Chapter 3E. Affected Environment and Environmental Consequences - Utilities and Highways

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Chapter 3E. Affected Environment and Environmental Consequences - Utilities and Highways

SUMMARY

This chapter discusses the effects of construction and operation of the DW project alternatives on existing utility infrastructure, public services, highways, county roads, and ferry services on the DW project islands.

Implementation of Alternative 1, 2, or 3 would result in significant impacts on electrical utilities and emergency services. Existing Pacific Gas and Electric Company (PG&E) overhead transmission lines would be inundated on reservoir islands during water storage operations and would need to be extended on Webb Tract, Bouldin Island, and Holland Tract to serve proposed siphon, pump, and recreation facilities. Operation of the recreation facilities on the DW project islands would increase demand for police and fire services on the DW project islands and in adjacent waterways. These impacts are considered significant. To mitigate impacts on electrical utilities to a less-than-significant level, DW, in coordination with PG&E, would permanently relocate the affected electrical transmission lines on reservoir islands to the improved perimeter levees during project construction and would extend the existing electrical transmission lines on the DW project islands to serve new facilities. DW would also incorporate adequate lighting, security services, and fire protection features into design and operation of the recreation facilities to reduce impacts on police and fire services. Also, under Alternative 3, fog hazard along SR 12 on Bouldin Island could increase and result in a significant and unavoidable impact on traffic safety; no mitigation is available to reduce this impact to a less-than-significant level. Implementing Alternative 1, 2, or 3 is not expected to result in any significant cumulative impacts.

Implementation of Alternative 1, 2, or 3 would result in less-than-significant impacts on PG&E gas lines on Bacon Island; ferry service operations to Webb Tract; and water supply, sewage, and solid waste facilities and services. Additionally, implementation of Alternative 3 would result in a less-than-significant impact on the structural integrity of SR 12.

Beneficial impacts on utilities and roadways are associated with improvement of existing levees under Alternative 1, 2, or 3. Utilities and county roads on levees would benefit from levee improvements on the DW project islands, and electrical transmission lines and utility facilities on adjacent islands would benefit from the overall reduction in cumulative risk of levee failure in the area.

Implementation of the No-Project Alternative would increase the subsidence rate of DW project island soils and, consequently, would increase the risk of failure of roads associated with DW island levees, maintenance requirements for gas lines on Bacon Island, and risk of structural failure and need for maintenance of transmission lines.

AFFECTED ENVIRONMENT

This section describes the utility and roadway infrastructure on the DW project islands. Information on utilities and roadways is based, in part, on information collected for the 1990 draft EIR/EIS. Where conditions have not changed, this information has been used to describe current conditions. The description of utilities and roadway conditions has been updated, however, to reflect changes in public access on Holland Tract Road, reconstruction of Bacon Island Bridge, and electrical utility line mapping and information on ferry service for Webb Tract. More information on existing use of roads is given in Chapter 3L, "Traffic".

Sources of Information

Information on utilities, services, and highways on the DW project islands was collected from current maps and communication with the affected public utility or service agency, county, or state agency. The DWR 1993 Delta atlas (DWR 1993) provided baseline mapping information.

Highways, County Roads, and Ferry Service

Figure 3E-1 shows the highways and county roads in the project vicinity.

Bacon Island

A county road provides limited access to portions of Bacon Island (Figure 3E-1). Bacon Island Road enters Bacon Island near its southeast corner and runs northward on the eastern perimeter levee to a private bridge to Mandeville Island; the road provides access to the Bullfrog Landing Marina and agricultural properties on Bacon Island.

As part of the San Joaquin County Regional Transportation Improvement Program, realignment and reconstruction of the Bacon Island Bridge between Bacon Island and Mandeville Island began in April 1994 (Vidad pers. comm.). The new bridge will be located approximately 300 feet north of the existing bridge. Construction activities are expected to last approximately 3 years; no construction would take place from February through July of each year.

Webb Tract

No county roads exist on Webb Tract; the Delta Ferry Authority provides ferry service to Webb Tract from Jersey Island (Figure 3E-1). The ferry operates from 8:00 a.m. to 5:00 p.m., Monday through Friday during fall, winter, and spring and Friday through Tuesday during summer. A total of 10,440 passengers used the ferry system in Contra Costa County in fiscal year 1991-1992 (California Office of the Controller 1993). Based on this figure, year-round average daily use is estimated to be 40 passengers. The ferry system is funded under a resolution by Contra Costa County, Webb Tract Reclamation District, and the Bradford Island Reclamation District, at one-third per entity.

Bouldin Island

SR 12, a two-lane highway between Lodi on the east side of the Delta and Rio Vista on the west side of the Delta, crosses Bouldin Island (Figure 3E-1). SR 12 runs along the bottom of Bouldin Island at 10-15 feet below water levels in exterior channels. At the east end of the island, SR 12 crosses Little Potato Slough on a swing bridge, and at the west end of the island it crosses the Mokelumne River, also on a swing bridge. No county roads exist on Bouldin Island.

Holland Tract

Holland Tract Road, a county road, enters the southwest corner of Holland Tract (Figure 3E-1). Since 1991, access northward on the western perimeter levee has been blocked by a locked gate. This county road also runs eastward on the south levee to the Holland Tract Marina at the southeast corner of the island, where it also ends at a locked gate. In 1993, the Contra Costa County Department of Public Works abandoned those sections of Holland Tract Road on the west and east perimeter levees past the locked gates (Badst pers. comm.).

Gas Facilities and Transmission Pipelines

Although no operating gas wells exist on the project islands, exploratory wells are continually being drilled throughout the Delta. Known underground gas fields and storage areas in the project vicinity are shown in Figure 3E-2. The possibility exists for gas wells to be drilled and even produce gas from the project islands because of third-party mineral right holders. Gas wells could be drilled on the reservoir islands during drawdown periods. The compatibility of gas drilling with water storage or wildlife habitat management of the islands would be reviewed by the lead agencies or oversight management team for the habitat islands; the administering county; and the California Department of Conservation, Division of Oil and Gas, prior to granting an oil or gas well permit for gas exploration on the islands. The county would be the lead agency under CEQA for permitting gas wells.

Implementation of the DW project would not affect the likelihood of gas exploration on DW project islands; mineral rights would not change under the DW project from current conditions, and future proposals to drill on the islands would be subject to environmental review by the county and by the California Department of Conservation under an oil or gas well permit. Assumptions

regarding the future locations and timing of gas well drilling on the project islands would be speculative and these issues are not addressed in the EIR/EIS.

Bacon Island

PG&E operates one high-pressure gas transmission line that crosses Bacon Island. Another gas transmission line owned by PG&E crosses the island but is not in operation (Figure 3E-3). The operating line is the only connection between PG&E's McDonald Island Storage Field to the east and its Bay Area customers. The McDonald Island Storage Field is primarily used to supply gas during peak winter periods when other resources are inadequate to meet immediate demands; the facility has supplied gas for up to one-third of PG&E's customers during those periods (Stoutamore pers. comm.).

Gas line 57-B serves as an input and output conduit for gas stored in the McDonald Island Storage Field; gas line 57-A is not in operation. Line 57-A is an 18-inch-diameter pipeline and Line 57-B is a 22-inch-diameter pipeline. Both lines are buried as they cross Bacon Island and are designed to operate under temporary flooded conditions on the island. Line 57-A has concrete weights, except for approximately 900 feet on the west side of the island that are concrete coated. Line 57-B is entirely concrete coated.

Webb Tract

Chevron owns a gas extraction well on Webb Tract, but the well is capped and not operating.

Bouldin Island and Holland Tract

No gas facilities or transmission pipelines exist on Bouldin Island or Holland Tract.

Electrical Transmission and Distribution Lines

PG&E operates 12-kilovolt (kV) electrical distribution lines on all four project islands to serve residences and farm operations (Figure 3E-3). These lines typically run on wooden utility poles.

Police and Fire Protection Services

Bacon Island and Bouldin Island

Police protection for Bacon Island and Bouldin Island is provided by the San Joaquin County Sheriff's Department. The department's main headquarters is in French Camp, California. The San Joaquin County Sheriff's department marine patrol division provides water patrol services to approximately 600 square miles of waterways in the Delta area. The marine patrol unit is staffed by four deputy officers and one supervisor; reserve officers are also used during major events and holidays. The marine patrol division substation, located at Steven's Anchorage in Stockton, responds to emergencies on Bouldin Island and Bacon Island. Through a mutual aid agreement with San Joaquin County, the Sacramento County Sheriff's Department, the Contra Costa County Sheriff's Department, and the U.S. Coast Guard also provide emergency services to Bacon and Bouldin Islands if needed. The San Joaquin County Sheriff's Department is responsible for law enforcement and investigation in the area regarding, but not limited to, drownings, boat accidents, drunkenness, theft, vandalism, property crimes, trespassing, disturbances, and enforcement of boat speed limits. (Bohnak pers. comm.)

Fire protection for Bouldin Island is provided by the San Joaquin County Delta Fire Protection District, Station 1. The Delta Fire Protection District's service area encompasses approximately 95 square miles and provides fire protection and emergency services to Bouldin Island. Station 1 is located in Lodi and is staffed by two full-time firefighters. Volunteer firefighters are also available to respond to fire emergencies as needed. Station 1 is equipped with four engines, including Type 1, 2, and 3 engines; one rescue unit; and two fire boats. The fire boats are launched at Tower Park Marina and Paradise Marina. Response time from Station 1 to Bouldin Island is approximately 2-3 minutes. The district has a Class VI Fire Department Insurance Service Office Rating and operates under a mutual aid agreement with other fire departments within San Joaquin County. (Davidson pers. comm.)

Bacon Island is not currently in a fire protection district. Fire protection services are the responsibility of the landowners.

Webb Tract and Holland Tract

The Contra Costa County Sheriff's Department provides law enforcement services for Webb and Holland

Tracts. The department's headquarters is in Martinez. The Contra Costa County Sheriff's Department Delta marine patrol division provides emergency service to Webb and Holland Tracts through its substation in Oakley. The marine patrol is staffed by two deputy officers year round; an additional deputy officer is available during the peak summer season (Memorial Day through Labor Day). Contra Costa County has a statewide mutual aid agreement with the San Joaquin County Sheriff's Department and the U.S. Coast Guard to respond to emergency situations in the Delta. Typical crimes reported to the sheriff's department in the Delta area include disturbances, thefts, and vandalism of property. (Hunt pers. comm.)

The Contra Costa County Fire Protection District provides fire protection for Holland Tract. The district is staffed by approximately 480 full-time firefighters, and the district service area encompasses approximately 350 square miles. Knightsen Station 94, located in Knightsen, provides emergency services to Holland Tract and is staffed by volunteer firefighters. Response time from Station 94 to Holland Tract is less than 7 minutes. The district has a Class III Fire Department Insurance Service Office Rating and operates under a statewide mutual aid agreement with other fire agencies in and around San Joaquin County. (Bell pers. comm.)

Similar to Bacon Island, Webb Tract is not currently in a fire protection district. Fire protection is the responsibility of the landowners.

Water Supply Facilities and Sewage Disposal Service

Existing water supply and sewage treatment facilities support farmsteads, rural residences, and seasonal barracks on Bacon Island; trailers, a residence, and a clubhouse on Webb Tract; rural residences and farmsteads mostly north of SR 12 on Bouldin Island; and rural residences, a trailer, and two marinas on Holland Tract. See Chapter 3I, "Land Use and Agriculture", for more information on existing structures and land uses on the DW project islands. Agricultural water supply under existing conditions is described in Chapters 3A, "Water Supply and Water Project Operations", and 3C, "Water Quality".

Water supply for existing buildings and facilities on the DW project islands is provided by wells on the islands, water pumped from nearby channels, and bottled water service. Well water and pumped water are treated on the islands. Treatments include pretreatment reverse osmosis systems and filtering systems. All water services are privately managed; no public facilities are available on the DW project islands.

Septic systems are primarily used for sewage disposal at existing buildings and facilities on the DW project islands. A lagoon treatment system on Holland Tract serves a marina. Waste is transported to a "lagoon" lined with material to prevent seepage into the ground and is treated through evaporation and aerobic decomposition.

Solid Waste Service

Solid waste collection and disposal service for the DW project islands is provided by private waste collection service(s) authorized to operate in Contra Costa and San Joaquin Counties. The waste is collected and transported to the appropriate county landfills in compliance with county and state regulations governing solid waste disposal.

The Marine Plastic Pollution Research and Control Act of 1987 (33 U.S.C. 1901 et seq.) requires that all ports, terminals, and marinas provide adequate reception facilities for disposal of garbage from vessels with which they conduct commerce. This act sets performance standards to ensure that garbage is removed from the vessels and processed in accordance with U.S. Coast Guard and U.S. Department of Agriculture (USDA) regulations. However, the installation of equipment to handle garbage is not a requirement. Waste collection and disposal activities are also subject to regulations stated in the California Administrative Code, Title 14, Division 7. (California State Lands Commission 1994.)

Other Utility Facilities

PG&E and Western Area Power Administration Transmission Lines

Two major electrical transmission lines cross Hotchkiss Tract and Veale Tract to the west and southwest of Holland Tract: PG&E's 500-kV Table Mountain-to-Tesla line and Western Area Power Administration's 230-kV Intertie line.

Santa Fe Railroad

Santa Fe Railroad's Stockton-to-Richmond rail line crosses the Delta in an east-west direction immediately south of the south end of Bacon Island (Figure 3E-1). The single-track line traverses a narrow linear causeway within Santa Fe Cut, which separates Bacon Island from Woodward Island to the south. Santa Fe Cut between the south edge of the island and the railroad causeway is approximately 400 feet wide along its entire length. Nineteen freight trains and eight passenger trains use the Richmond-Stockton line daily (Colbert pers. comm.).

Mokelumne Aqueduct

East Bay Municipal Utility District (EBMUD) owns and operates the Mokelumne Aqueduct, which crosses the Delta immediately south of the Santa Fe rail line (Figure 3E-1). The aqueduct, consisting of three above-ground steel and concrete pipelines, crosses Woodward Island south of Bacon Island, approximately 800 feet south of the rail line. Siphons connect the pipelines beneath Old River and Middle River west and east of Woodward Island. The aqueduct provides water to over 1 million people in the east Bay Area.

IMPACT ASSESSMENT METHODOLOGY

Analytical Approach and Impact Mechanisms

Impacts on utilities, services, and highways were assessed based on how construction and operation of the DW project alternatives would benefit or adversely affect the existing utility infrastructure or service. Effects of the project alternatives on highways and county roads were evaluated based on how the project operation could affect the integrity of the roadway levees through wave erosion and differential settlement; these effects are based on the assessment of levee stability described in Chapter 3D, "Flood Control". Potential changes in operation of the ferry system to Webb Tract were evaluated through discussions with the Delta Ferry Authority and estimation of changes in passenger travel during project operation. Effects of the project alternatives on gas and electrical transmission lines and facilities on the DW project islands were determined through discussions with the affected utility agency and estimation of alterations to the existing infrastructure and any changes in existing operation of the facilities that would be needed during project operation. Increased risk to facilities on adjacent islands was assessed using estimated changes in risk of levee failure during construction and operation of the DW project alternatives. Potential effects of the DW project alternatives on emergency services and public utilities were evaluated based on how project operation would affect the ability of the service agencies and existing facilities to adequately serve the DW project islands.

There is a potential of some level of continuing subsidence on the DW project islands even with the cessation of farming activities. As a result, the water storage capacity of the reservoir islands could increase in future years. The rate of subsidence, however, would be substantially less than under existing conditions. Reduced rates of subsidence and increased water storage capacity on reservoir islands would not be expected to substantially increase or decrease utility and roadway effects analyzed in this chapter.

Criteria for Determining Impact Significance

An alternative is considered to have a significant impact on utilities and highways if it would:

- increase risk of structural failure of existing railways and roadways, gas facilities and pipelines, electrical transmission and distribution lines, and water distribution facilities;
- result in a need for new systems, or substantial alterations to or increased maintenance of power or natural gas facilities, communication systems, water infrastructure, sewer lines, septic tanks, or solid waste services;
- result in increased demand for existing emergency services beyond their current capacity; or
- increase traffic hazards to motor vehicles, bicyclists, or pedestrians by degrading the existing infrastructure.

An alternative is considered to have a beneficial impact on utilities and highways if it would improve the existing utility or roadway infrastructure.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 1

Alternative 1 involves storage of water on Bacon Island and Webb Tract (reservoir islands), with Bouldin Island and Holland Tract (habitat islands) managed primarily as wildlife habitat. Reservoir islands would be managed primarily for water storage, with wildlife habitat and recreation constituting secondary uses. The impacts of Alternative 1 on utilities and highways in the project area are described below. Most of the impacts on utilities and highways under Alternative 1 are considered less than significant; mitigation is recommended for one impact that is considered significant.

Highways, County Roads, and Ferry Service

Bacon Island

Under Alternative 1, Bacon Island Road, the existing county road, would remain along the east side of Bacon Island to the private bridge to Mandeville Island. Implementation of Alternative 1 would improve the eastern perimeter levee on Bacon Island, thereby improving the structural integrity of Bacon Island Road.

Construction of Alternative 1 would not conflict with reconstruction of the Bacon Island Bridge. Public access to Bacon Island will be maintained during construction, and flooding of the island is not anticipated to conflict with construction access for Bacon Island Bridge reconstruction. DW will coordinate with San Joaquin County and the California Department of Transportation (Caltrans) during DW construction scheduling to plan levee construction work on Bacon Island in conjunction with the Bacon Island Bridge reconstruction. Therefore, implementation of Alternative 1 would not affect Bacon Island Bridge reconstruction.

Chapter 3D, "Flood Control", discusses the topic of levee reliability with regard to wave erosion and settlement, and Chapter 3L, "Traffic", addresses any construction-related safety and traffic impacts on Bacon Island Road.

Webb Tract

Implementation of Alternative 1 would reduce ferry traffic from Jersey Island to Webb Tract as farming operations on Webb Tract cease. However, the ferry would be used by DW workers and by recreationists to reach the island during project operation. Based on estimated recreation use-days under Alternative 1 (see Chapter 3J, "Recreation and Visual Resources"), the number of ferry passengers is expected to decline to approximately 55% of existing use during hunting season (October-January). Ferry use during spring and summer could also decline substantially. However, the current operation schedule for the ferry is not proposed to change during project operation. Because revenues for the ferry are not generated by passenger fees, funding for the ferry system would not be affected by reduced use during project operation, and the likelihood of service failure would not increase due to financial constraints. The operation and maintenance cost of running the ferry may decline as ferry traffic, especially heavy grain truck traffic, is reduced after project implementation.

Bouldin Island

Water storage levels during operation of the proposed project would not differ significantly from existing storage levels during agriculture production, so the risk of levee failure or traffic hazards (e.g., fog) along SR 12 would not change under Alternative 1. Therefore, implementation of Alternative 1 would not affect SR 12.

Holland Tract

As on Bouldin Island, projected water storage levels on Holland Tract under Alternative 1 would not exceed current water storage levels. Holland Tract Road would not be adversely affected by management of the island for wildlife habitat; the road would benefit from levee erosion control measures (i.e., levee revegetation) under Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-1: Increase in the Structural Integrity of County Roads. Implementation of Alternative 1 would result in levees surrounding reservoir islands being raised and widened. Erosion-resistant facing would be placed on the interior slopes of the levees. These levee improvement activities would increase the structural integrity of Bacon Island Road on the eastern perimeter levee of Bacon Island.

Because subsidence rates on habitat islands would decrease under Alternative 1, the stability of levees

surrounding Bouldin Island and Holland Tract would increase. DW would undertake levee rehabilitation on the habitat islands as needed consistent with the state standards described in DWR Bulletin 192-82 (DWR 1982), which would strengthen the levees. Holland Tract Road would benefit from the increased levee stability and the probable reduction of road maintenance activities. (See Appendix D2, "Levee Design and Maintenance Measures", for more detailed information regarding subsidence and erosion control.) This impact is therefore considered beneficial.

Mitigation. No mitigation is required.

Impact E-2: Reduction in Ferry Traffic from Jersey Island to Webb Tract. Implementation of Alternative 1 would cause cessation of farming operations on Webb Tract, and ferry traffic from Jersey Island to Webb tract would decline. Alternative 1 could generate approximately 15 passengers per hunting day (3 hunting days per week during the October-January season) for recreation access to Webb Tract, resulting in a decline of ferry use from the existing average of 40 passengers per day. The current ferry schedule (5 days per week) would not change during project operation. The ferry would provide transportation for DW workers year round. A projected net decline in ferry use during project operation would not result in a need for a new system or adversely affect operation and maintenance of the existing system. Reductions in traffic on the ferry, especially heavy grain truck traffic during harvest, could result in reduced operations and maintenance costs. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Gas Facilities and Transmission Pipelines

Bacon Island

Flooding of the PG&E easement on Bacon Island would not increase the risk of structural failure of the operating gas line or cause a physical change in PG&E's ability to supply gas to Bay Area customers. The risk of pipeline breakage, which is generally caused by internal corrosion, ground settlement, or physical damage from ground-disturbing equipment (e.g., farm equipment), would not increase under proposed project conditions. Indeed, the risk of pipeline rupture may decline because implementation of the DW project would eliminate ground disturbance from agricultural practices on Bacon Island.

The pipelines across Bacon Island would not require major structural modification under the proposed project. The operating gas line on Bacon Island is concrete coated, so it can withstand temporarily flooded conditions. The abandoned pipeline on Bacon Island may need to be anchored before island flooding to prevent it from floating (Grimm pers. comm.).

The proposed levee buttressing could cause differential settlement where the gas lines penetrate the Bacon Island exterior levees. During levee strengthening, DW engineers would monitor rates of settlement, and if levee stability problems are detected, initial operations would be halted until the problem is corrected. After levee improvements are completed, DW would conduct weekly inspections to check for potential problems, including levee stability and settlement, at existing gas lines. If weekly inspection indicates that settlement, erosion, or slumping at the gas lines have occurred, DW will notify PG&E and DW will implement corrective measures to mitigate any decrease in levee stability near the gas lines. See Appendix D2, "Levee Design and Maintenance Measures", for more detail on monitoring and corrective measures for levee stability issues. Although implementation of Alternative 1 could result in minor stability effects on existing gas lines at the exterior levees, implementing the measures described above would decrease the risk of failure of the gas lines.

As part of its pipeline maintenance procedure, PG&E conducts annual walking inspections along the pipeline route to check for slow leaks or evidence of internal corrosion. Valves are also monitored for pressure fluctuations that could be caused by leaks (Grimm pers. comm.). Implementation of Alternative 1 would not affect PG&E's routine maintenance along the pipeline; inspections could occur during dry periods, and no valves are located on the island. Inundation of the island, however, could slow PG&E's response time to repair a line if one failed while the island was flooded.

Currently, to respond to an emergency line failure on Bacon Island, PG&E would:

- shut off gas flowing through the line at the nearest valves (2.9 miles east of the east side of Bacon Island on McDonald Island and 5.2 miles west of the west side of Bacon Island);
- release gas within the pipeline section that crosses the island at one of the shut-off valves; and

- drive equipment to the leak site, uncover the pipe, cut out the damaged section, and weld a new section in place (Warner pers. comm.).

Under Alternative 1, this procedure would continue to be used during dry periods.

To service a line that failed on Bacon Island during water storage operations, PG&E would use a process similar to that used for lines under Delta channels. When a line breaks under a Delta channel, PG&E bores a new pipeline under the channel adjacent to the damaged line. The new pipeline is welded into the existing line on both sides of the channel, and the damaged line is abandoned. PG&E does not work through water to make repairs and is not currently equipped to service pipelines through water with divers and underwater equipment. (Warner pers. comm.)

If an emergency leak occurred on Bacon Island during water storage operations, PG&E would have to bore a new line (approximately 2 miles long) under the island. Construction of a new line under Bacon Island when the reservoir is full would be costly and time consuming. It could take 2-3 weeks to bore a new line under Bacon Island. Given PG&E's current operating procedures and equipment, underwater repair would not be a feasible alternative if a leak were to occur during water storage.

There is little likelihood of a line rupturing on Bacon Island when water storage operation coincides with critical gas line operation. This conclusion is based on the following considerations:

- Emergency ruptures on Bacon Island under the proposed project would be caused by internal corrosion or settlement pressures. Currently, pipeline ruptures in the Delta caused by internal corrosion are infrequent (Warner pers. comm.). PG&E more often must respond to leaks caused by farm equipment; emergency repairs in the Delta caused by ground-disturbing equipment generally occur once or twice a year.

- Annual inspections that can detect slow leaks, identify potential settlement problems, and prevent future ruptures in those areas by prescribing immediate repair work will still be conducted on the island during dry periods.

- Bacon Island will not be at full storage year round or every winter. Based on modeling of water storage operations for Alternative 1, it is estimated that Bacon Island would be at full storage approximately 50% of winters (filled by the end of December).

- McDonald Island is not the primary gas source for the Bay Area. The line crossing Bacon Island is used only during peak winter periods when other supplies are inadequate to meet immediate demands. Therefore, the use of the line crossing Bacon Island is only critical during these peak hours or days.

In conclusion, implementation of Alternative 1 would adversely affect PG&E's gas operations only if a line rupture caused by internal corrosion or settlement problems occurs along the 2-mile stretch of pipeline across Bacon Island while the island is flooded and the delivery of gas through the pipeline is critical to Bay Area customers. For the reasons stated above, the occurrence of these specific conditions during the 50-year project planning period is considered to be unlikely.

Webb Tract

The Chevron gas well on Webb Tract is capped and not operating. The capped well would not be disturbed during project construction or water storage operations. Therefore, Alternative 1 would not affect gas facilities on Webb Tract.

Bouldin Island and Holland Tract

As stated previously, no gas facilities or transmission pipelines exist on Bouldin Island or Holland Tract.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-3: Increase in the Risk to Gas Lines Crossing Exterior Levees on Bacon Island. Implementation of Alternative 1 would not substantially increase the risk of failure of gas lines at the exterior levees because settlement and erosion monitoring and control measures would be implemented as part of the DW project (see Appendix D2 for more detail regarding settlement and erosion control). Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact E-4: Increase in PG&E Response Time to Repair a Gas Line Failure on Bacon Island. Implementation of Alternative 1 would cause an increase

in PG&E's current response time to repair a gas line failure on Bacon Island during water storage. Based on the risk assessment described above, there is little likelihood of a line failure occurring when water storage operations are concurrent with peak gas demand periods. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Electrical Transmission and Distribution Lines

Bacon Island

PG&E may provide electrical service for the discharge pump stations on the reservoir islands under Alternative 1. This would require adding capacity to the existing transmission lines but would not require new transmission easements or structures on Bacon Island. Therefore, Alternative 1 would not substantially change the existing electrical infrastructure by increasing capacity on the lines.

Electrical lines along Bacon Island's perimeter levees would be modified as needed during project construction and levee improvements. DW would negotiate with PG&E regarding necessary arrangements for the needed work. Modifications to existing lines during levee construction would not substantially alter the existing system on Bacon Island. Before temporary or permanent modification or relocation of existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Webb Tract

As stated previously, PG&E may provide electrical service for discharge pump stations on the reservoir islands. If provision of electrical service is required, PG&E would add capacity to the existing transmission lines. Adding capacity would not require new transmission easements or structures, as described above for Bacon Island.

Some transmission lines are located on Webb Tract on the perimeter levees, and one line traverses the island. Consequently, inundation of Webb Tract would alter the existing system. The PG&E overhead transmission line that crosses the bottom of Webb Tract and connects to Bradford Island and Mandeville Island transmission lines (Figure 3E-3) would need to be relocated during construction. This would substantially affect the existing infrastructure on Webb Tract. Before temporary or permanent modification or relocation of existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Bouldin Island and Holland Tract

Wildlife habitat management on Bouldin Island and Holland Tract would be compatible with operation of PG&E electrical facilities. Some existing distribution lines that serve farming operations would no longer be needed. Infrastructure stability may be enhanced and maintenance needs reduced under Alternative 1 conditions because subsidence rates will be lower with wildlife management uses than under existing agriculture management. Chapter 3D, "Flood Control", discusses subsidence rates under existing and project conditions. Wildlife habitat management would not affect existing electrical utility lines on Holland Tract and Bouldin Island.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-5: Inundation of Electrical Transmission Utilities on the Reservoir Islands. Implementation of Alternative 1 would cause inundation of existing PG&E overhead transmission lines on Webb Tract during water storage operations. Maintenance of electrical service between Bradford Island and Mandeville Island would require raising or relocating the transmission lines. This impact is considered significant.

Implementing Mitigation Measure E-1 would reduce Impact E-5 to a less-than-significant level.

Mitigation Measure E-1: Relocate Electrical Transmission Lines to the Perimeter Levee around Webb Tract. DW, in coordination with PG&E, shall permanently relocate the existing electrical transmission lines on Webb Tract to the improved perimeter levees during project construction. The new or relocated transmission lines would be located along perimeter levees and would be installed overhead near the toe of the new slopes, similar to existing installations. Before temporarily or permanently modifying or relocating existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed

modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Impact E-6: Possible Need to Increase Capacity of the Existing Electrical Transmission Lines on the DW Project Islands. Implementation of Alternative 1 may require PG&E to provide electrical service for discharge pump stations, siphon stations, and recreation facilities on the DW project islands. If electrical service is required, PG&E would add capacity to the existing transmission lines. The proposed locations for some pump and siphon stations and recreation facilities (see Chapter 2, Figures 2-2 and 2-3) are adjacent to or within existing electrical line easements. Increasing capacity of existing transmission lines would not require new transmission easements or structures on the islands. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact E-7: Possible Need to Expand the Existing Electrical Transmission Lines on Webb Tract, Bouldin Island, and Holland Tract to Serve a Proposed Siphon Station and Recreation Facilities. Implementation of Alternative 1 may require PG&E to provide electrical service to a siphon station on the northeast end of Webb Tract and to recreation facilities along the perimeters of Webb Tract, Bouldin Island, and Holland Tract that would not easily be serviced by existing lines. Because service to these facilities would require an extension of existing service lines, this impact is considered significant.

Implementing Mitigation Measure E-2 would reduce Impact E-7 to a less-than-significant level.

Mitigation Measure E-2: Extend Electrical Transmission Lines to Serve New Siphon and Pump Stations and Recreation Facilities. DW, in coordination with PG&E, shall extend existing electrical transmission lines on the reservoir islands where needed to serve new siphon and pump stations and recreation facilities. Before modifying existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Police and Fire Protection Services

Implementation of Alternative 1 would result in an incremental increase in demand for police and fire protection services on the DW project islands. Construction and operation of the proposed recreation facilities on the DW project islands would result in the following conditions that would contribute to the need for emergency services:

- construction of new buildings,
- an increase in the number of people visiting the DW project islands,
- an increase in boating use on waterways adjacent to the DW project islands, and
- establishment of boat facilities, which commonly attract criminal activities (e.g., vandalism and theft).

Therefore, operation of the recreation facilities under Alternative 1 would increase the need for emergency services on the DW project islands.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-8: Increase in Demand for Police Services on the DW Project Islands. Implementation of Alternative 1 would increase demands on police service during project operation. Construction of the recreation facilities would increase recreation activity in the Delta and could attract criminal activity, which is currently very low on the DW project islands. This impact is considered significant.

Implementing Mitigation Measures E-3 and E-4 would reduce Impact E-8 to a less-than-significant level.

Mitigation Measure E-3: Provide Adequate Lighting in and around Buildings, Walkways, Parking Areas, and Boat Berths. DW should provide illumination, in compliance with the recommendations of the Contra Costa County Sheriff's Department and the San Joaquin County Sheriff's Department, in and around recreation facilities, walkways, parking areas, and boat berths on all the DW project islands. Also, DW should consult with both sheriff's departments for building design recommendations in order to avoid features that may promote criminal activity.

Mitigation Measure E-4: Provide Private Security Services for Recreation Facilities and Boat Docks. DW should provide 24-hour onsite private security for the recreation facilities and boat docks on all four DW project islands. The security service will assist the San Joaquin County Sheriff's Department and Contra Costa County Sheriff's Department by deterring criminal activity.

Impact E-9: Increase in Demand for Fire Protection Services on the DW Project Islands. Implementation of Alternative 1 would increase demands on fire protection services during project operation. Construction of the recreation facilities would increase the number of people recreating on the DW project islands. Also, two of the DW project islands (Webb Tract and Bacon Island) are not currently serviced by a fire protection district. This impact is considered significant.

Implementing Mitigation Measures E-5 and E-6 would reduce Impact E-9 to a less-than-significant level.

Mitigation Measure E-5: Incorporate Fire Protection Features into Recreation Facility Design. DW should incorporate the required design features identified in the Uniform Building Codes and the Uniform Fire Codes into the design of the recreation facilities and boat docks.

Mitigation Measure E-6: Provide Fire Protection Services to Webb Tract and Bacon Island. DW, in coordination with the county and the local agency formation commission (LAFCO), should incorporate Webb Tract and Bacon Island into an existing fire protection district or create a new fire protection district to serve these islands.

Water Supply Facilities and Sewage Disposal Service

Implementation of Alternative 1 would require the provision of water and sewage services to the proposed recreation facilities on the DW project islands. DW would need to provide new water sources and supply infrastructure for the recreation facilities. The recreation facilities would use gray water wherever possible to reduce the need for potable water consistent with county policies. To support recreation facilities, DW will need to increase bottled-water delivery service, drill and maintain new wells, and construct water treatment facilities as necessary to supply water at the recreation facilities.

DW will need to install sewage disposal systems that meet San Joaquin County and Contra Costa County requirements and standards for sewage disposal systems and design at the proposed recreation facilities. Facilities on the habitat islands would most likely be served by septic systems, and facilities on the reservoir islands would be served by a dual treatment system whereby gray water is treated to a tertiary level and released and black water is held in the system for offsite disposal.

DW will need to obtain the appropriate state and local permits for these facilities. Design of sewage disposal and water supply facilities would be site specific for each recreation facility, and the governing county would approve the final designs before issuing building or encroachment permits.

Implementation of Alternative 1 would also increase boating use and demand for boating-related sewage treatment and pumpout facilities. Pumpout stations would not be constructed at the recreation facility boat docks for sewage disposal. Boaters docked at the DW project facilities would use pumpout stations open to the public on Andrus Island, Empire Tract, Bethel Island, Terminous Tract, or other pumpout stations in the Delta (Figure 3E-4). Water quality issues associated with boat use and sewage disposal are addressed in Appendix C6, "Assessment of Potential Water Contaminants on the Delta Wetlands Project Islands".

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-10: Increase in Demand for Water Supply Services. Implementation of Alternative 1 would increase the need for potable water on the DW project islands. As part of the recreation facility design, DW will increase bottled-water delivery service, drill new wells, and incorporate water purification techniques as necessary to increase water supply at the recreation facilities. New services would need to be consistent with county policies. Therefore, this impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities. Before construction of the proposed recreation facilities, DW should demonstrate to the Corps and SWRCB that it has obtained all required

permits and approvals from local and state agencies for the design and construction of utilities and services including, but not limited to, water supply, sewage disposal, and solid waste disposal on the DW project islands.

Impact E-11: Increase in Demand for Sewage Disposal Services. Implementation of Alternative 1 would result in an increased need for sewage disposal at the proposed recreation facilities. As part of the recreation facility design, DW will install a new sewage disposal system at each facility consistent with San Joaquin County and Contra Costa County requirements for sewage disposal systems and design. Therefore, this impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 (described above) would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities

Solid Waste

Under Alternative 1, use of the recreation facilities would increase demand for solid waste removal services on the DW project islands. DW would need to contract with a private waste collection and disposal service authorized to operate in Contra Costa County and San Joaquin County to serve the recreation facilities.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-12: Increase in Demand for Solid Waste Removal Implementation of Alternative 1 would result in the need for solid waste removal at the recreation facilities. DW will contract with a private waste collection and disposal service to respond to the need for removal of solid waste from the recreation facilities. The amount of solid waste generated at the recreation facilities would not likely exceed capacity of the collection service or local landfills. Therefore, this impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 (described above) would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities

Infrastructure Facilities on Adjacent Islands

Infrastructure on adjacent islands includes transportation and water conveyance facilities (Figure 3E-1), underground gas fields and storage areas (Figure 3E-2), and gas and electrical transmission lines (Figure 3E-3). Increased risk of levee failure and seepage to adjacent islands caused by proposed water storage on Bacon Island and Webb Tract could threaten the reliability of these facilities and increase maintenance and repair costs; however, DW has made a commitment to improve levees around DW islands, which would increase the reliability of the DW island levees. DW will also mitigate any seepage problems beyond existing seepage levels by installing an interceptor well system around the project island levees (see Appendix D2, "Levee Design and Maintenance Measures", for more information on seepage control). Project features would maintain potential levee stability and seepage impacts at existing levels or better, so implementation of Alternative 1 would not increase the risk to adjacent utilities. Adjacent utilities would not be affected by Alternative 1.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 2

Impacts and mitigation measures under this alternative are the same as under Alternative 1.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 3

Alternative 3 involves storage of water on Bacon Island, Webb Tract, Bouldin Island, and Holland Tract, with secondary uses for wildlife habitat and recreation. The portion of Bouldin Island north of SR 12 would be managed as a wildlife habitat area and would not be used for water storage. The impacts of Alternative 3 on utilities and highways in the project area are described below.

Most of the impacts on utilities and highways are considered less than significant; mitigation is recommended for one impact that is considered significant, and no mitigation is available for one impact that is considered significant.

Highways, County Roads, and Ferry Service

Bacon Island

The effect of implementation of Alternative 3 on the structural integrity of Bacon Island Road would be identical to that described above under "Impacts and Mitigation Measures of Alternative 1". Reconstruction of the bridge connecting Bacon Island to Mandeville Island would not be affected under Alternative 3.

Webb Tract

The effect of implementation of Alternative 3 on ferry traffic from Jersey Island to Webb Tract would be identical to that described above under "Impacts and Mitigation Measures of Alternative 1".

Bouldin Island

Increased Flood Risk on SR 12. Under Alternative 3, DW proposes to construct levees along SR 12 to protect the highway and the NBHA north of the highway from the water storage operations on the south side of SR 12.

To retain water and protect the existing highway, a dam would be required along the south side of SR 12 across Bouldin Island. The dam, Wilkerson Dam, would be constructed according to standards of DWR's DSOD because water would be impounded within the Bouldin Island reservoir to a maximum pool elevation of +6 feet. Design features for Wilkerson Dam include measures to control settlement, seepage, and wave erosion. Extensive geotechnical studies have been conducted for the dam, and design specifications have been developed and submitted to DSOD for review and approval (HLA 1992, 1993). Appendix E1, "Design and Construction of Wilkerson Dam South of SR 12 on Bouldin Island", presents detailed information on the dam design, construction staging and monitoring, and results of geotechnical studies for Wilkerson Dam. Levee reliability is described in Chapter 3D, "Flood Control", based on preliminary technical analyses and design specifications (HLA 1989, 1992, 1993) and Moffatt & Nichol (1988).

Implementation of Alternative 3 could increase the risk of structural failure of SR 12 by increasing the risk of flood damage from the reservoir south of the highway. Appendix E1 describes dam design features that would minimize the risk of failure. The proposed dam would be protected from wind and wave erosion on the water side with a high-density polyethylene surface or riprap or cement soil, the toe of the proposed dam would be set back from the highway to protect the roadbed from mud heave or settlement problems caused by the new levee, and seepage through the dam would be monitored and controlled by a drainage system. Therefore, water storage operations south of SR 12 would not affect SR 12 roadway stability.

The levee along the north side of SR 12 would hold back water present year round within the NBHA. The entire habitat area would be regraded during project construction to achieve a desired mix of habitats, including year-round water in ditches and interconnecting ponds. The regrading design for the NBHA should be reviewed by Caltrans to verify that the probability of adverse flooding impacts on SR 12 would be negligible. As proposed, the water level in the NBHA would not differ substantially from current water levels during agricultural production. Therefore, the levee on the north side of SR 12 would not require DSOD's approval, and operation of the NBHA would not affect the structural integrity of SR 12.

Highway Safety. Low-lying winter fog is an existing traffic hazard on SR 12 and in the project area. Because implementing Alternative 3 would increase the amount of water surface area adjacent to SR 12, the amount of fog produced on Bouldin Island could increase and affect traffic conditions on SR 12 (Costa pers. comm.). Constructing reservoirs on DW project islands would not substantially increase regional fog hazards in the Delta but may create patches of fog on each island. Because SR 12 is a regional transportation route, increasing fog on Bouldin Island may increase traffic hazards. The reservoir will be constructed 240-370 feet from the existing highway right-of-way (HLA 1992), and the highway is currently raised +4 feet above adjacent fields, which may alleviate some fog hazard problems. Increased potential for fog to rise from the surface of reservoirs under Alternative 3 cannot be avoided, however, and is assumed to increase traffic hazards along SR 12.

Wind conditions on SR 12 would not substantially change from existing conditions under Alternative 3.

Construction of levees or soundwalls along roadways does not generally affect wind conditions on the road, and the levees would be set back 240-370 feet from the existing highway right-of-way. Therefore, construction and operation of Alternative 3 would not increase wind hazards on SR 12.

Visibility on the roadway could be adversely affected if the levee on the north side of SR 12 obstructed westbound views of the road along the curved portion of the highway; however, SR 12 is a raised roadway and the curve in the road is gradual. The levee would be constructed to approximately 6 feet in height and will be set back from the roadway at least 50 feet. Based on existing roadway conditions and proposed levee design, visibility on SR 12 for westbound traffic is not expected to substantially change from existing conditions. Therefore, construction of a levee along the north side of SR 12 would not affect visibility or traffic safety.

Holland Tract

Under Alternative 3, Holland Tract Road would remain along the southern levee of Holland Tract. Implementation of Alternative 3 would include improving the perimeter levee, thereby improving the structural integrity of Holland Tract Road.

Chapter 3D, "Flood Control", addresses levee reliability with regard to erosion and settlement, and Chapter 3L, "Traffic", addresses construction-related safety and traffic impacts on Holland Tract Road.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-13: Increase in the Structural Integrity of County Roads. Implementation of Alternative 3 would result in levees surrounding the reservoirs on the DW project islands being raised and widened. Erosion-resistant facing would be placed on the interior slopes of the levees. These levee improvements would increase the structural integrity of Bacon Island Road on the eastern levee of Bacon Island and Holland Tract Road on the southern levee of Holland Tract. Therefore, this impact is considered beneficial.

Mitigation. No mitigation is required.

Impact E-14: Increase in the Risk of Structural Failure of SR 12. Implementation of Alternative 3 could cause the proposed Wilkerson Dam along SR 12 to fail, which would result in the structural failure and inundation of SR 12. Because the design of Wilkerson Dam would minimize seepage, settlement, and erosion, adverse impacts on the structural integrity of SR 12 caused by levee failure and flooding would have a low probability of occurring (see Appendix E1). The final levee design would also address Caltrans' concerns and must be reviewed for structural stability and approved by DSOD.

As part of Alternative 3, DW, in coordination with Caltrans, will review the regrading design for the NBHA to verify that the probability of adverse flooding impacts along the north side of SR 12 would be negligible. Therefore, this impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-8 would monitor the effectiveness of those measures.

Mitigation Measure E-8: Coordinate Design and Construction of Wilkerson Dam with Caltrans and DSOD. Prior to project construction, DW shall demonstrate to the Corps and SWRCB that it has consulted with and obtained all required permits and approvals from Caltrans and DSOD for the design and construction of Wilkerson Dam.

Impact E-15: Increase in the Fog Hazard on SR 12. Implementation of Alternative 3 could increase the amount of fog produced along SR 12 on Bouldin Island by increasing the water surface area adjacent to the roadway. Fog on the roadway would increase existing traffic hazards on SR 12. This impact is considered significant and unavoidable.

Mitigation. No mitigation is available to reduce this impact to a less-than-significant level.

Impact E-16: Reduction in Ferry Traffic from Jersey Island to Webb Tract. This impact is described above under Impact E-2. This impact is considered less than significant.

Mitigation. No mitigation is required.

Gas Facilities and Transmission Pipelines

Bacon Island

The effects of flooding the PG&E easement and buttressing the exterior levees where gas lines penetrate

the levees on Bacon Island are described above under "Impacts and Mitigation Measures of Alternative 1".

Webb Tract

As explained above under "Impacts and Mitigation Measures of Alternative 1", a gas well on Webb Tract is capped and not operating. Construction activities and water storage operations would not disturb the capped well.

Bouldin Island and Holland Tract

As stated previously, no gas facilities or transmission pipelines exist on Bouldin Island or Holland Tract.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-17: Increase in the Risk to Gas Lines Crossing Exterior Levees on Bacon Island. This impact is described above under Impact E-3. This impact is considered less than significant.

Mitigation. No mitigation is required.

Impact E-18: Increase in PG&E Response Time to Repair a Gas Line Failure on Bacon Island. This impact is described above under Impact E-4. This impact is considered less than significant.

Mitigation. No mitigation is required.

Electrical Transmission and Distribution Lines

Bacon Island

As explained above under "Impacts and Mitigation Measures of Alternative 1", PG&E may provide electrical service for the proposed discharge pump stations on reservoir islands. This would require adding capacity to the existing transmission lines on Bacon Island but would not require new transmission easements or structures.

Webb Tract

The effects of flooding existing electrical transmission facilities that are located on Webb Tract off the perimeter levees are described above under "Impacts and Mitigation Measures of Alternative 1".

Bouldin Island and Holland Tract

Electrical distribution lines that traverse Holland Tract and Bouldin Island would be inundated during water storage operations and would require substantial alteration for existing services to be maintained on the islands. PG&E overhead transmission lines that cross the bottoms of the islands (Figure 3E-3) would need to be raised or relocated during construction. Before temporarily or permanently modifying or relocating existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-19: Inundation of Electrical Transmission Utilities on the Reservoir Islands. Implementation of Alternative 3 would cause inundation of existing PG&E overhead transmission lines on the bottoms of Webb Tract, Holland Tract, and Bouldin Island during water storage operations. To maintain existing service, the lines would need to be relocated. This impact is considered significant.

Implementing Mitigation Measure E-9 would reduce Impact E-19 to a less-than-significant level.

Mitigation Measure E-9: Relocate Electrical Transmission Lines to the Perimeter Levees around Webb and Holland Tracts and Bouldin Island. DW, in coordination with PG&E, shall permanently relocate the existing electrical transmission lines on Webb and Holland Tracts and Bouldin Island to the improved perimeter levees during project construction. The new or relocated transmission lines would be located along perimeter levees and would be installed overhead near the toes of the new slopes, similar to existing installations. Before temporarily or permanently modifying or relocating existing electrical lines, DW would conduct special-status plant surveys in areas that could be affected by the proposed modifications. If threatened or endangered plant species are found, DW will avoid disturbing those plants when making changes to existing electrical lines.

Impact E-20: Possible Need to Increase Capacity of the Existing Electrical Transmission Lines on the Reservoir Islands. Implementation of Alternative 3 may require PG&E to provide electrical service for discharge pump stations, siphon stations, and recreation facilities on the DW project islands. PG&E would add capacity to the existing transmission lines, which would not require new transmission easements or structures on the islands. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact E-21: Possible Need to Expand the Existing Electrical Transmission Lines on Webb Tract, Bouldin Island, and Holland Tract to Serve Proposed Siphon and Pump Stations and Recreation Facilities. Implementation of Alternative 3 may require PG&E to provide electrical service to siphon stations, a pump station, and recreation facilities that would not easily be serviced by existing lines. The following proposed pump station and siphon stations (as shown in Chapter 2, Figures 2-3, 2-10, and 2-11) would not be located adjacent to existing electrical line corridors: a siphon station in the northeastern corner of Webb Tract, a discharge pump station and a siphon station on the eastern side of Bouldin Island, and a siphon station near the northernmost point of Holland Tract. Recreation facilities would also be located along the perimeter levees in areas not serviced by electrical lines. Because electrical service to those facilities would require an extension of existing service lines, this impact is considered significant.

Implementing Mitigation Measure E-2 would reduce Impact E-16 to a less-than-significant level.

Mitigation Measure E-2: Extend Electrical Transmission Lines to Serve New Siphon and Pump Stations and Recreation Facilities. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Police and Fire Protection Services

The effects on emergency services that would result from constructing and operating recreation facilities are described above under "Impacts and Mitigation Measures of Alternative 1".

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-22: Increase in Demand for Police Services on the DW Project Islands. This impact is described above under Impact E-8 . This impact is considered significant.

Implementing Mitigation Measures E-3 and E-4 would reduce Impact E-22 to a less-than-significant level.

Mitigation Measure E-3: Provide Adequate Lighting in and around Buildings, Walkways, Parking Areas, and Boat Berths. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Mitigation Measure E-4: Provide Private Security Services for Recreation Facilities and Boat Docks. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Impact E-23: Increase in Demand for Fire Protection Services on the DW Project Islands. This impact is described above under Impact E-9. This impact is considered significant.

Implementing Mitigation Measures E-5 and E-6 would reduce Impact E-23 to a less-than-significant level.

Mitigation Measure E-5: Incorporate Fire Protection Features into Recreation Facility Design. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Mitigation Measure E-6: Provide Fire Protection Services to Webb Tract and Bacon Island. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Water Supply Facilities and Sewage Disposal Service

The effects on water supply and sewage disposal services that would result from constructing and operating recreation facilities are described above under "Impacts and Mitigation Measures of Alternative 1".

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-24: Increase in Demand for Water Supply Services. This impact is described above under Impact E-10. This impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Impact E-25: Increase in Demand for Sewage Disposal Services. This impact is described above under Impact E-11. This impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Solid Waste

The effects on solid waste disposal services that would result from constructing and operating recreation facilities are described above under "Impacts and Mitigation Measures of Alternative 1".

Summary of Project Impacts and Recommended Mitigation Measures

Impact E-26: Increase in Demand for Solid Waste Removal. This impact is described above under Impact E-12. This impact is considered less than significant.

Measures that would minimize the effects of this impact have been incorporated into the project description. However, implementing Mitigation Measure E-7 would monitor the effectiveness of those measures.

Mitigation Measure E-7: Obtain Appropriate Local and State Permits for Recreation Facility Services and Utilities. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Infrastructure Facilities on Adjacent Islands

Under Alternative 3, potential seepage from project islands would be similar to that described for Alternative 1. As part of Alternative 3, DW would install an interceptor well system in the exterior levees of the project islands to control seepage onto adjacent islands, as described in Appendix D2, "Levee Design and Maintenance Measures". Design features and proposed seepage control measures would keep potential adverse seepage problems at existing levels or better, and there would be no change in the risk to facilities on adjacent islands. Adjacent utilities would not be affected by implementation of Alternative 3.

IMPACTS AND MITIGATION MEASURES OF THE NO-PROJECT ALTERNATIVE

Implementation of the No-Project Alternative would cause an increase in the rate of subsidence on the island interiors due to continued tillage of areas now in production and increased tillage of areas now fallow. Subsidence gradually increases levee instability, seepage, and threats to utility and highway facilities on the project islands and the risk of a cumulative levee failure on adjacent islands. By increasing the rate of subsidence, implementation of the No-Project Alternative would speed the rate at which these effects begin to occur on the DW project islands.

The project applicant would not be required to implement mitigation measures if the No-Project Alternative were selected by the lead agencies. However, mitigation measures are presented for impacts of the No-Project Alternative to provide information to the reviewing agencies regarding the measures that would reduce impacts if the project applicant implemented a project that required no federal or state agency approvals. This information would allow the reviewing agencies to make a more realistic comparison of the project alternatives,

including implementation of recommended mitigation measures, with the No-Project Alternative.

Highways, County Roads, and Ferry Service

Bacon Island

Subsidence on Bacon Island would increase the risk of structural failure of the levees. Because Bacon Island Road traverses an existing levee, subsidence would result in increased risk of road failure and higher maintenance and repair needs over time. The levees would eventually have to be rehabilitated as a result of levee degradation.

Webb Tract

Ferry traffic to Webb Tract from Jersey Island would continue to operate at or above existing levels as farming operations increased. Therefore, implementation of the No-Project Alternative would not affect ferry operations.

Bouldin Island

Because SR 12 is a raised roadway, subsidence resulting from continued agricultural production would increase the risk of structural failure and increase maintenance needs for the highway.

Holland Tract

Similar to effects on Bacon Island Road described above, subsidence under the No-Project Alternative would result in increased risk of levee and road failure and higher maintenance and repair needs on Holland Tract Road over time.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in the Risk of Road Failure and Maintenance and Repair Needs. Implementation of the No-Project Alternative would result in increased subsidence rates on DW project islands, which would increase the risk of structural failure of levees and associated roadways on Bacon Island, Holland Tract, and Bouldin Island. More roadway maintenance and repair would be required over time. The perimeter levees eventually would have to be rehabilitated.

Implementing the following measure described in Chapter 3D, "Flood Control", would reduce this effect of the No-Project Alternative.

Buttress Perimeter Levees. The perimeter levees of the DW project islands could be substantially buttressed to increase levee stability under the No-Project Alternative. The need for improvements to these levees over time would be evaluated by the local reclamation districts.

Gas Facilities and Transmission Pipelines

Bacon Island

Continued subsidence resulting from increased agricultural uses would bring gas transmission lines on Bacon Island increasingly closer to the ground surface, requiring frequent restoration of the lines to new depths. Therefore, the No-Project Alternative would increase current maintenance requirements for the gas lines. The change in utility maintenance over time would be substantial.

Under the No-Project Alternative, Bacon Island levees eventually would have to be rehabilitated. As described for Alternative 1, levee buttressing could cause differential settlement where the gas lines penetrate the levee. It is reasonable to assume that a monitoring system and corrective measures would be implemented during levee rehabilitation under the No-Project Alternative, as described for Alternative 1.

Webb Tract

The capped gas well on Webb Tract would not be affected by increased agricultural production over time.

Bouldin Island and Holland Tract

As stated previously, no gas facilities or transmission pipelines exist on Bouldin Island or Holland Tract.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in Maintenance Requirements for Gas Lines on Bacon Island. Implementation of the No-Project Alternative would result in subsidence from

increased agricultural uses that would bring gas transmission lines on Bacon Island increasingly closer to the ground surface, requiring increased maintenance and restoration of the lines over time.

Electrical Transmission and Distribution Lines

Bacon Island, Webb Tract, Bouldin Island, and Holland Tract

Continued subsidence from increased agricultural uses under the No-Project Alternative would increase the risk of instability and failure of perimeter levees surrounding the DW project islands. Electrical transmission facilities located on perimeter levees would subsequently be subject to increased maintenance and risk of structural failure. Electrical facilities located on the interior of the DW project islands would also be disturbed by the effects of subsidence.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in the Risk of Structural Failure and Increase in Maintenance Requirements for Existing Transmission Utilities. Implementation of the No-Project Alternative would result in an increased rate of subsidence, which would result in levee instability and increased maintenance and risk of structural failure of existing electrical utility lines on the DW project islands.

Implementing the following measure would reduce this effect of the No-Project Alternative.

Buttress Perimeter Levees. This measure is described above.

Other Public Services

Implementation of the No-Project Alternative would not increase demands on police, fire, water supply, sewage, or solid waste services on the DW project islands. No new recreation facilities would be constructed, and increases in recreational use of the DW project islands would not result in a substantial demand for emergency services. Therefore, implementing the No-Project Alternative would not affect existing emergency or public services.

Infrastructure Facilities on Adjacent Islands

Under the No-Project Alternative, seepage to adjacent islands would be similar to existing seepage conditions because water would not be stored on the islands in amounts above those needed for intensified agricultural use. The No-Project Alternative would not affect facilities on adjacent islands.

CUMULATIVE IMPACTS

Cumulative impacts are the result of the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions. The following discussion considers only those project effects that may contribute cumulatively to impacts on utilities and highways.

Cumulative Impacts, Including Impacts of Alternative 1

Chapter 3D, "Flood Control", discusses the issue of levee failure on the DW project islands leading cumulatively to levee failures on other Delta islands. Risk of levee failure directly affects risk to roadway and utility stability, so cumulative levee failure would result in cumulative utility structural failure. As discussed in Chapter 3D, the reliability of the DW island levees under Alternative 1 would exceed current levee reliability. In addition, implementation of flood control programs such as DWR's Delta water management programs and levee maintenance programs would improve the regional flood control system and reduce flood-related risks to adjacent utilities and roads. Therefore, the cumulative risk of levee failure would be less than the current risk, and a beneficial effect on utility facilities is predicted.

Impact E-27: Cumulative Decrease in the Risk of Structural Failure of Roadways and Utilities. Implementation of Alternative 1 would result in increased levee stability on the DW project islands, which would decrease the cumulative risk of levee failure on adjacent islands. Furthermore, increased levee stability in the vicinity of the DW project islands would reduce the cumulative risk of structural failure of roadways and utilities in the area. This impact is considered beneficial.

Mitigation. No mitigation is required.

Cumulative Impacts, Including Impacts of Alternative 2

The cumulative impact of this alternative is the same as that described for Alternative 1.

Cumulative Impacts, Including Impacts of Alternative 3

The cumulative impact of this alternative is the same as that described for Alternative 1.

Cumulative Impacts, Including Impacts of the No-Project Alternative

Increased subsidence would increase the risk of levee failure on the DW project islands. Chapter 3D, "Flood Control", discusses the issue of levee failure on the DW project islands cumulatively leading to levee failures on other Delta islands and the risk of structural failure of roads and utilities on adjacent islands. As subsidence on the DW project islands increases, the risk of levee failure and cumulative risk of levee failure on adjacent islands increases. Roadways and utilities on the DW project islands and adjacent islands would be vulnerable to a slightly higher cumulative risk of levee failure under the No-Project Alternative.

Cumulative Increase in the Risk of Structural Failure of Roadways and Utilities. Implementation of the No-Project Alternative would result in increased subsidence on the DW project islands, which would increase the risk of levee failure on the DW project islands and the cumulative risk of levee failure on adjacent islands. Roadways and utilities on the DW project islands and adjacent islands would be vulnerable to a higher cumulative risk of levee failure. However, implementation of other flood control projects in the Delta and projects that would reduce subsidence on islands adjacent to DW project islands (i.e., Twitchell Island) (see Appendix 2, "Supplemental Description of the Delta Wetlands Project Alternatives") would partially offset the cumulative risks of flooding and risks to other Delta utilities and roads.

Implementing the following measure would further reduce this effect of the No-Project Alternative.

Buttress Perimeter Levees. This measure is described above under "Impacts and Mitigation Measures of the No-Project Alternative".

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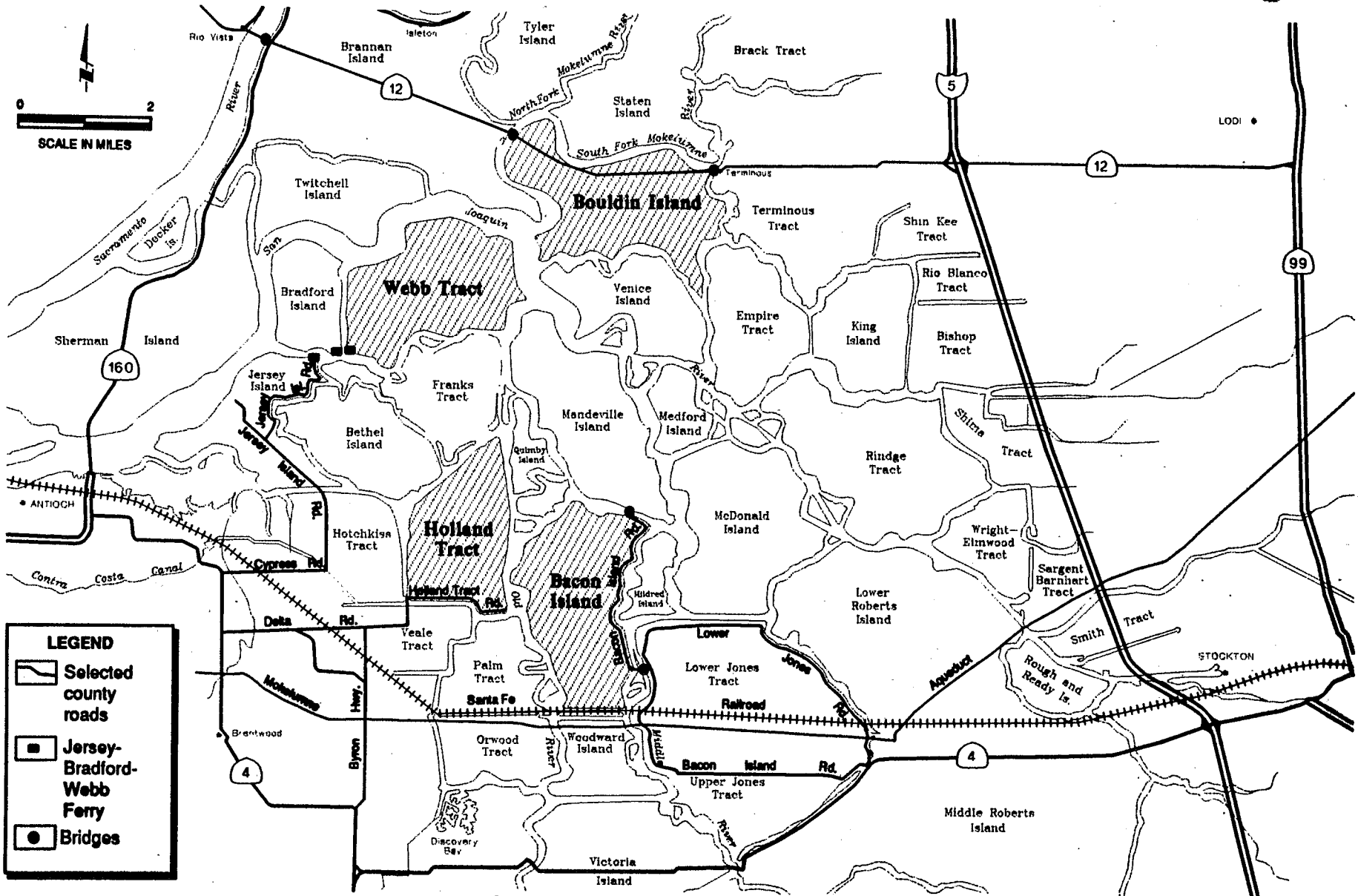

Source: California Department of Water Resources 1993.

Figure 3E-1.
Transportation and Water Conveyance Infrastructure in the DW Project Vicinity

DELTA WETLANDS
PROJECT EIR/EIS
Prepared by: Jones & Stokes Associates

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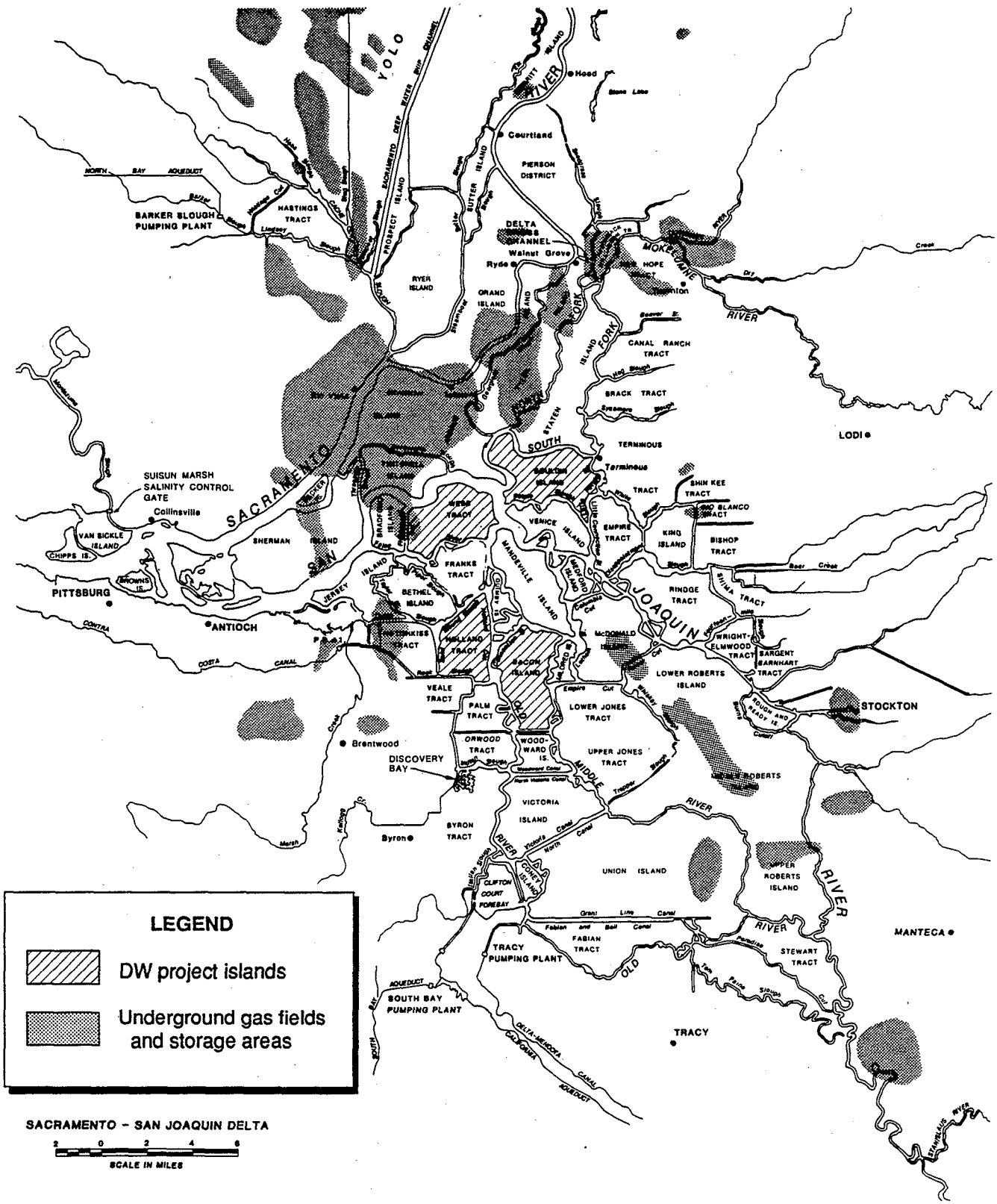
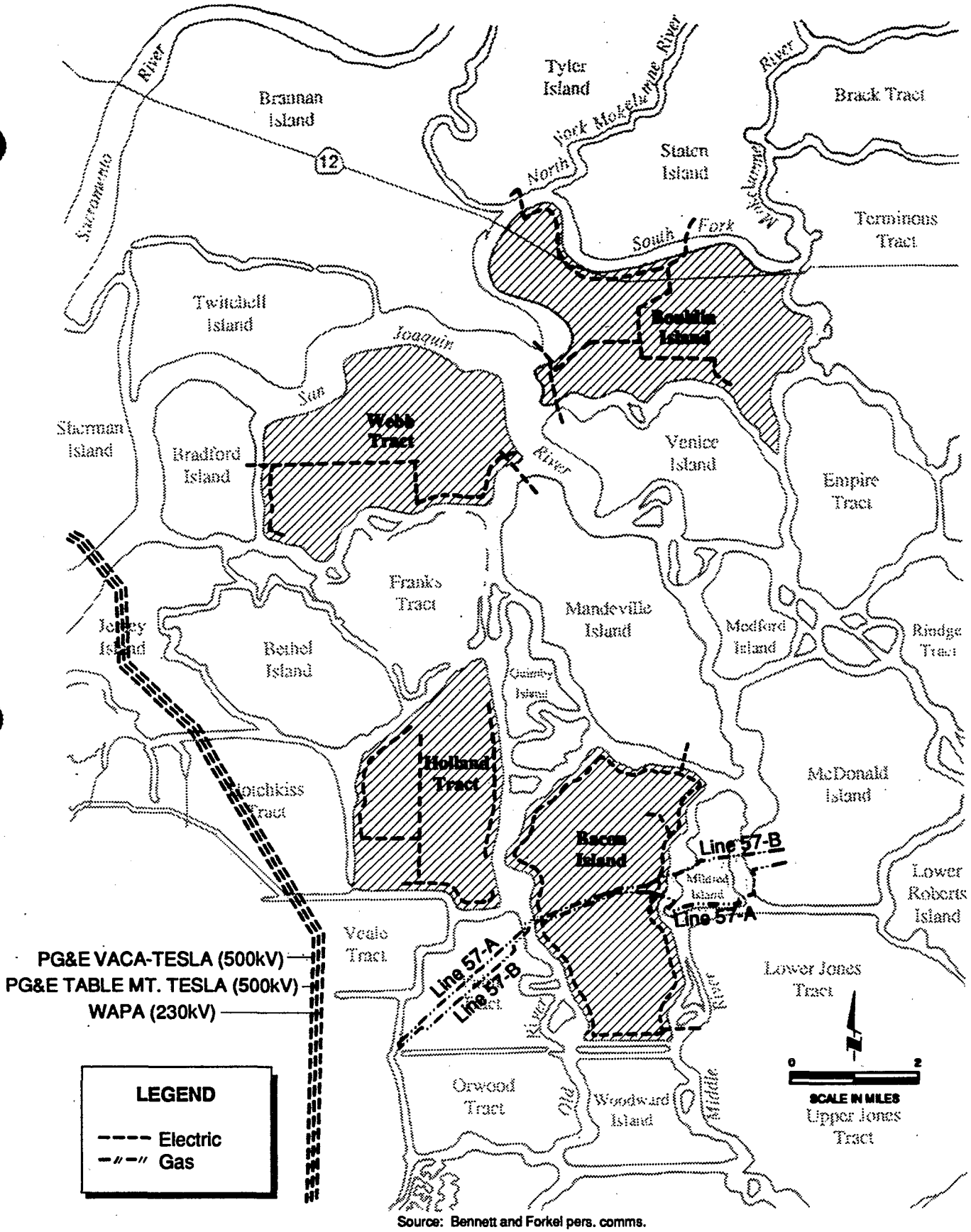


Source: California Department of Water Resources 1993.

Figure 3E-2.
Underground Gas Fields and Storage Areas in the DW Project Vicinity

DELTA WETLANDS
PROJECT EIR/EIS
Prepared by: Jones & Stokes Associates

C—060658



Source: Bennett and Forkel pers. comms.

Figure 3E-3.
Gas and Electric Transmission and Distribution Lines in the DW Project Vicinity

DELTA WETLANDS
PROJECT EIR/EIS
Prepared by: Jones & Stokes Associates

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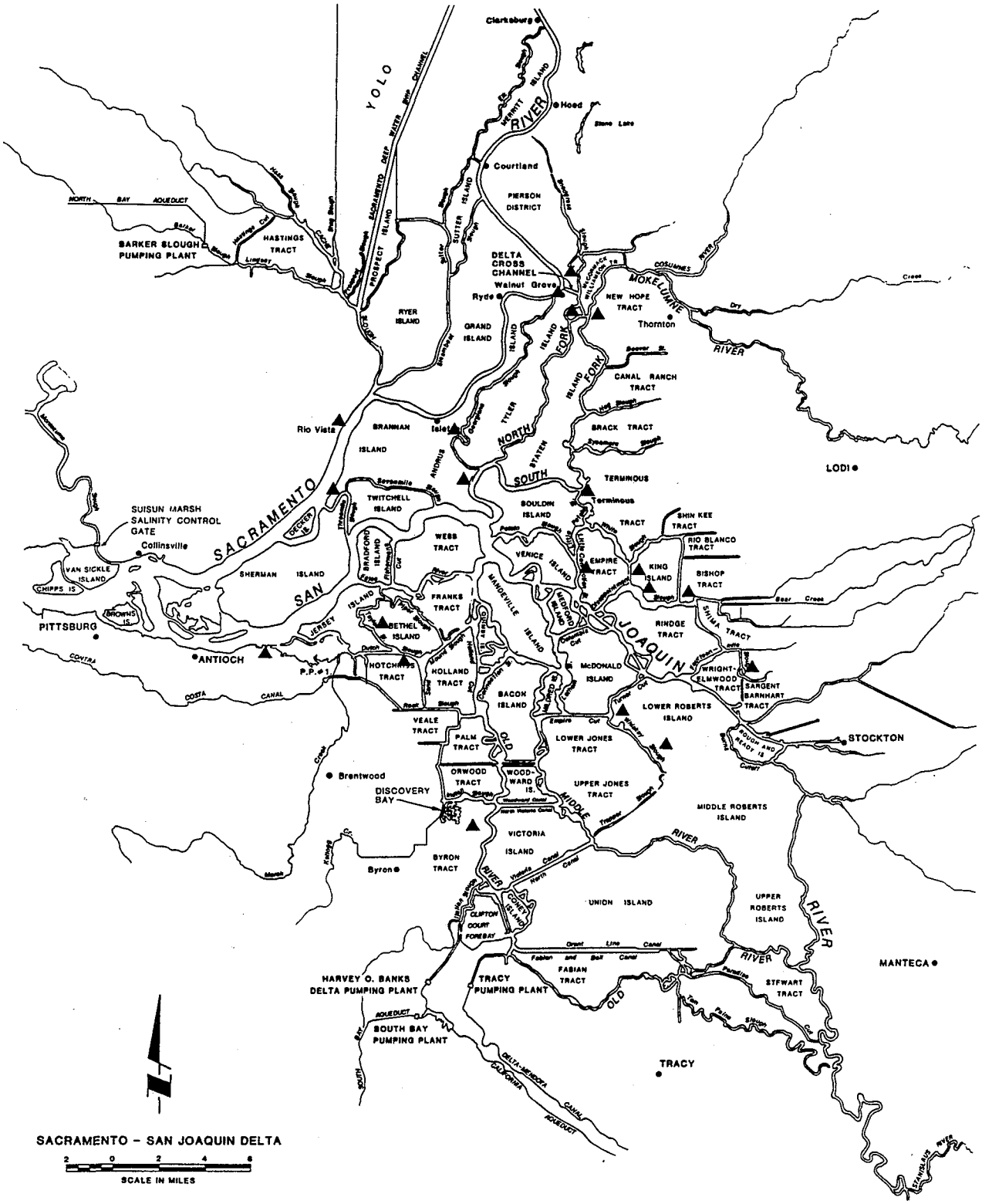

Source: San Francisco Estuary Project 1995.

Figure 3E-4.
Pumpout Stations in the DW Project Vicinity

DELTA WETLANDS
PROJECT EIR/EIS
Prepared by: Jones & Stokes Associates

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