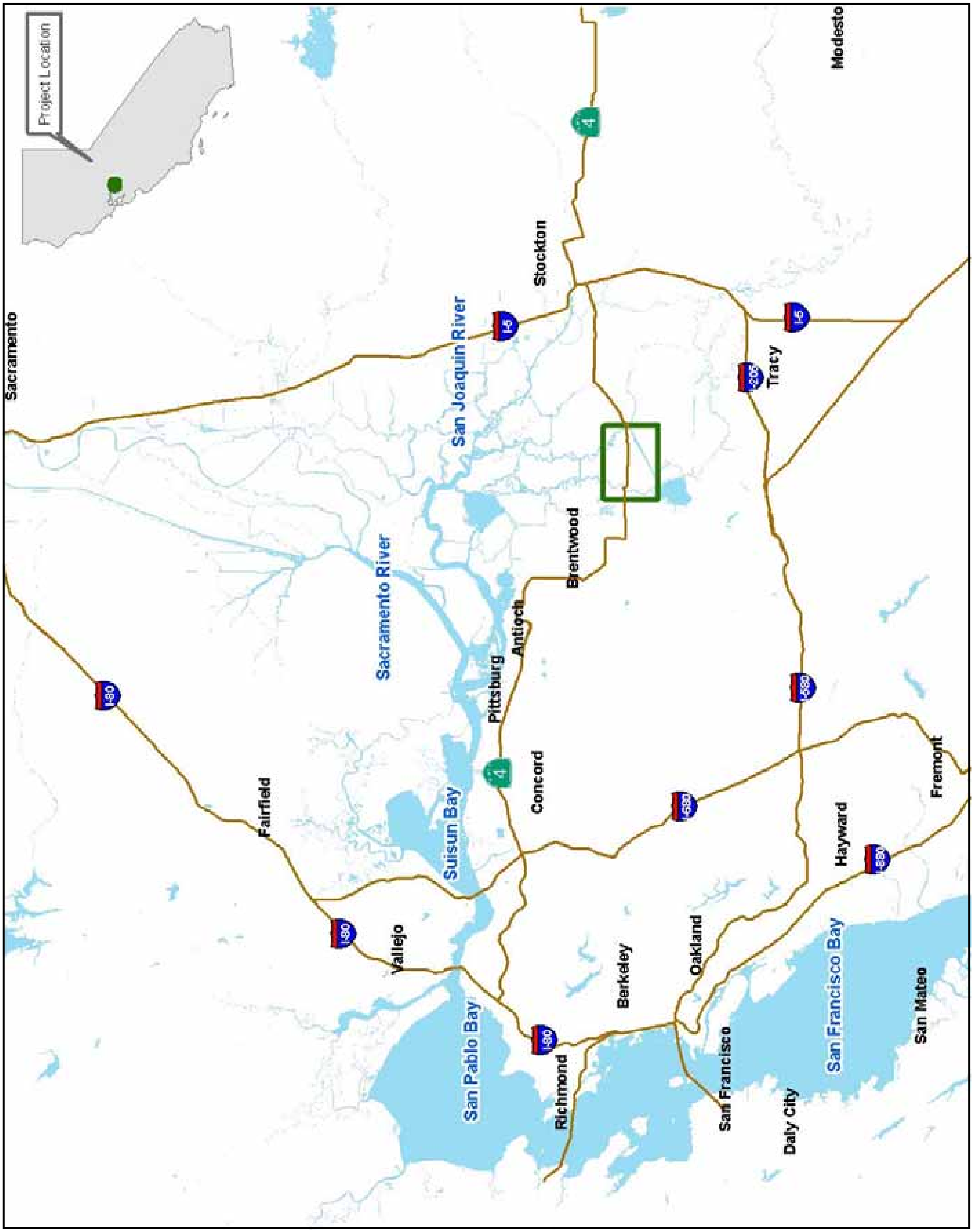
3.4.1 Location and Overview

The Proposed Action would be implemented in the Sacramento-San Joaquin Bay Delta, in San Joaquin and Contra Costa Counties. Its main features would be a new, screened water intake and pump station located along the lower third of Victoria Canal on Victoria Island in the central Delta, and a pipeline that would extend from the new intake directly across Victoria Island and Old River and tie into CCWD's existing Old River conveyance system on Byron Tract.

Exhibit 3.4-1 shows the regional location of the Proposed Action. Exhibit 3.4-2 shows the proposed project area in relation to other existing CCWD facilities in the Delta. Exhibit 3.4-3 is a conceptual depiction of the proposed intake location on Victoria Canal and the direct pipeline route to CCWD's existing Old River facilities. The specific footprint of the proposed intake, pump station, and conveyance pipeline with some surface appurtenances would be determined during final design based on various factors, including the results of geotechnical data collection, environmental constraints, and landowner negotiations. Victoria Island and Byron Tract in the project area are currently farmed.

The Proposed Action would include a new intake at a location with better quality water, but would not increase CCWD's total diversion capacity (rate or average annual quantity). The new intake would have a capacity of up to 250 cfs and would be a part of the Old River conveyance system. The existing Old River intake and pump station, with a current capacity of 250 cfs, would remain in use. The combined permitted capacity of the Old River conveyance system would remain 250 cfs. Rock Slough would continue to provide a portion of CCWD's water supply, but would be used less frequently under the Proposed Action because of the operational flexibility a new intake with better water quality would provide. The Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

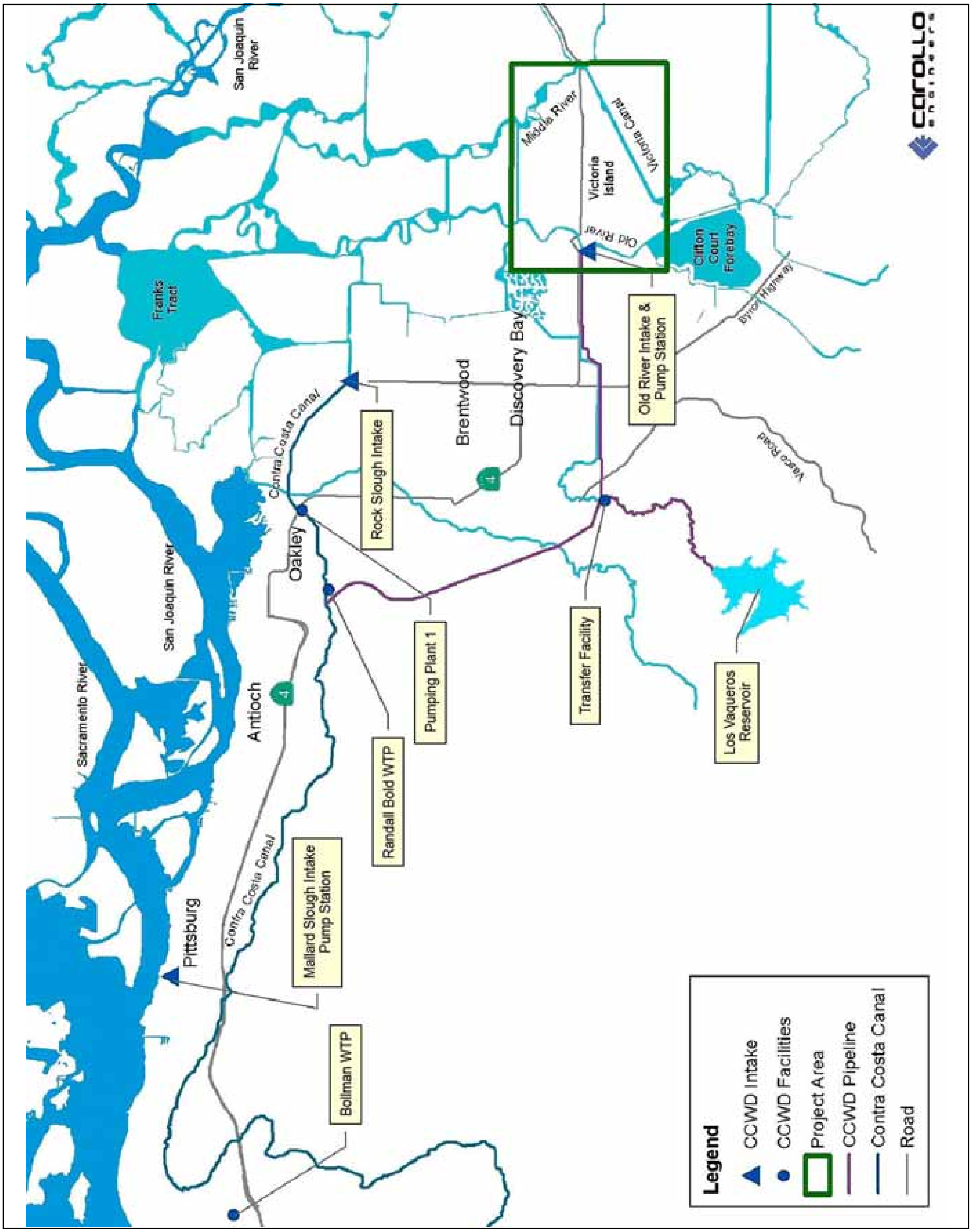
Implementation of the Proposed Action would provide CCWD with the operational flexibility to divert water from either the new intake on Victoria Canal or the existing Old River intake, or to blend waters from Victoria Canal and Old River, to provide the highest water quality for CCWD customers. The Proposed Action would involve adding a new point of diversion to certain existing water rights held by CCWD and by Reclamation. CCWD would not seek to increase its water rights, CVP contract amounts, or permitted Los Vaqueros Reservoir filling rates through this action.



Source: Carollo Engineers

Regional Vicinity Map for the Proposed Action

EXHIBIT 3.4-1

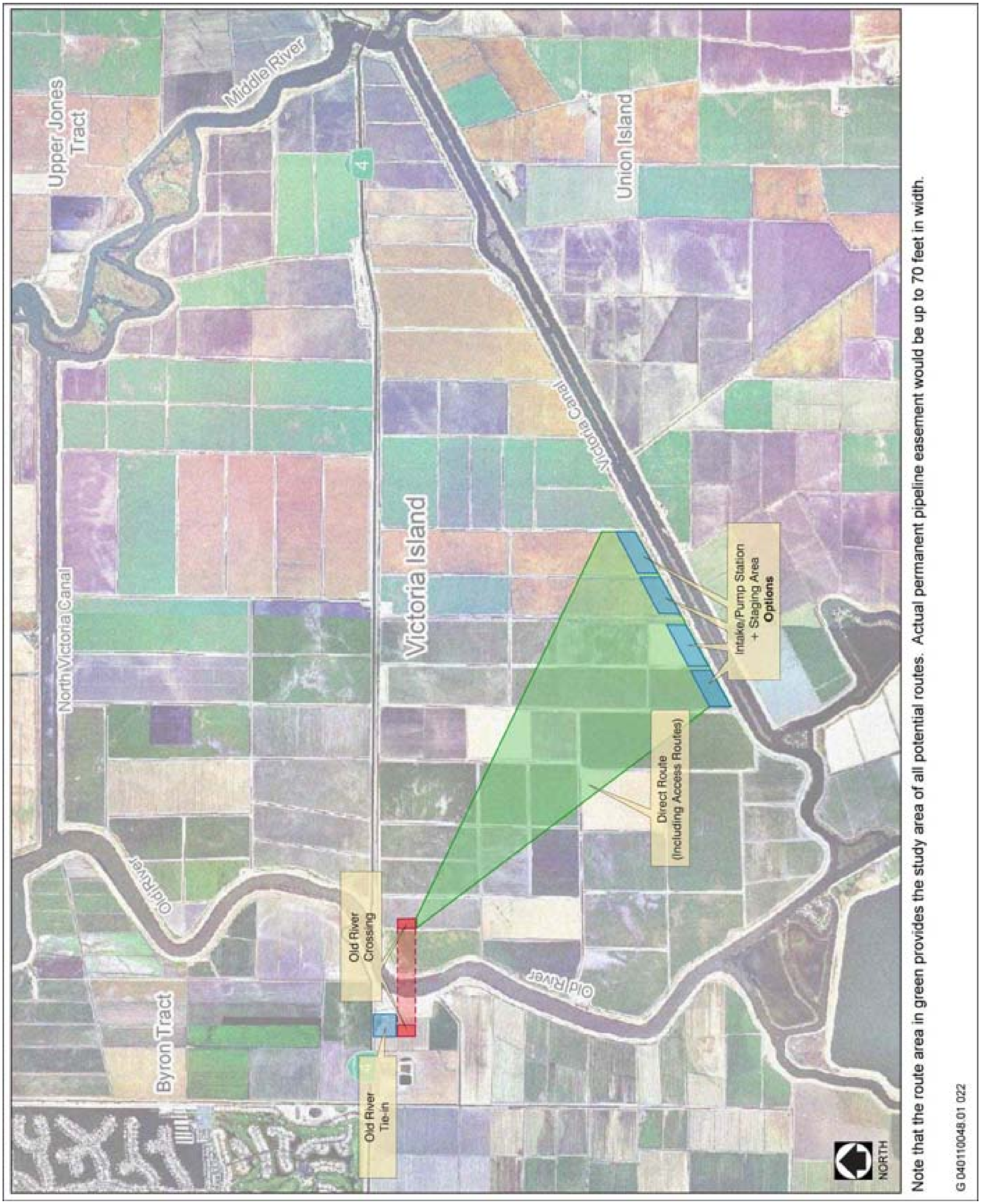


Source: Carollo Engineers

Project Location Area for the Proposed Action

EXHIBIT 3.4-2

EDAW



Source: Carollo Engineers

Conceptual Alignment, Direct Pipeline (Alt 1 – Proposed Action)

EXHIBIT 3.4-3

EDAW

3.4.2 Proposed Facilities

The Proposed Action would include the following facilities:

- Intake and pump station—a new water intake with a state-of-the-art fish screen, a pump station and ancillary structures, utilities, and access and security features.
- Levee improvements—reinforcement and reconfiguration of the levee at the intake/pump station site.
- Pipeline—a conveyance pipeline across Victoria Island, tunneled under Old River or routed over the levees and under the river bottom to Byron Tract, and tying into CCWD's existing Old River conveyance facilities, and associated modifications of the existing agricultural irrigation and drainage system on Victoria Island as needed.

Facility construction is described in Section 3.4.3, and proposed operations are described in Section 3.4.4.

3.4.2.1 Intake Structure and Pump Station

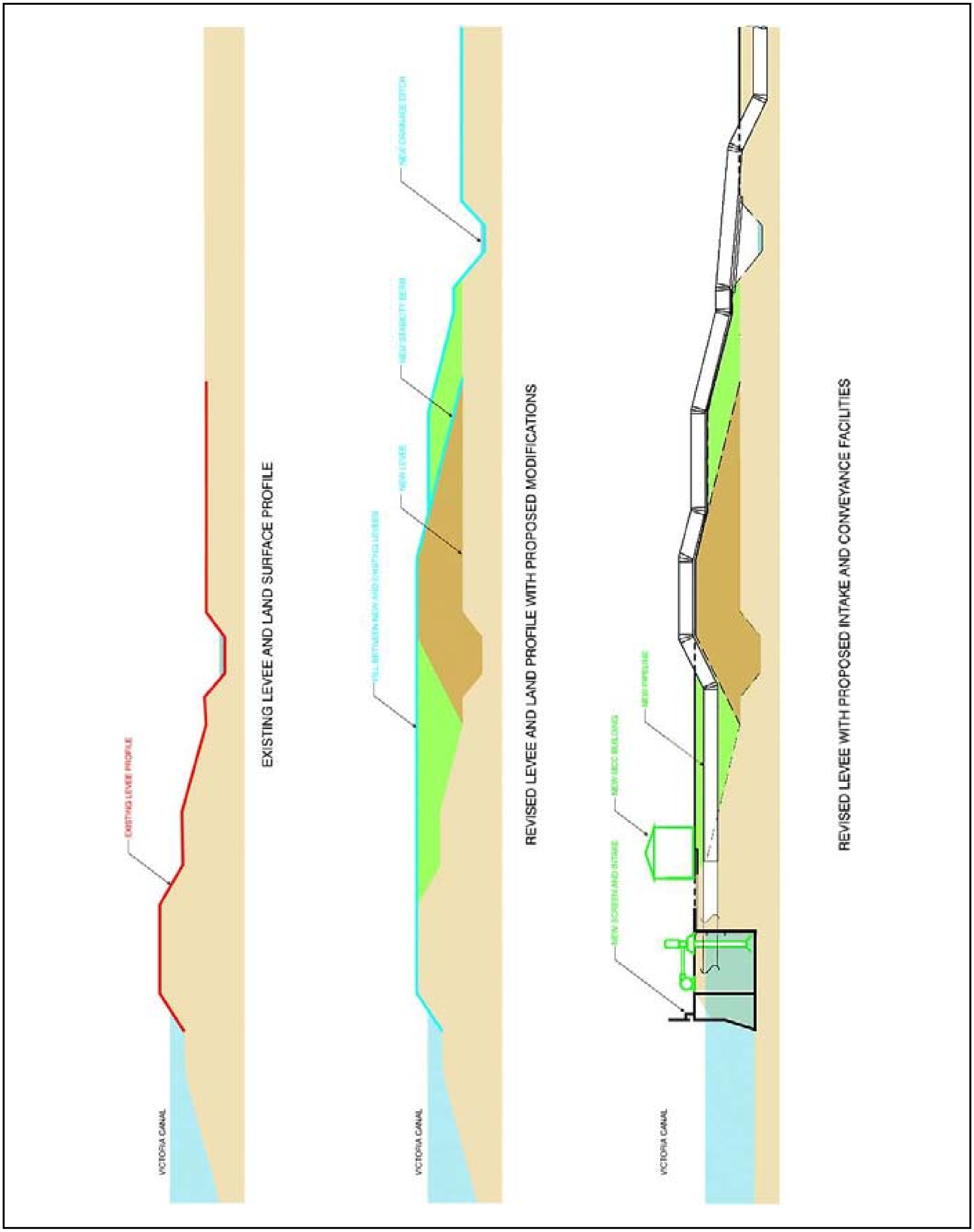
Exhibits 3.4-4 and 3.4-5 are a preliminary section view and plan view, respectively, of the proposed intake structure and pump station.

Intake and Fish Screen

The new intake structure would consist of a reinforced concrete structure with side retaining walls; suction pipes; and a fish screen, open to Victoria Canal, supported on concrete columns. The intake structure would be approximately 100 feet to 200 feet long, depending on the depth of the screen, which is anticipated to be 10 feet to 15 feet. The final sizing will be based on confirmation of fish screen design details with fishery agencies, levee geotechnical design considerations, channel bathymetry, and costs (e.g., it may be preferable to construct a narrower, deeper screen than a shallow, wide screen).

The state-of-the-art fish screen would provide a positive barrier against entrainment of fish and debris into the wet well/pump bays. The fish screen would be regularly cleaned with a mechanical cleaning system. The facility would be designed for a maximum perpendicular flow-through design velocity for the fish screens of 0.2 foot per second for any flow in Victoria Canal, which is consistent with the most stringent fish screening requirements in the Delta (i.e., USFWS screening criteria for Delta smelt).

Depending on the specific location of the intake, existing agricultural siphons in Victoria Canal and/or agricultural drainage pipes on Victoria Island may need to be temporarily removed or relocated during construction. At the completion of construction, any siphons that have been removed would be replaced and restored to their original operational condition or permanently relocated.

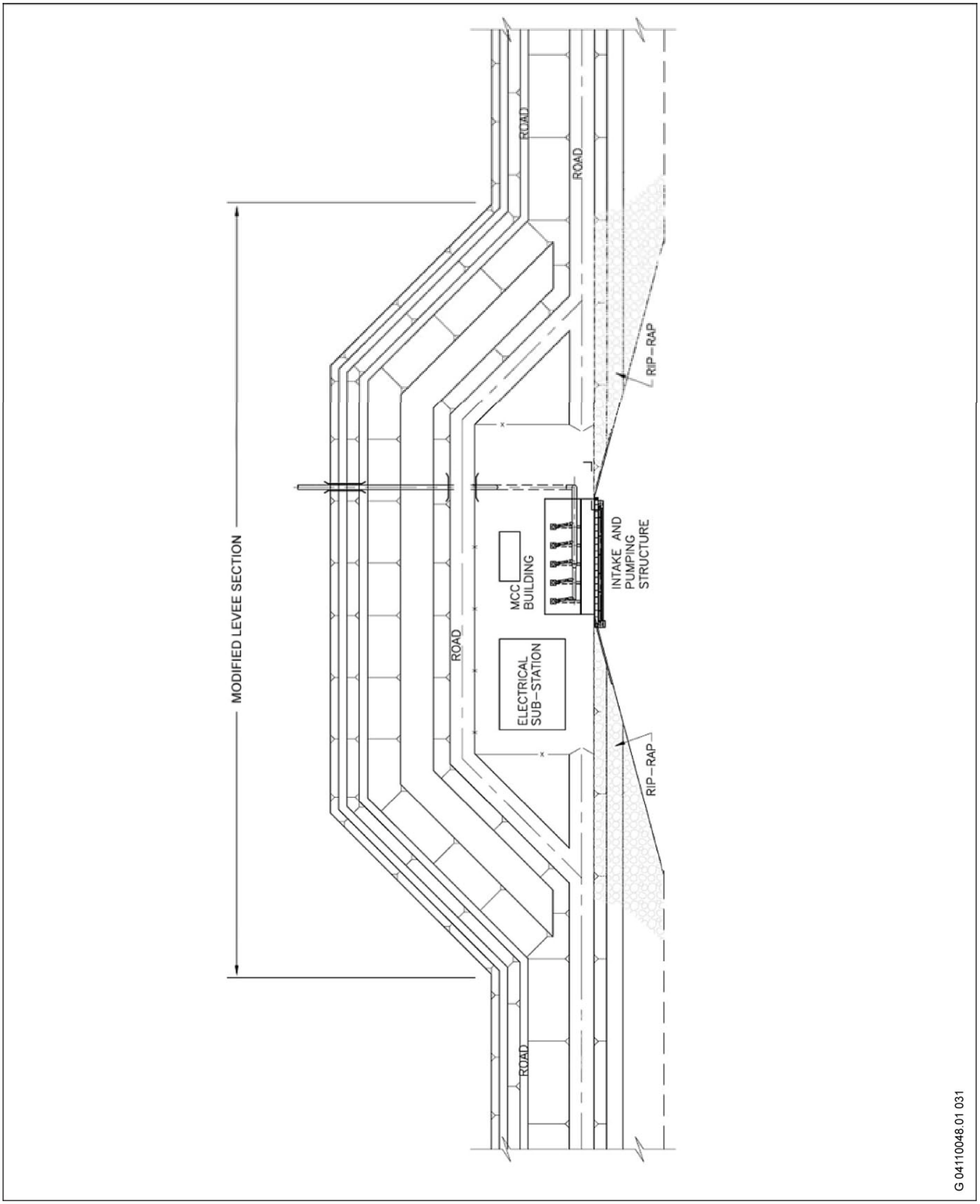


Source: Carollo Engineers

Conceptual Drawing of the Proposed Levee Modification and Proposed Intake and Conveyance Facilities

EXHIBIT 3.4-4

EDAW



Source: Carollo Engineers

Intake and Pumping Station, Preliminary Plan View

EXHIBIT 3.4-5

Pump Station and Ancillary Structures
A pump station would lift water from the new intake and convey it through the pipeline system and to the existing Old River pump station system on Byron Tract. The pump station and associated mechanical piping would occupy a footprint area approximately 140 feet long by 60 feet wide. Normal water surface elevations at the intake would vary with tide; however, the intake pumps would be designed to operate at high and low water levels. The pumps would discharge into a common pipeline.

The intake/pump station facilities would also include a smaller motor control center/maintenance building and an electrical substation. The substation would be an open area measuring approximately 120 feet by 80 feet surrounded by chain-link fencing.

Utilities
There are no utilities present at the proposed intake site. Electricity, non-potable water, a sanitary holding tank, and a telecommunications system would be provided as part of the Proposed Action.

A new power substation would be constructed on-site. Power transmission lines would be installed from either the Pacific Gas and Electric Company (PG&E) or the Western Area Power Administration (WAPA) distribution system to the substation. Power supply to the facility would be transmitted through the distribution system from a combination of available sources, which may include PG&E and/or Reclamation’s CVP. Potential corridors for power lines are the same as for the pipeline, although the pipeline and power lines may not be on the same alignment.

Water from Victoria Canal would be pumped through a screening filter to provide non-potable service water for the pump seals and washrooms.

Sanitary services for CCWD personnel on site for maintenance activities would be provided through the use of a below-ground holding tank that would be regularly maintained.

Antennas would be installed at the site to allow the station programmable logic controller and security system to communicate with CCWD’s supervisory control and data acquisition system. Telephone cable would also be installed to allow for voice and data communication.

Access and Security
Site access would be via the existing levee roads or an existing north-south dirt road located off of SR 4. The levee access roads may be surfaced with aggregate base rock to improve access during all weather conditions, but otherwise would not be modified. The north-south dirt road may be improved to accommodate two-way traffic and to meet anticipated vehicular traffic loadings.

Site security would include chain-link fencing surrounding the pump station and intake, switchyard and ancillary buildings.

3.4.2.2 Levee Improvements

The existing levee would be reinforced and reconfigured to serve as the engineered soil platform for the proposed intake/pump station facilities and to allow installation of the new intake structure. Exhibits 3.4-4 and 3.4-5 show the proposed levee modifications. The approximate footprint area of the levee improvements (i.e., measured at the base of the side slopes) would be 250–300 feet wide by 1,000–1,200 feet long. Approximately 6–8 acres at the intake site would be removed from agricultural use by the proposed levee modification.

The levee construction would require approximately 140,000 to 170,000 cubic yards of fill material as described in 3.4.3.4. The top of the reconfigured levee would be surfaced with aggregate base to maintain vehicular traffic during rain events. A ramp would be provided to allow access to the pump station and ancillary buildings. Slope protection (i.e., riprap) would be installed on the water side of the levee for up to 400–500 feet on each side of the intake structure. Specific information on construction of the levee improvements is provided in Section 3.4.3.2.

3.4.2.3 Conveyance Pipeline

The new conveyance pipeline would cross Victoria Island and Old River to tie into CCWD's existing Old River distribution system, as described below.

Pipeline Across Victoria Island

The new conveyance pipeline would traverse Victoria Island buried within a trench from the new intake and pump facility on Victoria Canal to the Old River levee. The conceptual pipeline routing for the Proposed Action is shown in Exhibit 3.4-3. The pipeline would transect Victoria Island diagonally and would be approximately 12,000–14,000 feet long. The pipeline would be sized to accommodate a flow rate of up to 250 cfs. The pipe diameter would be approximately 6 feet. Pipeline features such as air release, control valves, cathodic protection test stations, and access hatches would be installed in vaults or on pads above ground along the pipeline route.

The proposed pipeline routing may affect existing irrigation and drainage ditches that are used to irrigate existing fields and divert irrigation/storm water drainage from the fields (for discharge to Old River or Victoria Canal). Any ditches that potentially could be affected by the pipeline routing would be siphoned under, rerouted, crossed over, or replaced. The selected method for ditch crossings would be developed based on discussions with the landowner and considerations of both farming operations and construction costs. Nearly all effects on drainages would be temporary, as the ditches would be recontoured to their pre-project dimensions where possible.

Old River Pipeline Crossing

Two different construction methods are under consideration for the pipeline crossing of Old River. One option is tunneling. Under this option, the conveyance pipeline would be tunneled under Old River at an elevation determined to avoid unconsolidated soils and provide for sufficient protection of the pipeline, estimated to be at least 50 feet below ground surface elevation. Another option under evaluation is routing the pipeline over the levees and crossing the river channel. Under this option, the pipeline would penetrate the levee above the 100-year flood stage and follow the existing riprap-covered bank to the river bottom. Along the bottom of the river channel, the pipeline would be buried to a depth of 5–10 feet. Silt-trap features similar to those described for the tunnel option would also be installed.

Pipeline Connection to the Old River Distribution System
A new pipeline, approximately 50–100 feet long, would connect the pipeline from the Old River crossing to CCWD's existing Old River delivery pipeline within the existing setback levee. The pipeline would be installed using one of the trench construction methods described below in Section 3.4.3.3.

Easements
CCWD would acquire land and/or easements as needed for construction and long-term access to the project sites. On Victoria Island, CCWD would purchase or obtain a permanent easement up to 70 feet wide for the pipeline alignment. For the duration of project construction, a total construction easement (including the width of the permanent easement) of approximately 200 feet would also be required. Land and/or easements may also be required for the intake site, the levee crossings, and the river crossing (for in-river crossing alternative only).

Additional temporary construction easements of approximately 10 acres would also be required for construction staging areas. Additional temporary construction easements of approximately 25–40 acres for site access would be required on Victoria Island (range includes on-island road access and potential levee road access.

3.4.3 Project Construction

3.4.3.1 Intake Structure

Foundation Preparation
Soil densification may be required beneath the intake and levee to reduce the liquefaction potential of the soil and to improve its lateral strength during seismic events. Preloading of the soils beneath the levee may also be required to reduce long-term settlement of the levee.

In-Water Construction Activities
In-water construction activities for installation of the intake and fish screen would be conducted either from a barge or from the top of the levee road. Most of the construction activities would be conducted in a dewatered cofferdam and would be isolated from Victoria Canal. As part of the construction of the new intake structure, a sheet pile cofferdam would be installed in Victoria Canal to isolate the work area from the canal water and provide a means to conduct construction work in a dewatered environment. Following installation of the cofferdam, the water in the cofferdam enclosure would be treated (as necessary) and discharged back to Victoria Canal, and the remaining intake construction work would be conducted in a dewatered environment.

If material needs to be removed for bed preparation at the cofferdam site, this excavated material would be contained within a designated containment area or areas on the land side of the levee. An earthen dike or siltation fences would enclose the containment area(s). Retention of the excavated materials would promote settling of the suspended sediments. Any excess water (desilted supernatant) would be returned back into Victoria Canal or Old River.

To provide additional depth for the fish screen, excavation may be required in Victoria Canal in the immediate vicinity of the intake in an area up to 50,000 square feet to depths within 1 to 2 feet of existing channel bottom. The need for excavation would be determined during final design based on the results of field data. Excavated materials would be transferred to the designated containment or disposal areas on the land side of the levee.

3.4.3.2 Levee Improvements

Construction of levee improvements would occur in two phases. First, an earthen setback levee would be constructed on the landward side of the existing levee (see Exhibit 3.4-5). The setback levee would be integrated with the existing levee to provide continuity of the land/water barrier. Construction activities for the new intake would be initiated along the existing levee edge after the setback levee is completed. All new construction for the setback levee would incorporate modern techniques for soil compaction.

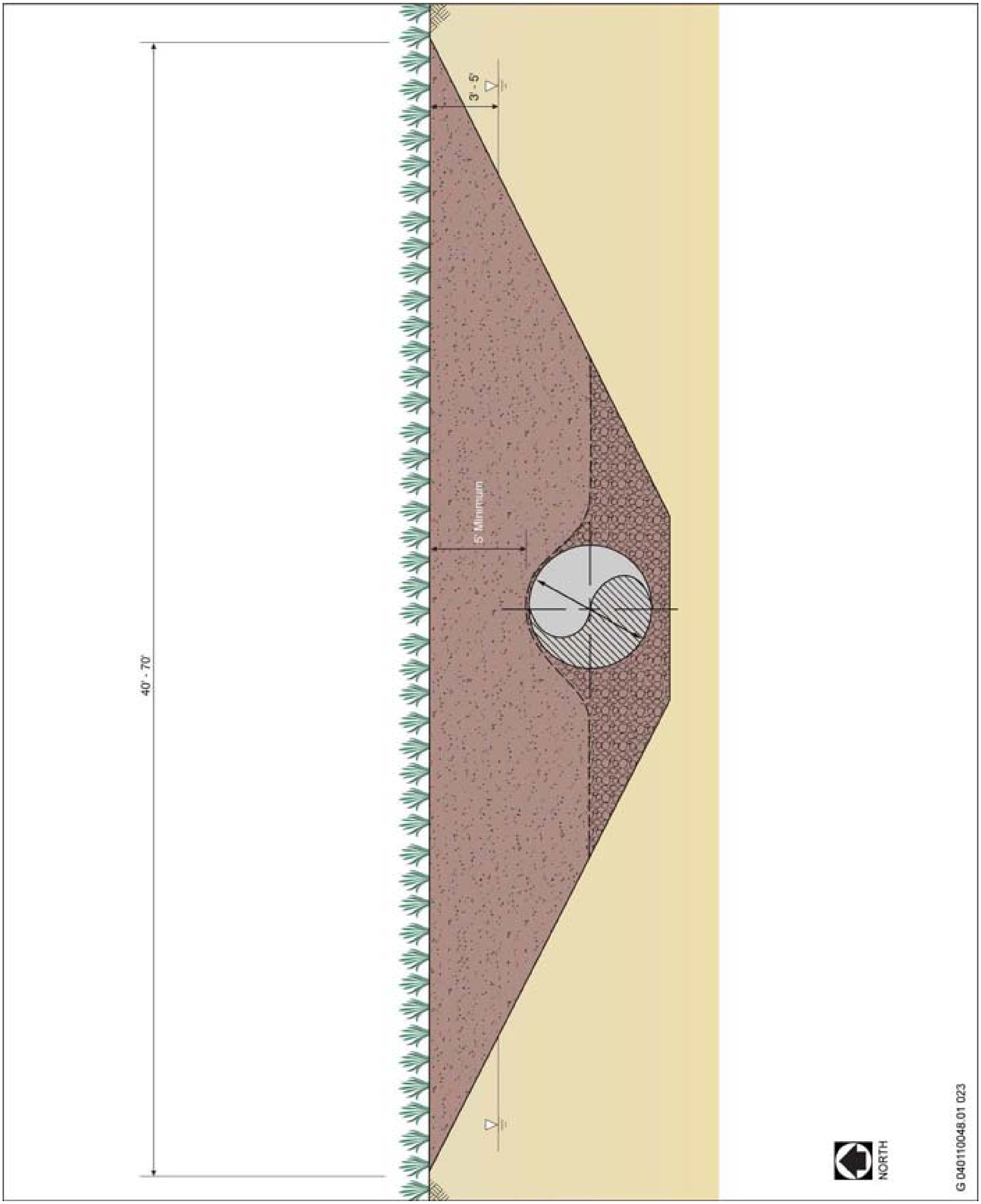
The new levee configuration would consist of additional earthen fill placed approximately 1,000–1,200 feet longitudinally and 250–300 feet laterally on the land side of the existing levee. Sheet piles would also be longitudinally placed approximately 320 feet upstream and downstream of the new intake, and would be integrated into the new setback levee to serve as a seepage barrier. Slope protection in the form of riprap would be installed on the water side of the existing levee for a distance of approximately 400–500 feet both upstream and downstream of the new intake. The new fill behind the existing levee would be constructed to maintain continuity of the existing road system along the existing levee crest. The elevation along the top of the new embankment fill would match the existing levee top elevation. Erosion control measures such as hydroseeding would be used on the landward side of the new setback levee.

See Section 3.4.3.4, “Borrow Areas,” below regarding the source of fill material for the proposed levee improvements.

3.4.3.3 Pipeline Construction

Pipeline Installation on Victoria Island

The conveyance pipeline would be constructed across Victoria Island using a conventional trench design. Because the conveyance pipeline would likely be installed below the groundwater table, the trench is designed to provide enough earthen cover over the pipe to counter any buoyant forces that may occur. The pipeline would be buried in a trench that would be excavated to maintain a minimum cover of 5 feet over the pipeline. Exhibit 3.4-6 shows a conceptual example of pipe trench design. The as-built surface elevation would generally match the original ground surface elevation.



Source: Carollo Engineers

Conceptual Drawing of Conventional Trench Design

EXHIBIT 3.4-6

EDAW

Dewatering would likely be required for construction of the pipeline across Victoria Island. Discharge of dewatering water could be to land or to Old River. See Section 3.4.3.4, “Borrow Areas,” below regarding the placement of spoils from trenching operations.

Pipeline Crossing of Old River
Two different construction methods are under consideration for the pipeline crossing of Old River, tunneling and crossing over the levees and burying the pipe in the river bed, as described below.

Tunneling
Under the tunneling option, the pipeline would be installed under Old River using standard tunneling techniques. A large pit would be excavated on Byron Tract, west of the existing levee. A similar pit would be excavated on Victoria Island. One pit would operate as a launching pit while the other acts as a receiving pit, functioning as a drop shaft for the completed pipeline. The pit dimensions would be approximately 30 feet long by 15 feet wide by 80 feet deep. Once the new pipe is in place, concrete access vaults would be constructed within both the launching and receiving pits, prior to backfilling of the pits.

Crossing Over the Levees
Under this option, the pipeline would penetrate the levee above the 100-year flood stage and follow the existing riprap-covered bank approximately 65–75 feet to the river bottom. Along each levee, the pipeline would be supported by piles (size and number to be confirmed during final design). Along the bottom of the river channel, the pipeline would be buried to a depth of 5–10 feet. A barge with mechanical dredging equipment would be used to complete the in-river pipeline construction. The trench would be approximately 8–10 feet wide at the bottom, and 65–80 feet wide at the top (accounting for side slopes for the trench excavation). The trench would be partially backfilled with crushed rock and/or riprap to stabilize the trench section and make it suitable for pipe installation. At the completion of construction, the channel bottom would be restored to preconstruction conditions.

Trench construction in the river using the mechanical dredge would employ an environmental bucket to the maximum extent possible; the environmental bucket differs from the more traditional “clam-shell” bucket type in that the bucket is specifically designed to minimize release and suspension of sediments during excavation. This dredged material would be contained within a designated containment area or areas on the land side of the levee. An earthen dike or siltation fences would enclose the containment area(s). Retention of the dredge spoils would promote settling of the suspended sediments. Any excess water (desilted supernatant) would be returned back into Victoria Canal or Old River.

Pipeline Connection to the Old River Distribution System
Pipe would be installed on Byron Tract using the method described above for Victoria Island.

3.4.3.4 Borrow Areas

Borrow areas are sites where native materials are obtained for required construction activities. Borrow material would be required for both the construction of the setback levee and backfill for the pipeline trench. Approximately 140,000–170,000 cubic yards of borrow material would be required to construct the new setback levee. The amount of material needed for pipeline backfill depends on pipeline length, material, and depth of burial. An estimated 120,000–170,000 cubic yards of high-quality material would be required for the pipeline backfill. Depending on local soil conditions, this material may be available from the excavation of the pipeline trench itself, or may need to be borrowed from another location to backfill the pipeline. The excavation and backfill of the pipeline trench would result in a net excess of 20,000–60,000 cubic yards.

Preliminary soils data confirms that on-site soils are suitable for levee and pipeline backfill. Accordingly, an option for new embankment and trench fill would be to select native material obtained from Victoria Island. Based on preliminary field work, it is expected that select soils for the setback levee could be obtained by on-site shallow excavation (e.g., “land leveling”) to depths of approximately 1 to 1.5 feet in an area of up to135 acres.

If on-site borrow activity is not used, the contractor would obtain borrow material from an off-site borrow location. The contractor typically would select a source of off-site borrow. Potential borrow areas have been identified within 20 miles of the project site.

3.4.3.5 Construction Access and Staging

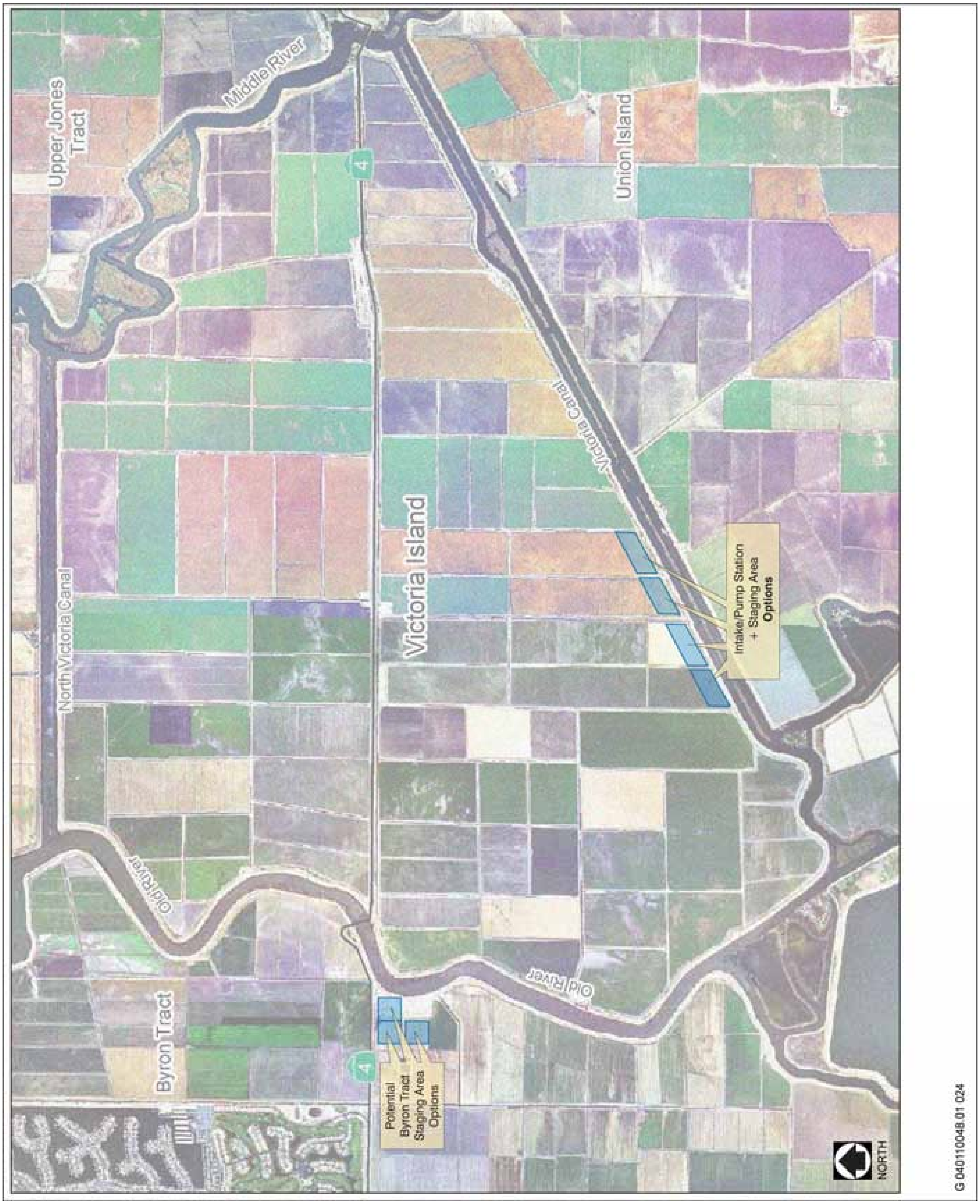
Construction staging areas would be located on both Victoria Island and Byron Tract. Proposed staging areas on Victoria Island and Byron Tract are shown in Exhibit 3.4-7. Staging areas for construction parking and the temporary stockpiling of excavated soils and storage of construction equipment and materials are expected to occupy approximately 10 acres on Victoria Island. Pipeline materials (e.g., piping, backfill material, and geogrids) would be stored along the pipeline route within the temporary easement. A smaller staging area would be located on Byron Tract.

3.4.3.6 Construction Workforce, Equipment, and Schedule

The total construction duration is estimated at 36 months.

Table 3.4-1 summarizes the duration of the major construction components. There would be overlap in the timing of construction of some of the components.

At the construction sites, typical heavy construction equipment that may be used includes excavators, backhoes, bulldozers, scrapers, graders, sheepsfoot or tamping foot rollers, water trucks, a front-end loader, several dump trucks, a drill rig, a pump truck, truck-mounted cranes, pile drivers, pickup trucks, and miscellaneous equipment.



Source: Carollo Engineers

Potential Staging Areas for the Proposed Action

EXHIBIT 3.4-7

Table 3.4-1
Anticipated Duration of Major Construction Components for the Proposed Action

Construction Phase	Anticipated Duration
Existing Victoria Canal Levee Improvements	6–8 months
New Victoria Canal Intake Structure/Fish Screen and Pump Station Installation	24 months
New Pipeline Installation	6–18 months
Old River Pipeline Crossing	7–9 months
New Pipeline Connection at the Existing Old River Pump Station	1 month
Total Construction Duration	36 months

It is anticipated that approximately 50 to 75 truck round trips would be required to transport the contractor's equipment to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed. About 200–300 highway truck trips would be needed to bring the riprap to the site from the quarry of origin. An additional 1,000–1,500 trips would be needed to bring aggregate surfacing to the site from the quarry of origin. About 300–400 concrete loads, transported by transit mixer truck, are also likely. About 150 trailer truck loads would be required to bring other permanent materials, such as geogrid, fish screens, sheet piles, masonry, piping, structural steel, utility poles, and ancillary equipment, to the site. In addition, about 50 highway truckloads may be needed to carry construction debris and waste dump materials to a suitable landfill. If off-site borrow material is used to provide fill for the setback levee construction, up to an additional 11,500 trips may be needed. This would total about 14,000 total round trips during the construction period of approximately 30–36 months, or an average of about 15 round trips per day. The actual round trips per day during construction may range between 8 and 100 to meet specific construction sequencing needs. The construction labor force is estimated to average about 75 to 100 people over the total construction period. Peak staffing could be close to 125 people if major construction components are conducted simultaneously (e.g., if the intake and the conveyance pipeline are constructed at the same time).

Typical construction would occur during daylight hours Monday through Friday. However, the construction contractor may extend the hours and may schedule construction work on weekends if necessary to complete aspects of the work within a given timeframe. An exception to the typical construction timing would be tunneling to install the pipeline under Old River, which would not depend on daylight and may be conducted around the clock.

3.4.4 Operations and Maintenance

CCWD currently delivers water using the three Delta intakes based on a goal of delivering water with chloride concentrations of 65 mg/l or better to its untreated- and treated-water customers, as described in the background section of this document. With implementation of the Proposed Action, CCWD would have the flexibility to relocate some of its pumping from the existing Old River intake to the new location during certain periods of the year to obtain better water quality. Water quality at the intake locations and diversion patterns are described in greater detail in the water resources section of this document (Section 4.2). In general, Old River water quality is best in late spring and early summer. Victoria Canal water quality is better than Old River water quality in late summer and fall. The addition of the proposed intake on Victoria Canal would provide CCWD with the flexibility to divert up to 250 cfs of water for conveyance to the Los Vaqueros Reservoir and the Contra Costa Canal using the existing Old River intake, the new Victoria Canal intake, or a combination of the two intakes. The combined permitted capacity of the Old River conveyance system would remain 250 cfs. Rock Slough would continue to provide a portion of CCWD's water supply, but would be used less frequently under the Proposed Action because of the operational flexibility that would be provided by a new intake with better water quality. Mallard Slough intake would continue to provide a portion of CCWD's water supply in a manner similar to its current operations.

The proposed intake would use CCWD's existing water supply and would not divert additional water out of the Delta; it would simply allow CCWD to shift the location and timing of pumping between the existing Old River intake and a new location based on water quality. CCWD would not seek to increase its water rights, contract amounts, or permitted Los Vaqueros Reservoir filling rates through this project.

The pump station for the new intake on Victoria Canal would be operated similarly to the existing Old River pump station. The Old River pump station is normally operated remotely from the Bollman WTP but can be locally operated at the pump station itself. CCWD personnel sequentially start the Old River pumps to initiate diversion from Old River. The number of pumps operating at any given time depends on CCWD's flow requirements and diversion strategy. When the pump station is taken off line, the pumps are turned off and the wet well remains flooded.

Maintenance activities at the proposed new intake and pump station would be similar to maintenance activities currently conducted at the Old River pump station, including pump and equipment inspections and maintenance, water quality monitoring, and fish monitoring activities. Periodic maintenance dredging may also be required at the new intake facility. The existing Old River facility has not required any maintenance dredging to date, but an intake on Victoria Canal could experience different sedimentation conditions. Because the proposed new pump station would be unstaffed, CCWD personnel would monitor the station via telemetry as well as through regular inspections.

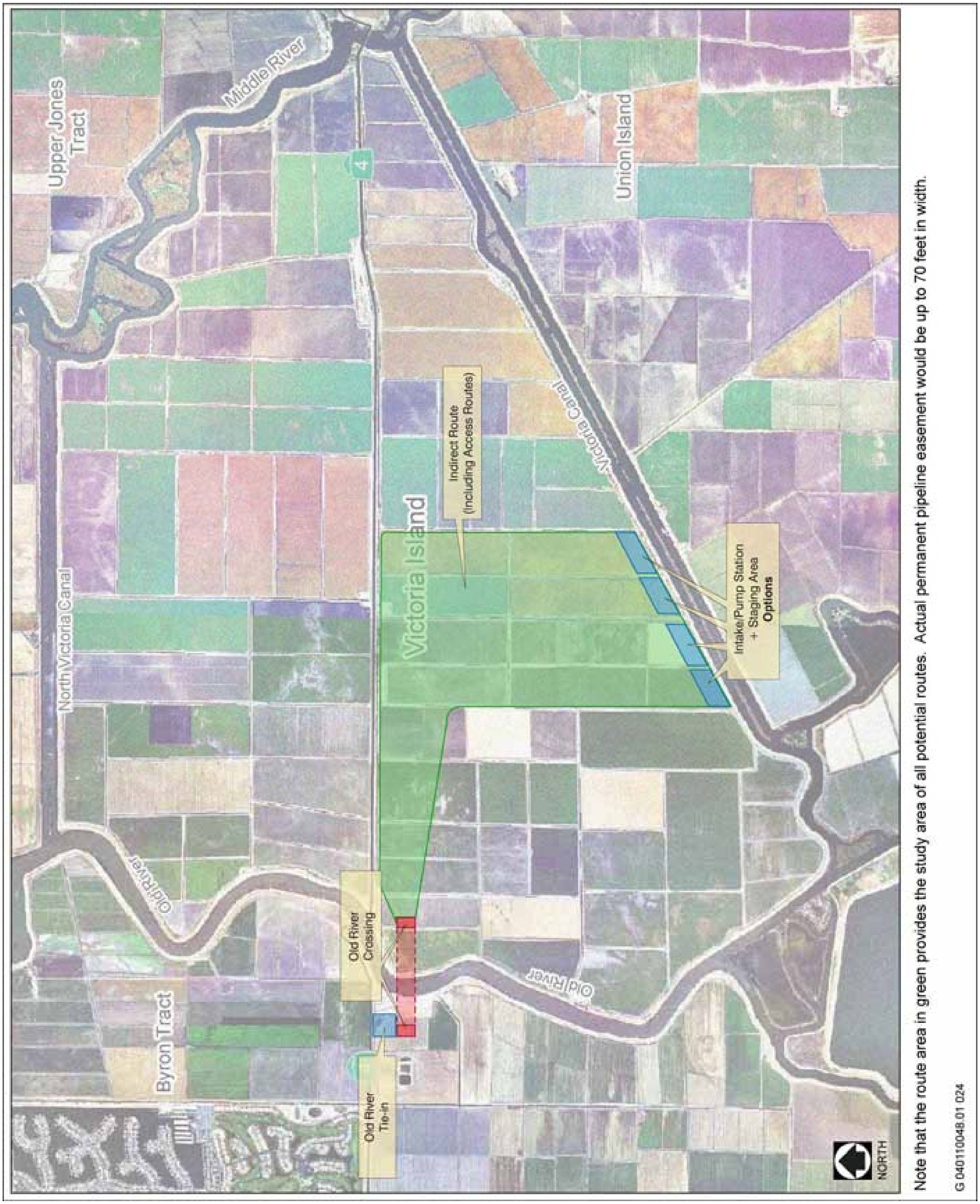
3.5 Alternative 2, Indirect Pipeline Alternative

The features of Alternative 2, the Indirect Pipeline Alternative, are the same as described for the Proposed Action, except that the pipeline route from the proposed new intake on Victoria Canal to the Old River crossing would be indirect and, therefore, longer. Exhibit 3.5-1 shows a conceptual alignment, with the pipeline extending northward from the proposed intake structure location parallel to an existing agricultural access road to below SR 4, then westward and parallel to the highway to the Old River levee. The alignment would be approximately 17,000–20,000 feet long. An estimated 175,000–240,000 cubic yards of high-quality material would be required for pipeline backfill. The excavation and backfill of the pipeline trench would result in a net excess of 30,000–90,000 cubic yards of material for which disposal would be needed. Alternative 2 would be operated the same as described in Section 3.4 for the Proposed Action. This alternative was responsive to concerns raised by the landowner during scoping that alternatives be examined that follow existing drainages on the island to minimize disruptions to existing agricultural practices.

3.6 Alternative 3, Modified Operations Alternative

The physical features of Alternative 3, the Modified Operations Alternative, are the same as those described in Section 3.4 for the Proposed Action. The operations would differ in that CCWD would relocate a portion of the current Rock Slough pumping as well as some of the current Old River pumping to the new screened intake. The Rock Slough intake is unscreened and, during project scoping, fisheries agencies requested that CCWD consider how the Alternative Intake Project could be developed to enable CCWD to divert more of its supply through screened intakes.

Operations under Alternative 3 would differ from the Proposed Action as follows: CCWD would immediately apply to change its permits to allow diversion of up to 320 cfs through the Old River conveyance system rather than in the future, as planned. Combined diversions from the 250-cfs Old River pump station and the proposed 250-cfs alternative intake would be limited to 320 cfs by the capacity of the pipeline connecting the Old River pump station to CCWD’s transfer station that routes water either to the Los Vaqueros Reservoir or the Contra Costa Canal. CCWD would not increase the average total annual quantity diverted from the Delta. This change would enable CCWD to relocate up to half of the current Rock Slough diversions to the screened Old River conveyance system in the near term. Rock Slough would continue to provide a portion of CCWD supply, but would be used less frequently in the near term than under the Proposed Action. Mallard Slough operations would be similar under both alternatives.



Source: Carollo Engineers

EXHIBIT 3.5-1

Conceptual Alignment, Indirect Pipeline (Alt 2)

EDAW

3.7 Alternative 4, Desalination Alternative

3.7.1 Facility Locations

The Desalination Alternative would include a new brackish water desalination plant that would process up to 85 mgd (132 cfs) of untreated water to produce approximately 70 mgd (109 cfs) of treated water . The facilities would convey and treat water diverted through a screened intake at CCWD’s existing Mallard Slough plant located in the western Bay-Delta vicinity.

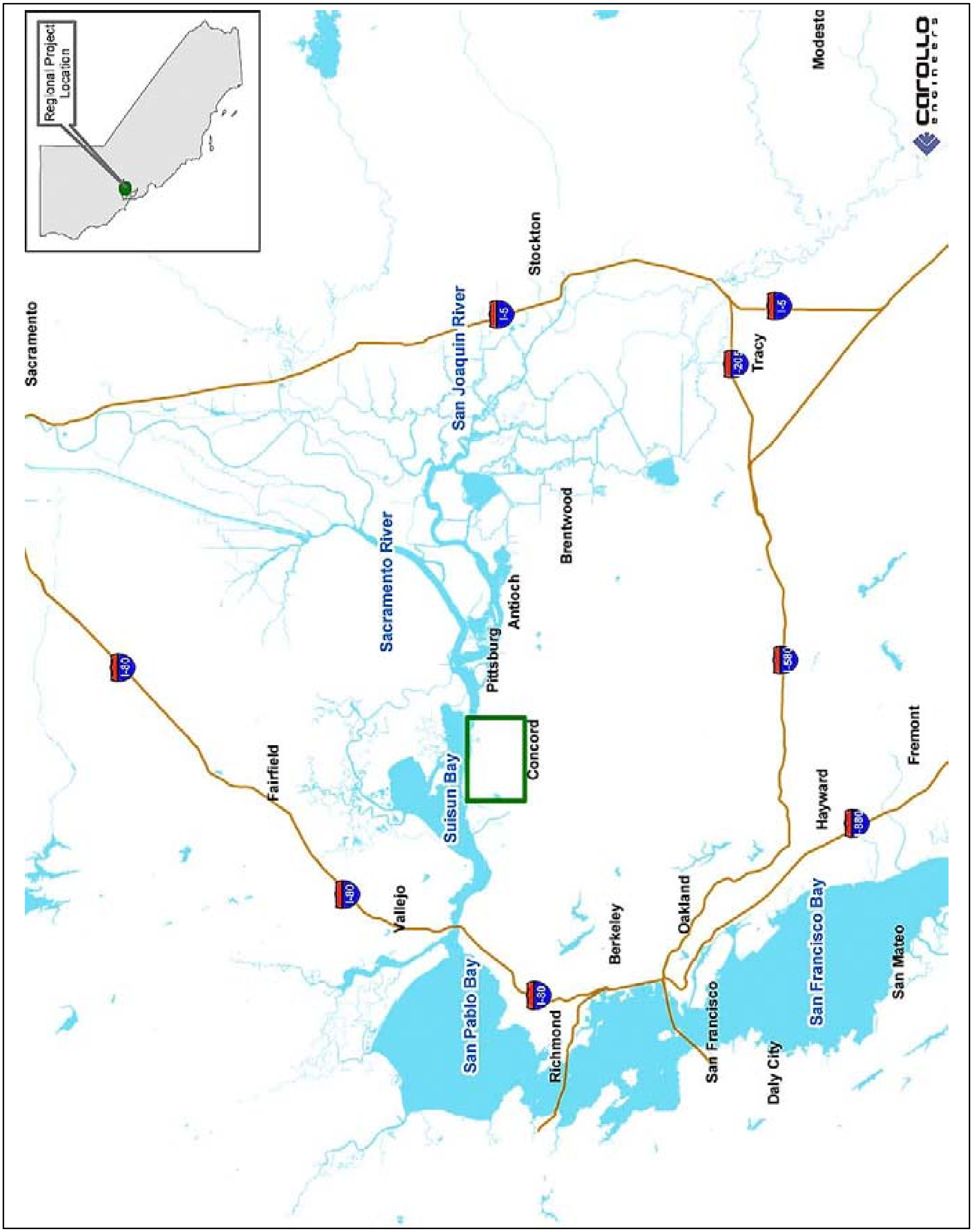
Exhibit 3.7-1 shows the regional location of the Desalination Alternative facilities, all of which would be in Contra Costa County. The new intake would be an expansion of the existing CCWD Mallard Slough intake and pumping plant, which is at the southern end of a dredged channel west of Mallard Slough on Honker Bay, near the City of Pittsburg and the community of Bay Point. The desalination plant would be located within the existing property boundary of CCWD’s Bollman WTP in Concord. The locations of these sites are shown in Exhibit 3.7-2. The untreated-water conveyance pipeline would follow the existing Mallard Slough pipeline and Contra Costa Canal alignments from the intake/pumping plant to the desalination plant. A concentrate disposal pipeline would extend northward from the plant for discharge into Suisun Bay.

This alternative would serve the demands of the treated water service area (TWSA) customers currently served by the Bollman WTP. This alternative would reduce the overall demands on the Contra Costa Canal, such that the canal would primarily serve CCWD’s untreated-water customers. The reduced demands on the canal would in turn reduce diversion quantities from the Rock Slough and/or Old River intakes, and would reduce the quantity of blending water required from the Los Vaqueros Reservoir.

The Desalination Alternative would meet the basic project purpose of protecting and improving water quality for both untreated-and treated-water customers by providing high-quality treated water to customers served by Bollman WTP and by reducing overall demands on the Contra Costa Canal, such that the Los Vaqueros Project can be used more effectively to provide high-quality water to the remaining untreated-and treated-water customers.

3.7.2 Overview of Desalination

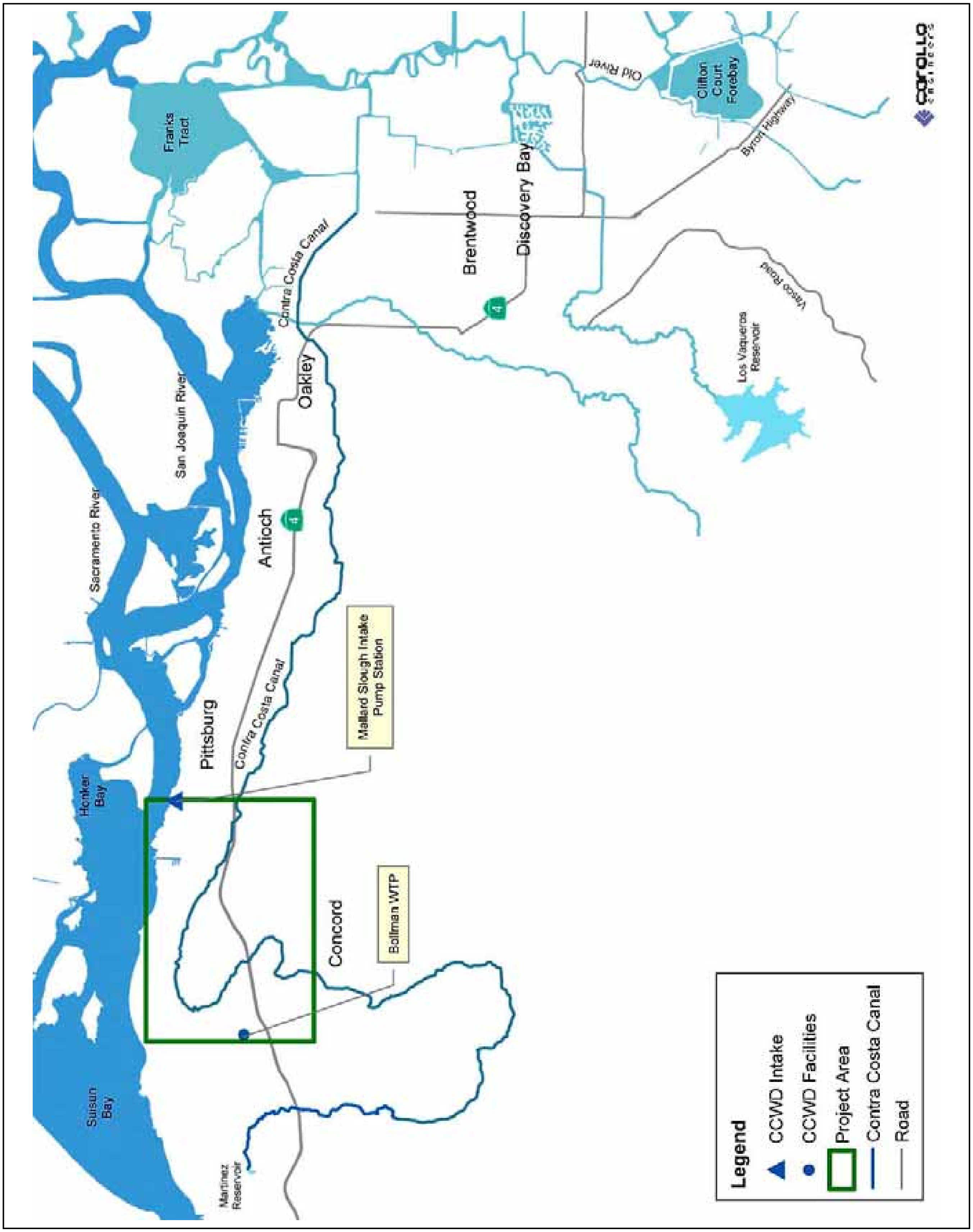
Desalination is a water treatment process used to remove salts, other dissolved minerals, and organic constituents from brackish water or seawater. The two most common desalination processes are reverse osmosis (RO) and electrodialysis/electrodialysis reversal. RO was selected as the basis for the project concept because it is more cost effective for the high-end range of total dissolved solids (TDS) concentrations typical of the Delta source, which can be generally categorized as a brackish water (TDS of 500–10,000 milligrams per liter [mg/L]) in the vicinity of the Mallard Slough intake.



Source: Carollo Engineers

Desalination Alternative: Regional Vicinity

EXHIBIT 3.7-1



Source: Carollo Engineers

Desalination Alternative: Project Location Area

EXHIBIT 3.7-2

The RO process produces two end streams: low-salinity product water and concentrate byproduct, which is disposed of. The amount of byproduct is a function of salinity concentration and mineral content of the feed water. Brackish water RO plants typically recover 80–85% of the feed water for mineral/salt concentrations typical of the Delta source near Mallard Slough (i.e., the amount of treated water produced by the process is about 15–20% less than the amount of water treated). The process can be accomplished with 90–98% salt rejection.

3.7.3 Desalination Alternative Facilities

The Desalination Alternative would include the following major facilities:

- Screened intake and pumping plant—an expansion of CCWD's existing Mallard Slough intake and pumping facilities.
- Conveyance pipeline—to convey untreated water from the Mallard Slough intake and pumping plant to the desalination plant at the existing Bollman WTP site.
- Desalination facilities and concentrate disposal pipeline—treatment systems in a new desalination plant located at the Bollman WTP site, and a pipeline to convey the concentrate byproduct from the desalination plant to Suisun Bay.

Because all of the new facilities for the Desalination Alternative would be expansions of existing CCWD facilities or would be constructed adjacent to existing CCWD facilities, each subsection below includes a description of the existing facilities followed by a description of the new facilities that would be added for desalination.

3.7.3.1 Mallard Slough Intake and Pump Station

Existing Intake and Pump Station

The existing Mallard Slough intake and pump station is west of Southern Energy's Bay Point Electric Power Plant at the southern end of a dredged channel due west of Mallard Slough. Site access is from the north end of Poinsettia Avenue in Bay Point. The facility consists of a screened slough intake with an automatic cleaning system, pumps, an adjoining PG&E transformer platform, and an electrical room. The ground around the facility is surfaced with crushed rock. The site is surrounded by undeveloped land.

The intake/wet well structure is reinforced concrete construction on reinforced concrete piles.

The intake structure allows water to flow from Mallard Slough to the pumping system. Fish screen panels prevent fish from entering with the diverted water from the slough and screen debris to prevent clogging of the pump passages. A floating log boom system keeps floating debris from entering the intake area.

The pump station currently transfers up to 60 cfs (40 cfs under normal operation) from the Mallard Slough intake via a pipeline to the Contra Costa Canal. The system can also be operated to pump water through the Mallard Slough pipeline directly to the Mallard Reservoir at the Bollman WTP.

Intake and Pump Facilities Required for the Desalination Alternative
The Desalination Alternative would require the expansion of the existing Mallard Slough intake and pump station from its current capacity of 60 cfs to a capacity of approximately 125–132 cfs. The diversion capacity of 125–132 cfs is necessary to meet a 70-mgd treatment capacity target, allowing for losses associated with the concentrate byproduct disposal from the desalination treatment process. A change in the current Mallard Slough water rights would be required for this capacity increase; these water rights are described in Section 3.7.5.1.

Exhibit 3.7-3 shows a conceptual delineation of the footprint of the new intake and pump station adjacent to the existing facilities. The expansion would be within the existing CCWD property boundary. The new pump station and supporting structure would be constructed similar to the existing pump station and would include a screened intake with an automatic cleaning system, additional pumps, and associated electrical system upgrades. The fish screen design would match the existing screen design and would meet required flow velocity limitations established by the resource agencies.

Site access would be from the south by the existing pump station access road.

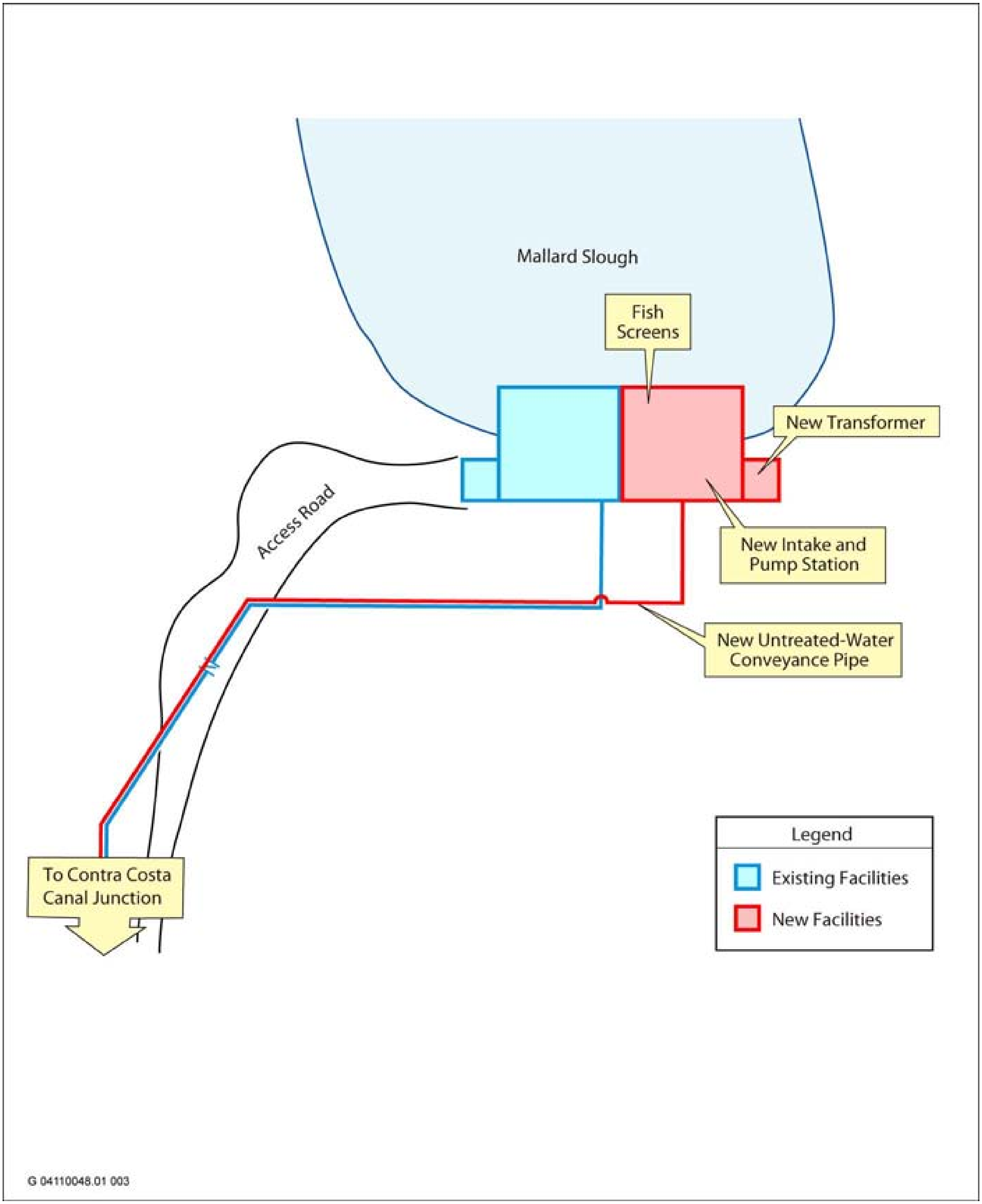
3.7.3.2 Untreated-Water Conveyance Pipeline

Existing Pipelines
As shown in Exhibit 3.7-4, a pipeline currently conveys water from Mallard Slough to the Contra Costa Canal. The pipeline alignment begins at the Mallard Slough intake and pump station and crosses the railroad track alignment to Crivello Avenue. From Crivello Avenue, it continues to the northern end of Cleveland Avenue, and from Cleveland Avenue it crosses the EBMUD Mokelumne Aqueducts to the Contra Costa Canal. The pipeline crosses property owned by CCWD and Southern Energy; crosses under utilities and railroads operated by Chevron Pipeline Company, Kinder Morgan, Union Pacific Railroad, and Burlington Northern Santa Fe Railroad; tunnels under the EBMUD Mokelumne Aqueducts; and finally terminates at the Contra Costa Canal.

Conveyance Pipeline Required for the Desalination Alternative
A new pipeline 4–5 feet in diameter would be constructed to convey the additional flow from the expanded Mallard Slough intake to the desalination plant that would be constructed at the Bollman WTP site. The new conveyance pipeline would run parallel to the existing pipeline up to the Contra Costa Canal (Exhibit 3.7-4), at which point it would transition westward in an alignment parallel to that of the canal to its terminus at the Bollman WTP site (Exhibit 3.7-5). The entire untreated-water conveyance pipeline would be located within CCWD easements and rights-of-way.

3.7.3.3 Desalination Treatment Facilities

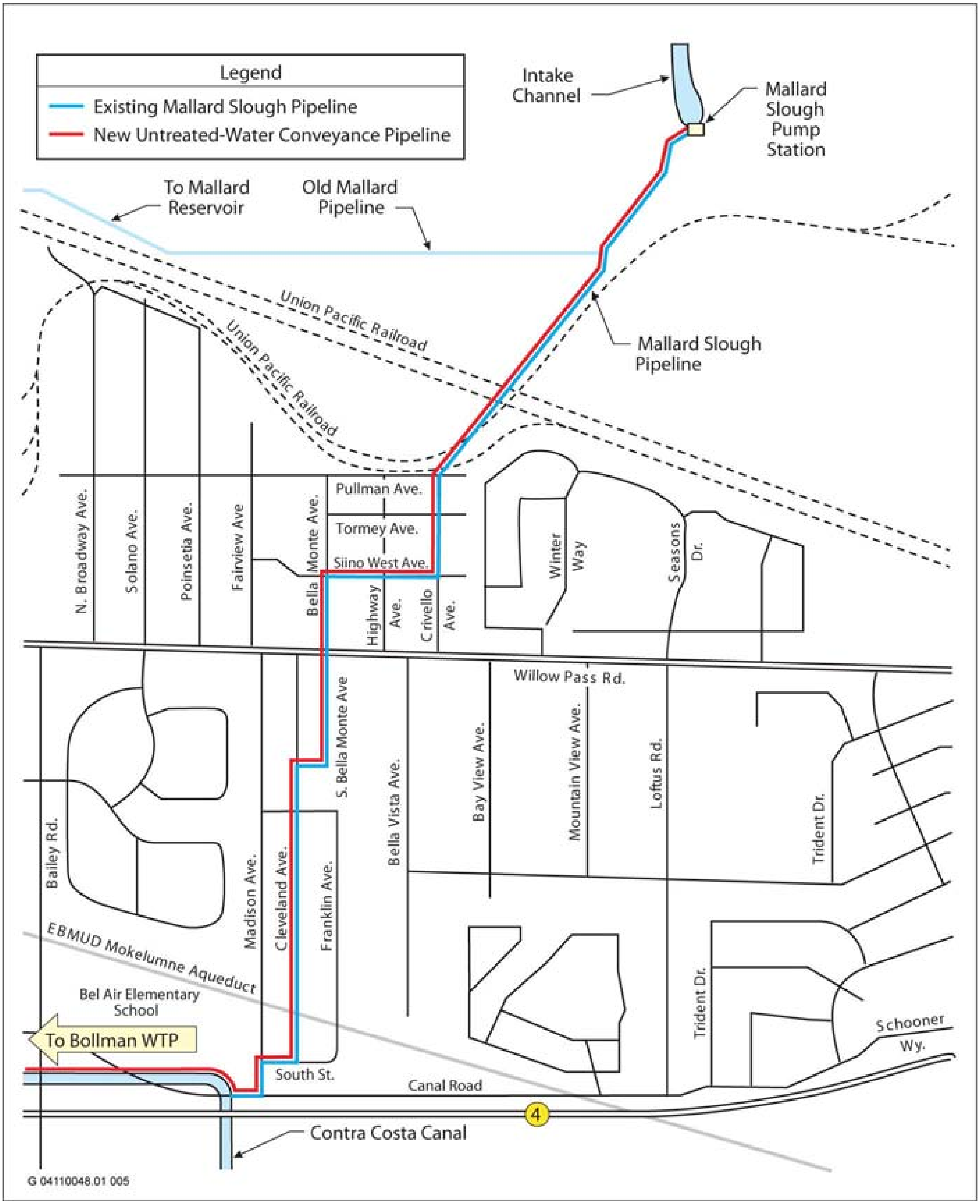
The desalination treatment facilities would be constructed on vacant land within the boundaries of the existing Bollman WTP site in Concord.



Source: Carollo Engineers

Desalination Alternative:
Conceptual Facility Improvements at Mallard Slough Intake

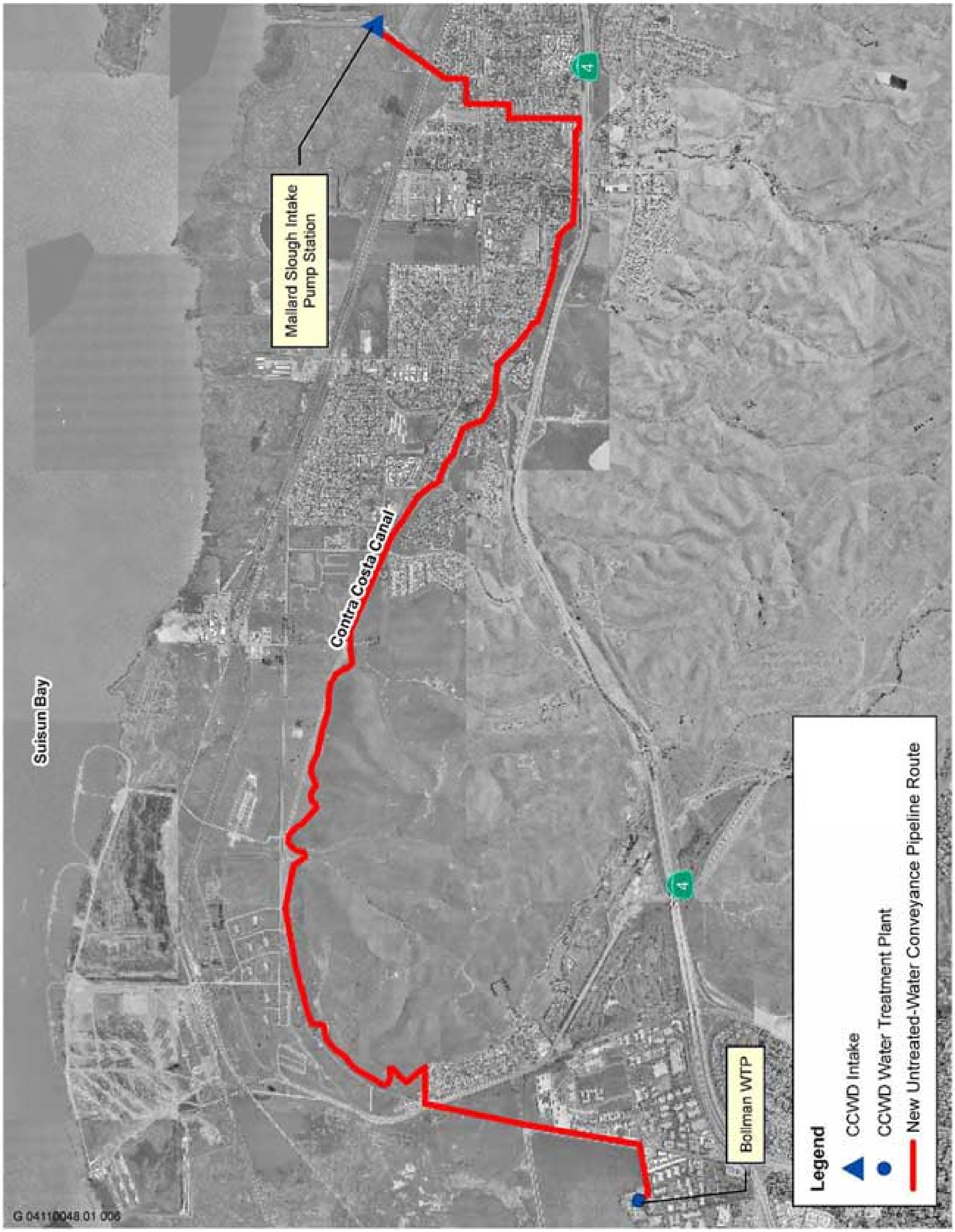
EXHIBIT 3.7-3



Source: Carollo Engineers

Desalination Alternative: Untreated-Water Conveyance Pipeline Route from Mallard Intake to the Contra Costa Canal Junction

EXHIBIT 3.7-4



Source: Carollo Engineers

Desalination Alternative: Untreated-Water Conveyance Route from Contra Costa Canal Junction to Bollman WTP

EXHIBIT 3.7-5

Existing Bollman WTP Facilities
The Bollman WTP is a state-of-the-art facility providing drinking water to over 200,000 residents in central Contra Costa County. The major facility components include Mallard Reservoir, where untreated water from the Contra Costa Canal is stored, and facilities for pretreatment, ozonation, filtration, chemical addition processes, and treated water storage.

Treatment Facilities Required for the Desalination Alternative

Tie-In to Pump Station
Untreated water would be conveyed in the new conveyance pipeline to a direct tie-in to the existing pump station that feeds the Bollman WTP (it is preferable to directly tie in to the pumping facility so as to limit the amount of higher-salinity water delivered to Mallard Reservoir, which in effect would dilute the untreated water supply and reduce the efficacy of the RO process). Some minor modifications would be required to connect the new conveyance pipeline to the existing system.

Pretreatment
Pretreatment would be provided through the existing conventional treatment facilities at the Bollman WTP. The current rated capacity of the existing treatment facilities is 75 mgd. For the purposes of this evaluation, no upgrades to the existing facility are assumed, as the plant can produce a slightly increased capacity of 82 mgd as a pretreatment step for subsequent RO membrane processes.

Desalination Treatment with RO
Desalination treatment would occur in a new building measuring approximately 80,000–100,000 square feet, which would be constructed in a currently vacant area on the Bollman WTP property. The building would house the RO membranes, piping, booster pumps, filters, and chemicals, as well as space for offices, storage, and instrumentation. The likely location of the new plant at the Bollman WTP site is shown in Exhibit 3.7-6.

Facilities for Post-Treatment of Product Water
The product water from the RO process would be blended and chemically conditioned for pH and alkalinity adjustment (i.e., lime and carbon dioxide addition). This post-treatment process is necessary to achieve an improved mineral balance with increased hardness to protect the distribution system against corrosion. The water would be disinfected before delivery to the distribution system through existing treatment plant distribution pumping systems.

Solids Handling and Disposal
CCWD currently discharges waste solids (i.e., suspended solids and pretreatment flocculant solids) off-site to a lagoon-type storage system for drying and disposal that is located at the Central Contra Costa Sanitation District treatment facility. Solids generated by the desalination pretreatment and treatment processes would be disposed of in the same manner using the existing facilities; no capacity upgrades to the solids handling systems are anticipated.

The lagoon storage system is a passive system for draining and air drying the waste solids. Once dry (approximately 35–50% solids concentration), the solids are removed for disposal at a local landfill site. The removal and disposal operations are typically completed six to eight times per year. Approximately 25,000–35,000 cubic yards (cu yds) of additional solids would be produced each year as a result of the desalination process.

Water Distribution
Distribution of desalinated water to CCWD's treated water customers would be via CCWD's existing distribution system. No improvements to the existing system are anticipated in association with the desalination facility.

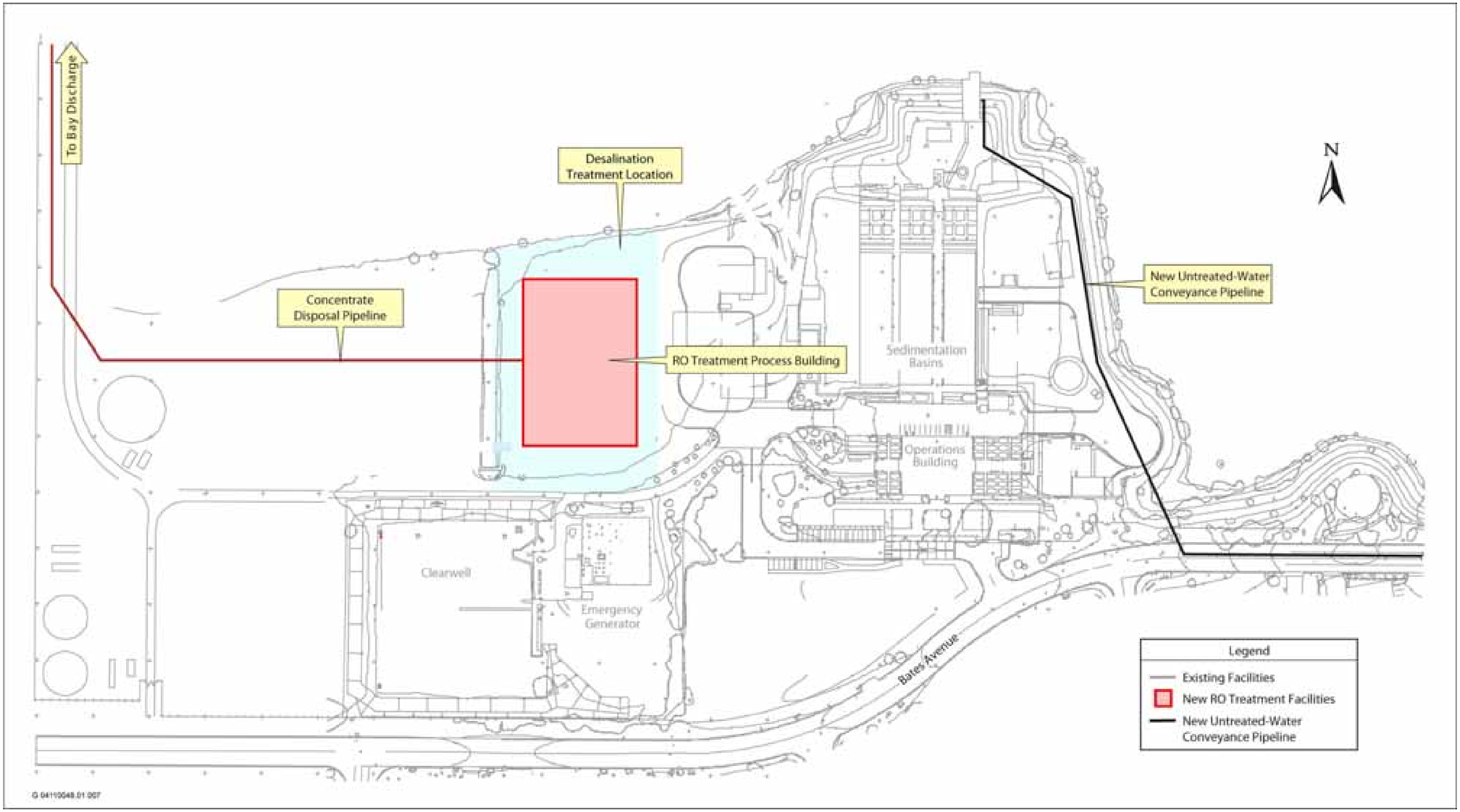
Concentrate Disposal
Disposal of RO byproduct concentrate can be achieved through several methods, including direct discharge to surface water or ocean, blending with treated wastewater effluent prior to surface water or ocean discharge, and underground injection. For the purposes of this evaluation, it is assumed that the concentrate disposal would be by direct surface water discharge through a new pipeline to Suisun Bay (near San Francisco Bay).

Blending the byproduct concentrate with wastewater is considered to be a potentially viable option, as the CCWD Bollman WTP site is near the Central Contra Costa Sanitation District wastewater treatment facilities. Accordingly, blending with treated wastewater would be evaluated during additional preliminary engineering efforts prior to final design if this alternative is selected for implementation. Prior to disposal, concentrate byproduct from the RO units would pass through an energy recovery turbine to maximize energy efficiency of the system.

The concentrate disposal element of the Desalination Alternative would require the construction of a new pump station and pipeline with a capacity of approximately 12 mgd. The pipeline would be approximately 14,000–15,000 feet long and would convey the concentrate byproduct from the Bollman WTP site to a discharge area in Suisun Bay. The pipeline would be routed west and north along the western perimeter of Mallard Reservoir, then would continue northward, crossing under Waterfront Avenue and along the western perimeter of the U.S. Naval Weapons Center property (Exhibit 3.7-7). The pipeline would cross property owned by CCWD and Southern Energy; pass under utilities and railroads operated by Monsanto Chemical Company, Tosco Oil Company, Kinder Morgan, Union Pacific Railroad, Burlington Northern Santa Fe Railroad, and the U.S. Navy; and ultimately terminate in Suisun Bay.

The discharge facilities would consist of an outfall diffuser located approximately 2,000 feet from the shoreline, in Contra Costa County. Like other similar outfall systems, the discharge pipe would terminate at a water depth of 50–75 feet and would be designed with nozzle-type ports to provide velocity and dispersion mixing of the concentrate sufficient to meet dilution standards.

The discharge to Suisun Bay would require a discharge permit from the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) and would conform to the SFRWQCB Basin Plan.

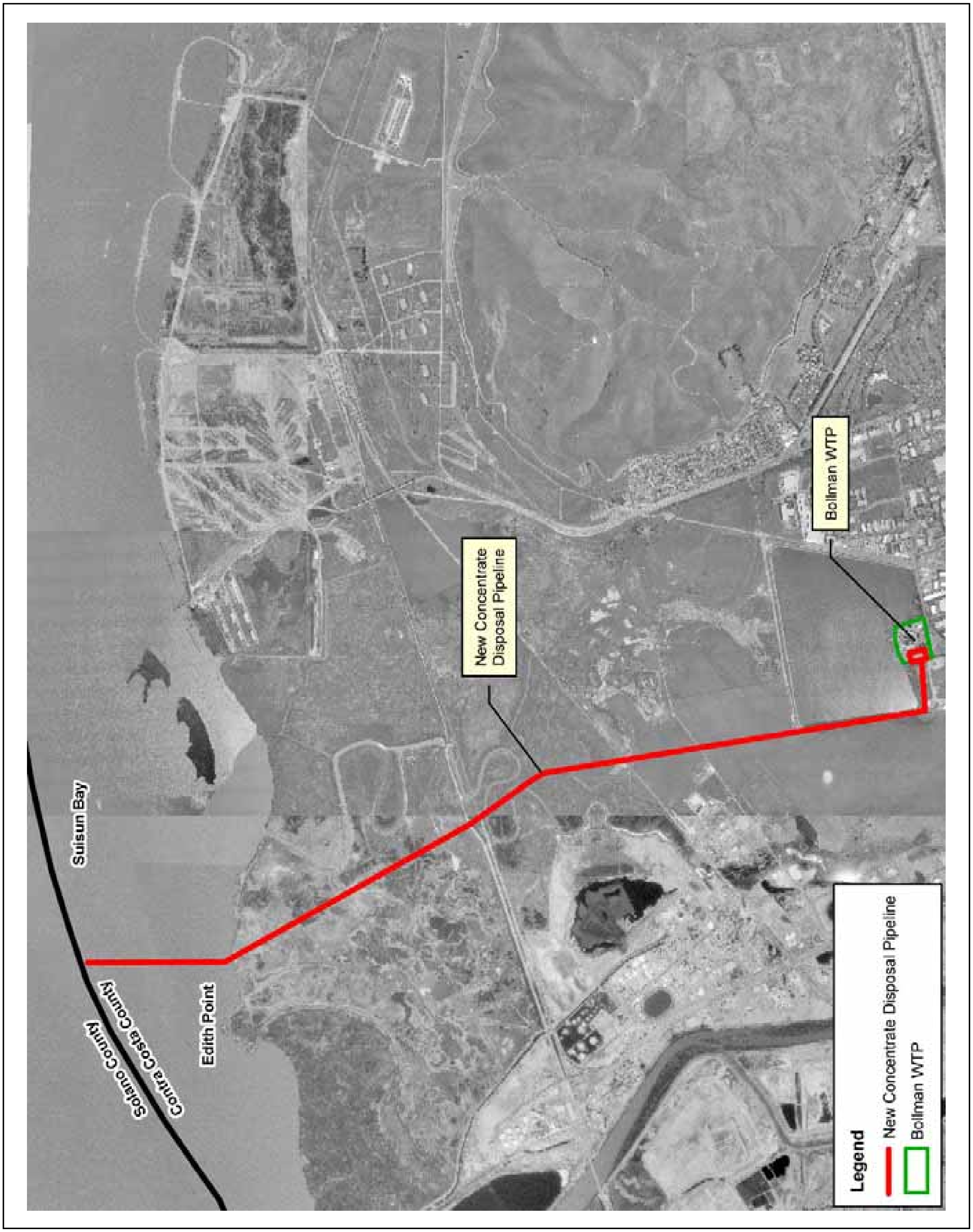


Source: Carollo Engineers

Desalination Alternative: New RO Treatment Facilities at the Bollman WTP

EXHIBIT 3.7-6

EDAW



Source: Carollo Engineers

Desalination Alternative:
Concentrate Disposal Conveyance Pipeline Route

EXHIBIT 3.7-7

EDAW

3.7.3.4 Easements and Right-of-Way

The intake and conveyance pipeline would be located on existing CCWD properties and easements.

For the brine discharge pipeline, CCWD would purchase or obtain a permanent right-of-way approximately 20–40 feet wide for the pipeline alignment. For the duration of project construction, an additional construction easement approximately 15–30 feet wide along both sides of this right-of-way may also be required.

Additional temporary construction easements of approximately 5 acres (3 acres near the CCWD Bollman WTP and 2 acres near the bay) would also be required for construction staging areas.

3.7.4 Construction of the Desalination Alternative

3.7.4.1 Facilities

Intake and Pump Station

The expansion of the Mallard Slough intake and pump station would include on-site demolition; grading/excavation; construction/expansion of the intake, pump station, and fish screen; landscaping; and facility startup/testing. Primary construction materials would include concrete, crushed rock, engineered fill, fish screens, log booms, pumps, and piping.

In-water construction activities would most likely be conducted from a barge or may be conducted from the land via crane. Most of the construction activities would be conducted in a dewatered cofferdam or would be isolated from Mallard Slough. As part of the construction of the new intake structure, a sheet pile cofferdam would be installed in the slough to isolate the work area from the slough water and provide a means to conduct construction work in a dewatered environment. Following installation of the cofferdam, the water in the cofferdam enclosure would be discharged back into the slough, and the remaining intake construction work would be conducted in the dewatered environment.

If material needs to be removed for bed preparation at the cofferdam site, a crane with a dredge bucket may be used to remove this bottom material. This dredged material would be contained within a designated containment area or areas on land, which would be located within the construction staging areas. An earthen dike, geotextile logs, or siltation fences would enclose the containment area(s). Retention of the dredge spoils would promote settling of the suspended sediments. Any excess water (desilted supernatant) would be returned to Mallard Slough.

Dredging may be required in the slough in the immediate vicinity of the new intake to provide a deeper cross sectional area for the new screen. The need for dredging would be determined during final design based on the results of field data. If dredging is required, the preferred underwater excavation method is to use mechanical dredging equipment. Dredging activities would be conducted via a barge with a clamshell-type bucket dredge. An environmental bucket designed to minimize release and suspension of sediments would be used to the extent possible. If needed, a traditional toothed-bucket dredge would be used to excavate compacted materials encountered during the dredging activities. It is anticipated that the dredged materials would consist of 70% to 80% solids. Dredged materials would be transferred to the designated containment or disposal areas on the land side of the levee.

In-water construction activities would conform to the DFG construction windows for in-water construction projects in the Delta. This construction window is typically August 1 until as late as December 15, depending on sensitive fish resources that may be present during certain times of the year.

Conveyance Pipeline

Construction of the untreated-water conveyance pipeline would include excavation, bedding preparation, backfill, and pipeline installation, and construction of tie-ins to the Mallard Slough plant and the Bollman WTP. Primary construction materials would include pipeline, bedding material, imported backfill, and cathodic protection.

The pipeline would be installed using a combination of conventional “cut-and-cover” construction in an open trench and “no-trench” subsurface installation (i.e., directional drilling and/or jack and bore) where conventional installation is not practical (i.e., railroad crossings, heavy traffic areas, etc.). The conventional trench design would entail the direct burial of the pipeline in a pipe trench that is excavated to maintain a minimum cover of 4–6 feet over the pipeline. The trench base would be approximately 6–8 feet wide, with the top of the trench being approximately 6–12 feet wide (depending on soil stability and need to cut trench sections with side slopes and/or need for shoring; to be determined in final design). The bottom of the trench would be backfilled with pipe bedding material (e.g., crushed rock) up to the centerline of the pipeline. The as-built surface elevation along the entire alignment would match the original ground surface and would be restored to preconstruction conditions.

Dewatering may be required for construction of the pipeline across parts of the pipeline route (the need for dewatering would be confirmed during final design via additional geotechnical investigations along the pipe route). Removed groundwater would be pumped into portable sedimentation tanks to remove suspended material prior to discharge to the adjacent sanitary sewer system or, alternatively, to drainage courses along the pipeline route. The excavation may be shored with steel sheet piles along the pipeline alignment to minimize the width of the excavation.

Desalination Facility and Concentrate Disposal Pipeline

Construction of the desalination facility would include grading and excavation, building construction and outfitting, landscaping, and facility startup and testing. Primary construction materials would include concrete; RO process equipment, including membranes and pumps; building materials (e.g., formwork, steel, wood, etc); piping; and backfill material.

Construction of the byproduct concentrate disposal pipeline would include excavation, bed preparation and backfill, pipeline installation, and the construction of the outfall diffuser. Primary construction materials would include pipeline, bedding material, and imported backfill.

The concentrate disposal pipeline installation would be installed using conventional "cut-and-cover" trench installation as described above. Dewatering is anticipated along most (and potentially all) of the pipeline route, and would be accomplished with the use of a well point system, as described above for the untreated-water conveyance pipeline.

The diffuser pipeline would enter the bay and follow the existing bottom contour. The pipeline would be supported by piles (exact size and number would be confirmed during final design), and would be would be buried to a depth of 5–7 feet. A barge with mechanical dredge equipment would be used to complete the in-river pipeline construction. The trench would be approximately 8–10 feet wide at the bottom and 65–80 feet wide at the top (accounting for side slopes for the trench excavation). The trench would be partially backfilled with crushed rock and/or riprap to stabilize the trench section and make it suitable for pipe installation. At completion of construction, the bay bottom would be restored to pre-construction conditions.

The diffuser pipeline would extend 2,000-2,500 feet into the bay. The section of pipe with diffuser ports would be 150 to 250 feet long. Diffuser ports would be spaced every 3 to 5 feet along the top of the pipes. Flexible wire hose, or PVC pipe, would be attached to the diffuser pipes to allow for the discharge above the soil surface. One-way flow devices would be attached to the hose/pipes to prevent the accumulation of sediment in the pipe.

3.7.4.2 Construction Staging

Construction staging areas for office space, worker and equipment parking, storage, and other temporary uses during construction of the Desalination Alternative facilities would be established at the Mallard Slough intake on CCWD property adjacent to the existing pump station, along the conveyance and concentrate disposal pipeline routes in temporary easements, and on CCWD property at the Bollman WTP site.

3.7.4.3 Construction Workforce, Equipment, and Schedule

The overall construction period is anticipated to last 36 months. Table 3.7-1 summarizes the anticipated duration of the major construction components. It is assumed that construction of the treatment plant and conveyance systems would occur in parallel, and that the contractor would be working year round (except when restricted because of environmental considerations).

Contractor construction equipment could include construction trailers, excavators, front-end loaders, a tower crane, truck-mounted cranes, pile drivers, a bulldozer, a grader, a water truck, a vibratory compactor, concrete trucks, highway trucks, tunneling equipment, and other miscellaneous equipment.

It is anticipated that approximately 10–150 workers per day would be required at the various sites over the 36-month period of construction of the intake, conveyance pipeline, plant, and disposal pipeline for byproduct concentrate.

Typical construction hours would be during daylight hours; however, work hours and/or work days could be extended as needed to meet special requirements.

Table 3.7-1
Anticipated Duration of Major Construction Components for the Desalination Alternative

Component	Duration
Mallard Slough intake/pump station expansion	8–12 months
Construction of untreated-water conveyance pipeline	10–12 months
Desalination facility construction	30–36 months
Construction of pipeline for byproduct concentrate disposal	4–6 months
Total Construction Duration	36 months

3.7.5 Operations and Maintenance

3.7.5.1 Operational Criteria

CCWD has two permits for diversion at Mallard Slough issued by the SWRCB. One allows for direct diversion of 39.3 cfs (24.5 mgd) from the Mallard Slough pump station and 3,780 acre-feet per year to storage. The total volume authorized under this permit is 14,880 acre-feet per calendar year. The other authorizes an additional 11,900 acre-feet per year to be diverted from August 1 to December 31 at a rate not to exceed 39.3 cfs. Together, the two permits authorize CCWD to divert 26,780 acre-feet per year. Because of high salinity during most of the year at the Mallard Slough intake, CCWD has historically diverted only a fraction of the permitted water right. Most diversions from Mallard Slough occur during the spring months, when water quality is the best.

Under the Desalination Alternative, diversions at Mallard Slough would be increased to meet the capacity of the Bollman WTP. Sizing the desalination facility to match the existing infrastructure allows the benefits to be maximized while the costs are minimized. Desalination would be used to protect and improve water quality for all CCWD customers during periods when salinity at CCWD's Rock Slough and Old River intakes is elevated and blending with water from the Los Vaqueros Reservoir is required to meet CCWD's water quality goals. Therefore, the desalination facility would be expected to operate during periods when the salinity is most elevated at CCWD's existing Delta intakes. These periods are typically from September through December, but may be extended during drier years. Diversions at the existing Rock Slough and Old River intakes would decrease, but CCWD's overall diversions from the Delta would increase by 3 thousand acre-feet (TAF) per year, on average, because of the extra water required for saline concentrate at a desalination facility.

The desalination alternative would require diversions in excess of CCWD's current water rights at this intake. Increasing diversions could be accomplished either through the revision of existing water rights to increase the permitted diversion capacity at Mallard

Slough up to a total diversion of 125–132 cfs (approximately 80–85 mgd) to meet the demands of the Bollman WTP or by adding Mallard Slough as a point of diversion under CCWD's CVP contract and diverting water in excess of CCWD's existing water rights as CVP water. CCWD's diversions would remain within CCWD's total CVP contract allocation. Modeling for the desalination alternative (see Section 4.2) assumes that water diverted beyond the existing Mallard Slough water rights comes from CCWD's CVP allocation.

3.7.5.2 Desalination Plant Performance

As noted above, the percentage of product water concentrate byproduct is a function of salinity concentration and mineral content of the feed water. Based on a preliminary review of water quality data for untreated water and applications of RO treatment for similar source waters, a value of up to 85% recovery of permeate water (i.e., desalted product water) has been assumed for the purposes of this project concept. The remaining 15% would be discharged as concentrate byproduct. Actual values of permeate recovery may be lower by 5–10%, and would need to be confirmed prior to final design with bench and/or pilot scale testing.

Table 3.7-2 shows the estimated feed, permeate, and concentrate flows for the desalination treatment alternative.

Table 3.7-3 shows the projected water quality constituent values in the untreated feed water, bypass/blending stream, permeate, and concentrate byproduct stream.

Table 3.7-2
Projected RO Treatment Flow Rates for the Desalination Alternative

Parameter	Maximum Flow Rate (mgd)
Intake	82
RO Feed [a]	79
Bypass [b]	3
RO Permeate	67
RO Concentrate Byproduct	12
Total delivery to system [c]	70

[a] RO Feed water requires pretreatment. Conventional treatment is assumed based on ability to use existing Bollman WTP facilities.
[b] Bypass water is assumed to consist of conventionally treated water from the Mallard Slough intake. This water is blended with RO permeate to meet CCWD finished water quality goals.
[c] Total delivery to system of 70 mgd is sum of bypass water and RO permeate.

Table 3.7-3
Projected Water Quality Constituent Concentrations for the Desalination Alternative

Parameter	Unit	Mallard Slough Feed Water (Average 1996–2000)[a]	RO Permeate	Finished Water[b]	RO Byproduct
Chloride	mg/L	776	25	65	6,200
Sodium	mg/L	595	17	45	3,870
TDS	mg/L	2140	50	150	13,348
Potassium	mg/L	20	0.7	2	130
Magnesium	mg/L	80	0.5	4	522
Calcium	mg/L	35	0.2	23	233
Alkalinity	mg/L	61	4	63	510
Nitrate	mg/L	1.6	0.3	0.3	8.5
Sulfate	mg/L	152	1.7	14	1,660
Silica	mg/L	17	0.3	1.0	110
Phosphate	mg/L	0.3	-	< 0.1	2.0
Hardness	mg/L as $CaCO_3$	295	2.7	75	2,850
PH		7.67	6.4	8.1	8.4
Ammonia	mg/L	0.1	-	< 0.1	< 0.7
TOC	mg/L	2.7	-	< 0.5	< 18
CCPP[c]	mg/L as $CaCO_3$			5.0	
Larson Ratio[d]				1.5	

[a] Table 3-6 of Bay Area Regional Desalination Project Pre-Feasibility Study Final Report, URS Corporation and Boyle Engineering, October 2003

[b] Post-treatment includes chemical treatment and blending conventionally treated water at a ratio of 17% non-desalinated water to total finished water. Chemical treatment includes 50 mg/L of carbonic acid, 45 mg/L lime, and 2.5 mg/L of sodium hypochlorite.

[c] Calcium carbonate precipitation potential. Used to assess corrosivity of finished water. Should be within the range of 4–10 mg/L as $CaCO_3$.

[d] Used to assess corrosivity of finished water with respect to chlorides and sulfate. Should be less than 5.

3.7.5.3 Desalination Facility Operations

Plant Staffing

The desalination plant would operate 24 hours per day, averaging 5 months of use per year, and would require an increase of fewer than 10 staff people performing operations and maintenance at the Bollman WTP. The new intake and pump station would be operated remotely.

Storage and Handling of Chemicals
Various chemicals typically associated with desalination facility operation would be stored on-site. These chemicals include sodium hypochlorite, ammonia, lime, carbon dioxide, ferric sulfate, polymer, sulfuric acid, sodium bi-sulfite and the mild detergent soaps for RO membrane cleaning. All chemicals would be stored, handled, and used in accordance with all applicable Federal, State, and local standards. These chemicals are food-grade-purity compounds typically used in conventional treatment facilities.

3.8 Comparison of the Effects of the Alternatives

The potential environmental effects of the Proposed Action and alternatives are described in Chapter 4, "Affected Environment and Environmental Consequences." See Sections 4.2 through 4.20 for detailed descriptions of the analysis of effects. Table 4.21-1, "Summary of the Environmental Effects of the Alternatives", provides a summary comparison of the impacts of each alternative. This section provides a brief descriptive overview of how the significant benefits and impacts of the alternatives compare to one another.

The Proposed Action and Alternatives 2 and 3 are very similar in terms of their potential environmental impacts. The primary difference in effect between the Proposed Action and Alternative 2 is that the Indirect Route (Alternative 2) would reduce the acreage subject to temporary disruption of farming operations as compared to the Proposed Action. The amount of temporarily affected agricultural land along the pipeline alignment during construction and pipeline installation would be approximately 200–470 acres with implementation of the Proposed Action versus approximately 155–305 acres with implementation of Alternative 2. The impacts of Alternative 3 (Modified Operations Alternative) would be similar to those of the Proposed Action and Alternative 2, with the primary difference being a greater benefit for fisheries resources; in the near term, Alternative 3 would reduce estimated fish entrainment losses compared with existing conditions and with the Proposed Action and Alternative 2, although under future conditions, the benefits would be generally the same under all three alternatives.

One of the primary differences between Alternative 4 and the Proposed Action, Alternative 2, and Alternative 3 is project location. The Proposed Action and Alternatives 2 and 3 would be located in a rural area with few sensitive receptors and developed land uses that could experience project impacts, especially during construction. The primary land impacts associated with the Proposed Action and Alternatives 2 and 3 would be agricultural land conversion and temporary impacts to agricultural operations. In comparison, some components of Alternative 4 (Desalination Alternative), in particular the untreated water conveyance pipeline, would be located in urban areas, in close proximity to sensitive receptors and developed land uses. Temporary construction impacts such as air quality, noise, traffic, and visual impacts would be substantially greater under Alternative 4 than under the Proposed Action and Alternatives 2 and 3.

In addition, the water quality and fisheries benefits of the Proposed Action, Alternative 2, and Alternative 3 would be much greater than those of Alternative 4, and Alternative 4 would increase adverse fisheries effects from the saline concentrate discharged into Suisun Bay and increase entrainment and impingement losses of larval delta smelt at the Mallard Slough intake.

3.9 CEQA Environmentally Superior Alternative

The State CEQA Guidelines require identification of an environmentally superior alternative and specify that “if the environmentally superior alternative is the ‘no project’ alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.”

The No-Action Alternative is generally the environmentally superior alternative because it would not result in any adverse short-term, long-term, or cumulative effects to environmental resources; however, the No-Action Alternative would not improve drinking water quality for CCWD customers and would not reduce fish entrainment as the Proposed Action and Alternatives 2 and 3 would.

Given the similarities and differences between alternatives described in Section 3.8, “Comparison of the Effects of the Alternatives,” Alternative 3 is considered to be the environmentally superior alternative, despite temporary construction-related air quality impacts and its contribution to permanent agricultural land conversion, because it would provide improved water quality and provide the greatest benefit to fisheries.

3.10 Project Approvals and Permits

The CCWD Board of Directors will use this EIR/EIS to consider approval of the project. Reclamation will use it as it considers approval of an additional point of diversion, pursuant to CCWD’s long-term renewal contract for CVP water service, and to petition the SWRCB for water right changes.

Various other public agencies have jurisdiction over elements of the Proposed Action or alternatives, and permits and other authorizations would be required from these agencies for project implementation. The EIR/EIS is expected to meet these agencies’ environmental review requirements under CEQA and NEPA. Additional agencies that would not have any specific regulatory authority over the project are nevertheless responsible for resources that could be affected by construction or operation of the Proposed Action or alternatives, and are expected to use this EIR/EIS to evaluate whether the project could affect those resources.

Table 3.10-1 lists these agencies and the project permits or approvals for which they would be responsible, or resources over which they have jurisdiction.

Table 3.10-1
Required Permits and Approvals and Related Agency Responsibilities

Agency	Permit /Approval or Resource Protection Responsibility
Lead Agencies	
Contra Costa Water District	▸ CEQA lead agency – overall project approval
Bureau of Reclamation	▸ NEPA lead agency – mutual agreement with CCWD required for an additional point of diversion, pursuant to terms of CCWD long-term renewal contract for CVP water service; and petition SWRCB for necessary water right changes
Federal Agencies	
U.S. Army Corps of Engineers (USACE)	▸ Clean Water Act Section 404 Permit (all alternatives) ▸ Rivers and Harbors Act Section 10 Permit (over-the-levee pipeline option for Alternative Intake; Desalination Alternative)
U.S. Fish and Wildlife Service (USFWS) and	▸ Endangered Species Act compliance (all alternatives) ▸ Fish and Wildlife Coordination Act compliance (all alternatives)
National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS)	▸ Endangered Species Act compliance (all alternatives)
State Agencies	
California Department of Fish and Game (DFG)	▸ California Endangered Species Act compliance (all alternatives) ▸ Fish and Game Code Section 1602 Streambed Alteration Agreement (all alternatives) ▸ Fish and wildlife resource protection – CEQA trustee agency (all alternatives)
State Lands Commission	▸ Land use lease (Desalination Alternative) ▸ Resource protection for State sovereign lands, including tidal and submerged lands and the beds of navigable waterways – CEQA trustee agency (all alternatives)
California State Water Resources Control Board (SWRCB)	▸ Amended surface water right (all alternatives)
California Regional Water Quality Control Board (RWQCB), Central Valley Region (5) for Alternative Intake or San Francisco Bay Region (2) for Desalination Alternative	▸ Clean Water Act Section 401 water quality certification (all alternatives) ▸ National Pollutant Discharge Elimination System permit (all alternatives) ▸ Waste discharge requirements (Desalination Alternative)
The Reclamation Board	▸ Reclamation Board Encroachment Permit (Alternative Intake)
California State Office of Historic Preservation (OHP)	▸ National Historic Preservation Act Section 106 compliance (all alternatives)
California Department of Water Resources (DWR)	▸ State Water Project water supply and water resource protection (no permit required) (Alternative Intake)
California Department of Boating and Waterways	▸ Boating safety issues (no permit required) (all alternatives)
California Department of Health Services (DOHS)	▸ Domestic water quality regulation/permitting (all alternatives)

Table 3.10-1
Required Permits and Approvals and Related Agency Responsibilities

Agency	Permit /Approval or Resource Protection Responsibility
Local Agencies	
Bay Area Air Quality Management District (BAAQMD)	▸ Permit to construct/ permit to operate (all alternatives)
San Joaquin Valley Air Pollution Control District (SJVAPCD)	▸ Permit to construct/ permit to operate (Alternative Intake)
Delta Protection Commission	▸ Delta land use and resource planning (no permit required) (Alternative Intake)
Bay Conservation and Development Commission	▸ Construction/Operation Permit (Desalination Alternative)
Reclamation Districts 800 and 2040	▸ Levee maintenance (Alternative Intake)
Source: Data compiled by EDAW in 2005	