BURDELL RANCH
RESOURCE MANAGEMENT PLAN

April 26, 2000

Prepared for:

Mount Burdell Enterprises
and
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INTRODUCTION AND PURPOSE

Burdell Ranch is located in northern Marin County, California, east of U.S. Highway 101 approximately 25 miles north of San Francisco and 7 miles south of Petaluma (Figure 1). Prior to 1992, the Burdell Ranch covered 740 acres of low-lying land between Highway 101 and the Petaluma River. The present ranch lands encompasses 131.8 acres on two sides of the Marin County Municipal Airport (Gnoss Field) (Figure 1).

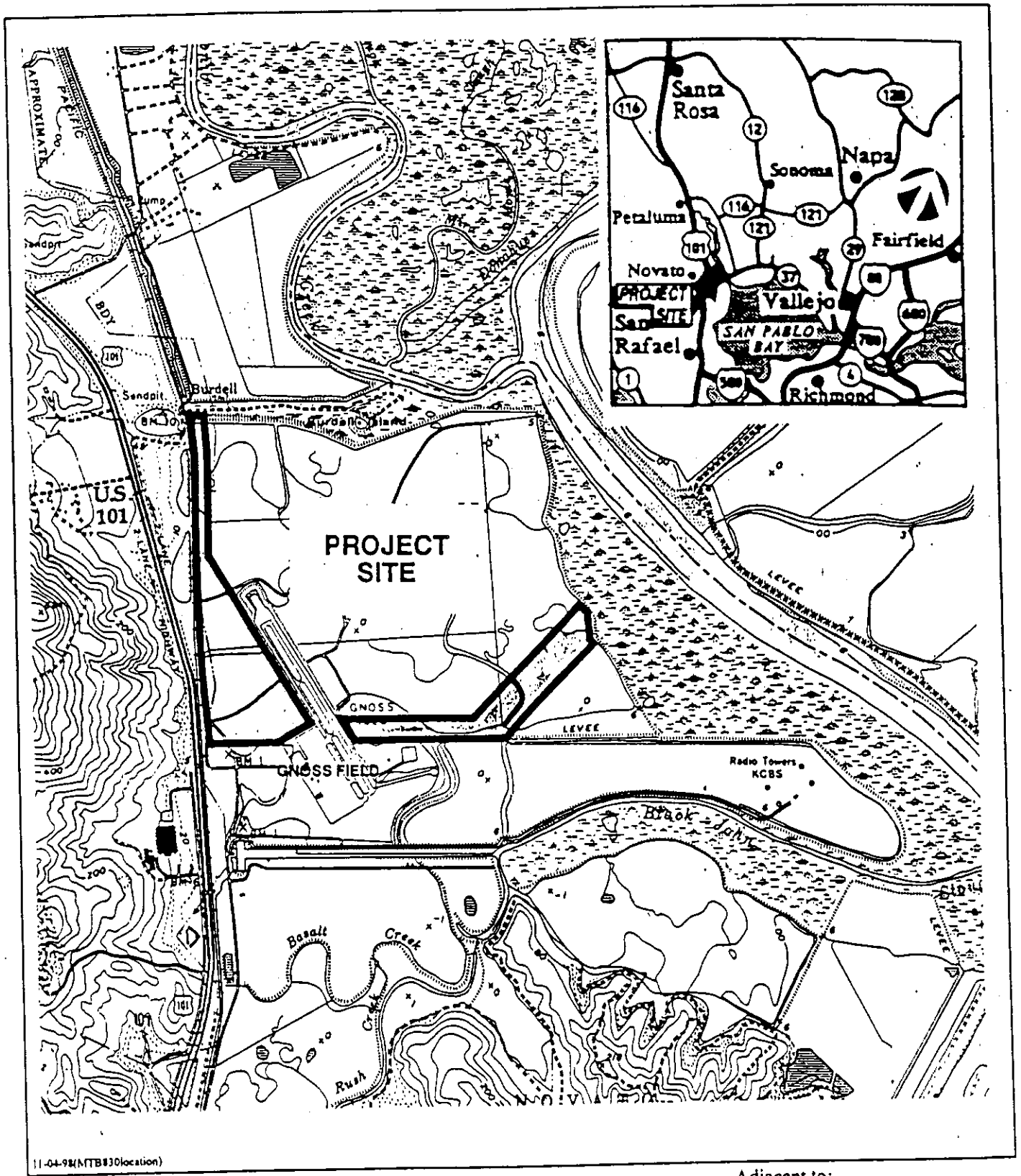
In 1992, the California Department of Fish and Game (CDFG) purchased 582 acres of the Burdell Ranch for the purpose of wetland protection and enhancement. At the time of the purchase, 71 acres were set aside and property boundaries were aligned at the request of Marin County to account for future proposed expansion of Gnoss Field, including lengthening the existing runway and developing a second, cross-wind runway. An additional 14.5 acres were to be purchased by the Marin County Open Space District. The owners of Burdell Ranch (Burdell) were to retain 72.3 acres in the southwestern corner of the site which are zoned M3 Industrial in the Marin County General Plan.

Under the 1992 agreements with the County, the Open Space District had one year to purchase the 14.5 acres of open space lands. The County also had agreed to accept a two year, one dollar per year option to purchase the remaining airport expansion lands. The county did not purchase the open space lands nor was the option exercised. In March 1997, the County Board of Supervisors approved an update of the Gnoss Field airport master plan that, among other things, expresses renewed interest in acquiring portions of the ranch for the north runway extension. In December of 1997 the County acquired 26 acres at the end of the runway for possible future expansion.

The owners of Burdell Ranch, working in cooperation with the DFG, Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers, propose to establish a Wetland Conservation Bank on the remaining 122.8 to 131.8 acres of private lands contiguous to CDFG's lands. These lands include areas in the airport master plan that are identified for a second, cross-wind runway, expansion of aircraft parking and hangars, and the M-3 zoned lands (Figure 2). One area of the remaining private ranch lands, totaling 9 acres, will be reserved for some period in order to accommodate a potential future public interest project.

The Conservation Bank will be developed in two phases (Figure 2). The first phase encompasses 26.8 acres, located west of the Gnoss Field Runway. Of the 26.8 acres, 19.3 acres are upland and 7.5 acres are existing wetland.

The second phase covers the 51-acre area in the southwestern corner of the site which is comprised primarily of fill material deposited from an old quarry on the adjacent Mount Burdell. This area encompasses most of the M-3 Industrial zoned land on the site. Approximately 41.4 acres of upland and 9.6 acres of wetland are present in this area. Wetland restoration in this area will require different management and more extensive grading than the Phase 1 area. This area can and will likely be managed as a separate hydrologic unit from the Phase 1 area. The Phase 1 and Phase 2 units include 2.8 acres of levee easement that constitutes a 30-foot strip to the east and south of the property. The 45-acre area which has been proposed for the cross-wind runway for Gnoss Field will be deeded in feetitle to the CDFG as part of the bank implementation.



Purpose: Wetland Restoration and Enhancement

Adjacent Property Owners:

1 Redwood Landfill, Inc.
2 Lynn Fleshman
3 County of Marin
4 State of California, Wildlife Conservation Board
5 JHW Family Ltd. Ptns.
6 Bortolussi

Proposed Wetland Conservation Bank

Burdell Ranch
Conservation Bank Location

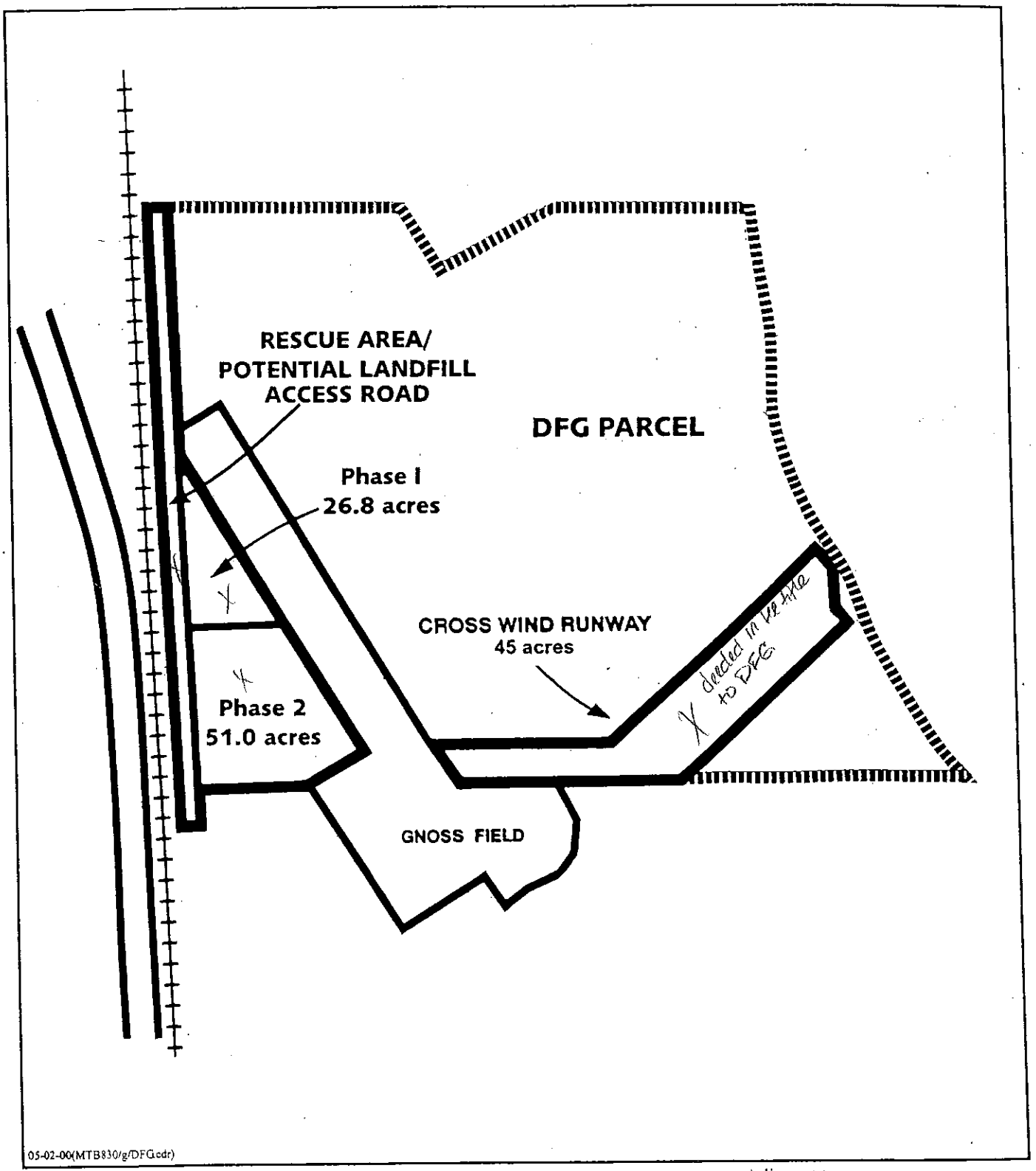
Figure 1

Scale in feet

0 2000

N

Adjacent to:
Petaluma River
At: County of Marin
Application by:
Mount Burdell Enterprises/
Burdell Ranch Partners Ltd.
C/O Law offices of
James McKelenney
365 Bel Marin Keys Blvd Suite 100
Novato, CA 94949



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Proposed Wetland Conservation Bank

Burdell Ranch Conservation Bank Units

Figure 2

N

Adjacent to:
Petaluma River
At: County of Marin
Application by:
Mount Burdell Enterprises/
Burdell Ranch Partners Ltd.
C/O Law offices of
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An additional 9 acres of ranch lands lying in a 100-foot wide strip along the western property boundary parallel to the North Western Railroad right of way will also not be included in the initial conservation bank lands. This strip has been identified as a potential future safe alternative access road to the Redwood Sanitary Landfill which lies to the north of the ranch. While wetland restoration and enhancement on these lands will occur concurrently with the Phase 1 of the bank, the Burdell Ranch owners will reserve this area (Figure 2) from the conservation bank for this potential use at the present time in order not to preclude this public interest project. This land, however, may be added to the conservation bank in the future at discretion of the Agencies and Burdell Ranch owners.

Table 1 provides a summary of the applicable information on existing acreages and available credits for the conservation bank and reserve areas.

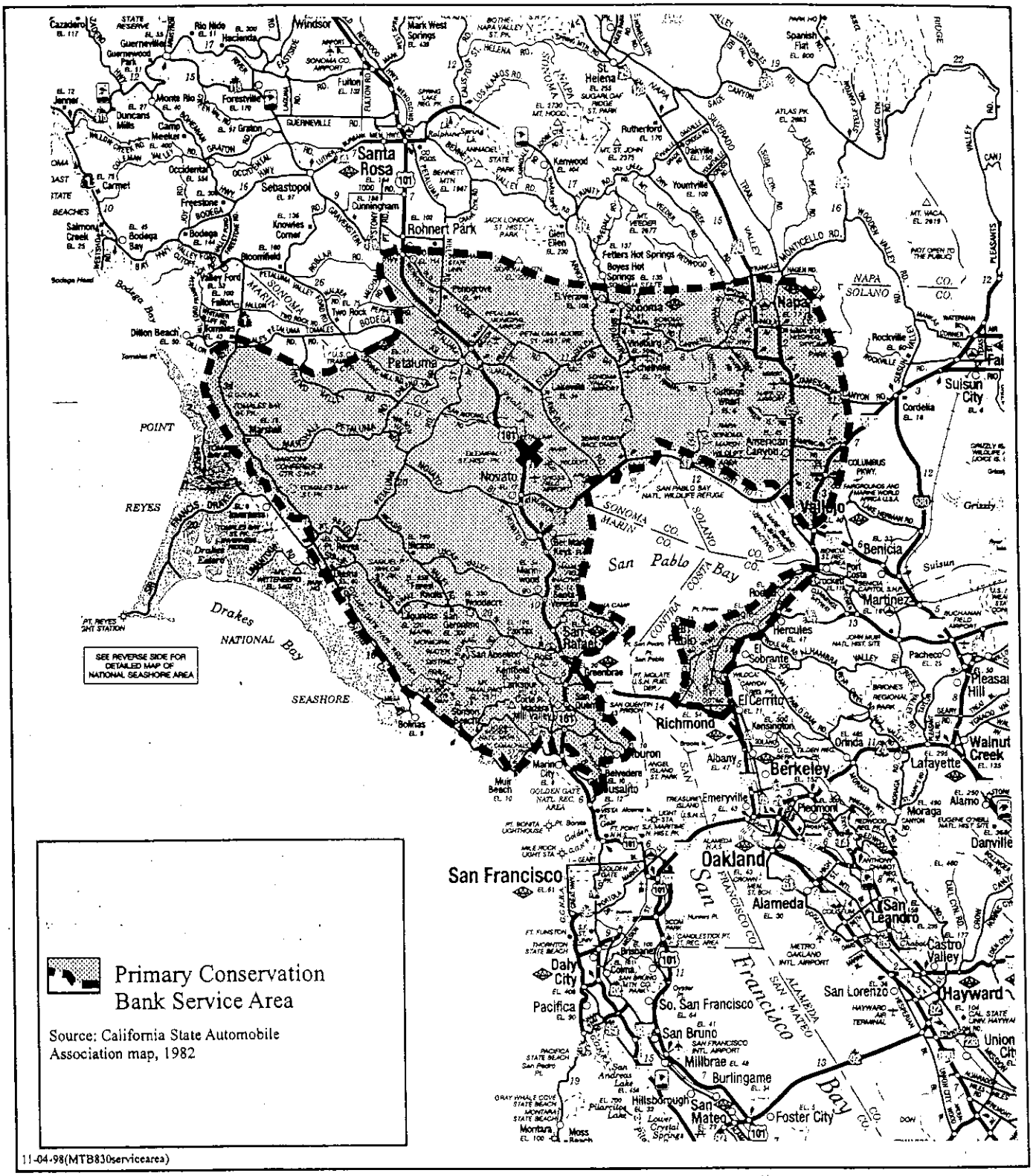
Table 1 - Summary of Existing Acreages and Mitigation Credits

Area	Total Acreage	Wetland (ac)	Upland (ac)	Credits
Conservation Bank Area		135.3		=102.7
Phase 1, North Unit	26.8	7.5	19.3	15.5
Phase 2, South Unit	51.0	9.6	41.4	32.5
SubTotal	77.8	17.1	60.7	48.0
Reserve Area	9.0	1.8	7.2	6.7
Crosswind Runway	45.0	12.9	32.1	0

Creation of the conservation bank provides a mechanism and financial incentive for Burdell to restrict future development of these private lands for purposes other than wetland restoration and enhancement. This bank will create wetlands and enhance existing wetlands to provide off-site compensation for unavoidable impacts to certain types of wetlands and associated resources caused by projects within the identified bank service area encompassing portions of Marin, southern Sonoma, southern Napa, western Solano, and northern Contra Costa counties (Figure 3).

Establishing and utilizing this conservation bank will help achieve no net loss of wetland acreage, functions, and values, and will provide greater predictability to project proponents affecting wetlands. Additional conservation bank objectives are to:

- Reduce DFG's and Burdell's current operation and maintenance costs at the site.
- Eliminate current constraints to DFG's ability to implement desired wetland restoration/enhancement activities on DFG's contiguous land.
- Provide public access to both the public and private lands in a manner compatible with resource objectives.
- Allow Burdell an economically viable use of their remaining private lands while enhancing the diversity, extent, and quality of wildlife and wetland habitats on these lands as well as the adjacent state lands.



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Proposed Wetland Conservation Bank
Burdell Ranch Conservation Bank
Geographic Service Area
Figure 3

Scale in miles
0 9
N

Adjacent to:
Petaluma River
At: County of Marin
Application by:
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The RMP is consistent with the goals, objectives, and policies of Marin County's recently adopted General Plan (County of Marin 1994). The goals and objectives of the Resource Management Plan are also consistent with the draft planning objectives for the Burdell Ranch developed by the County of Marin as part of the county's Petaluma River Enhancement Plan (J. Peters, Questa Engineering, pers. comm.). While the county plan is considered to be an advisory document for the DFG and private lands, establishment of the conservation bank will facilitate implementation of elements of the recommended actions for the DFG and these private lands by providing landowner cooperation for changes in hydrologic management of these contiguous ranch lands.

This Resource Management Plan (RMP) describes the management, monitoring requirements, and performance criteria for the Conservation Bank.

RESPONSIBLE PARTIES

Burdell will serve as the bank manager and will be responsible for necessary construction, compliance, monitoring and reporting requirements for the wetland mitigation bank as well as management of the bank lands while the bank is in operation. After the successful sale or dedication of mitigation bank credits or abandonment of the bank, DFG will assume long-term responsibility for the maintenance and management of the conservation bank site.

Following is the contact information for the responsible parties for the conservation bank:

Applicant:	Mount Burdell Enterprises and Burdell Ranch Partners, LTD. C/O James McKenney 365 Bel Marin Keys Boulevard, Suite 100 Novato, CA 94949 Tel (415) 884-2164 Fax (415)
RMP Preparation:	LSA Associates, Inc. 157 Park Place Pt. Richmond, CA 94801 Tel (510) 236-6810 Fax (510) 236-3480 Contact: Steve Foreman
RMP Oversight/ Ownership	California Department of Fish and Game, Region 3 7329 Silverado Trail Napa, CA 94558 P.O. Box 47 Yountville, CA 94599 Tel (707) 944-5500 Fax (707) 944-5563 Contacts: Jim Swanson, Fred Botti, and Carl Wilcox

ENVIRONMENTAL SETTING

The original Burdell Ranch lands were part of a 8,877 acre land grant in 1843 known as Rancho Olompali. This rancho included lands from San Antonio Creek in the north, the City of Novato in the south, Red Hill in the west, and San Pablo Bay to the east (Questa Engineering 1994). The rancho has been subdivided and has changed hands several times over the last 155 years. Largely undeveloped remnants of the old rancho include Mount Burdell, Olompali State Park, Burdell Island, and the 737 acres of the DFG lands and remaining private parcel of Burdell Ranch.

Present development on the combined 737 acre ranch and DFG lands consist of unpaved roads, railroad right of way, dikes, drainage ditches, culverts, and fences. The ranch lands inboard of the perimeter levees have subsided as is common with most diked historic bayland sites. Water levels are managed by pumping to promote suitable conditions for annual grasses and forbs for livestock forage and hay production. The ranch has been used historically for livestock grazing and oat and rye hay production.

EXISTING CONDITIONS

The proposed bank lands and adjacent DFG lands are relatively flat, with slight hummocks and depressions which are scattered throughout the area. The land is also dissected by several excavated drainage channels and remnant historic slough channels. Approximately 51 acres in the southwestern corner of the site (approximately 3 acres of this area is within the reserved roadway alignment) are comprised of old fill material deposited from an old quarry on the adjacent Mount Burdell. This fill material also extends onto lands (both Burdell Ranch and DFG ownership) east of the airport. As is common with many diked historic bayland sites, the land has subsided, averaging between 0 and -3.3 feet NGVD or more. Elevations in the filled area in the southwestern corner range from 3 to 6 feet.

BIOLOGICAL RESOURCES

Four vegetation/plant community associations are present on the Ranch. These are seasonal wetland, permanent slough, intermittent slough, and non-native annual grassland. Following is a brief summary of the characteristic vegetation and wildlife on the ranch lands:

Seasonal Wetlands: These are seasonally inundated or saturated areas with partially drained Reyes soils with moderate salinity and low pH. These seasonal wetlands occur in depressions and adjacent to permanent or intermittent sloughs, and are usually bounded by non-native annual grasslands. Typical plant species include facultative and facultative wetland plant species such as bird's-foot trefoil (*Lotus corniculatus*), ryegrass (*Lolium perenne*), Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), brass buttons (*Cotula coronopifolia*), sand spurrey (*Spergularia rubra*) and rabbit's-foot grass (*Polypogon monspeliensis*).

Permanent Sloughs: These are permanently saturated or inundated remnant salt marsh sloughs with undrained Reyes soils of high salinity and low pH. The banks and edges of these sloughs are sparsely vegetated with obligate wetland plant species, including

pickleweed (*Salicornia virginica*), saltgrass (*Disticlis spicata*), and alkali bulrush (*Scirpus robustus*).

Intermittent Sloughs: These are seasonally saturated remnant salt marsh sloughs with partially drained Reyes soils of moderate salinity and low pH. The bottoms and banks of these sloughs are densely vegetated with facultative and facultative wetland species, including saltgrass, ryegrass, Mediterranean barley, brass buttons and rabbit's-foot grass.

Non-native Annual Grasslands: This community type occurs on the slightly higher hummocks and broad plains on drained Reyes series and Xerorthents fill soils. These grasslands tend to be dominated by three non-native species, bird's-foot trefoil, ryegrass and yellow star-thistle (*Centaurea solsititalis*).

Field studies were conducted from January 1994 through September 1994 to assess the extent of wetlands on the 155 acres owned by Burdell Ranch at that time. These studies included monitoring of 20 shallow groundwater monitoring wells through the rainy season. Thirty-nine data points were also sampled to develop information on vegetation, soils, and hydrologic conditions. A draft jurisdictional determination was submitted to the Corps in September 1994. Following a site inspection by Corps regulatory staff in December 1994, a final determination was completed and confirmed by the Corps in January 1995. Based on this analysis, the seasonal wetland, permanent slough, and intermittent slough communities were considered to be wetland communities and cover approximately 31 acres of the 129 acres currently owned by Burdell Ranch.

The non-native annual grassland community was not considered to be wetland because of the lack of hydric soil functions and wetland hydrologic conditions based on the current and historic management of groundwater levels on the Ranch.

Water Birds: Tables 2, 3, and 4 provide summaries of available water bird census data for the USFWS Diked Baylands Study M-2 and M-3 census areas that encompasses most of the Burdell Ranch. The M-2 encompasses the DFG lands and the proposed mitigation bank lands north and east of Gnoss field. The M-3 census area included the industrial zoned area (Phase 2 of the proposed mitigation bank) in the southwest portion of the ranch.

The tables show species diversity and constitute only a sampling of the total numbers of birds using the area. Although bird counts have been conducted since 1982, only data for 1986 and 1987 have been summarized because the USFWS did not access the Burdell Ranch until July 1986. Surveys prior to 1986 were conducted from adjacent parcels which allowed very limited viewing of the site (USFWS 1988).

The diversity of water birds using the M-3 census area during 1986 and 1987 is relatively low, with only six species or types of water birds detected (Table 2). This data is similar to what has typically seen on this parcel (S. Foreman, pers. observations). Waterbird use is typically low because of the limited ponding and generally degraded conditions within the fill area. Characteristic water birds include killdeer *(Charadrius vociferus)* typical of lowland grasslands, and mallard *(Anas platyrhynchos)* which occurs in flooded drainage channels dissecting the area.

The USFWS water bird counts typically resulted in fewer than 20 birds, and often no water birds were detected (Table 2). Most birds were observed in flight as they passed over the

Table 2

Summary of U.S. Fish and Wildlife Service Diked Baylands Study
Water Bird Data Census, Area M-3 (Southwest Fill Area/Phase 2 Mitigation Bank), Burdell Ranch

	1986			1987													
SPECIES	10/30	11/13	12/04	01/08	01/22	02/05	02/19	03/12	03/19	04/02	04/30	06/11	07/09	09/03	11/19	12/17	12/31
Great egret														1			
Mallard												1					
Duck sp.										2							4
Killdeer		2				12	6	7		3							
Greater yellow		1															
Gull sp.[1]			151		398	5		200					3	2			16
TOTAL	0	3	151	0	398	17	6	207	0	5	0	1	3	3	0	0	20
Estimated Ponding (percentage)		-	1	-	-	-	-	0.5	-	0	0	0	0	0	0	1	0

[1]Noted mostly as flyovers to or from the nearby Redwood Sanitary Land Fill.

Table 3 - Summary of U.S. Fish a[illegible]llife Service Diked Baylands Study
Water Bird Data Census, Area M-2 (California Department of Fish and Game lands and Phase 1 Mitigation Bank), Burdell Ranch
Onsite Surveys During 1986 and 1987[1]

SPECIES	1986				1987													
	10/16	10/30	11/13	12/04	1/08	1/22	2/05	2/19	3/12	3/19	4/02	4/16	4/30	6/11	7/09	9/03	11/19	12/17	12/31
Pied-billed grebe	1									1								1	
Double-crested cormorant	2				4	1	1	1				1				1			
Snowy egret			1		4		1					1	3		2		1	1	13
Great egret	3	1	4	3	3	3	1	2	5	2	3	2	6	2	2	5	2	2	2
Great blue heron	2	2	2	1						2	2	1	1	1	1	4	1	1	
Mallard	4	12			2	3	13	58	3	23	14	7	14		1	5			
Gadwall								2						15					
Green-winged teal						1	2		2										
American wigeon						2		4			40								
Northern pintail						6					2								
Cinnamon teal							3		2	8	1	7	6						
Canvas-back																			
Common goldeneye						1					2								
Duck sp.		78					13		33		48								2
American coot									21			3							
American avocet					3														
Killdeer	2	2	2	1	1	1	2	2	1	3	3	1	3		1	3	1	7	1
Marbled godwit											1								
Long-billed curlew					36	5					2						13	35	21
Willet					1														
Greater yellowlegs	1			1	2	1		2		1								6	1
Common snipe																			2
Least sandpiper	14																		
Shorebird sp.					10														
Gull sp.[1]		31	28	90	228	370	38	100	150	200		21	3	1	81	1			50
TOTAL	29	126	37	98	290	429	94	171	196	243	118	41	30	19	5	101	19	53	92
Estimated Ponding (%)	2	-	2	0	1	-	-	1	1	3	3	1	0	0	0	1	-	2	4

[1]Estimated to cover roughly 25 percent or 175 acres of the M-2 County Area (FWS 1988).

[2]Noted mostly as flyovers to or from the nearby Redwood Sanitary Land Fill.

Table 4 - Summary of U.S. Fish and Wildl[illegible]vice Diked Baylands Study Water Bird Data Aerial Surveys of Census Area M-2 (California Department of Fish and Game Lands and Phase 1 Mitigation Bank), Burdell Ranch

	1982	1983						1984			1986
	12/17	01/21	02/01	03/14	03/29	04/25	12/28	02/23	04/03	12/11	02/27
SPECIES											
Pied-billed grebe							5				
Snowy egret	33				4		1				
Great egret	13		1	8	13	2	1		1	1	2
Egret sp.					11						
Great blue heron			1						1		
Tundra swan			4								
Mallard			39	25	11				5		24
Gadwall			20	15	2						
American wigeon			302	150	15			26			
Northern pintail			307		132						
Northern shoveler			71		7						
Cinnamon teal											20
Ruddy duck		1									
Canvasback			50								40
Bufflehead			1								
Duck sp.			21	726	43						
American coot			307	80							
American avocet			15								
Marbled godwit							75			25	
Long-billed curlew							1				
Willet			102	5	10						
Yellowlegs sp.							4				
Shorebird sp.			60								75
Gull sp.[1]		4	1810	2	50		4774			5	20000
TOTAL	51	5	3111	1011	298	2	4861	26	7	31	20141

[1]Noted mostly as flyovers to or from the nearby Redwood Sanitary Land Fill.

area. The highest of 20 counts conducted in 1986 and 1987 were on December 4, 1986 and January 22 and March 12, 1987. On these dates, the majority of the water birds (100, 100, and 97 percent, respectively) were gulls passing over the parcel enroute to, or from, the Redwood Sanitary Landfill to the north. Data for nine counts conducted from adjacent parcels for the period from February 1984 through March 1986 show a similar level of water bird activity in the proposed development area: low diversity with two to three species and low numbers with less than 10 individuals recorded per census (range 0-7). These data indicate that the proposed construction area is only marginally productive in terms of water bird habitat values.

Available water bird census data from onsite surveys in 1986 and 1987 and aerial surveys between 1982 and 1986 (USFWS County Area M-2) are summarized in Table 3 and Table 4, respectively. Although these data represent a minimum number of water birds likely to be present (smaller species and birds in far reaches or corners of the site may remain undetected during surveys), only a relatively low level of water bird use was detected (Tables 3 and 4) given the large size of the census area (total census area is approximately 700 acres of which the USFWS estimates adequate coverage for about 25 percent or 175 acres) (USFWS 1988). The highest of 19 onsite ground counts that were recorded of the available 19 census dates in 1986 and 1987 were recorded on January 8 and 22, 1987. On these two dates, 290 and 429 water birds were observed (Table 3). Of these, the majority (78 to 86 percent respectively) were gulls that were noted as passing over the property enroute to, or from, the Redwood Sanitary Land Fill located to the north.

Typical species observed on the parcel include great blue heron, egrets, mallard, American widgeon, pintail, and killdeer. Total numbers for all water birds, excluding gulls, is generally less than 100 individuals (Table 3) distributed over roughly 25 percent of the site.

Available aerial census data, which probably provides a more accurate estimate of water bird use over the entire parcel and covers a longer period of time, is summarized in Table 4. These data include 11 census dates between December 1982 and February 1987. Excluding the large number of gulls that are most likely enroute to or from the landfill, observed water bird use shows a similar pattern to the onsite ground counts. Numbers of water birds were generally less than 250 (range 2 to 248 water birds, Table 4). The largest recorded observation, again excluding gulls, was of approximately 1,300 water birds (primarily ducks) on February 1, 1983 (Table 4).

Threatened and Endangered Species: The tidal marshes outboard the ranch levees provide habitat for the typical suite of listed Bay Area endemic wetland species such as California clapper rail (*Rallus longirostris obsoletus*), black rail (*Laterallus jamaicensis cortiniculus*), and salt marsh harvest mouse (*Reithrodontomys raviventris*). In the interior portions of the ranch, significant use or populations of these species is not expected, except salt marsh harvest mice likely move into the interior, diked grassland areas during the winter and spring to escape flooding and possibly to feed on emerging grass growth.

PAST WATER MANAGEMENT

The majority of the Burdell Ranch has been used for livestock grazing and oat and rye grass hay production. The southeast corner of the site (Phase 2 conservation bank lands) and a portion of the lands immediately east of the existing Gnoss Field runway were also

historically use for sediment settling ponds for the rock quarry on the adjacent Mount Burdell. The quarry ceased operation in the 1960s.

Information on past water management on the ranch was obtained from John Hale, the tenant rancher whose family has operated the ranch for the last 75 years. Because the ranch lands are subsided (average of -2 to -3.3 feet NGVD or more), gravity drainage is inefficient and an existing 10,000 GPM pump is necessary to discharge water from the site. Water sources are direct rainfall and runoff from portions of the adjacent Mount Burdell. An additional water inlet is located along the Petaluma River. This source is used for summer water to maintain water levels in the old sloughs and ditches. Figure 2 shows the location of the pump, river intake, and the up slope watersheds/inflow locations.

The historic water management objective on the ranch is to maintain a sufficient groundwater table to maximize grass and hay growth through the spring and to minimize the extent of seasonally flooded ponds which decrease desired forage grasses. Water is also typically maintained in sloughs and ditches to keep cattle out of the channels and to maintain adequate water for mosquito fish. Desired water levels are set visually by the rancher and the specific water elevation is unknown.

In most years, the pump is set for automatic operation beginning with the onset of the major rainy season in late October or November and generally remains set for automatic operation until mid March. The rancher has typically turned off the automatic operation when only an additional 5 to 6 inches of rain are expected. This late rain provides sufficient water to offset normal infiltration and evaporation in order to carry the desired water levels through the spring and early summer. If spring rains exceed 5 to 6 inches, the pump is turned on again. During the summer months, water from the Petaluma River is typically added in July and August to flush new water through the ditches and sloughs to improve water quality and maintain desired water levels.

Based on groundwater monitoring studies on the ranch in 1989 and 1994, this water management regime results in a groundwater level 1 to 3 feet below the average soil surface during the rainy season and 3 to 4 feet during the summer months. The seasonal wetlands exist on the ranch in depressions which are closer to the groundwater and/or where water ponds and infiltration is slow because of the high clay content soils.

MANAGEMENT PLAN

GOALS AND OBJECTIVES

The management goal for the Burdell Ranch is to provide a matrix habitat of seasonal wetlands and riparian habitats with perennial water and associated wetlands in sloughs and ditches in a manner that will increase wetland extent and functional habitat values for wildlife. Specific management objectives are:

Hydrology

- Maintain freshwater conditions in the management area to the extent feasible through retention of up slope runoff and rainfall. Make-up water for dry years, dry season, and fall flood-up will be brackish water from the adjoining DFG lands.

Vegetation

- Increase wetland vegetation species and structural diversity while preventing establishment of dense large mono-typic stands of cattail and/or tule and large areas of dense weedy, ruderal vegetation.

- Establish groves of willow and other applicable native low-land woody riparian habitat along existing and created channels and sloughs.

- Prevent establishment of exotic pest plant species.

Wildlife

- Maximize the extent and duration of shallow seasonal ponds consistent with other management objectives. Provide a normal maximum high water levels that maintains water depths at less then 1.5 feet during early and mid winter water period. This is expected to result in an approximately equal mix of open water shallow ponds and exposed vegetated wetland.

- Manage water depths and ponding to emphasize habitat values for migratory and wintering waterfowl in the fall and winter. Draw-down water levels in late winter/early spring to expose mudflats and create shallows for northward migrant shorebirds.

- Establish groves of lowland riparian habitat for migratory neotropical songbirds.

Mosquito Abatement

- Maintain suitable water levels and quality in channels and sloughs for mosquito fish and other mosquito larvae predators.

- Manage the density and composition of vegetation through water manipulation, controlled burns, livestock grazing, mowing, disking, or other applicable measures in a manner to minimize dense stands of aquatic vegetation which may serve as refuge for mosquito larvae from predators.

- Manage water levels, fall flood-up, and spring draw-down to minimize larvae habitat and nuisance hatches.

Management practices will be adapted, as appropriate, to achieve the basic management goals and to add or modify existing objectives for the ranch wetlands. Future decisions on changes to the basic management plan will be by mutual agreement between DFG and Burdell for the Phase 1 conservation bank lands.

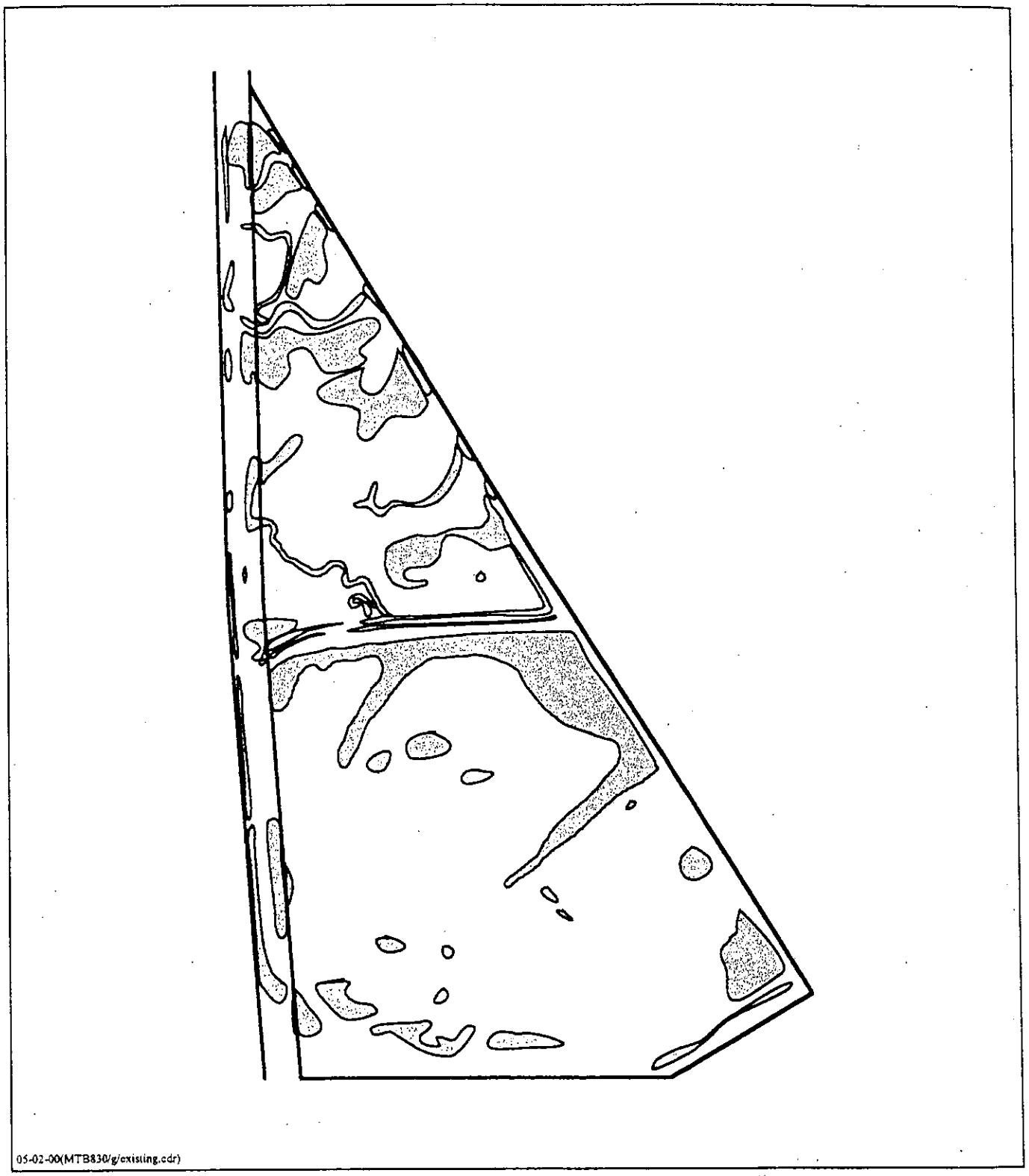
Grading Plan

A preliminary grading plan for the bank is included in the Map Pocket (attached). Figures 4 and 5 show the existing wetland configuration on the bank area and the planned new bank wetland community configuration, respectively. Under the grading and management plan, the bank lands would be divided into two basic cells or units.

The northern unit, or phase 1 area, is approximately 26.8 acres and consists of existing intermixed seasonal wetland pools and grassland on Reyes soils. The primary management or wetland development activities on this cell involve constructing a berm and placing water control structures at two locations. Wetland acreage would be increased primarily by allowing rainfall and up slope runoff to pond on the site. Riparian vegetation would also be planted along portions of the two existing inflow channels and one constructed channel through the area. The area would be basically managed to maintain an open herbaceous vegetation community with small interspersed stands of riparian woodland (Figure 5). The principal changes would be increased extent and duration of seasonal ponding in low lying areas, higher groundwater levels, and shifts in vegetation from facultative and upland grasses to wetland associated herbaceous species. This unit is expected to contain approximately 21.7 acres of mesic (3 to 5 month ponding or soil saturation) seasonal wetland (7.5 acres existing and 14.2 acres restored), 1.3 acres of willow/riparian community, and 3.8 acres of upland.

Upland habitat in the north cell would occur along the perimeter of the area in a 30 foot wide berm on the east side of the bank lands (1.4 acres) and initially in a 50 to 100-foot wide strip on the west side of the bank along the railroad (2.4 acres)(see Figure 5 and Grading Plan - map pocket).

The lower unit or Phase 2 area is 51 acres and is the area of the old quarry ponds/fill. This area is designed to have a greater variation in topographic relief in order to provide greater variety in wetland and riparian communities. The grading plan shows a rough grading scheme for this area. Water would be derived from direct rain as well as up slope runoff.



05-02-00(MTB830/g/existing.cdr)

Purpose: Wetland Restoration
and Enhancement
Adjacent Property Owners:
1 Redwood Landfill, Inc.
2 Lynn Fleshman
3 County of Marin
4 State of California, Wildlife
Conservation Board
5 JHW Family Ltd. Ptns.
6 Bortolussi

Existing Wetlands Configuration

Burdell Ranch
Conservation Bank Units

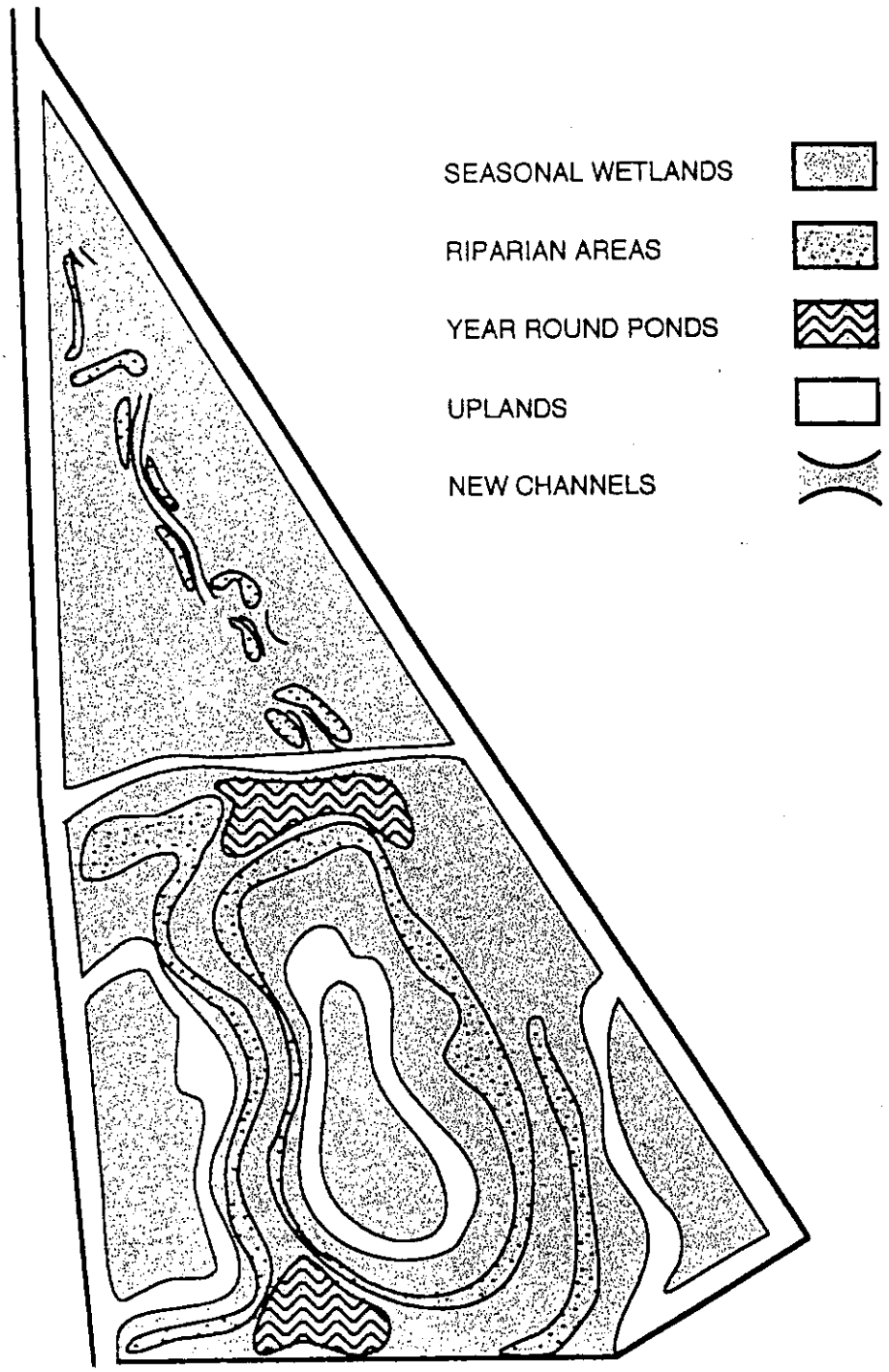
Figure 4

Approximate scale in feet

0 500

N

Adjacent to:
Petaluma River
At: County of Marin
Application by:
Mount Burdell Enterprises/
Burdell Ranch Partners Ltd.
C/O Law offices of
James McKelenney
365 Bel Marin Keys Blvd Suite 100
Novato, CA 94949



05-02-00(MTB830/g/proposed.cdr)

Purpose: Wetland Restoration and Enhancement
Adjacent Property Owners:
1 Redwood Landfill, Inc.
2 Lynn Fleshman
3 County of Marin
4 State of California, Wildlife Conservation Board
5 JHW Family Ltd. Ptns.
6 Bortolussi

Proposed Wetlands Configuration

Burdell Ranch
Conservation Bank Units

Figure 5

Approximate scale in feet

0 500

N

Adjacent to:
Petaluma River
At: County of Marin
Application by:
Mount Burdell Enterprises/
Burdell Ranch Partners Ltd.
C/O Law offices of
James McKelenney
365 Bel Marin Keys Blvd Suite 100
Novato, CA 94949

The principal features are two broad channels, with gradual slopes to higher ground in the center of the area and on the east and west sides of the unit.

This area is designed to contain a mix of seasonal wetland types ranging from short duration hydro-periods (4 to 6 weeks) to longer hydro-periods (3 to 9 months), riparian habitat, two ponds and associated channels, and uplands. The longer hydroperiod wetland pond and channel habitats are expected to develop between the -1 and 1 foot contours and will cover an estimated 2.6 acres. Riparian communities would cover approximately 7.8 acres between the 1 and 2-foot contours. Moderate duration hydro-period wetlands will also be created between the 2 and 3-foot contours. These wetlands will periodically flooded by backwater from the ponds and channels and will generally occur in a zone between the upland slopes and terraces and the channel and riparian communities. Shorter duration hydro-period wetlands will occur in three shallow depressional zones or swales, covering approximately 10.3 acres, on higher benches above the main wetland areas. Rainfall will be the primary source of water for this wetland habitat. The intent of these features are to provide large areas of shallow, ponded water. Essentially, these swales are designed to fill with rain water and provide shallow standing water for a few weeks at a time. The swales would likely fill and dry several times during most winters. While these features would be wetlands, they would provide similar functions as upland communities the majority the year. Another 8.9 acres of upland would be present.

Additional grading/wetland creation is proposed for the areas east of the Gnoss Field runway to provide the mitigation acreage for the 0.9 acre of fill required to implement the project. The grading plan (map Pocket) identifies 1.9 acres of wetland creation through removal of existing levees of the old remnant sections of the historic quarry pond.

Water Management

Winter rain and runoff will be the primary source of water for winter conditions. Summer make-up water, if needed, will be provided through inflow from the Petaluma River through the adjacent DFG lands. Questa Engineering Corporation (1994) estimated normal annual runoff from the east Burdell Mountain watershed into the Burdell Ranch lands at 1,030 acre-feet per year. A more detailed analysis, using a smaller watershed that directly feeds the conservation bank site estimates an annual 598 acre-feet of runoff and direct rainfall onto the bank site. This is sufficient to flood the entire bank site to a depth of over 7 feet.

As is typical of many diked historic bayland sites, the land surface of Burdell Ranch has subsided significantly from its historical, pre-diking elevation. The main plain of the ranch lands is 6.5 to 7 feet below the out board tidal marsh. The difference in tidal elevation between mean higher high water (MHHW) (the elevation of the marsh plain) and mean lower low water (MLLW) is approximately 5.9 feet (Questa Engineering Corporation 1994). Under most normal conditions, water can drain by gravity from the bank site onto to the DFG lands to the east. However, significant removal of water on the entire ranch requires the operation of the existing pump on the Petaluma River. Basic water management will involve:

- **September 15.** On the northern unit, phase 1 area, inflow will be provided from the southern unit, phase 2 area, and from the adjoining DFG lands using the identified water control devices (see grading plan in map pocket, attached). The

water table will be raised to provide approximately 5 percent of the area in flooded, shallow ponds for early water bird migrants.

- **October 15 to March 1.** Allow water to collect to maximize the extent of shallow flooded ponds without creating extensive areas of ponding in excess of 1.5 feet deep.

- **March 1 to May 15.** Water levels will be drawn down to provide shallow ponds and exposed mudflats for shorebirds during the peak migration period. After the migration period (generally around mid May), water levels will be drawn down if necessary to drain ponds for the purposes of discouraging waterfowl nesting and for mosquito control.

- **May 15 to September 14.** Inflow water from the adjoining DFG lands will be added as necessary during June, July, and August to maintain ditch and channel "bank full" conditions in order to provide adequate permanent water to maintain mosquito fish populations and improve water quality.

VEGETATION MANAGEMENT AND PLANTING PLAN

The primary vegetation management objective is to prevent establishment of large monotypic stands of cattail and/or tule and large areas of dense weedy, ruderal vegetation. Vegetation will be controlled, in part, through water level manipulation and other management options such as livestock grazing, moving/disking, and controlled burns. Herbicides and mechanical removal may also be employed in site-specific instances to control establishment of invasive exotic pest plant species.

The need for specific vegetation management will be reviewed annually at the end of the annual growing season (mid to late summer) in order to determine the need for control prior to the next growing season. The need for and specific types of control activities will be adapted to specific needs as determined by DFG.

Channel banks will be planted with native lowland riparian species such as yellow willow (*Salix lasiandra*), bow elder (*Acer negundo*), or other suitable low land riparian trees. The typical channel will have an approximately 10-foot wide low flow channel with a bottom elevation equal to or lower than the existing outlet channel (approximately -3.0 feet). Along the sinuous channel alignments, a 10-foot wide bench will be excavated such that the bench is approximately 1 foot above the channel bottom (-2.0 feet) and on average of 1 to 2 feet below the adjacent lands. These benches will be planted with cuttings or seedlings from local stock sources. Trees will be planted in clusters of 3 to 5 seedling or cuttings. Cluster plantings will be on roughly 15-foot centers along each bench area.

MOSQUITO ABATEMENT

Mosquito abatement will emphasize the ecological control of mosquitoes through the timing of water level manipulation, control of vegetation, and use of native/naturalized predators in order to minimize the need for application of chemical or other emergency control measures. DFG and Burdell will cooperate with Sonoma-Marin Mosquito Abatement to maximize the effectiveness of the biological control measures and in application of emergency control measures.

MONITORING AND REPORTING PLAN

Annual monitoring and reporting will be conducted. Each annual monitoring report will evaluate the site conditions against the performance criteria specified in this Management Plan. The intent of the monitoring is to assess the progress of the Conservation Bank wetlands towards meeting target success criteria and to provide necessary data on the need to adapt, alter, or implement specific management activities.

The monitoring will be conducted for 5 years, unless a shorter time frame is agreed to by the agencies after a minimum of 3 years. Monitoring may be extended if the final success criteria are not achieved by year 5 or management practices are significantly altered such that compliance with final performance criteria cannot be assumed. Monitoring would continue until final performance criteria are achieved two consecutive years. Reports will be due July 31 of each reporting year.

PERFORMANCE CRITERIA

The primary performance criteria is to increase the extent of functional wetland habitat within the Phase 1 bank boundaries by a minimum of 15.5 acres and 32.5 acres in Phase 2 area. The restored and enhanced existing wetlands should have the basic vegetation characteristics and wildlife use as described below. Failure to achieve specific performance objectives does not in it self constitute failure of the conservation bank to achieve desired objectives. Significant deviations, however, will require analysis and consultation with DFG, the Corps and other applicable agencies to determine if the conservation bank is proceeding appropriately, whether deviations are a result of other regional factors, or whether management activities or specific performance criteria need to be modified.

Specific performance criteria are:

Target Functional and Section 404 Jurisdictional Wetland Acreage to be Restored

The minimum target functional wetland habitat restoration is 15.5 acres for the Phase 1 bank area and 32.5 acres for the Phase 2 area within 5 years after implementation of each phase. The proposed bank credit is 155 credits for Phase 1 and 325 credits for Phase 2. The restored wetlands shall meet or exceed the technical criteria for wetlands as outlined in the Corps 1987 Wetland Delineation Manual and subsequent technical clarifications in place as of April 1997. Specific criteria shall include:

- Vegetation - The vegetation criterion shall be satisfied if greater than 50 percent of the relative cover and dominant plant species shall be classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC).

- Soils - The soils criterion will be based on establishing an active aquic moisture regime versus direct visual characteristics of soil chroma and mottling. The criterion shall be satisfied where soils are ponded for greater than 7 days from a single storm event or the water table is within 1.5 feet of the soil surface for a minimum of 14 consecutive days.

- Hydrology - The hydrology criterion shall be satisfied if the site is ponded or saturated to within 0.5 feet of the surface for a minimum period of 18 consecutive

days (5 percent of the growing season). The desired objective is to achieve ponding or saturation to within 0.5 feet of the soil surface for 46 or more consecutive days (12.5 percent of the growing season).

Vegetation Composition

Tall emergents (cattail and tule) or ruderal vegetation should not exceed an initial target objective 20 percent of the phase 1 area and contiguous DFG lands. If this 20 percent coverage is exceeded, DFG and Burdell shall implement appropriate control measures. This initial target level may be adjusted by DFG and Burdell based on visual assessment and judgment that a higher coverage is not affecting habitat values or that a lower coverage is warranted to achieve desired habitat objectives.

Wildlife

No specific wildlife performance criteria are proposed; however, wildlife use of the conservation bank lands and adjacent DFG lands should be consistent with and reflect the seasonal management regimes for specific wildlife groups: waterfowl in late fall through mid winter and shorebirds in late winter and early spring. Water bird use is also expected to substantially increase over levels documented during the USFWS Diked Bayland Study in 1986 and 1987 and DFG aerial surveys between 1982 and 1986 (see Section 2.2).

MONITORING METHODS

The monitoring program described herein is primarily intended to assess the success of establishing the desired performance and habitat objectives for the conservation bank. Specific monitoring methods are described below.

Hydrology

Hydrologic conditions will be monitored to assess and determine the desired seasonal water levels, extent of normal seasonal ponding, and establishment of hydrologic wetland criteria.

A staff gage will be placed in an accessible and convenient location along the access road in the southwestern corner of the Phase 1 area. The extent of desired normal ponding (normal maximum winter water levels), spring draw-down, and minimum summer water levels will be assessed visually by representatives of DFG and Burdell. Once the desired maximum normal ponding regime is identified, the water level elevation at the staff gage will be recorded and the control weirs set to provide the desired water level. Similar visual assessment procedures will be used to establish the desired spring draw-down and minimum summer water levels. The staff gage will be recorded on a minimum basis of once a month.

Six (6), shallow (3 to 5 foot deep) peizometers will be established on higher, non-ponded hummocks within the phase 1 bank area to document the hydric soil criterion. Beginning in September of year one of monitoring, the peizometers will be read monthly until ground water levels reach 1.5 feet of the soil surface. Peizometers will then be read every 7 to 10 days (appropriate to weather conditions) until groundwater levels have remained within 0.5

feet of the soil surface for a minimum period of 18 consecutive days (5 percent of the growing season). Monitoring will continue once every two weeks until water levels have remained within 0.5 feet of the soil surface for 46 consecutive days (12.5 percent of the growing season). Peizometers will be monitored in years one, three, and five unless more frequent monitoring is warranted because of changes in management activities or failure to meet objectives for two consecutive years.

Similar procedures will be utilized for the Phase 2 area.

Vegetation

Aerial photographs will taken or obtained in monitoring years one, three, and five to assess mid-winter open water ponds/mud flats and to map dominant species/assemblage groups (herbaceous, tall emergent, riparian, ruderal vegetation, etc.). The bank lands will also be visually assessed on an annual basis in order to identify needs to implement specific management practices to control invasive exotics and dense stands of monotypic emergent vegetation or ruderal vegetation.

Quantitative sampling methodology will be used to monitor vegetation parameters in the Phase 1 bank area. Parameters to be measured are: total plant cover, percentage wetland plant cover, mean height of vegetation strata, and plant species composition.

Samples from no fewer than three replicate, 100 meter long transects will be taken from each of the two primary habitat/vegetation associations within the phase 1 bank area: higher ground, hummock areas and lower lying winter ponded habitats. Transect locations will be determined and mapped following implementation of the conservation bank.

To assess plant cover, mean height of vegetational strata and plant species composition, a minimum of 10 one-meter square plots (quadrats) will be established at random along each transect. Herbaceous areal cover will be estimated by absolute cover class (<5 percent, 5-15 percent, 16-25 percent, 26-50 percent, 51-75 percent, 76-100 percent) for each species (native and non-native). Cover estimates will be averaged to determine overall cover for the entire planting area. Photographs will be taken of each sampling plot in which cover is estimated in order to provide some verification of estimation data.

Unequal cover class intervals are used in the sampling; such intervals allow for an easier estimation of species-cover to area relationships than do equal class intervals. Moreover, the less abundant species or species with small areal cover sometimes have an important diagnostic significance, which requires a finer breakdown in the lower scale values as compared to the larger scale values (Mueller-Dombois and Ellenberg 1974).

Wildlife

Bird use will be monitored four times a year. Surveys will be conducted twice in winter (December and late January), once in mid-March, and once in late September/early October. Two permanent sampling stations, a minimum of 200 meters apart, will be established on the site. The survey method will generally follow those outlined by Blondel et al. (1981) for point counts using an index of abundance (IPA) for all counts. The spring and fall point counts will be sampled for 20 minutes during the morning hours with both the species presence and numbers of individuals recorded. The winter counts can be

conducted at any time during the day, but with the same count method. All counts will be timed to coincide with high tide conditions in the Petaluma River and San Pablo Bay.

Since species utilization of the habitat is a primary focus of the counts, the data recorded will include counts of species engaged in breeding, foraging, resting and preening behaviors. All counts will be scheduled during similar high tidal cycles, and will not be conducted in periods of high winds and inclement weather.

This census method is well suited to long-term studies in homogenous habitats, however it is important that the method be standardized to ensure good data (Dawson 1981). The surveys will be conducted annually for the first 5 years. Additional data collected will include evidence of nesting such as the presence of nests, presence of young out of a nest, adults observed with food, copulation, distraction displays, adults carrying nesting material, courtship, and territorial males, etc. Location of nests on the site will be mapped and the species identified.

Corps Jurisdictional Determination

Each annual report will contain an assessment of the extent of wetlands meeting the Corps 1987 Manual criteria for wetlands. This assessment will be based on data derived from the groundwater and vegetation monitoring described previously. A formal determination will be requested in year 5 in order to document final success criteria relative to wetland creation performance criteria.

IMPLEMENTATION, OPERATION, AND MAINTENANCE COSTS

Burdell will provide applicable funding for the ongoing operation, maintenance, and protection of the conservation bank lands. In general, wetland restoration and management activities for the conservation bank can be simply implemented by changing existing management practices and installation of water control devices.

Routine annual maintenance and operation involves opening the intake gates for summer make-up water and initial fall flood-up, and general repair of ranch facilities (fencing, berms, levees, etc.). Recurring annual costs primarily involve a fair share percentage of the electricity costs for pump operation for the DFG and conservation bank lands. Current and anticipated periodic costs include invasive weed control and vegetation management.

Based on Burdell Ranch records for the period of 1983 through 1994, the average annual electrical cost for pump operation ranges from $431 to $4,034, with an average annual costs of $1,316 for the entire 737-acre ranch. The median cost is $627. This time period includes two years in which the levees were over topped in winter storms and pumping costs were $3,158 and $4,034 (winter 1984-85 and 1985-86). Average annual costs excluding these two years is $809. Under the proposed operation schedule, pumping costs should be less than the previous management regime. Burdell's fair share of the pumping costs, based on acreage, would be 10 percent, or $132 per year of the average annual electrical costs.

Other long-term costs that would be integrated with DFG's management of the adjacent lands involve labor opening the intake gate for summer make-up water and initial fall flood-up, and general repair of ranch facilities (fencing, berm maintenance, etc.) and periodic vegetation management for invasive weed control.

At the time of each sale of mitigation credits, Burdell shall deposit into an endowment account under the control of DFG an amount of $230 for each credit (0.1 acre) sold. Beginning on January 1, 2002, and upon each one year anniversary thereafter, the per-Credit amount of the endowment deposit shall be increased by a percentage equal to the percentage increase, if any, in the Consumer Price Index for the San Francisco Bay Region as published by the United States Department of Labor, Bureau of Labors Statistics. The $230 per credit fee will generate a $35,650 endowment for the long term management trust account for Phase 1 (based on 155 credits)and $74,750 for the Phase 2 area (based on 325 credits), or a total of $110,400 for both phases. The 9-acre potential roadway reserve area if added to the bank at a later date would generate an additional $15,410 (based on 67 credits). These funds are to be used as a permanent capital endowment principal, the interest from which will be available to provide a fair-share cost for operations, management, and protection of the existing State Lands and Conservation Bank at Burdell Ranch. DFG shall deposit the permanent capital endowment principal in a special deposit account established pursuant to Government Code section 16370 and the principal shall not be drawn upon unless the DFG finds such expenditure of principal is essential to protect the continued functions and values of wetlands on the site. Operation, management, and protection activities shall include, but shall not be limited to, costs of attorneys, reasonable administrative overhead, biological monitoring, improvements to carrying capacity, and law enforcement, as necessary to maintain the lands in conditions suitable for the protection of the wetlands.

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Questa Engineering Corporation. 1994. Existing Conditions Report. *Enhancement Plan for the Petaluma River, Marin County, California*. Prepared for Marin County Planning Department and California Coastal Conservancy. Point Richmond, California.

See refs to get Alden San info on where to obtain the final Enhancement Plan (not avail @ State Lib.)