Upper San Joaquin River Basin Storage Investigation

Montgomery Reservoir

Surface Storage Option Technical Appendix to the Phase 1 Investigation Report

A Joint Study by:

Bureau of Reclamation
Mid-Pacific Region

California Department of Water Resources

In Coordination with:

The California Bay-Delta Authority

October 2003

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Montgomery Reservoir Site, Dry Creek

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SURFACE WATER STORAGE OPTION TECHNICAL MEMORANDUM

MONTGOMERY RESERVOIR

UPPER SAN JOAQUIN RIVER BASIN STORAGE INVESTIGATION

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Acronyms and Abbreviations List

BLM	United States Department of the Interior, Bureau of Land Management
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
Corps	United States Army Corps of Engineers
CVP	Central Valley Project
DSOD	Division of Safety of Dams
DWR	Department of Water Resources
elevation	number of feet above mean sea level
EM	Engineering Manual
HEP	Habitat Evaluation Procedure
Investigation	Upper San Joaquin River Basin Storage Investigation
MID	Merced Irrigation District
NEPA	National Environmental Policy Act
PCB	polychlorinated biphenyl
RCC	roller-compacted concrete
Reclamation	Bureau of Reclamation
ROD	Record of Decision
TAF	thousand acre-feet
TM	Technical Memorandum
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

EXECUTIVE SUMMARY

The Upper San Joaquin River Basin Storage Investigation (Investigation) considered several potential storage options in the eastern San Joaquin Valley. This document describes an initial review of the potential Montgomery Dam and Reservoir in Merced County, California. The reservoir would be an off-stream storage facility that would store Merced River water diverted from surplus flows.

The reservoir would be created by a zoned earthfill embankment dam on Dry Creek, a northern tributary to the Merced River, downstream of New Exchequer Dam and Lake McClure. In addition to the main dam, the reservoir would require construction of eight saddle dams, with a combined crest length of 14,300 feet. At a pool elevation of 325 feet above mean sea level, the reservoir would store up to 241 thousand acre-feet (TAF) of water.

The reservoir would store Merced River water released from Lake McClure, diverted at Merced Falls, and conveyed by gravity via the North Side Canal, an existing gravity distribution canal that serves the portion of the Merced Irrigation District (MID) lying north of the Merced River. Stored water would be used to meet local water needs, allowing water stored in Lake McClure to be used for other uses. Some of the stored water would flow west by gravity to MID water users served by the downstream portion of the North Side Canal. Additional water could be pumped upstream through the modified North Side Canal to serve MID customers located between Montgomery Reservoir and the Merced Falls Diversion Dam. Water could also be transferred from the North Side Canal to the Main Canal of MID through a connecting pipeline, which would include a siphon beneath the Merced River.

No major issues were identified regarding the technical feasibility of designing and constructing the required facilities. Most of the land that would be inundated is used for grazing, with sparse rural development. Adverse impacts to wildlife, recreational resources, and existing land uses are expected to be low. Impacts to botanical resources are expected to be more significant, but are likely mitigable. Further study would be required to assess potential impacts to aquatic resources and water quality.

MID, the local agency that would serve the water stored in Montgomery Reservoir, has expressed concern regarding the quality of the water that would be developed. With a storage capacity of slightly more than 240 TAF and a reservoir surface area of nearly 8,000 acres, the average reservoir depth would be roughly 30 feet when filled. Concerns about high water temperature, the likelihood of algal growth, and relatively high evaporative losses make the water that would be developed undesirable to MID and its customers at this time. Therefore, the Montgomery Reservoir option was been dropped from further consideration in the Investigation.

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CHAPTER 1. INTRODUCTION

The Bureau of Reclamation, in cooperation with the California Department of Water Resources (DWR), is completing the Upper San Joaquin River Basin Storage Investigation (Investigation) consistent with the CALFED Bay-Delta Program Record of Decision (ROD), August 2000. The Investigation will consider opportunities to develop water supplies to contribute to water quality improvements and restoration of the San Joaquin River, and to enhance conjunctive management and exchanges to provide high-quality water to urban areas. The ROD indicated that the Investigation would consider enlarging Friant Dam or developing an equivalent storage program to meet Investigation objectives.

The Investigation identified several potential surface storage sites to be initially considered through prefeasibility-level studies of engineering and environmental issues. This Technical Memorandum (TM), which was prepared as a technical appendix to the Phase I Investigation Report, presents findings from a prefeasibility-level review of the potential Montgomery Dam and Reservoir.

OPTION SUMMARY

The potential Montgomery Dam and Reservoir would be sited in Merced County, near the town of Snelling, approximately 17 miles north of Merced. The dam site is located on Dry Creek, north and 16 miles upstream of its confluence with the Merced River. New Exchequer Dam and Lake McClure, on the Merced River, lie about 12 miles east of the potential dam site. Figure 1-1 shows the general location of the potential reservoir and Figure 1-2 shows the immediate area of the option.

The potential reservoir would store available excess flows diverted from downstream of New Exchequer Dam at the Merced Falls Diversion Dam. Water diverted would be conveyed by gravity to Montgomery Reservoir through an expanded North Side Canal, which is an existing gravity distribution canal that serves the portion of the Merced Irrigation District (MID) that lies north of the Merced River. The North Side Canal would be expanded and modified to become a two-way canal to facilitate conveyance of water to and from Montgomery Reservoir (Figure 1-3).

Surplus flows from the Merced River stored in Montgomery Reservoir would be used to meet local water needs, allowing water stored in Lake McClure to be used for other uses. The water stored in Montgomery Reservoir would be discharged via a pumping plant located at the base of the new embankment dam and pumped through a new discharge pipeline to the expanded North Side Canal. As originally conceived, some of the water placed in the canal from Montgomery Reservoir would flow west by gravity to meet the needs of MID water users downstream of the turnout. Additional water would flow east from the pumping plant, upstream through the North Side Canal. This water would help meet the needs of MID customers located along the expanded North Side Canal between Montgomery Reservoir and the Merced Falls Diversion Dam.

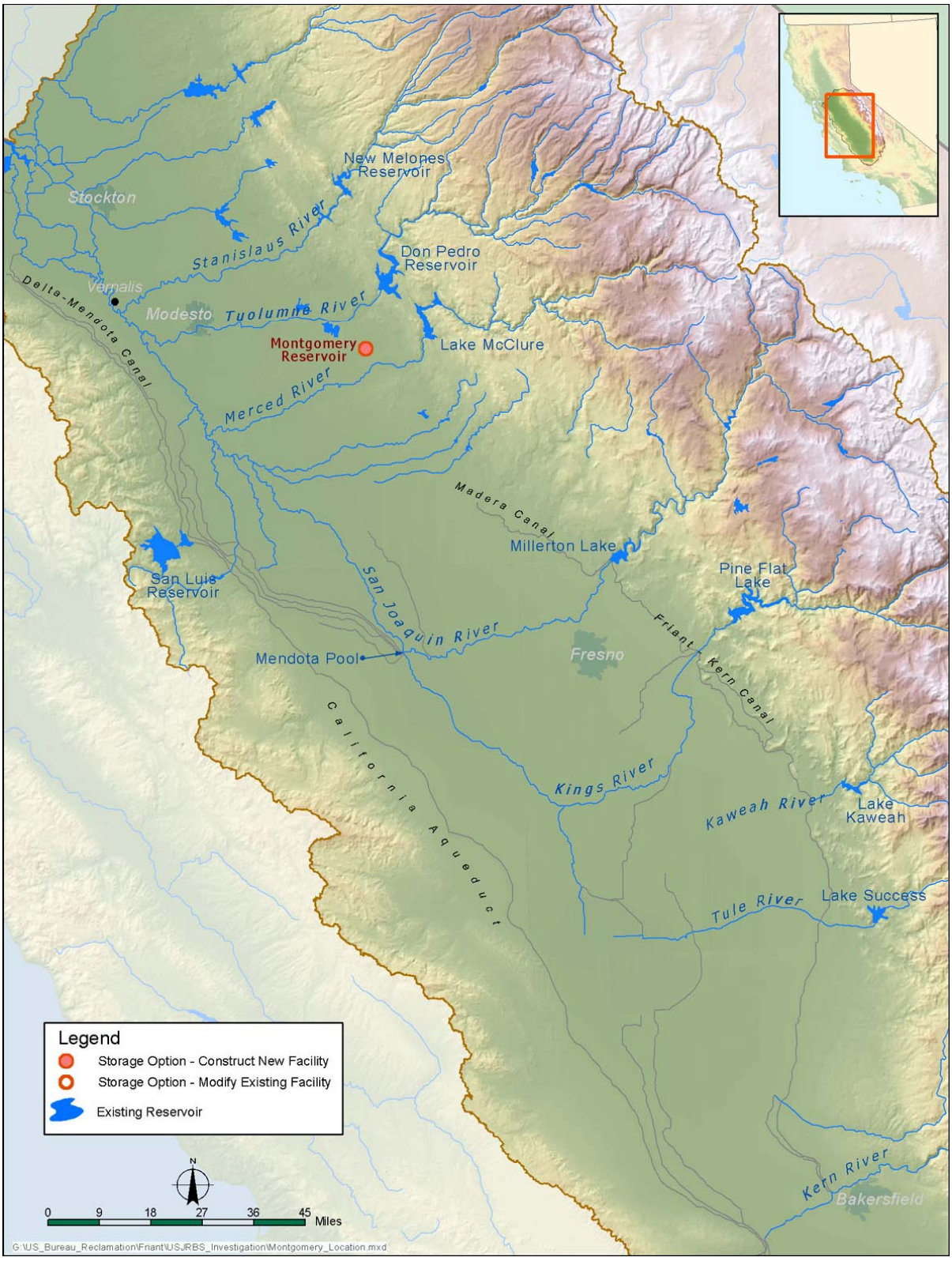

FIGURE 1-1. MONTGOMERY RESERVOIR LOCATION SITE MAP

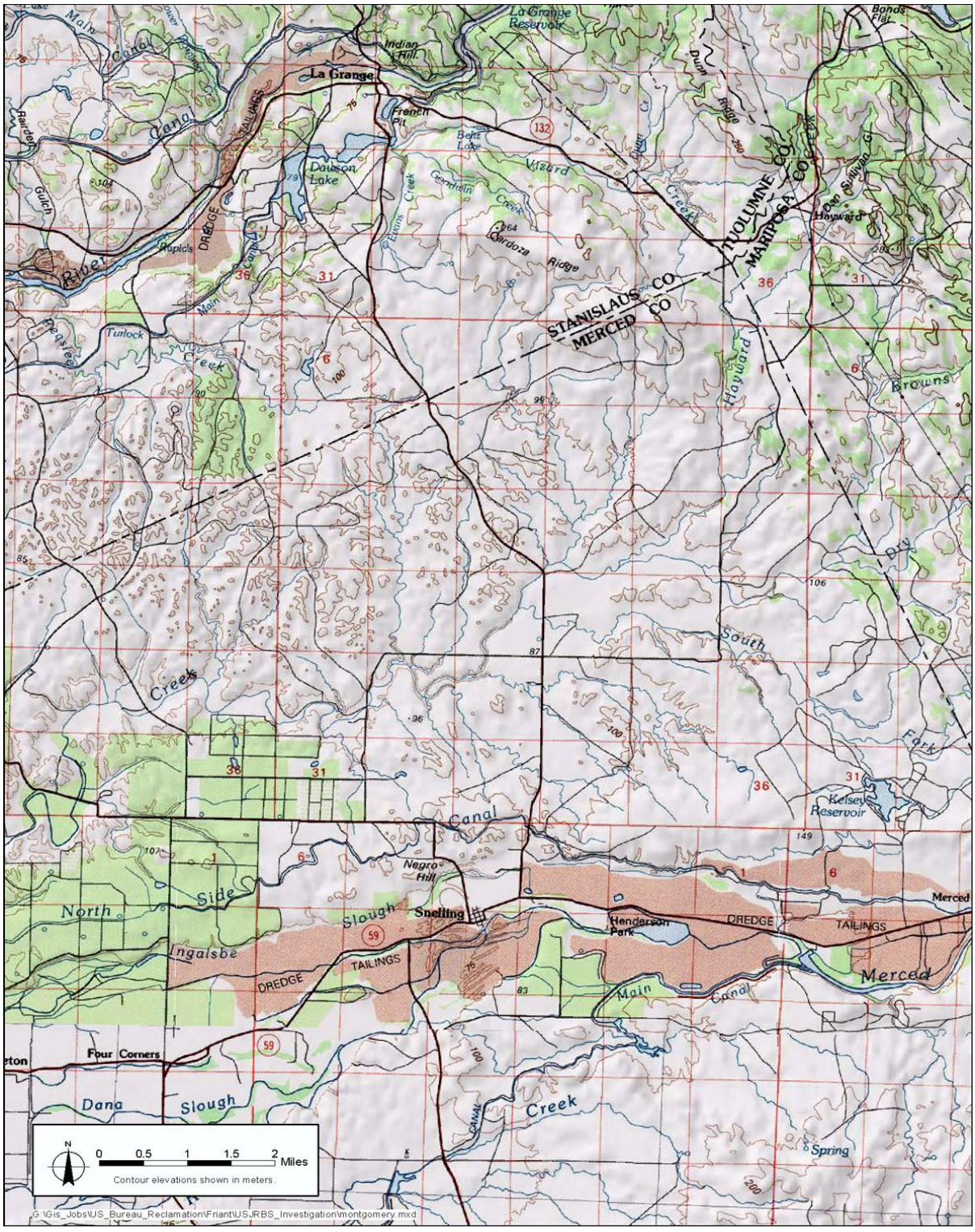

FIGURE 1-2. POTENTIAL MONTGOMERY RESERVOIR AND VICINITY

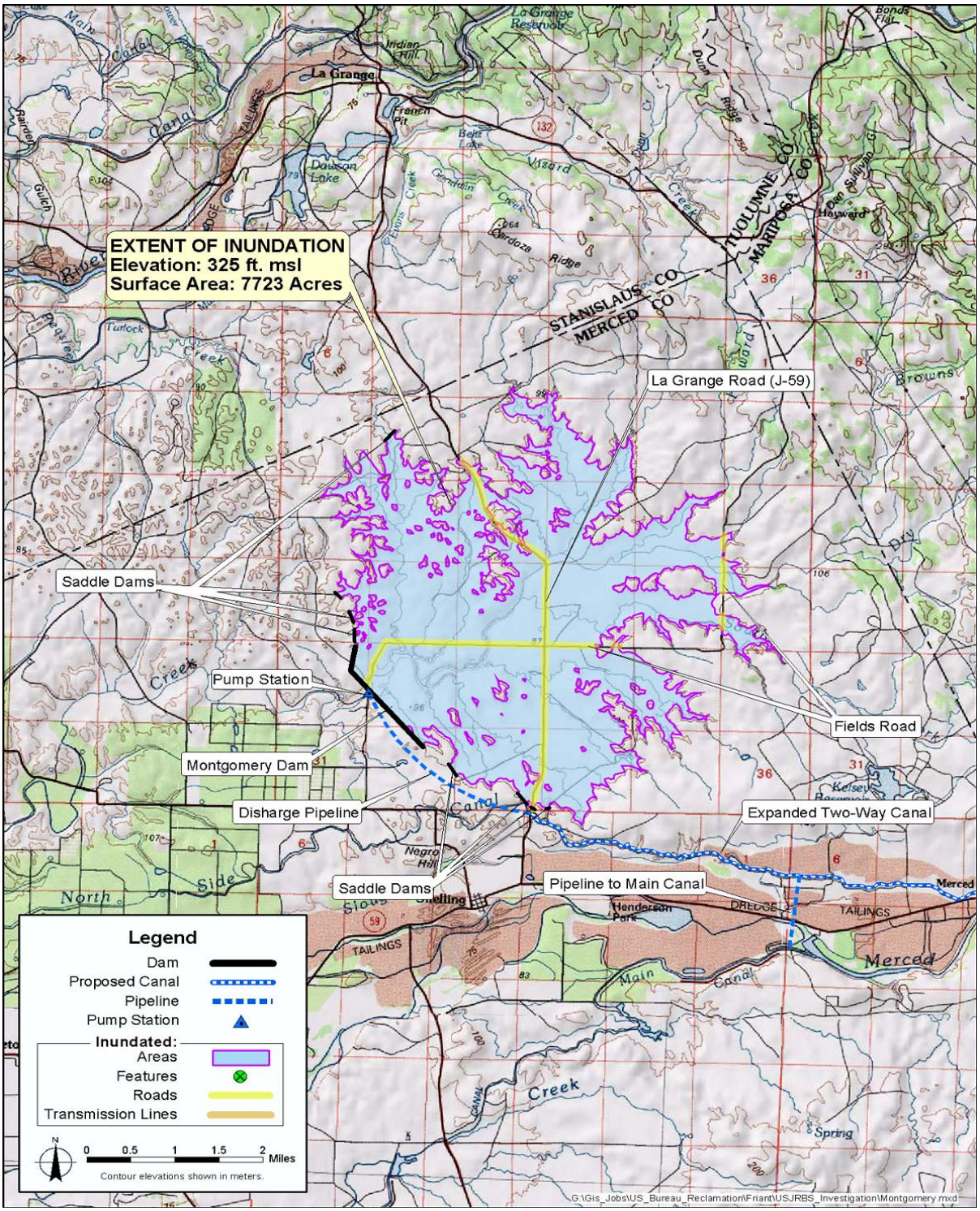

FIGURE 1-3. POTENTIAL FACILITIES AND POTENTIALLY INUNDATED FEATURES

A portion of the water conveyed east from Montgomery Reservoir through the North Side Canal would be piped through the new Main Canal Pipeline to the MID Main Canal, downstream of Snelling Dam. This water would be used to meet MID demands south of the Merced River. The water stored in Lake McClure that would otherwise have been released to meet MID local demands could then be used to supplement other water supply needs downstream of Lake McClure. Other potential benefits of a Montgomery Reservoir include environmental uses, reservoir recreation, local flood control, and conjunctive use opportunities.

Personal communication between DWR staff and the MID assistant director indicated that MID is not interested in using water from the potential Montgomery Reservoir because of concerns about high temperature and the likelihood for algae growth.

EXISTING FACILITIES

No water storage facility presently exists at the site. In the general area, New Exchequer Dam/Lake McClure are located about 12 miles east of the Montgomery Dam site. These facilities are owned and operated by MID. About 8 miles downstream of New Exchequer Dam on the Merced River is McSwain Dam, also owned and operated by MID. Merced Falls Diversion Dam, located roughly 1 mile downstream of McSwain Dam, is used by MID to divert water into the North Side Canal. Snelling Dam, located about 3 miles downstream of Merced Falls Diversion Dam, is used by MID to divert water into the Main Canal, which serves areas south of the Merced River.

SUMMARY OF PREVIOUS INVESTIGATIONS

In the 1920s, it was first determined that the water deficiency in the San Joaquin Valley could be reduced with transfers of surplus water from northern California rivers to drier areas of the San Joaquin Valley.

In 1960, as a result of Federal and State planning in the 1930s and 1940s, the joint San Luis Unit of the Central Valley Project (CVP) was authorized. The CVP provided new water supplies for much of the west side of the San Joaquin Valley, but not the east side of the valley. The East Side Division was later authorized to develop water supply projects to meet the needs of the east side of the San Joaquin Valley.

In 1961, Reclamation published two reports, both for the CVP East Side Division. The first of these, Feasibility Design Estimate Drawings, Volume II, contained feasibility design drawings, topography, hydrography, area-capacity curve, road relocation information, and a feasibility estimate layout for Montgomery Dam and Reservoir. The second report, Cost Estimate-Project DC-1, Appendix, Volume III, Central Valley, provided cost estimates for dam construction, a spillway, outlet works, land and rights-of-way acquisition, relocation of existing property, clearing land, and other components of the East Side Canal, including Montgomery Dam and Reservoir.

In June 1966, Reclamation, CVP East Side Division, presented a report on the feasibility of water supply development. This report contained some information about Montgomery Dam and Reservoir, but mostly relied on prior studies.

In September 1968, Reclamation produced the document A Re-evaluation of the Report on the Feasibility of Water Supply Development. In this report, Montgomery was still considered part of the East Side Canal project. The report updated estimates from the 1966 report.

In December 1992, the United States Fish and Wildlife Service (USFWS) published the document Planning Aid Report – San Joaquin River Basin Resource Initiative – Montgomery Offstream Storage Reservoir. The report focused on the impact that the construction of the reservoir and delivery canal would have on vegetation, wildlife, and fish if the reservoir were operated for environmental, water quality, and recreation purposes.

In June 1993, the San Joaquin River Management Program Wildlife Committee wrote a memorandum titled Montgomery Offstream Storage Reservoir Proposal. The report assumed that the primary purpose of Montgomery Reservoir was to provide water for instream flow to benefit anadromous fish migration in the Merced and San Joaquin rivers. The report described the impacts to wildlife and included listed and candidate species that may occur in the area of the potential reservoir.

In September 1995, USFWS produced the report Environmental Effects of Yield Increase Options. This report to Congress described possible actions to increase the yield of the CVP by the amount of water dedicated to fish and wildlife restoration purposes under the CVP Improvement Act. The report included environmental effects of surface storage in Merced County and contained preliminary information on the potential occurrence of endangered and threatened, proposed, and candidate species.

Some of the data were used by the CALFED Storage and Conveyance Refinement Team in its 1997 report, Facilities Descriptions and Updated Cost Estimates for Montgomery Reservoir. The report reviewed potential water supply augmentation options throughout California; Montgomery Reservoir was identified as a potential surface storage site. The report summarized all previous work performed on Montgomery Reservoir and costs were updated from 1961 dollars to 1996 dollars. The report considered Montgomery Reservoir to be an off-stream storage site.

In August 2000, Montgomery Reservoir was again considered in the document CALFED Initial Surface Water Storage Screening. In this screening, further investigation was deferred until further estimates of costs, benefits, and impacts were completed.

POTENTIAL IMPROVEMENTS CONSIDERED

Three potential sizes for Montgomery Dam and Reservoir are considered in this TM. The two smaller sizes are discussed in Chapter 5, but the focus of this report is on the largest of the three options, which is described in this section. Unless otherwise indicated, references to Montgomery Dam and Reservoir relate to the largest of the three options.

Montgomery Dam would be a zoned earthfill dam with a volume of about 6.2 million cubic yards. The total height of the dam would be 101 feet above the original streambed. The crest of the dam (main dam and series of saddle dams) would be 30 feet wide and 14,300 feet long at an elevation of 336 feet above mean sea level (elevation 336). At maximum conservation pool, the reservoir water surface would be at elevation 325, with a surface area of approximately 8,050 acres and a capacity of 241 thousand acre-feet (TAF) (Figure 1-3). (All elevations in this TM are expressed in feet above mean sea level, unless otherwise noted.)

A dam spillway capacity curve provided in the 1961 Reclamation report showed a maximum capacity of about 1,000 cubic feet per second (cfs) based on a glory hole type design located on the left side of the embankment dam. The spillway would drain into an unnamed tributary of Dry Creek; the spillway inlet would be at elevation 329 and the outlet at elevation 310.

The outlet works would be located near the center of the dam and would release water to Dry Creek. An outlet works capacity curve based on this design (Reclamation, 1961a) showed a maximum outlet capacity of 5,200 cfs. DWR Division of Safety of Dams (DSOD) requires that during emergency evacuation, 10 percent of the maximum water depth must be released in 10 days. For Montgomery Dam, the emergency evacuation rate would be approximately 3,650 cfs, well within the 5,200 cfs design capacity of the potential outlet works.

A pumping plant would be constructed at the base of the main dam, along with a 2.8-mile-long, 1,000-cfs discharge pipeline to convey flows from the pumping plant to the North Side Canal. The canal would be modified to become a two-way canal and its capacity would be expanded to 2,000 cfs for a length of 30,000 feet. A new pipeline would connect the North Side Canal with the Main Canal. This pipeline would be approximately ¾ mile long, crossing beneath the Merced River.

APPROACH AND METHODOLOGY

This TM was prepared from a brief review of the previous studies listed above, an engineering field reconnaissance on 2002 June 14 (Appendix A), and an environmental field reconnaissance of the potential dam and reservoir area on 2002 May 29 (Appendix B).

During the June 2002 field trip, engineers and geologists examined the site under consideration. Locations of existing and potential structures were visually assessed. Topography, geology, geotechnical conditions, and utilities were noted. Access routes and possible borrow, staging, and lay-down areas were considered.

During the May 2002 environmental field visit, specialists in botany, wildlife, aquatic biology, recreational resources, and cultural resources visually assessed existing environmental resources. Additional research was conducted, making use of prior studies and available literature, the California Natural Diversity Database (CNDDB), topographic maps, and aerial photographs. This information was used to preliminarily identify the extent to which potential environmental impacts might constrain storage options under consideration. Where evident, opportunities for improving environmental resources or mitigating adverse effects were also noted. Surveys were not conducted and consultations with external resource management or environmental agencies were not held.

The seismotectonic evaluation conducted by Reclamation (2002) for this study was based on readily available information and is considered appropriate for prefeasibility-level designs only. Detailed, site-specific seismotectonic investigations have not been conducted for this preliminary analysis and remotely sensed imagery was not evaluated. More detailed, site-specific studies would be required for higher-level designs.

For prefeasibility-level planning studies, designs and analyses are typically quite general. Design layouts, sections, and dimensions for this study have been assumed based on standard practice and experience with similar facilities. Extensive efforts to optimize the design have not been made, and only limited "value engineering" techniques have been used.

CHAPTER 2. TOPOGRAPHIC SETTING

Regional topography consists of the nearly level floor of the San Joaquin Valley rising abruptly to moderately steep, northwest-trending foothills with rounded canyons. The dam site is located in low rolling hills separated by broad, flat-bottomed stream valleys on the margin of the San Joaquin Valley. Elevations in the immediate area of the dam site range from approximately elevation 240 to over elevation 350. Farther east, the land surface sharply steepens to the foothills of the Sierra Nevada. The stream valleys have been cut into the rolling terrain west-southwest draining creeks, rivers, and associated large tributaries. Three rivers dominate the area, the Merced (3 miles directly southeast of the site), Tuolumne (6 miles to the northwest), and Stanislaus (20 miles to the northwest). Dry Creek is a southwest-flowing tributary to the Merced River.

The potential main dam site is located across a relatively narrow reach of the Dry Creek valley, approximately 16 river miles upstream of Dry Creek's confluence with the Merced River. The left and right abutments of the main dam structure traverse a series of low hills and shallow valleys, rising ultimately to about elevation 330. The streambed axis at the potential dam site is about elevation 240, while the maximum height is about elevation 360.

AVAILABLE TOPOGRAPHIC MAPPING

Topographic mapping other than that available publicly from the United States Geological Survey (USGS) is not known. Base maps used by Reclamation in the feasibility investigations appear to be from USGS sources.

AVAILABLE AERIAL PHOTOGRAPHY

Aerial photography of various scales and imagery is available from the archive files of the USGS. Additional aerial imagery may also be available from the United States Department of Agriculture, Reclamation, and United States Army Corps of Engineers (Corps). A specific search of available photography was not conducted for this TM nor was any aerial photography reviewed.

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CHAPTER 3. GEOLOGIC AND SEISMIC SETTING

The Montgomery area is located in the San Joaquin Valley portion of the Great Valley Geomorphic Province near its boundary with the Sierra Nevada Geomorphic Province. The Great Valley basin is filled with thick accumulations of marine (at depth) and non-marine sediments shed largely from the Sierra Nevada mountain range. Recent alluvium of lake and river origin blankets most of the present-day surface, while dissected remnants of Pliocene and Pleistocene alluvial fans rim the valley margin.

The Sierra Nevada mountain range is characterized by batholiths of Mesozoic granitic rock in the central and eastern portions and Paleozoic roof pendants of the Calaveras Complex and related rocks on the western flanks. The Sierra Nevada foothills take the form of outliers of low to irregular hills of Mesozoic granitic and late Paleozoic to Mesozoic basic and ultrabasic rock (ophiolites), and other associated Mesozoic metamorphic rocks.

Overall, seismic hazard potential at the site is low. Two preliminary earthquake loading parameters were considered in this prefeasibility-level evaluation: fault sources, and areal/background sources (Reclamation, 2002).

Twenty-two potential fault sources for the site were identified, including those faults associated with the San Andreas fault, seven western Great Valley faults, seven eastern Sierra Nevada faults, the White Wolf fault of the southern San Joaquin Valley, and six faults of the Sierra Nevada foothills fault system. The southern portion of the Sierra Nevada foothills fault system passes about 12 miles to the east-northeast of the dam site, although historic seismicity rates are low.

The areal/background seismic source considered was the South Sierran Source Block, the region surrounding the potential dam and reservoir site. This region possesses relatively uniform seismotectonic characteristics.

Probabilistic seismic hazard analysis shows that peak horizontal accelerations to be expected at the site are 0.13g with a 2,500-year return period, 0.18g with a 5,000-year return period, and 0.23g with a 10,000-year return period.

SITE GEOLOGY

USGS preliminary geologic maps of Cenozoic deposits in the Snelling and Merced Falls Quadrangles (USGS, 1980) provide most of the geologic details for the site. Geologic units at the dam site and reservoir area range in age from Miocene through lower Pliocene and Pleistocene to Recent. The major units are the Mehrten, Laguna, Turlock Lake, Riverbank, Modesto, and post-Modesto formations. Less important, and smaller in areal coverage, are the Ione formation in the northeast portion of the reservoir and the Valley Springs formation in the central portion of the reservoir.

The Miocene and lower Pliocene Mehrten formation comprises mudstone, siltstone, sandstone, conglomerate, and lahars (deposits from volcanic mudflows) derived from andesitic volcanic centers located near the crest of the Sierra Nevada.

Above the Mehrten lies the Pliocene Laguna formation. The Laguna is a thick gravel unit with subordinate sand and silt, derived from mixed metamorphic, volcanic, and granitic sources in the Merced and Tuolumne river drainages.

The Pleistocene Turlock Lake formation underlies much of the rolling landscape in the area. The lower member within the Turlock Lake unit (unit t2l) is composed of arkosic fine sand, silt, and clay derived from fine glacial outwash and rock flour from the core of the Sierra Nevada. The upper unit (t2u) is coarser, consisting of coarse arkosic sand and gravel also derived from glacial outwash.

The Pleistocene Riverbank formation (unit r3f) is found in the area as small remnants of locally derived alluvial silt and sand that form terraces along the margin of Dry Creek. This deposit contains abundant volcanic detritus derived from the Mehrten formation.

The Pleistocene Modesto formation (units mlf and m2f) is a locally derived alluvial silt, sand, and gravel forming terraces along Dry Creek. This deposit contains abundant volcanic and metamorphic detritus.

The only post-Modesto deposit mapped in the area is the Recent unit identified as pm2f. This unit is described as alluvial sand, gravel, and silt deposited along Dry Creek and derived from foothill andesitic and metamorphic sources.

No known faults have been identified at the Montgomery Dam and Reservoir site. Geologic mapping of the Montgomery Reservoir site by Reclamation in 1944 and 1958 detected no fault traces. The Reclamation reports did not discuss faulting or seismic activity in the area.

SITE GEOTECHNICAL CONDITIONS

From the description of geologic units mapped at the potential Montgomery Dam and Reservoir site, the only indurated rocks are those of the Mehrten Formation, and these rocks are only slightly indurated. It is not clear whether the dam foundation would encounter the Mehrten Formation. The Mehrten Formation is a known water-bearing unit and yields water to wells, indicating that it is relatively permeable. The rest of the geologic units mapped in the area all appear to be unconsolidated and very permeable.

The most significant geotechnical condition at the site appears to be seepage. Based on a 1993 Reclamation memorandum, extensive seepage losses from the reservoir are expected. Seepage losses from a full reservoir without grouting, deep cutoff, or blanketing were estimated to be 15 TAF per year. Seepage from a minimum pool at elevation 280 was estimated at 5 TAF per year. The most severe seepage would likely occur in the southern and western portions of the reservoir where the geologic units appear to be more permeable. The remaining and greater portion of the reservoir was expected to be reasonably impermeable.

Seepage in the southern portion of the reservoir would likely be to the Merced River, while losses in the rest of the area underlain by the Mehrten Formation would be mainly to groundwater. Reclamation's 1971 Ground-Water Geology and Resources Appendix estimated that about 5.7 TAF of estimated seepage could be recovered by irrigation wells. A Reclamation Preliminary Geologic Report stated that the areas of potential severe leakage could be suitably treated through blanketing over an area of 5/8 of a square mile, or 1½ linear miles along the southern side of the reservoir. The report considered providing the foundation with a grout curtain (Reclamation, 1944).

Groundwater within the area of the potential Montgomery Reservoir exists in the unconsolidated material and weakly consolidated formations. As noted above, the Mehrten Formation is a known water-bearing unit. The underlying Valley Springs Formation may act as a perching unit due to its impervious nature. Reclamation work in 1944 and 1958 encountered water in all boreholes, ranging in depth from 5 to 12 feet below ground surface. Water level elevations in 1959 ranged from about elevation 280 feet near the upstream portion of the reservoir, to about elevation 210 near the potential dam. This water table was believed to be near a seasonal high and should not create a problem for the reservoir site unless a deep borrow pit is developed.

Groundwater flow is from the northeast to the southwest at a gradient of about 22 feet per mile. This water level gradient roughly corresponds to the dip of the impervious Valley Springs Formation. Subsequent groundwater level monitoring in the site area indicates very little change since the initial observations were made.

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CHAPTER 4. HYDROLOGIC SETTING

Dry Creek above the potential Montgomery Dam is located on the north side of the Merced River, extends for about 10 miles, and drains approximately 68 square miles. Elevations within the Dry Creek watershed range from about elevation 125 at its confluence with the Merced, to about elevation 1,400 in its headwaters near Lake McClure.

RAINFALL

Rainfall in this Mediterranean climate region varies from about 6 inches per year in the valley to about 50 inches per year in the Sierra Nevada mountain range. Normal annual precipitation over the general Merced River basin area averages 11.5 inches per year (DWR, 1995)

About 90 percent of the rainfall in the region occurs from November through April. Below about elevation 5,000, precipitation typically occurs as rain, while above it falls as snow. However, warm winter storms may produce rain up to elevation 11,000, and exceptionally cold fronts may drop snow on the valley floor.

EROSION, RUNOFF, AND RECHARGE

Information on specific soils/erosion/runoff potential for the site was not identified.

According to DWR, average annual natural recharge in the basin is 47 TAF (DWR, 1995). Artificial recharge is undetermined; applied annual recharge is 254 TAF. Based on average extraction for agricultural and urban uses, the groundwater basin is in overdraft by an annual average of 15 TAF.

AVAILABLE FLOOD DATA

The potential Montgomery Dam and Reservoir site is located outside the floodplain of the Merced River. According to USGS flow data obtained from 1967 to 1992 (the only years for which data are available) at the gage on Dry Creek at the site of the dam (Gage No. 11271320, Dry Creek near Snelling), flows in Dry Creek are minimal for most of the year, with maximum flood pulses of up to 6,700 cfs. Frequency analysis results for available annual peak flow data are shown in Table 4-1.

TABLE 4-1.
PEAK FLOW ANALYSIS COMPARISON

Analysis	5-Year Flood (cfs)	10-Year Flood (cfs)	25-Year Flood (cfs)
Reclamation, 1959	1,900	2,500	3,400
USGS Gage Data	4,740	7,400	11,400

CHAPTER 5. STORAGE STRUCTURES AND APPURTENANT FEATURES

This chapter describes the recommended storage structures and appurtenant features for the Montgomery site, and the constructibility, cost, and the systems operations for this option.

STORAGE STRUCTURE

The potential Montgomery Dam would be a zoned earthfill dam. Figure 5-1 is a cross section of the proposed dam type. This TM considers three potential dam sizes for the potential Montgomery Dam. The largest of these options would rise 101 feet above the stream bed. The crest length would be 11,300 feet and 30 feet wide at elevation 336. The embankment slopes would be 3:1 (horizontal to vertical) on the upstream side and 2:1 on the downstream side.

A 1961 Reclamation report indicated that eight saddle dams of various lengths and heights would be required to complete the reservoir. This TM considers an updated preliminary Montgomery Dam profile that includes the main dam and seven saddle dams. Two smaller dam options are also considered. No saddle dams would be required for either of the two smaller dam sizes. This TM assumes essentially the same design for the crest width, the outlet works, and the spillway for both smaller dam sizes. The only significant exception is the crest elevation and resulting length.

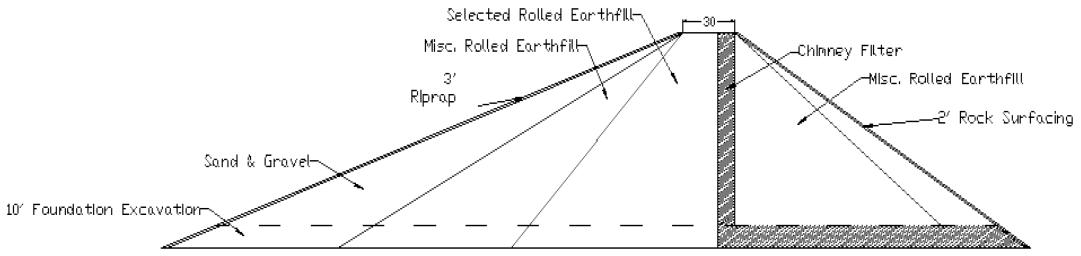

FIGURE 5-1. SCHEMATIC CROSS SECTION OF POTENTIAL MONTGOMERY DAM

The middle-size dam would have a crest length of 8,085 feet at elevation 321, a conservation pool top at elevation 310, a capacity of 137 TAF, and a surface area of approximately 5,930 acres. As with the largest option, the dam crest would be 30 feet wide.

The smallest dam option would have a crest length of 5,635 at elevation 311, a conservation pool top at elevation 300, a capacity of 86 TAF, and a surface area of approximately 4,230 acres. The dam crest for this option also would be 30 feet wide.

Volumes for each of the three dam sizes are given in Table 5-1 below. This table also shows the volume of earthfill components that would be needed for each respective dam size.

TABLE 5-1.
EARTHFILL VOLUMES FOR DAM SIZES CONSIDERED

Crest Elevation	el. 336	el. 321	el. 311
Selected rolled earthfill	1,575,000	724,000	586,000
Chimney blanket	921,000	407,000	346,000
Miscellaneous rolled earthfill	1,998,000	946,000	731,000
Sand and gravel fill	1,307,000	617,000	480,000
Riprap	291,000	148,000	109,000
Rock surfacing	115,000	60,000	45,000
Total fill	**6,207,000**	**2,902,000**	**2,297,000**

Roller-compacted concrete (RCC) construction, developed in the 1980s, is being used more frequently for dam construction because of its cost and time savings. Dam volumes can be reduced greatly from earthfill construction and time saved over conventional concrete techniques because RCC can be rapidly placed using conventional construction equipment.

In 1993, a cost comparison between RCC and earthfill dams at the Red Bank Project near Red Bluff showed RCC to be approximately half the cost of earthfill. For the potential Montgomery Dam and Reservoir, such a savings in initial construction costs may be roughly estimated at $20 to $30 million dollars. Therefore, future studies of the potential Montgomery Reservoir option should evaluate the use of RCC as a construction material with special attention paid to both the availability of aggregate in the area and a proper design to control excess seepage.

RESERVOIR AREA/ELEVATION/CAPACITY CURVES

Curves showing water surface elevation versus reservoir area and capacity for Montgomery Reservoir are shown in Figure 5-2.

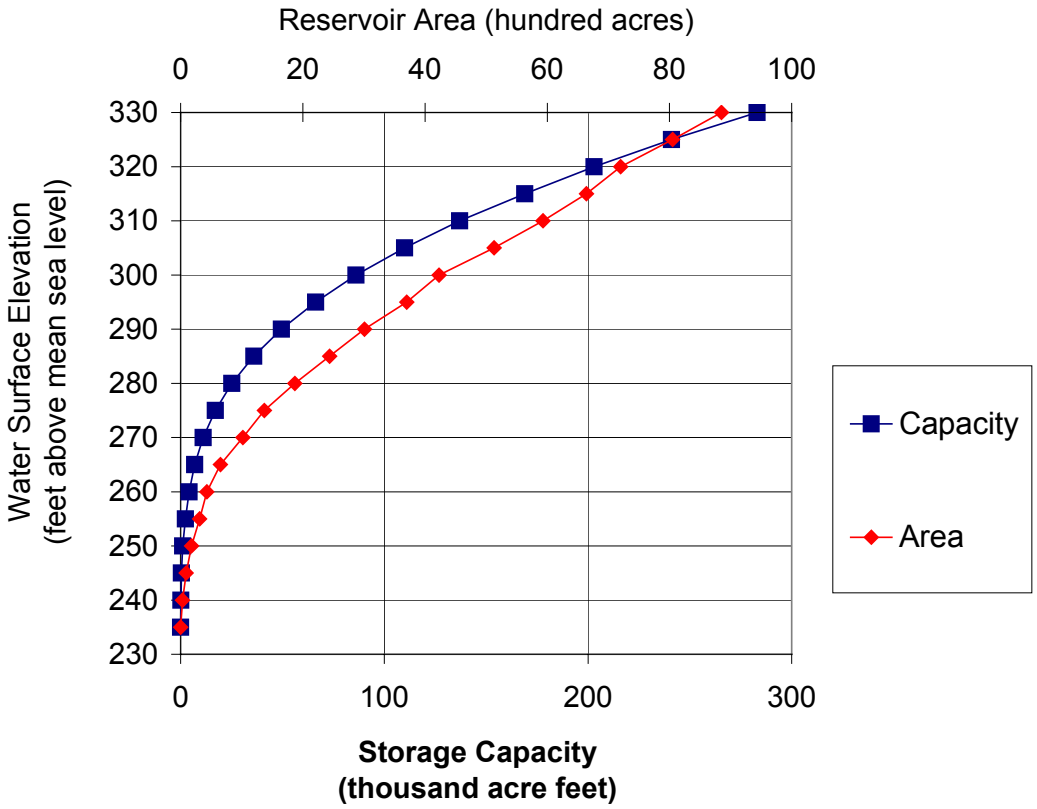

FIGURE 5-2. RESERVOIR AREA – ELEVATION – CAPACITY CURVES

APPURTENANT FEATURES

This section describes major appurtenant features that would be associated with the dam.

Conveyance

As originally conceived, to deliver water from the Merced Falls Diversion Dam to the potential reservoir (about 5.7 miles), the existing North Side Canal would be expanded from a one-way gravity canal to a two-way 2,000 cfs canal. To deliver water back to the North Side Canal, a new, approximately 2.8-mile-long, 1,000 cfs discharge pipeline would be constructed from the pumping plant at the base of the dam to the North Side Canal. Water delivered to the North Side Canal would flow in either direction from the connection point with the pipeline.

A Main Canal Pipeline would connect the North Side Canal with the Main Canal. This pipeline would be approximately ¾-mile long, crossing beneath the Merced River and would facilitate delivering Montgomery Reservoir water to MID water users south of the Merced River. Deliveries from Montgomery Reservoir would reduce diversions from the Merced River to the Main Canal at Snelling Diversion Dam.

Pumping Plants

The only required pumping plant would be located at the base of the dam to service the discharge pipeline back to the North Side Canal. This pumping plant was only described generally and qualitatively in all previous studies.

CONSTRUCTIBILITY

This section discusses issues of concern related to constructing the dam.

Land, Rights-of-Way, Access, and Easements

The potential reservoir area presently contains several homes/farms, roads, and an aboveground telephone line. Most of the land is used for grazing. Required relocations would consist of the telephone line, nearly 6 miles of Fields Road, about 4½ miles of County Road J-59, and about ¼ mile of Olsen Road.

Borrow Sources/Materials

There appear to be sufficient materials in the vicinity to meet requirements. A preliminary evaluation of borrow materials was performed in 1944, and a more detailed survey (32 bore holes and laboratory testing) was completed in 1959. Ample sources of impervious and semi-impervious material appear to be available within 2 to 3 miles of the dam site. The most promising source of impervious material appears to be within the reservoir site, along Dry Creek, in the form of clayey alluvial terrace deposits.

A significant silty sand deposit, probably suitable for semi-impervious transition material, is reportedly located at the south end of the dam site. Large quantities of dredge tailings and river gravel for pervious fill and concrete aggregate are found about 3 miles south of the dam site along the Merced River. Calaveras Materials operates a commercial gravel plant on the Merced River about 6 miles southwest of Snelling.

A potential riprap quarry site of dense, sub-schistose, meta-pyroclastic greenstone is reportedly located about 8 miles east of Snelling. Other suitable deposits of crystalline bedrock may exist closer to the dam site.

Foundations

It is anticipated that the dam foundation will be built in unconsolidated and permeable to very permeable geologic units. It is uncertain whether the dam would be founded in the Mehrten Formation, a known water-bearing unit in the eastern side of the northern portion of the San Joaquin Valley.

Seepage in the dam foundation is the only concern indicated in previous studies. Accordingly, per Corps Engineer Manual 1110-2-1901 (EM), a 10-foot wide downstream-side chimney filter draining to the downstream toe of the embankment would be required for all three dam sizes considered. In addition, the EM would consider a grout curtain as a part of the foundation design.

Power Sources

Nearby electrical power from commercial sources appears to be available.

Staging and Lay-Down Area

Potential staging and lay-down areas are located immediately upstream and downstream of the site.

Contractor Availability and Resources

There are several local general engineering contractor or regional-based general engineering contractors capable of performing the dam construction.

Construction Schedule and Seasonal Constraints

The climate of central California is mild with no snow. The coldest month is January, with an average daily high and low of 55° F and 36° F, respectively. The wet season is December through March, with an average monthly rainfall of about 2.5 inches. Dam types considered in this report are relatively immune to these climate conditions and year-round construction is assumed.

Flood Routing During Construction

Flows in Dry Creek are minimal most of the year with infrequent flood pulses of up to 6,700 cfs. Construction of the embankment could be staged or scheduled so that the remaining section on Dry Creek would be planned for the dry season; therefore, flood routing would not be needed during that portion of construction.

Environmental Impacts During Construction

Environmental impacts during construction could be mitigated with proper planning and implementation of best management practices. The work site is remote from urbanization; therefore, noise and visual impacts would be minimal. The access road would require re-routing and could be restricted to the general public, except those property owners with lands upstream and American Indians requiring access to their tribal lands. Air quality issues could be mitigated by dust control measures for both the spillway excavation and berm construction. A cultural survey should be conducted to identify ancestral American Indian or historic artifacts and construction activities would be restricted in those areas. Bald eagles have been sighted in the region. Importing construction materials from distant sources would cause traffic impacts, but with proper planning and coordination with Caltrans, major impacts easily could be mitigated. Truck traffic for importing materials and excavation equipment traffic would discharge exhaust to the local air basin. All construction equipment should have spark arresters and fire control equipment should be kept readily accessible during construction. Construction water would have to be controlled and provisions for runoff and erosion control will need to be developed and implemented. A spill control plan would be needed to control any construction-related fuels, lubricants, and other materials.

Permits

It is probable that Federal and non-Federal sponsors would be involved. This probable joint sponsorship might complicate the permitting process, as Federal projects are not subjected to the same level of permitting required for non-Federal projects.

Given the probable duality of sponsorship, and potential environmental and cultural impacts identified, at a minimum, certain permits could be required from the permitting agencies listed in Table 5-2.

TABLE 5-2. POSSIBLE PERMITS REQUIRED

Permit	Permitting Agency
Permit to Construct	DSOD, Merced County
Encroachment	Caltrans, Merced County
Air Quality	CARB, Merced County
Low/No Threat NPDES	RWQCB
Waste Discharge	RWQCB
401 Certification	SWRCB
Blasting	Merced County
Stream Bed Alteration	CDFG
Fire/Burn	CDF, Merced County

Key:

CARB	California Air Resources Board
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
DSOD	Department of Safety of Dams
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board

In addition, the following agencies could be involved in the review of permit conditions:

- Bureau of Land Management (BLM)
- State Historic Preservation Office
- Advisory Council on Historic Preservation
- United States Fish and Wildlife Service (USFWS)

In obtaining these various permits, several plans would have to be prepared and submitted to the responsible agencies for review and approval:

- Construction Plan and Summary Documents
- Quality Control Inspection Plan
- Highway Notification Plan
- Blasting Plan
- Noise Monitoring Plan
- Water Quality Monitoring Plan

- Noxious Weed Control Plan
- Bat Protection Plan
- Management Plan for Avoidance and Protection of Historic and Cultural Properties
- Storm Water Pollution Prevention Plan
- Spill Prevention/Containment Plan
- Visual Quality Control Plan
- Dust Control and Air Quality Plan

Another important regulatory requirement involves compensation/mitigation for habitat loss. In October 1998, USFWS issued its draft Coordination Act Report and Habitat Evaluation Procedure (HEP Analysis). The HEP Analysis delineates how compensation for adversely affected baseline habitat and wildlife conditions is to be determined.

In addition, if power generation is included in a project or is modified for an existing project, the Federal Energy Regulatory Commission may become involved in the permitting process.

COSTS

Based on both the 1961 Reclamation Cost Estimate Appendix and the 1997 CALFED Storage and Conveyance Refinement Team report, cost estimates for the potential Montgomery Dam and Reservoir were prepared and updated to April 2002 unit costs using Reclamation Construction Cost Trends. The San Joaquin District of DWR provided cost estimates for land acquisition; Reclamation provided additional costs for grouting work. Costs also were evaluated by MWH dam cost estimators, and costs were modified to reflect current material costs and standards of practice, especially with respect to seismic requirements.

Initial Construction Costs

Table 5-3 summarizes the estimated first cost for the three potential dam sizes considered. The estimated first cost of the largest reservoir option considered (dam crest at elevation 336) is $244 million. Cost estimate details are contained in Appendix C. Field costs represent the estimated cost to construct identified features, plus provisions for unlisted items (15 percent), contingencies (25 percent), and mitigation (5 percent). Total costs include field costs plus estimated costs for future analyses and planning documentation, development of designs, and construction management (15 percent).

TABLE 5-3.
SUMMARY OF FIRST COSTS

Montgomery Dam and Reservoir	Estimated Cost ($Millions)		
	Dam Crest Elevation (ft)		
Cost Component	311	321	336
Dams	12.2	15.8	35.5
Spillway	0.7	0.7	0.7
Outlet Works	15.6	15.6	15.6
Supply Pipeline	19.2	19.2	19.2
Pumping Plant	35.3	35.3	35.3
Discharge Pipeline	20.5	20.5	20.5
Main Canal Pipeline	6.4	6.4	6.4
Unlisted Items	16.5	17.0	20.0
Contingency	32	33	38
Mitigation	8	8	10
Total Field Cost	167	172	201
Investigation/Design/CM	**25**	**26**	**30**
Lands	7	9	13
Total First Cost	**199**	**207**	**244**

Operations and Maintenance Costs

Costs for power and reservoir filling were not calculated in this or any previous study. Operation, maintenance, and replacement costs were not estimated for this prefeasibility-level effort.

SYSTEMS OPERATIONS

Systems operations are described only generally and qualitatively in all previous studies; no quantitative description is available. As originally conceived, excess flows from Merced Falls Diversion Dam would be diverted through the expanded, two-way North Side Canal to Montgomery Reservoir, which would store up to 240 TAF. Water from the reservoir would be drawn through the outlet works and discharge pipeline to the North Side Canal, where it could be shipped first west by gravity to MID water users downstream of the turnout, and then east by pumping to users along the expanded North Side Canal between Montgomery Reservoir and the Merced Falls Diversion Dam.

CHAPTER 6. HYDROELECTRIC POWER OPTIONS

Various hydroelectric power options were considered for each surface storage site, including Montgomery.

PUMPED STORAGE

Pumped storage is not a viable option for this storage option.

ADDED HYDROELECTRIC POWER TO EXISTING STRUCTURES

There are no existing water storage or hydroelectric structures on Dry Creek.

NEW HYDROELECTRIC POWER

Hydroelectric power generation is not considered feasible with the potential new dam on Dry Creek.

TRANSMISSION AND DISTRIBUTION

Transmission and distribution systems would not be required for the potential Montgomery Dam and Reservoir.

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CHAPTER 7. ENVIRONMENTAL CONSIDERATIONS

This chapter describes existing environmental resources at the site and qualitatively describes potential effects of reservoir development. To reflect a conservative approach, environmental issues were reviewed for the largest reservoir size considered in this TM. The discussion in this chapter is intended to indicate the extent to which expected or potential environmental effects might pose a constraint to reservoir development. Where evident, opportunities for improving environmental resources or mitigating adverse effects have been noted. Analysis focused on botany, terrestrial wildlife, aquatic biology, water quality, recreational resources, cultural resources, and existing land uses. Mining and other known past activities that might affect site conditions are also briefly discussed, along with the potential presence of hazardous or toxic materials. Temporary construction-related disruptions and impacts are discussed in Chapter 5.

Identification of constraints was conducted at a preliminary, prefeasibility-level of planning, consistent with the current phase of the Investigation. Criteria considered were based, in part, on criteria commonly used to evaluate environmental impacts of projects under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The application of criteria that may be used for NEPA or CEQA evaluation does not imply that the analysis is at the level necessary for an Environmental Impact Statement or Environmental Impact Report. Considerations included presence of special status species (e.g. species listed as endangered or threatened), species of concern, or sensitive habitats; relative amounts of affected riparian or wetland habitat; effects on native or game fish; conflict with established recreational uses or land uses; presence of nationally registered historic places, sacred Native American sites, or Traditional Cultural Properties; permanent disruption or division of established communities; and loss of energy production facilities.

BOTANY

Several geological formations are present, including the Mehrten, Ione, and Valley Springs formations. These formations often have perched groundwater that can form vernal pools, and large areas with potential vernal pools are evident on available aerial photography. Though present in only a small portion of the reservoir area, the Ione formation in nearby Amador County is associated with several very rare plant species.

The site is characterized by grassland and pasture, which are not generally thought of as special habitats unless dominated by native perennial grasses. Sparse riparian habitat (approximately 55 acres) has been identified on site. In addition, over 700 acres of seasonal wetlands (mostly vernal pools) have been identified on site.

Nine special status plant species occur in and around the potential Montgomery Reservoir area. Of these, seven are associated with vernal pools, and six are listed as threatened or endangered by USFWS or the State of California. Two other species have California Native Plants Survey List 1B status.

Listed species with particularly high potential to be in the area include Hartweg's pseudobahia (endangered – Federal and State), Hoover's spurge (threatened – Federal), Colusa grass (threatened – Federal, endangered – State), hairy Orcutt grass (endangered – Federal and State), and succulent owl's-clover (threatened – Federal, endangered – State).

Constraints

This site has a very high potential for the presence of special status plant species. For the most part, these species would occur in vernal pools, but Hartweg's pseudobahia also may occur elsewhere. Small numbers of special status species may not be a serious constraint, but if large numbers, or more than one species are found, the cost of preparing and implementing mitigation plans could be high.

Opportunities

It is possible that some mitigation could be done on site, perhaps including substantial riparian habitat creation. If a large number of vernal pools (and vernal pool species) are not affected, creation or restoration of riparian habitat could be a benefit.

WILDLIFE

This potential reservoir site is vegetated with perennial and annual grassland species. The area has been heavily used for agriculture, particularly grazing, which has altered the natural biotic communities.

A review of the CNDDB of sensitive species occurrences throughout the State shows that foothill yellow-legged frogs, California tiger salamanders, western pond turtles, tri-colored black birds, golden eagles, and the Merced kangaroo rat may inhabit the area. The kangaroo rat is not a State- or Federally listed species.

A dense population of bullfrogs is present in the existing reservoir area; bullfrogs often are limiting factors for foothill yellow-legged frog, California tiger salamander, and western pond turtle populations.

Bald eagles have been sighted in the region.

Constraints

Based on current knowledge regarding this site, significant wildlife-related constraints appear unlikely.

Opportunities

The potential Montgomery Dam and Reservoir site does not appear to have significant wildlife constraints, and site development could benefit local wildlife if riparian and emergent vegetation is established along the shoreline and in bays. This habitat may attract sensitive species such as tri-colored blackbird and willow flycatcher.

AQUATIC BIOLOGY/WATER QUALITY

Dry Creek in the area of the potential dam and reservoir is a small, low-elevation stream. The drainage area consists of rolling, grassland-covered hills. At the time of the site reconnaissance in May 2002, the stream had little flow, and flow may cease entirely by late summer, although pool habitat probably persists through the dry season.

The streambed substrate in most portions of the stream reviewed consists of bedrock and alluvial gravel. Stream banks are highly eroded with widely scattered riparian trees and bushes. Instability of stream banks largely results from trampling and grazing by cattle on riparian vegetation. The stream appears eutrophic, with large mats of algae covering the stream margins, particularly in pools.

Aquatic animals observed in Dry Creek during the field visit include many bullfrogs, snails, crayfish, and fish. A number of large tadpoles, one crayfish, and one small fish were found in the stream at the Fields Road crossing. A number of fish fry, and the snail Physa, were found along a shallow gravel bar just downstream of the J-59 County Road bridge. Physa is generally associated with warm, eutrophic habitats in areas of hard water.

Habitat conditions in the reach of Dry Creek that would be inundated by the reservoir are likely inhospitable to most fish species. Due to the lack of riparian vegetation and low or absent summer flow, water temperatures are probably high and dissolved oxygen levels may often be low during summer. California fish species able to tolerate such conditions include California roach, mosquito fish, and green sunfish.

The California roach (*Lavinia symmetricus*) is a native species. The San Joaquin Valley subspecies (or "form") of this species is on the "Watch List" of the State of California Fish Species of Special Concern (Moyle et al., 1995). Further research is needed to determine if this species occurs in the area. The other two species, mosquito fish (*Gambusia affinis*) and green sunfish (*Lepomis cyanellus*), are abundant, exotic species.

Constraints

The potential option would entail creation of a 241 TAF reservoir with a maximum pool at elevation 325. At maximum pool, the reservoir would inundate almost 7 miles of Dry Creek and a total of 5 miles of two tributaries, South Dry Creek and Hayward Creek.

Principal effects on aquatic biological resources would result from replacing stream habitat with lacustrine habitat. Populations of fish and other organisms adapted to a stream environment would be reduced or eliminated from inundated areas, while those of species adapted to lacustrine conditions would be enhanced. The most likely native fish species to be affected would be the California roach, which is generally not found in lakes. Further investigation into the status of California roach in Dry Creek is needed.

Water quality effects of the potential dam and reservoir would largely depend on whether significant temperature and/or dissolved oxygen stratification would develop in the reservoir during the summer months. A thermally stratified reservoir would retain a pool of cold water near the bottom through at least part of summer and fall, while a reservoir stratified with respect to dissolved oxygen would develop an oxygen deficit in deep water layers.

Whether or not a reservoir stratifies is determined by a complex array of factors; including water depth relative to surface area, seasonal differences in water temperatures of inflows, and the reservoir depth from which water is released. A quantitative assessment of stratification probability would require complex modeling and other analyses. However, the potential reservoir would be fairly large and shallow, and two existing large, shallow reservoirs in the region, Success Lake and Lake Isabella, are generally weakly stratified with respect to temperature during summer and strongly stratified with respect to dissolved oxygen concentration (Corps unpublished data).

Large shallow water bodies are more readily mixed by winds than are deeper water bodies. Both existing reservoirs have deep storage release outlets, resulting in the loss of colder water and interference with development of significant thermal stratification. If water were released from a higher water level in the potential reservoir, the reservoir would be more likely to thermally stratify, but also would likely develop even greater dissolved oxygen stratification. In either case, water temperature and/or dissolved oxygen conditions would be unsuitable for a cold water fishery.

The only contaminant water quality issue identified for this measure is mobilization of mining wastes that could potentially result if mine tailings near Dry Creek at the upper end of the potential reservoir are inundated. To evaluate potential impacts of mine wastes, further investigation would be needed to establish whether tailings would be inundated, the type of mining conducted at the site, and likely chemical composition of the mine tailings.

Opportunities

Potential opportunities to enhance aquatic biological resources or improve water quality with this measure include establishing a warm water fishery in the reservoir, and creating and enhancing spawning habitat for fall-run Chinook salmon (*Oncorhyncus tshawytscha*) in lower Dry Creek.

A warm-water fishery could be established by stocking the newly created reservoir with game fish species. Most warm-water species would likely be self-sustaining following an initial stocking program, provided that selected species were well-suited to new reservoir conditions. These species could include black bass, catfish, and others.

A potentially important effect of this measure on aquatic habitat would occur if increased summer flow in Dry Creek resulted from the reservoir. Increased downstream flow would likely enhance fishery resources, potentially including native warm-water species and fall-run salmon. Depth in the potential reservoir from which water was released could affect downstream water quality conditions.

If the reservoir were thermally stratified, releases from the lower reservoir depths would result in reduced water temperatures in Dry Creek for some distance downstream. Lowered water temperatures would benefit native warm-water and cold-water species. Dissolved oxygen concentrations would be reduced immediately below the dam, which would adversely affect fish, but turbulent mixing would saturate the water with oxygen within a short distance. Releases from lesser depths would likely have less effect on water temperatures.

Creation or enhancement of fall-run spawning habitat in lower Dry Creek would be considered if the potential option produced suitable flow and temperature conditions. Spawning habitat improvements would potentially entail measures such as creating a deep-water outlet for dam storage releases, modifying the timing of dam releases and restoring spawning gravels in the stream. Restoring riparian vegetation and excluding cattle grazing would also improve habitat.

Removing the tailings before dam construction could mitigate potential adverse effects on water quality that might result from inundation of mine tailings near Dry Creek.

RECREATION

The potential reservoir would inundate about 7 miles of Dry Creek and portions of two tributaries, South Dry Creek and Hayward Creek. Flood releases from Lake McClure would be diverted to the new Montgomery Reservoir via the North Side Canal at the existing Merced Falls Diversion Dam. The reservoir would also store natural runoff from Dry Creek.

No developed recreation facilities would be inundated by the new reservoir, or along the North Side Canal. Pioneered trails suggest that some dispersed recreation occurs along the banks of Dry Creek, but dispersed use along Dry Creek is not expected to be heavy because access is limited by private property.

Lake McClure is a popular recreation destination and supports water-oriented activities such as flat-water boating, fishing, nature viewing, and swimming. Public lands managed by the United States Department of the Interior, Bureau of Land Management (BLM), surround the upper portion of the lake. These lands are used for activities such as picnicking, camping, hiking, mountain biking, and horseback riding.

La Grange Road, which crosses Dry Creek just upstream of the potential dam site, provides access to Lake McClure and other recreation destinations such as Yosemite National Park and Merced and Don Pedro Reservoirs. Presumably, creating Montgomery Reservoir would require reconstructing or rerouting La Grange Road and the existing bridge crossing over Dry Creek.

Constraints

Constructing the new Montgomery Dam and Reservoir is not expected to result in significant impacts to recreation resources in the vicinity of Dry Creek. No developed recreation facilities exist in the area that would be inundated by the reservoir or along the North Side Canal. Intensive dispersed use along Dry Creek is unlikely owing to private property.

Montgomery Reservoir would be filled by diverting flood flows from Lake McClure, via the North Side Canal, and natural flows from Dry Creek. Diverting flood flows would not affect water levels at Lake McClure. Recreation activities and opportunities at Lake McClure would be unaffected.

Construction of the new dam and reservoir could temporarily affect recreation travelers utilizing La Grange Road to access Yosemite Park, Lake McClure, and Merced and Don Pedro reservoirs. However, this impact would not be considered significant because alternative travel routes are available.

Opportunities

Construction of Montgomery Dam and Reservoir is not expected to result in significant impacts to existing recreation resources and no mitigation would be required. The new reservoir would create new water-oriented recreation opportunities and would draw recreation visitors to the area; therefore developed day, and possibly overnight, facilities should be provided.

Day-use facilities typically include parking areas with accessible stalls, accessible toilets, picnic tables, dumpsters, and a potable water source. In this case, shade shelters should be provided due to the absence of mature trees. Designated campsites could also be provided for overnight use. A boat launch should be provided if a sport fishery is established.

CULTURAL RESOURCES

The intersection of Dry Creek and the Merced River is within the traditional territory of the Coconoon Northern Valley Yokuts people. Ancestral Yokuts habitation sites are expected, although specific locations are not documented (Wallace, 1978). The upper reaches of the potential reservoir extend into Southern Sierra Miwok territory (Levy, 1978). No specific Miwok sites are yet documented for the area; most known village sites are either on higher elevation reaches of the Merced River, on Mariposa Creek or the Chowchilla River, farther south. There are few surviving descendants of the Northern Valley Yokuts, and no organized communities.

Specific information is presently unavailable regarding the archaeology of the Dry Creek area north of Snelling. Prehistoric sites are likely to be associated with Dry Creek and the former riparian resources. Sites may also be found in association with vernal pools found in the area (Roop 1981). One bedrock mortar site was observed along Dry Creek during the May 2002 field reconnaissance.

Specific information regarding history of the Dry Creek Area north of Snelling is presently unavailable. Historic sites are likely in the area. The North Side Canal passes near the south edge of the potential reservoir, and dredge tailings associated with gold mining are located a short distance southeast. A memorial roadside cross (marked "KING BIG 9-30-69 3-13-00") was observed at the edge of La Grange Road near Dry Creek in May 2002.

Constraints

Some cultural resources are known to be present in the area, and additional resources are likely. Inundation of archaeological sites (prehistoric or historic) can result in loss of important scientific data. An unknown number of sites would be adversely affected by construction of the reservoir. No properties eligible for the National Register of Historic Places are known to be present, but future study may identify such properties. No Native American sacred sites or Traditional Cultural Properties are known in the area, but this does not rule out their presence.

Opportunities

Inundation damage to archaeological sites can be mitigated with scientific data recovery programs. Reservoir projects also provide an opportunity for public interpretation of the past. Ancillary facilities, such as roads, power lines, or other structures, may provide opportunity to avoid impact to archaeological sites through design or facility placement.

LAND USE

Most of the area is used for grazing. Several large homes and ranches, including a cluster of farmhouses, are located east of the potential dam in the area of inundation.

Constraints

The potential need to remove some houses is not considered a constraint because the number is small and does not represent a community that would be disrupted. It is not known whether the Williamson Act pertains.

Four miles of La Grange Road would be inundated and a new road and bridge would be needed. Travel would be disrupted during construction. In addition, 4 miles of Fields Road would be inundated. Because these effects would be temporary, they are not viewed as major constraints for this measure.

Merced County General Plan and Zoning Ordinance designations are currently being researched. These findings and potential presence of Williamson Act lands may present constraints.

Opportunities

Most of the potential inundation area is used for grazing. Reservoir construction would not divide an existing residential community and could be considered to create an opportunity for land use changes.

MINING AND OTHER PAST ACTIVITIES

Placer mine tailings were observed near Dry Creek at the upper end of the potential reservoir. This suggests the possible presence of placer gold deposits.

Constraints

No constraints have been identified for this option.

Opportunities

No opportunities have been identified for this option.

HAZARDOUS AND TOXIC MATERIALS

Rural residential homes usually have septic systems. Agricultural properties in the area may possess, or have once possessed underground or aboveground storage tanks for petroleum hydrocarbons, fertilizers, pesticides, or herbicides. Depending on the type of operation, electrical transformers containing polychlorinated biphenyls (PCBs) may also be or have been present in the area.

Constraints

Potential residuals from fuel and lubricant hydrocarbons, fertilizers, pesticides, herbicides, and electrical transformers may exist on the site and would require remediation.

CHAPTER 8. FINDINGS AND CONCLUSIONS

This document describes an initial review of the potential Montgomery Reservoir Dam and Reservoir in Merced County, California. The reservoir would be an off-stream storage option that would store Merced River water diverted from surplus flows.

No major issues were identified regarding the technical feasibility of designing and constructing the required facilities. Most of the land that would be inundated is used for grazing, with sparse rural development. Adverse impacts to wildlife, recreational resources, and existing land uses are expected to be low. Impacts to botanical resources are expected to be more significant, but are likely mitigable. Further study would be required to assess potential impacts to aquatic resources and water quality.

MID, the local agency that would serve the water stored in Montgomery Reservoir, has expressed concern regarding the quality of the water that would be developed. With a storage capacity of slightly more than 240 TAF and a reservoir surface area of nearly 8,000 acres, the average reservoir depth would be roughly 30 feet when filled. Concerns about high water temperature, the likelihood of algal growth, and relatively high evaporative losses make the water that would be developed undesirable to MID and its customers at this time. Therefore, the Montgomery Reservoir option was been dropped from further consideration in the Investigation.

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APPENDIX A

Engineering Trip Report

Montgomery Reservoir

Field Trip Log			
Trip Log Number:	16	**Project No.:**	1003032.01180502
Dates:	6/14/02	**Times:**	0940-1015
Site Name:	New Montgomery	**Location:**	Snelling
Prepared By:	DKR/JMH/WAM	**Reviewed By:**	
Date:	6/14/02	**Date:**	

Attendees/Visitors Name	Organization/Phone/Email
DKR	MWH, 925.685.6275 x125, david.k.rogers@mwhglobal.com
JMH	MWH, 925.685.6275 x143, james.m.herbert@mwhglobal.com
WAM	MWH, 425.602.4025 x1060, william.a.moler@mwhglobal.com

Weather Conditions:

Clear, warm (mid 70s), light breeze

Access Route (attach map):

Highway 99, to Keyes Rd / County Road 16 (E) south of Modesto, to Fields Rd (N), or

Highway 99, to State Highway 59 (N) in Merced, to Montgomery St (N), to Fields Rd (N)

Attachments:	**Yes**	**No**
Photo Log	✓	
Photos	✓	
Video Log (available)	✓	
Dictation Log (available)	✓	
Topographic Map	✓	

Purpose:

Review potential location of new dam site.

Field Observations:

Existing Structures/Cultural Features:

There are a few scattered rural residences surrounded by open agricultural land, consisting mostly of grazeland and some orchard crops.

Rights of Way/Access Restrictions:

Public roads lead to the axis of the New Montgomery Dam where it crosses Dry Creek. Other portions of the dam axis are on private property and do not appear to be accessible by road.

Overhead/Buried Utilities:

Overhead/underground utilities provide some services to the area.

Description of Potential Structures (attached a field sketch or sketch on a topo map):

Per URS, the potential New Montgomery Dam would be located about 3½ miles north of the town of Snelling on Dry Creek, a tributary to the Merced River. The dam would a be a zoned earthfill embankment having a height of up to 101 feet above streambed level, that would store up to 241 TAF of water at a pool elevation of 325 ft. Eight saddle dams of various lengths would be required above elevation 300 ft. In addition to natural runoff, water would be diverted from the Merced Irrigation District Lake McClure via a two-way facility from Merced Falls Diversion Dam to Montgomery Reservoir. Water would be conveyed south from Montgomery via a new canal to the Madera Canal (URS, 2000).

A Feasibility Design Drawing for Montgomery Day was prepared in 1960 by the USBR. The drawing illustrates a dam similar to that described by URS. The main dam structure would be about 2 miles long and have a height of 101 ft high at the maximum section. The

outlet works and pumping plant would be on the right abutment, near the main Dry Creek channel. The spillway, a 10½-ft circular conduit, would be located on the far right of the right abutment, near the main canal outlet works. It appears that seven saddle dams are included in the design (USBR, 1960).

Description of Appurtenant Features (spillways, tunnels, pumping plants, flood routing/coffer dams/dewatering during construction, outlet works, switch yards, transformer yards, transmission lines, conveyance pipelines/canals, access roads, security, operation/maintenance):

The dam illustrated in the USBR drawing would consist of a zoned earthfill embankment structure, 10½-ft diameter circular conduit spillway, canal outlet works, reservoir outlet works and a pumping plant (USBR, 1960).

Briefly Describe Geologic/Geotechnical Site Conditions:

The New Montgomery Dam and Reservoir would be located on rolling topography on sediments of the Great Valley, below the foothills of the Sierra Nevada. The State geologic map and mapping conducted by the USBR shows the dam would rest primarily on Plio-Pleistocene and middle to lower Pliocene non-marine sedimentary units, with Recent alluvial sediments along Dry Creek (CDMG, 1966; USBR 1959).

The Plio-Pleistocene unit is identified as the Turlock Lake formation, which consists of river-laid pebbly sand and gravel, interbedded silt and lake-laid clay. This unit may also contain a blue, diatomaceous unit called the Corcoran Clay. The middle to lower Pliocene unit is identified as the Mehrten formation, which consists of river-laid andesitic (volcanic), sandstone, gravel, conglomerate, siltstone, claystone, and interbedded, altered rhyolitic (volcanic) ash near the base of the unit (CDMG, 1966; USBR 1959).

More eastern portions of the reservoir will lie also on the Miocene Valley Springs formation (river-laid tuffaceous (volcanic) sand, sandy clay, and siliceous sand with interbedded rhyolitic tuff altered to bentonitic clay), and the Eocene Ione formation (a river-laid quartose anauxite-bearing sandstone and conglomerate with sandy clay at base) [CDMG, 1966; USBR 1959].

It is likely the faults of the Sierra Frontal fault system would most likely be the controlling faults for the New Montgomery site. The Foothills Fault System consists of two, subparallel faults known as the Bear Mountain fault, located about 11½ miles east of the site) and the Melones fault, located about 18 miles east of the site. Other regional faults capable of generating significant ground motions at the site include the San Andreas fault system, the White Wolf fault, and the Garlock fault.

Location/Description of Nearest Borrow Areas (attach map or show on topo map):

Construction material studies have not been conducted; however, potential borrow areas are pervious, semi-pervious and impervious fill may exist within the geologic units underlying the dam/reservoir.

Location/Description of Equipment/Material Staging and Lay Down Areas (attach map or show on topo map):

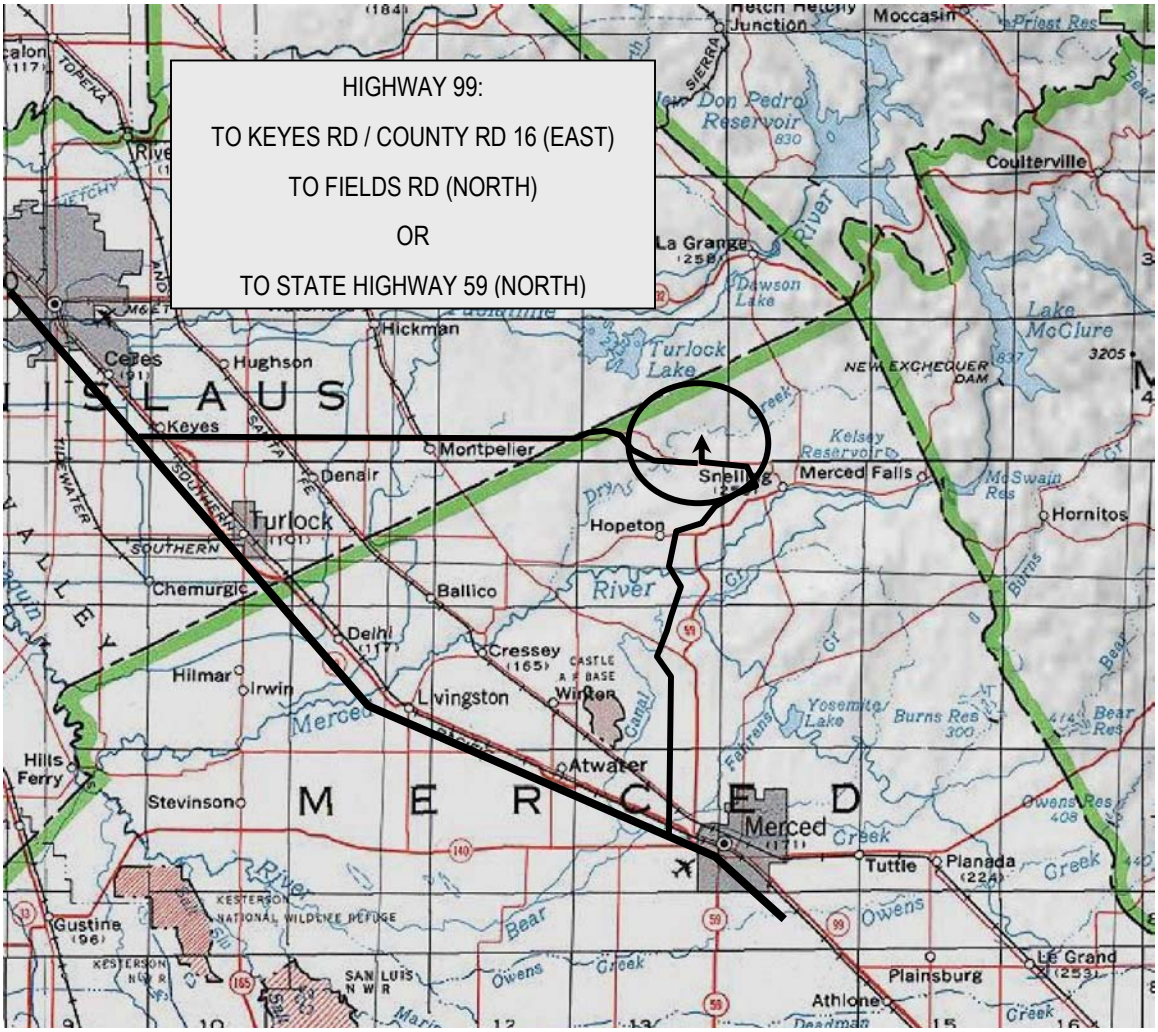
Potential staging and laydown areas may be found in a number of locations around the potential dam site.

Identification of Environmental Sensitive Areas (wetlands, springs, rivers, streams, endangered/threatened species habitats, etc.):

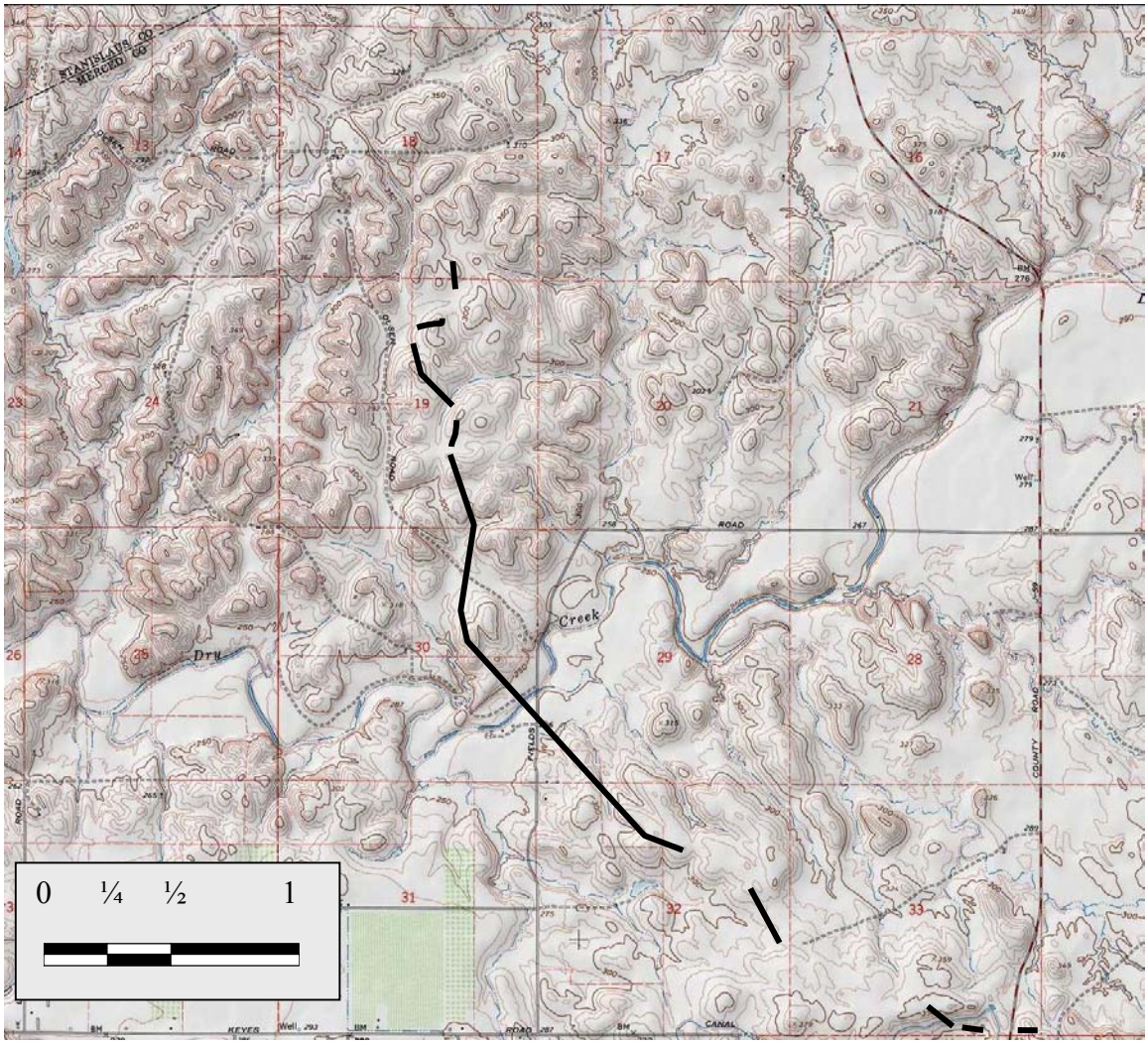
URS reported that several species of fish, amphibians, and reptiles may occur in the area. An upland terrestrial wildlife habitat covers most of the area. In addition, wetland (vernal pool), and aquatic habitats may be found in the area. Several species of plants and animals native to the area are sensitive and Federal- and State-listed endangered species (URS, 2000).

Description of Mining or Other Anthropologic Activities:

None were noted.



MONTGOMERY SITE VICINITY MAP



LOCATION OF POTENTIAL DAM

Montgomery – Upstream view of Dry Creek from potential dam site.

Downstream view of Dry Creek from potential dam site.

Cross-stream view of Dry Creek stream bank at potential dam site.

Northward view along right abutment alignment from Dry Creek.

Northward view along right abutment alignment from Dry Creek.

Upstream / northeastward view of potential reservoir area from Dry Creek.

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APPENDIX B

Environmental Trip Report

Montgomery Reservoir

ENVIRONMENTAL TRIP REPORT – MONTGOMERY RESERVOIR

A team of environmental specialists completed an initial field trip to the potential Montgomery Reservoir site on May 29, 2002. The field trip was the first task in the environmental study of several potential surface storage options identified for initial review during the Upper San Joaquin River Basin Storage Investigation. For initial consideration, the environmental review focused mainly on construction and potential upstream impacts associated with potential surface storage sites. The site visit provided an opportunity to conduct preliminary reconnaissance of existing resources at the various locations for the following resource areas: terrestrial biology; aquatic biology and water quality; recreation; cultural resources; and land use.

This appendix includes a brief overview of the resource specialists' observations, trip logs prepared by team members, photographs taken during the field trip, and maps used to identify and review existing resources.

SUMMARY OF FIELD OBSERVATIONS

This storage option would involve constructing a new dam along Dry Creek, a tributary to the Merced River from the north, downstream of Exchequer Dam. Water would be provided from the Merced River via an existing canal, and would be used in the area south of the Merced River. The new dam and reservoir would be situated on private property that is characterized by gently rolling hills comprised of open grassland, pasture and to a lesser extent, irrigated crops. Large homes are scattered throughout the area on relatively large parcels (e.g. greater than 5 acres). The Merced River and the town of Snelling are located about 3 miles south of the site.

Botany

- This option would result in a significant amount of habitat loss due to the size of the reservoir (about 8,000 acres)
- Habitat types are not widely varied.
- Effects on riparian habitat would be low since much of the habitat has already been degraded.
- The potential for special status species could be high because of the presence of limestone and the possibility of vernal pools.

Wildlife

- The major species of concern for this area would be San Joaquin kit fox and possibly loss of raptor foraging area.
- No nesting would occur here due to a lack of suitable nesting trees.
- Dry creek has slight vegetation along the shoreline with shallow standing water.

- The presence of substantial numbers of bullfrogs limits the possibilities of sensitive amphibian species such as the red-legged or foothill yellow-legged frogs.
- Observed cliff swallows under bridge along with blackbirds and meadowlarks (not sensitive species).

Aquatic Biology/Water Quality

- Dry Creek may have intermittent flow; pools were the principal aquatic habitat type at the time of field visit.
- Substrate consisted of bedrock and gravel.
- The stream banks were eroded and supported little riparian vegetation probably because of cattle grazing.
- The stream appears to be eutrophic; large mats of algae covered the stream margins, particularly along pools.
- Many fish fry, many large bullfrog tadpoles, one crayfish and a small fish were found in the stream.
- The snail, *Physa,* which is generally associated with warm, eutrophic habitats and hard water, was abundant in the stream.
- The creek likely contains no significant aquatic biological resources, but database and literature searches should be conducted to confirm.
- Construction of a reservoir would create new aquatic habitat and fisheries opportunities, primarily for exotic fish species.
- Diversions from Merced River would potentially affect fisheries and water quality of the river and/or Lake McClure and Lake McSwain.

Recreation

- The dam and reservoir would be located on private property. There are no developed recreation facilities in the area, but the presence of "pioneered" trails along the creek bank suggest some recreation activity occurs.
- Construction of this dam and reservoir is not expected to substantially affect recreation resources and/or opportunities along Dry Creek.
- Diversions from the Merced River could impact recreation resources and opportunities, depending on the location of the intake and the affect of withdrawals on flows in the Merced River.

Cultural Resources

- Sparse riparian growth observed may not represent the pre-contact situation; the area probably included Valley Oak and more diverse vegetation than at present.
- Prehistoric sites are likely, associated with Dry Creek and riparian resources formerly present.

- One prehistoric site was observed (bedrock mortars [BRMs] on a rock outcrop at the edge of Dry Creek near La Grange Road).
- Historic sites are likely, associated with agricultural activities, and perhaps with mining activities toward the south side of the potential reservoir.
- A memorial roadside cross-marked with "KING BIG 9-30-69 3-13-00" was observed at the edge of La Grange Road near Dry Creek.

Land Use

- Much of the area appears to be used for grazing.
- There are several large homes and ranches including a cluster of houses West of the potential dam location in the area of potential inundation.
- Travel on La Grange Road is likely to be disrupted during construction and the bridge over the creek would have to be rebuilt.

Field Trip Log - Botany		
Trip Log Number:	S19	**Project No.** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	Jeff Glazner/Barry Anderson/David Stevens	
Date:	June 5 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	
Attachments	
Photo Log	yes
Photos	yes
Topographic Map(s)	no

Field Observations:

Existing Facilities:

None, other than residences

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Mostly annual grassland, pasture, and irrigated fields. Grasslands and pasture areas could have vernal pools. Limestone outcrops were identified by the geologist. Both vernal pools and limestone are known to harbor special status species, and several wetland and upland special status species are known to occur in the area. Dry Creek is probably intermittent, and it supports scattered willows and cottonwoods. No continuous riparian canopy was observed, and grazing degrades what is present.

Need for additional (engineering/hydrological, or other) information on measures

- Geology or soils information
- Spillway elevation and limits of inundation
- Locations of all saddle dams
- Location of diversion from Lake McClure
- Location of conveyance from Merced Falls Diversion Dam
- Location of new canal to Madera Canal
- Locations of realigned existing roads
- Location of work pads, access roads, and other construction areas

Additional data needs (within each specific discipline)

CNDDB report

CNPS report

Ceres report

Field surveys for wetlands and special status species and habitats

Field Trip Log – Wildlife		
Trip Log Number:	S19	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	Dave Stevens, Stephanie Murphy	
Date:	June 4, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	Dry Creek area near La Grange Road and Fields Road, north of Snelling
Attachments	
Photo Log	
Photos	
Topographic Map(s)	

Field Observations:

Existing Facilities:

This option would involve constructing a new dam along Dry Creek, which would submerge Dry Creek and the surrounding area. The new dam and reservoir site are situated on private property, which is characterized by gently rolling hills comprised of open grassland, pasture and to a lesser extent, irrigated crops. Large homes are scattered throughout the area on relatively large parcels (e.g. greater than 5 acres). The Merced River and the town of Snelling are located about 3 miles south of the area.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

The major species of concern for this area would be San Joaquin kit fox and possibly loss of raptor foraging area. No nesting would occur here due to a lack of suitable nesting trees. Dry creek has slight vegetation along the shoreline with shallow standing water. The presence of substantial numbers of bullfrogs limits the possibilities of sensitive amphibian species such as the red-legged or foothill yellow-legged frogs. Observed cliff swallows under bridge along with blackbirds and meadowlarks (not sensitive species).

Need for additional (engineering/hydrological, or other) information on measures

Need information on area that would be submerged by Montgomery Reservoir.

Need to know how the Merced River ties in to this option, as follows:

How much flow would be diverted from the Merced and when?

Additional data needs (within each specific discipline)

Need to know current flow information for dry creek.

Need to know current surrounding usage – free range cattle?

Field Trip Log – Fish and Water Quality		
Trip Log Number:	S19	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	Philip Unger	
Date:	June 6, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	Dry Creek area near La Grange Road and Fields Road, north of Snelling
Attachments	
Photo Log	No
Photos	Yes
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

This option would involve constructing a new dam along Dry Creek, which would submerge Dry Creek and the surrounding area. The new dam and reservoir site are situated on private property, which is characterized by gently rolling hills comprised of open grassland, pasture and to a lesser extent, irrigated crops. Homes are scattered throughout the area on relatively large parcels (e.g. greater than 5 acres). The Merced River and the town of Snelling are located about 3 miles south of the area.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Dry Creek was the only aquatic environmental feature observed at either site (S19a or S19b). Flow in the creek was low (< 5 cfs) and pools was the principal aquatic habitat. Substrate consisted of bedrock and gravel. The stream banks were eroded and supported little riparian vegetation probably because of cattle grazing. Cattle droppings were abundant and probably create eutrophic conditions in the creek. Large mats of algae covered the stream margins, particularly along pools. Because of the sparseness of the vegetation and low topographic shading, the creek is exposed and summer water temperature is probably high. Except for pools, the stream is probably dry during late summer and autumn. The snail, *Physa,* which is generally associated with warm, eutrophic habitats, was abundant at site S19a. The presence of snails also suggests that water hardness is fairly high. Limestone outcrops that were identified at the site also suggest high water hardness. Many fish fry were also observed at this site. Many large bullfrog tadpoles, one crayfish and a small fish, probably a minnow, were seen at Site S19b.

Need for additional (engineering/hydrological, or other) information on measures

Need information on exact area that would be submerged by reservoir.

Need information on range of seasonal flow conditions in Dry Creek.

Need the following estimates for potential reservoir:

- Mean depth for each month, April – October.
- Mean surface area of shallow water habitat (less than 15 feet deep) in each month, April – October.
- Mean rate of water level fluctuation for each month, April – October.

Need to know how the Merced River ties in to this option, as follows:

- Where would the diversion on the Merced River be located?
- How much flow would be diverted from the Merced and when?
- Would diversions from the Merced result in changes in the operation (e.g. reservoirs levels) at Lake McClure or Lake McSwain.
- If so, what would be timing and magnitude of reservoir fluctuations at these reservoirs?

Additional data needs (within each specific discipline)

Need information on summer water temperatures and dissolved oxygen levels in Dry Creek and list of fish species likely present in the creek. Also, any existing water quality information. If the Merced River, Lake McClure or Lake McSwain is involved, additional information will be needed as follows:

- Fish species in affected reach of Merced River.
- Fish species in Lakes McClure and McSwain.
- Summer water temperatures in affected reach of Merced River.
- Existing water quality data for the Merced River, Lakes McClure and McSwain.

Field Trip Log - Recreation		
Trip Log Number:	S19	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	Sandra Perry	
Date:	June 3, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	Dry Creek area near La Grange Road and Fields Road, north of Snelling
Attachments	
Photo Log	No
Photos	Yes
Topographic Map(s)	Yes

Field Observations:

Existing Facilities:

This option would involve constructing a new dam along Dry Creek, which would submerge Dry Creek and the surrounding area. The new dam and reservoir site are situated on private property, which is characterized by gently rolling hills comprised of open grassland, pasture and to a lesser extent, irrigated crops. Large homes are scattered throughout the area on relatively large parcels (e.g. greater than 5 acres). The Merced River and the town of Snelling are located about 3 miles south of the area.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

There are no recreation facilities situated in the immediate area. However, "pioneered" trails are present along the creek banks to the west and east of the La Grange Road bridge crossing indicating some recreation occurs along the creek. Recreation activities probably include fishing, picnicking, and sunbathing. There is no evidence of overnight camping (eg. firerings).

La Grange Road is likely used by recreation visitors traveling between Merced and Don Pedro Reservoir, and potentially Lake McClure. La Grange Road may also be used by recreation visitors traveling to Yosemite.

Need for additional (engineering/hydrological, or other) information on measures

Need information on area that would be submerged by Montgomery Reservoir.

Need the following information to determine whether travel along La Grange Road would be disrupted during the recreation season:

- Timing of dam construction
- Timing of La Grange Road and bridge reconstruction
- Travel routes for construction equipment

Need to know how the Merced River ties in to this option, as follows:

- Where would the diversion on the Merced River be located?
- Where would the conveyance structure (e.g. flowline) be located?
- Would the flowline be above ground (canal) or underground (tunnel)
- How much flow would be diverted from the Merced and when?
- Would diversions from the Merced affect the operation (e.g. reservoirs levels) at Lake McClure or Lake McSwain.
- Timing of reservoir fluctuations at affected reservoirs
- Timing and magnitude of diversions from the Merced

Additional data needs (within each specific discipline)

No additional information regarding recreation is needed if the option only involves Dry Creek. However, additional information will be needed if the Merced River or Lake McClure or Lake McSwain is involved, as follows:

Location of existing recreation facilities along affected portion of the Merced and at affected reservoirs

Types of recreation activities that occur along the Merced and at the affected reservoirs

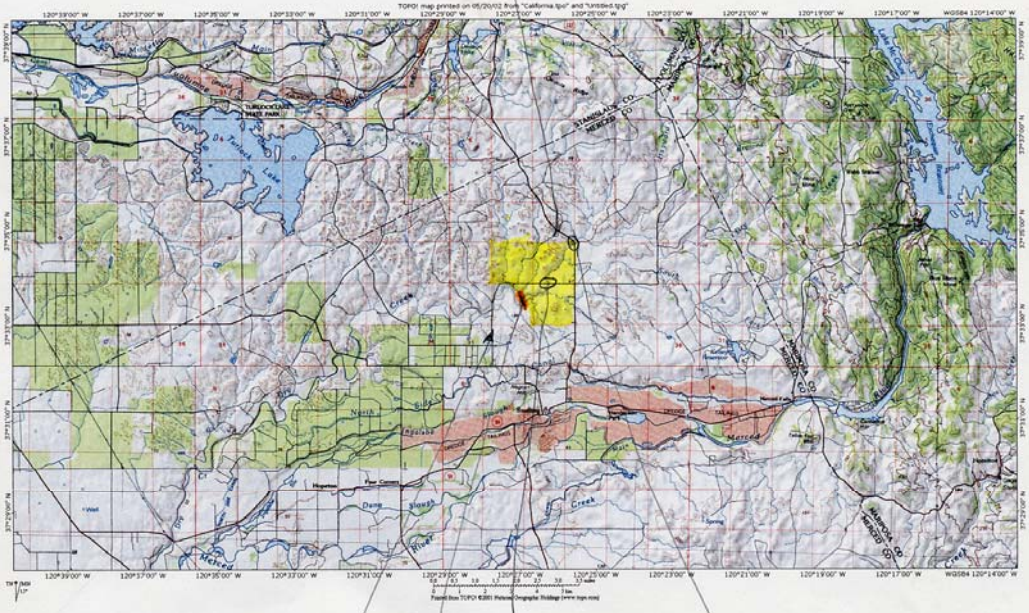
Use levels by activity along the Merced River and at the affected reservoirs

Montgomery

S19A & B

Project Area is private property
Mainly open pasture, scattered large Homes
Rolling Hills w/ dry grass

VERY SMALL ROAD (MORE LIKE ATTAIN)



FIELDS ROAD (GRAVEL)

DAM SITE

CONCRETE CROSSING OVER DRY CREEK (S19B)

BRIDGE CROSSING OVER DRY CREEK (S19A)

- PIONEERED TRAILS TO WEST & EAST ALONG CREEK BANK
- No RECREATION FACILITIES
- No OVERNIGHT CAMPING

Field Trip Log – Land Use		
Trip Log Number:	S19	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	Irina Torrey	
Date:	June 12, 2002	

Weather Conditions:	Hot and dry
Areas Covered (attach map with notations	Dry Creek area near La Grange Road and Fields Road, north of Snelling
Attachments	
Photo Log	Yes
Photos	Yes
Topographic Map(s)	No

Field Observations:

Existing Facilities:

This option would involve constructing a new dam along Dry Creek, which would submerge Dry Creek and the surrounding area. The new dam and reservoir site are situated on private property, which is characterized by gently rolling hills comprised of open grassland, pasture and to a lesser extent, irrigated crops. Large homes are scattered throughout the area on relatively large parcels (e.g. greater than 5 acres). The Merced River and the town of Snelling are located about 3 miles south of the area.

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Much of the area appears to be used for grazing. Although there do not appear to be any homes immediately at the site of the new dam, there are several large homes in the area, at both locations, S19A and S19B. There is a cluster of houses on the West side of the dam location. Some of these homes may be within the inundation area.

The bridge at La Grange Road is likely to be inundated and would have to be rebuilt.

La Grange Road is likely used by recreation visitors traveling between Merced and Don Pedro Reservoir, and potentially Lake McClure. La Grange Road may also be used by recreation visitors traveling to Yosemite.

Need for additional (engineering/hydrological, or other) information on measures

Need information on area that would be submerged by Montgomery Reservoir.

Need the following information to determine whether travel along La Grange Road would be disrupted during the recreation season:

- Timing of dam construction
- Timing of La Grange Road and bridge reconstruction
- Travel routes for construction equipment

Additional data needs (within each specific discipline)

Need to know how many homes are in the reservoir inundation area or the immediate vicinity.

Field Trip Log – Cultural Resources		
Trip Log Number:	S19	**Project No.:** 8004094
Dates:	May 29, 2002	
Site Name:	Montgomery Reservoir	
Location:	1A – Intersection of La Grange Road and Dry Creek at bridge crossing 1B – Intersection of Fields Road and Dry Creek at concrete stream bed crossing	
Prepared By:	David White	
Date:	May 29 2002	

Weather Conditions:	Hot & dry
Areas Covered (attach map with notations)	La Grange Road, Fields Road. Vehicular reconnaissance of area, with two stops at road crossings of Dry Creek.
Attachments	
Photo Log	Yes – MWH 0205
Photos	Yes; nos. 1-6
Topographic Map(s)	USGS Snelling quad

Field Observations:

Existing Facilities:

La Grange Road and Fields Road traverse area; no existing dam

Existing Environmental Features as Appropriate to Discipline (hydrology; aquatic-water quality; terrestrial—plants; wildlife; recreation; cultural resources; land use; aesthetic)

Cultural resources:

Prehistoric: Sparse riparian growth may not represent pre-contact situation; the area probably included Valley Oak and more diverse vegetation than at present. Prehistoric sites likely, associated with Dry Creek and riparian resources formerly present. One site observed (BRMs on rock outcrop at edge of Dry Creek near La Grange Road).

Historic: Memorial roadside cross (KING BIG 9-30-69 3-13-00) observed at edge of La Grange Road near Dry Creek.

Other sites likely, associated with agricultural activities, perhaps with mining activities toward the south side of the potential reservoir.

Need for additional (engineering/hydrological, or other) information on measures

Need precisely mapped footprint of reservoir, with various potential dam levels; also need footprint of all associated ground disturbance areas, to include but not be limited to offices and maintenance buildings, construction set-up and lay-down areas, access roads, electric transmission lines, water conveyance structures, and all other facilities.

Need to know if BuRec has previously studied a potential Dry Creek Reservoir (see map showing a reservoir footprint in the area).

Additional data needs (within each specific discipline)

Need archaeological records search with California Historic Resources Inventory System (CHRIS) clearinghouse. Clearinghouse: Central California Info Center, CSU-Stanislaus, Turlock CA.

May need consultation with the BuRec cultural resource specialist regarding sites that may not be recorded with the CHRIS information center.

Also need brief review of archaeological and ethnographic literature pertaining to the area. Minimal level of effort: (1) to identify types of archaeological remains expected, time periods represented; and (2) to identify Native American tribes historically occupying the area, along with published information on major named villages or other ethnographic sites.

Picture: P5290012 Montgomery Reservoir site (view W downstream, from La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290013 Montgomery Reservoir site (view W downstream, from La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290014 Montgomery Reservoir site (view E upstream, from La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290015 Montgomery Reservoir site (view E upstream, from La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290016 Montgomery Reservoir site ("KING BIG" memorial cross at La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290017 Montgomery Reservoir site (BRMs [Bedrock mortars] at La Grange Road bridge, May 29, 2002, late morning)

Picture: P5290001 Looking south-west from La Grange road down stream Dry Creek, about 2 miles upstream of potential Montgomery Dam.

Picture: P5290002 Looking north-east from La Grange road upstream Dry Creek, about 2 miles upstream of potential Montgomery Dam.

Picture: P5290003 Looking east from La Grange road upstream Dry Creek, about 2 miles upstream of potential Montgomery Dam.

Picture: P5290004 Looking east from La Grange road upstream Dry Creek, about 2 miles upstream of potential Montgomery Dam.

Picture: P5290005 Looking south-east from La Grange road upstream Dry Creek, about 2 miles upstream of potential Montgomery Dam.

Picture P5290006 Looking south from near La Grange road about 2 miles upstream of potential Montgomery Dam. Dry Creek flows to the right.

Picture: P5290007 Looking south from near La Grange road about 2 miles upstream of potential Montgomery Dam. Dry Creek flows to the right.

Picture: P5290008 Looking north from near La Grange road about 2 miles upstream of potential Montgomery Dam.

Picture: P5290009 Looking east from near La Grange road about 2 miles upstream of potential Montgomery Dam.

Picture: P5290010 Looking south-east from near La Grange road about 2 miles upstream of potential Montgomery Dam.

Picture: P5290011 Looking west from below La Grange road down stream Dry Creek, about 2 miles upstream of potential Montgomery Dam. Note traveled path.

Picture: P5290012 Looking east from La Grange road at Dry Creek bank.

Picture: P5290013 Looking north-west from La Grange road upstream Dry Creek, about 2 miles upstream of potential Montgomery Dam. Note traveled path.

Picture: P5290014 Looking north from Field Road upstream Dry Creek about 1 miles upstream of potential Montgomery Dam site.

Picture: P5290015 Looking north from Field Road upstream Dry Creek about 1 miles upstream of potential Montgomery Dam site.

Picture: P5290016 Looking south from Field Road downstream Dry Creek about 1 miles upstream of potential Montgomery Dam site.

Picture: P5290017 Looking south from Field Road downstream Dry Creek about 1 miles upstream of potential Montgomery Dam site.

Picture: P5290018 Looking south-west from Field Road downstream Dry Creek about 1 miles upstream of potential Montgomery Dam site.

Montgomery 5/29/02

Montgomery 5/29/02

Montgomery, looking East 5/29/02

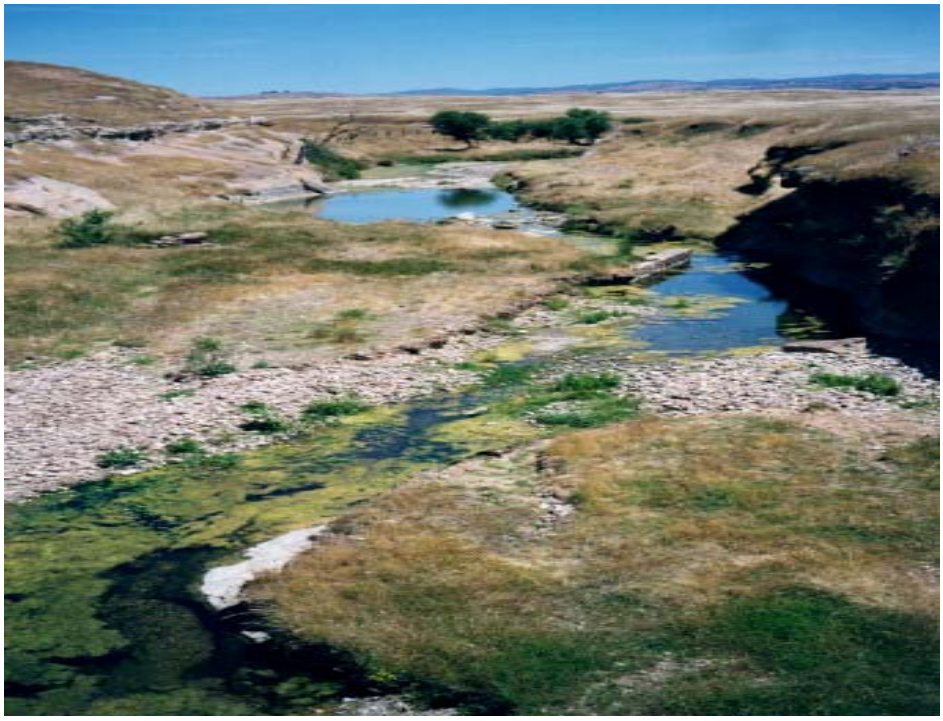
Montgomery, looking West 5/29/02

Potential Montgomery Reservoir site, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view downstream (SW) from La Grange Road bridge, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view from La Grange Road bridge of pool with algal mat, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view upstream (NE) from La Grange Road bridge, 5/29/02



Potential Montgomery Reservoir site, Dry Creek, view upstream (NE) from La Grange Road bridge of pool with algal mats, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, gravel bar downstream of La Grange Road bridge, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view downstream (SW) from hill N of La Grange Road bridge, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, gravel bar viewed from hill N of La Grange Road bridge, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view upstream (NE) from hill N of La Grange Road bridge, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view upstream (N) from Fields Road ford, 5/29/02

Potential Montgomery Reservoir site, Dry Creek, view downstream (S) from Fields Road ford, 5/29/02