

**SOLANO COUNTY  
WATER AGENCY**

**FLOOD CONTROL  
MASTER PLAN**

**PHASE II**

May 1998

Prepared by



Consulting Engineers

074-97-03.10



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# EXECUTIVE SUMMARY

Intense storms over the past couple of years caused flooding in many unincorporated areas of Solano County. The Solano County Water Agency (SCWA) Board of Directors, in response to public concerns voiced during and after these storm events, requested staff to take a more active role in county-wide flood control issues.

Solano County Water Agency has increased its efforts in county-wide flood control in response to public concerns. Current efforts include funding short-term projects, continued responsibility for the Ulati and Green Valley Flood Control Projects, providing technical assistance on flooding problems, and coordinating the Flood Control Task Force and various working groups to resolve drainage issues.

In February 1997, SCWA staff outlined a two-phased approach to develop a county-wide Flood Control Master Plan that would include an analysis of both infrastructure and institutional issues. Phase I of the Master Plan was completed in November 1997. The Phase I report documented flood related problems reported by individuals, the Solano County Department of Transportation (DOT), the flood control task force working groups, the local Resource Conservation Districts (RCD), cities, and site specific information provided by Solano County Water Agency (SCWA) staff. This information was used in Phase II to analyze the problems and establish the basis for their consideration by SCWA in developing an overall Master Plan.

## FLOOD RELATED PROBLEMS

The first step in Phase II was to classify the reported flood problems into two broad categories, local problems and problem areas, based on the areal extent of the problems and the anticipated complexity and cost of the solution.

### Local Problems

Local problems are associated with a specific drainage problem which affects one or more property parcels. Examples of local problems include plugged or inadequate culverts or a section of ditch or creek choked by vegetation or debris. Elimination of these local problems typically results in insignificant downstream impact. These problems can be solved through SCWA's current grant program; local RCD and Natural Resources Conservation Service (NRCS) technical assistance; Solano County DOT, Irrigation District, and Reclamation District improvements; and landowner actions.

### Problem Areas

Problem areas are drainage basins or subbasins which require a coordinated solution among landowners or agencies. The reported problems in a problem area are similar and are related to the same drainage system, for example, a tributary or reach of a stream which is under capacity or which has an inadequate downstream outlet. Solutions for problem areas typically require

consideration of the entire drainage system. Solutions may also address more than one problem area, for instance an entire watershed or region. Because the goal of Phase II was to provide a comprehensive approach for solving countywide drainage and flood control problems, this report focuses mainly on solutions to problem areas and their encompassing watersheds.

Solano County Water Agency's greatest challenge will be providing protection against localized drainage and regional flooding problems given limited staff and financial resources. Two criteria have been established in this Phase II work to prioritize the problem areas and assign the appropriate level of resources to their solution. These include: 1) the type of flood damage, and 2) the severity and frequency of the damage.

The first criterion is the type of flood damage. The following categories of damage were established in order of relevance to SCWA objectives. Each was assigned a high (H), medium (M), or low (L) rating and used to rank problem areas.

1. Threats to human safety and lives (H)
2. Damage to public works and infrastructure, including water and transportation facilities such as water supply, sanitary sewer facilities, bridges, and roadways (H)
3. Structural damage to residential property (H)
4. Structural damage to businesses (including farms) (H)
5. Sediment deposition in channels and marshlands (M)
6. Erosion of channels and agricultural land (M)
7. Degradation of water quality (M)
8. Impact to agricultural production (M)

The second criterion for setting problem priority is related to the frequency and severity of damage. The following goals were established for each damage category listed in the first criterion. The problem areas have been rated on whether the corresponding goal is met. If the goal is not met, or hardly ever met, it is rated high (H). If the goal is routinely met or exceeded, it is rated low (L). Medium (M) ratings are given for goals sometimes met.

1. The 10-year frequency storm event should not affect human safety. Ten-year storm event floodwaters should not cause major public roads to be closed to emergency response vehicles. The 100-year storm event should not threaten human lives.
2. Public infrastructure is designed for different storm recurrence intervals. Floods less frequent than the intended design should not impede the intended use of the facility.
3. The 10-year storm should not damage homes.
4. The 10-year storm should not damage businesses
5. Sediment deposition in channels should not reduce channel capacity below its design capacity. Sediment deposition in managed wetlands should not exceed expected natural rates or volumes.

6. Erosion should not threaten residential or business structures or degrade property value.
7. Runoff water quality should meet current and projected state and federal requirements.
8. The 10-year storm runoff should drain from agricultural land before crop damage occurs. This is generally 24 to 48 hours; see Table 1-2 for flooding impact on specific crops.

These two criteria, and their rating categories, were used to rate the type of damage and frequency and severity of the damage in each problem area. Table ES-1 shows the problem areas with their ratings and an overall rating. These ratings were used to rank the priority for SCWA participation in development of plans to solve the problems.

## **FLOOD CONTROL/DRAINAGE PLANNING**

There are three potential levels of SCWA involvement in flood control/drainage planning and implementation in the County. These levels are based on the geographical extent of each flood control problem, the relative cost of their solutions, and the potential level of financial participation by SCWA. The three levels are listed below.

1. Solving the problem using the existing SCWA flood control/drainage project grant program.
2. Coordination and development of a regional solution by SCWA through the development of a local Watershed Management Plan (WMP).
3. Participation in a U.S. Army Corps of Engineers (COE) Watershed Management Plan (WMP).

### **SCWA Grant Program**

The grant program should continue to address the short term flood control needs. This program should focus on the critical flood control problems which threaten life and property. Less severe problems may be addressed through the more comprehensive WMPs. The suggested funding level for the grant program is between \$50,000 to \$100,000 annually, requiring approximately two to three person months of staff resources.

### **Local Watershed Management Plans (WMPs)**

Solving flood control problems for a problem area or an entire watershed requires a more comprehensive and coordinated planning effort than solving local problems. Typically, additional data gathering and studies of the problems and drainage systems to determine the most viable solution and to minimize downstream impacts are necessary. In addition, the solutions may require more complex permitting and funding mechanisms. The development of WMPs is the first step in addressing these problems.



Rating:  
D = Type of flood damage  
F = Frequency/severity of damage  
O = Overall rating

**Table ES-1. Problem Areas**

Region	Watershed	Problem Area	Description	Rating		
				D	F	O
S	Freeborn Creek	Freeborn Creek	• Sediment is deposited in the lower reaches of the creek.	M	L	M
	American Canyon Creek	American Canyon Creek	• Watershed has high sediment production due to large scale land movements, channel bank failure, and conversion from oak woodland and native grasses to annual grasses and intensive cattle grazing. • The change in dredging frequency in the Suisun Marsh has made the effect of silt in the Marsh more noticeable. • Construction of I-80 has concentrated drainage in locations creating large gullies contributing sediment to American Canyon Creek. • Reservoir on East Fork of Lynch Canyon tributary, shows signs of gully erosion on the spillway, high flows and sediment loads will result should erosion lead to reservoir failure.	M	H	H
	Jameson Canyon Creek	Jameson Canyon Creek	• Sediment is deposited in the lower reaches of the creek.	M	H	H
	Green Valley Creek	Upper Green Valley Creek	• Volkhardt drain is overgrown with vegetation. • Portions of Green Valley Country Club Estates, downstream of the confluence of Green Valley Creek and Wild Horse Creek, lies within the 100 year floodplain. • Green Valley Rd. and Rockville Rd. flood.	H	L	M
		Lower Green Valley Creek	• Sediment is deposited in the lower reaches of the creek. • Sediment is filling drainage structures in lower watershed. • High annual maintenance and reduction of flood control.	M	H	H
	Dan Wilson Creek	Dan Wilson Creek	• Suisun Valley Road floods south of Suisun Creek. • Rockville Road and Rockville Cemetery flood.	L	M	L
	Cordelia Slough	Cordelia Slough	• Sediment has deposited in slough impacting managed wetlands.	M	H	H
	Suisun Creek	Suisun Creek	• Flooding below I-80. • Levee break south of SPRR • Willota Oaks Subdivision in danger of flooding.	H	M	H
	Ledgewood Creek	Upper Ledgewood Creek	• Ledgewood Creek and Gordon Valley Creek overtop. • Vineyards and Clayton Road flood.	M	H	M
		Lower Ledgewood Creek	• Ledgewood Creek overtops and floods Ledgewood Rd, Abernathy Rd and Mankas Corner Rd. • COE study for Fairfield streams indicates Ledgewood Creek bifurcates sending 2500 cfs towards I-80. Fairfield believes this is unsubstantiated and that structures are being built and flood insurance premiums are being paid based on an incorrect 100 year flood plain.	H	M	H
U	McCune Creek	Winters Road	• Winters Road is low relative to surrounding property in many places; old railway crossing, old plant and dips. • Land leveling has left the roadway low with no outlet. • Field leveling and preparation, and herbicide practices have increased runoff. • Orchards flood.	M	M	M

**Table ES-1. Problem Areas, Cont'd.**

Rating:  
D = Type of flood damage  
F = Frequency/severity of damage  
O = Overall rating

Region	Watershed	Problem Area	Description	Rating		
				D	F	O
		Wolfskill	<ul style="list-style-type: none"> <li>• Halley and McCune Roads flood.</li> <li>• Ditches are filled in with silt.</li> <li>• Channels are inadequate.</li> <li>• SID Canals have blocked drainage in some areas.</li> <li>• Property and orchards flood.</li> </ul>	H	M	H
		Halley Road	<ul style="list-style-type: none"> <li>• Halley Road is frequently flooded.</li> <li>• Field and pasture flooding.</li> <li>• Structures flood in Kobert Rd. area.</li> </ul>	H	M	H
		Farmer's Drain	<ul style="list-style-type: none"> <li>• Orchard and field flooding.</li> </ul>	M	M	M
	Sweeney Creek	Allendale Road	<ul style="list-style-type: none"> <li>• Inadequate capacity of water course along Allendale Rd, a tributary to Sweeney Creek?</li> <li>• Classify above with Sweeney above Putah and below Timm Rd.</li> </ul>	M	H	M
		Above Timm Road	<ul style="list-style-type: none"> <li>• Extensive creek bank erosion in the English Hills along Sweeney Creek, English Creek and a tributary to Sweeney Creek.</li> </ul>	L	M	M
		PCS to Timm Road	<ul style="list-style-type: none"> <li>• Sweeney Creek capacity is reduced by vegetation.</li> <li>• Debris dams in Sweeney Creek have caused flooding.</li> <li>• 5' culvert crossing at Timm Road backs up Sweeney Creek.</li> <li>• Widespread flooding in the areas of Timm Rd. and Shawn and Heather Lanes.</li> <li>• Structures close to waterways are frequently flooded.</li> </ul>	H	H	H
		Ulati Project to PCS	<ul style="list-style-type: none"> <li>• Channel capacity reduced by vegetation growth.</li> <li>• I-505 crossing may be under capacity.</li> </ul>	H	H	H
		Lower Sweeney Creek	<ul style="list-style-type: none"> <li>• Beaver dams on Sweeney Creek.</li> </ul>	L	L	L
	Gibson Canyon Creek	Gibson Canyon Creek	<ul style="list-style-type: none"> <li>• Septic system problem</li> <li>• Local properties flooded</li> </ul>	H	M	M
	Horse Creek	Horse Creek	<ul style="list-style-type: none"> <li>• Interior drainage is surcharged when water level in Horse Creek is high.</li> </ul>	H	H	H
	Ulati Creek	Ulati Creek	<ul style="list-style-type: none"> <li>• The Ulati Creek channel has high flooding potential with ten year events.</li> <li>• The channel overtops where the banks are low.</li> <li>• Interior drainage is surcharged when Ulati Creek is high.</li> <li>• Homes and property are flooded.</li> </ul>	M	M	M
	Alamo Creek	Alamo Creek	<ul style="list-style-type: none"> <li>• The Alamo Creek channel has a less than ten year level of protection within the urban area.</li> <li>• The channel overtops where the banks are low.</li> <li>• Interior drainage is surcharged when Alamo Creek is high.</li> <li>• Homes and property are flooded.</li> </ul>	H	H	H

Rating:  
D = Type of flood damage  
F = Frequency/severity of damage  
O = Overall rating

Table ES-1. Problem Areas, Cont'd.

Region	Watershed	Problem Area	Description	Rating		
				D	F	O
D	Dixon	Batavia	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Land leveling has eliminated drainage outlets.</li> <li>Area fields drain to Olsen drain which has a low outlet to the Ulatis Flood control project, preventing drainage when flows are high in the project; also culverts along Olsen drain are under capacity.</li> <li>Agricultural lands flood, County roads are inundated in several locations, homes in flood danger.</li> </ul>	H	M	M
		City of Dixon	<ul style="list-style-type: none"> <li>Ongoing disagreement between City of Dixon and DRCID related to responsibility for and equitable solutions to needed downstream improvements.</li> <li>City retention Basin A creates high groundwater problems.</li> </ul>	L	L	L
		North of Dixon	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Area lacks adequate drainage facilities.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	M	L
		Milk Farm	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Area lacks adequate drainage facilities.</li> <li>Land leveling has eliminated drainage outlets.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	M	L
		Northeast of Dixon	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Area lacks adequate drainage facilities.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	M	L
		East of Dixon	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Agricultural lands and County roads are flooded.</li> </ul>	L	M	L
		South of Dixon	<ul style="list-style-type: none"> <li>Increased runoff due to changes in agricultural practices.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	M	L
		Maine Prairie	<ul style="list-style-type: none"> <li>Area is downstream of a large drainage area that has increased runoff due to agricultural practices.</li> <li>Area floods when DRCID system is over capacity.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	H	M
		RD2068 Main	<ul style="list-style-type: none"> <li>Area is downstream of a large drainage area that has increased runoff due to agricultural practices.</li> <li>Area floods when DRCID system is over capacity.</li> <li>Agricultural land and County roads flooded.</li> </ul>	L	H	M
		Hass Slough	<ul style="list-style-type: none"> <li>Sediment has deposited in slough.</li> <li>Area is downstream of a large drainage area that has increased runoff due to agricultural practices.</li> </ul>	L	H	M
		Cache Slough	<ul style="list-style-type: none"> <li>Sediment has deposited in slough.</li> <li>Dixon Boat Club facilities flood.</li> </ul>	M	H	M

Rating:  
D = Type of flood damage  
F = Frequency/severity of damage  
O = Overall rating

**Table ES-1. Problem Areas, Cont'd.**

Region	Watershed	Problem Area	Description	Rating		
				D	F	O
	Yolo Bypass	RD2068 East	<ul style="list-style-type: none"> <li>Runoff has increased due to agricultural practices.</li> <li>Area drains to Yolo bypass, flooding is exacerbated with high flows in the Bypass.</li> <li>Agricultural land on County roads flooded.</li> </ul>	L	H	M
		RD2068 to PS5	<ul style="list-style-type: none"> <li>Drains are pumped to Yolo Bypass, flood water is detained during high tide.</li> </ul>	L	L	L
	Putah Creek	Putah Creek	<ul style="list-style-type: none"> <li>County roads flood.</li> <li>Land leveling has left roadways lower than surrounding property.</li> </ul>	L	M	L
	Sulphur Springs Creek	Sulphur Springs Creek	<ul style="list-style-type: none"> <li>Creek capacity is reduced by vegetation and debris.</li> <li>Culverts and bridges are inadequate.</li> <li>High tides in combination with runoff prevent drainage of lower watershed.</li> <li>Overbank flows cause damage to property and restrict access to entry roads of industrial development in the flood plain, Benicia Industries, Southern Pacific RR, and Exxon have been affected in the past.</li> </ul>	H	L	M
V	Homeacres	Homeacres	<ul style="list-style-type: none"> <li>Road flooding.</li> <li>Sheet flow over area.</li> <li>Inadequate drainage facilities.</li> </ul>	M	H	M
	Barker Slough	Barker Slough	<ul style="list-style-type: none"> <li>Sediment has deposited in slough. Hwy 113 is subject to flooding.</li> </ul>	L	M	M
	Rio Vista	Rio Vista	<ul style="list-style-type: none"> <li>Sacramento River overflow floods areas along river and surcharges interior drainage</li> </ul>	H	L	M

Watershed Management Plans provide the mechanism to assess the natural resources in a watershed, set goals, identify ways to solve resource problems and develop a watershed program to implement solutions. The plans are not focused solely on flood control but on a number of natural resource issues such as flood prevention, erosion and sediment control, water quality management, fish and wildlife habitat improvement, wetlands creation and restoration, groundwater management, and water supply.

The Solano County Water Agency could provide technical and financial assistance toward the development of these WMPs. The plans would be developed in cooperation with the landowners and local agencies within the proposed planning area. SCWA could assist in funding of the plans, but recommended projects or management programs would not likely be funded by SCWA. SCWA's role in local WMPs would include:

1. Coordinating with local agencies in the development of WMPs.
2. Performing or funding studies and/or hydrologic and hydraulic modeling needed for the WMPs.
3. Designing or funding design of conveyance systems or storage facilities.
4. Preparing grant proposals/requests for outside funding or setting up funding arrangements.
5. Providing project construction oversight.
6. Developing pilot projects to demonstrate individual management program elements and their potential for integration into a watershed program.

This Phase II report recommends the local WMPs as the primary mechanism for SCWA participation in development of flood control solutions. Through development of local WMPs, SCWA will be more involved in county-wide flood control planning and will lead a comprehensive approach to flood control. Local WMPs are the first step in defining and implementing flood control projects and management programs. The local WMPs are not only valuable in defining solutions for watersheds, but will also provide the basis for securing state and federal funding.

#### **U.S. Army Corps Of Engineers (COE) Watershed Management Plans**

The Solano County Water Agency and other agencies in the County are considering the possibility of addressing some of the major flood control problems through joint sponsorship with the COE of WMPs in the Dixon, Ulati, and Suisun regions. The COE would fund half of the cost of these WMPs; local and state sponsors are required to contribute the remaining half. SCWA can contribute to the cost through in-kind services such as data collection and developing hydrologic models. The COE, SCWA, and other agencies are currently developing a Project Study Plan (PSP) and a Feasibility Cost Sharing Agreement (FCSA) for the WMPs. Each management plan is anticipated to cost between one and two million dollars, with completion estimates of 18 months to two years from the date of receipt of local and federal funds. If the COE WMPs lead to authorization of the design and construction of a flood control project, the federal government will provide 50% to 75% of the project cost. SCWA financial participation in these plans will be contingent upon the overall cost of the plans, the elements of the plans,

and the financial participation by other agencies. SCWA could provide in-kind services to these plans through developing those elements of the plans identified in this report as part of the local WMPs.

### **Summary**

Table ES-2 summarizes the watersheds in the County in which problem areas have been identified and recommends that either a local or COE WMP be prepared for each. A priority rating and estimated cost for development of the local WMPs is also provided. The priorities were based on the type and severity of the flooding within the watershed, the level of local interest in developing solutions, the probability of funding, and the potential downstream impacts of WMP implementation. It is recommended that SCWA budget \$200,000 annually for preparation of local WMPs.

### **FLOOD CONTROL/DRAINAGE ACTIVITIES**

SCWA should also pursue flood control/drainage support activities which are not focused on particular flood control problems but would be valuable to overall flood control efforts in the County. Table ES-3 lists these activities and provides an estimate of the potential cost. The last activity does not include a cost but will require considerable staff assistance with other local agencies. It is recommended that \$50,000 to \$100,000 be appropriated each year for the next few years to implement Activities 1 through 4.

### **FLOOD CONTROL/DRAINAGE COORDINATION**

The third category of SCWA participation is coordination with other agencies and cities. The Flood Control Task Force Working Groups have provided input which indicates there is a lack of coordination of flood control efforts. It is estimated this increase in coordination will require an additional person-month of SCWA staff time. This excludes coordination efforts which are integral to the planning and activities categories previously discussed.

### **SUMMARY OF ESTIMATED MASTER PLAN RESOURCE ALLOCATIONS**

A summary of the total recommended SCWA staff and financial resource allocations to meet the level of participation described above is provided in Table ES-4.

**Table ES-2. Recommended Watershed Management Plans**

Region	Watershed	Problem Areas	Local WMP Only	Local WMP Developed in Conjunction with COE WMP	Included Within COE WMP	Priority	Estimated Cost, \$1,000s
S	Freeborn Creek	Freeborn Creek			✓		(a)
	American Canyon Creek	American Canyon Creek			✓		(a)
	Jameson Canyon Creek	Jameson Canyon Creek			✓		(a)
	Green Valley Creek	Upper and Lower Green Valley Creek		✓		M	100-150
	Dan Wilson Creek	Dan Wilson Creek			✓		(a)
	Cordelia Slough	Cordelia Slough			✓		(a)
	Suisun Creek	Suisun Creek		✓		M	100-150
	Ledgewood Creek	Upper and Lower Ledgewood Creek		✓		H	100-150
U	McCune Creek	Winters Road, Wolfskill, Halley Road, Farmers' Drain		✓		M	50-100
	Sweeney Creek	Allendale Road, Above Timm Road, PCS to Timm Road, Ulati Project to PCS, Lower Sweeney Creek		✓		M	50-100
	Gibson Canyon Creek	Gibson Canyon Creek			✓		(a)
	Horse Creek	Horse Creek			✓		(a)
	Ulati Creek	Ulati Creek			✓		(a)
	Alamo Creek	Alamo Creek			✓		(a)
D	Dixon	Batavia, City of Dixon, North of Dixon, Milk Farm, Northeast of Dixon, East of Dixon, South of Dixon, Maine Prairie, RD2068 Main, Hass Slough, Cache Slough	✓			M	50-100
	Yolo Bypass	RD2068 east and to PS5	✓			L	(b)
	Putah Creek	Putah Creek	✓			L	(b)
V	Sulphur Springs Creek	Sulphur Springs Creek	✓			L	(b)
	Homeacres	Homeacres	✓			M	50-100
M	Barker Slough	Barker Slough	✓			L	(b)

(a) Cost for WMP would be integrated with other problem areas into the overall COE WMP.

(b) Costs were not estimated for low priority WMPs.

**Table ES-3. Flood Control Activities**

Activity	Estimated Costs, <sup>(a)</sup> thousand dollars	Implementation Time, years
1. Hydrologic Data Collection Program <sup>(b)</sup>	376	5
2. County Hydrology Manual Update	59	1
3. Ulatis Flood Control Project Model Revisions	67	1
4. National Flood Insurance Program Assistance	5	ongoing
5. Storm Water Quality Management	—	ongoing

<sup>(a)</sup> Costs assume the work would be completed by a consultant managed by SCWA staff.

<sup>(b)</sup> Costs include SCWA ongoing development of the Automated Data Acquisition and Early Warning System

**Table ES-4. Summary of Estimated  
Master Plan Implementation Resource Allocations<sup>(a)</sup>**

	Annual costs, thousand dollars	Annual Staff Time, person-months/year
Planning		
Grants	50-100	2-3
Watershed Management Plans	200 <sup>(b)</sup>	5-6
Activities	150	3
Coordination		1
Total	400-450	11-13

<sup>(a)</sup> Estimated level of effort each year for next three-year period.

<sup>(b)</sup> This could provide direct funding of local WMPs, and/or in-kind services match for COE WMPs.