

# **FLOOD CONTROL AND WATER CONSERVATION DISTRICT**

## **Prepared for Winter Storms?**

### **SUMMARY**

The Flood Control and Water Conservation District, part of the County Public Works Department, manages the waterways and storage basins in Santa Barbara County. The District deals with emergencies on a regular basis, as winter rains often generate violent flows in the County's creeks and rivers. The Grand Jury investigated the District's flood control program to assess its effectiveness in protecting the County from the effects of these flows.

The Grand Jury found that the Flood Control and Water Conservation District has a well-planned, proactive, and comprehensive program of annual maintenance and capital improvement projects to prevent flood damage during the winter rains. The Grand Jury also found a well-planned, tested emergency response capability for occasions when heavy flows do occur.

The major dams in the County, Bradbury and Twitchell, serve a flood control role as well as forming part of the water conservation system. The dams are under close supervision by Federal and State agencies and have been seismically reinforced. The Grand Jury visited both Bradbury and Twitchell dams and found them under the control of experienced and knowledgeable operators.

The Santa Maria levee, which protects the City of Santa Maria and the greater Santa Maria Valley from storm waters in the Santa Maria River, had a major failure in 1998 and is at risk of failing again. Although the District is working proactively to minimize this risk through interim measures, an engineering study indicates that a permanent reinforcement of the levee will cost over \$38 million. State and Federal assistance will be required to fund this work. During the preparation of this report, newspaper articles have reported that State and Federal officials are paying increased attention to the safety of the levee.

### **INTRODUCTION**

The Santa Barbara County Public Works Department deals with emergencies on a regular basis. Winter rains in Santa Barbara County often generate violent flows in the creeks cascading down the mountains to both the ocean and the Santa Ynez Valley and in the Cuyama, Sisquoc, and Santa Maria Rivers.

Two major dams – Bradbury (Lake Cachuma) and Twitchell (Twitchell Reservoir) – control flows in the Santa Ynez and Santa Maria River basins respectively. In

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addition to providing critical water supplies to County residents, businesses and agriculture, these dams serve as key elements of the flood control system.

Another key element is the Santa Maria levee, a 24-mile-long structure built to keep the Santa Maria River from flooding the City of Santa Maria and nearby residential and agricultural land.

The Flood Control and Water Conservation District is the part of the County Public Works Department that manages the waterways and storage basins in Santa Barbara County. During the period November 2005 – March 2006 the Grand Jury investigated how the District administers its flood control program in order to assess its effectiveness in responding to recurring problems such as winter rains and to other natural emergencies.

The Grand Jury reviewed documents including the Public Works Department website, Annual Routine Maintenance Plan 2005-2006, Capital Improvement Plan 2005-2006, Emergency Operations Plan, and a report on the Santa Maria Levee prepared by the District with technical assistance from Penfield & Smith Engineers, Inc. The Grand Jury interviewed personnel in the Public Works Departments of the County and City of Santa Maria and in the Santa Maria Valley Water Conservation District.

The Grand Jury made site visits to the Santa Maria levee in November 2005, to Bradbury Dam in January 2006, and to Twitchell Dam in March 2006.

### **OBSERVATIONS AND ANALYSIS**

The Flood Control and Water Conservation District is part of the Water Resources Division within the Santa Barbara County Public Works Department. The District's mission is to provide flood protection and to conserve storm, flood and surface waters for beneficial public use. The District is a dependent special district<sup>1</sup> within Santa Barbara County whose boundaries coincide with the County's boundary. The Board of Supervisors acts as the Board of Directors of the District, and the District's staff comprises County employees.

The State Legislature created the District in 1955 in response to severe flooding and damage suffered from storms in the early 1950s. At that time, the District's primary charge was to implement a program of channel maintenance and capital improvements to mitigate the threat to life and property from flooding. The

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<sup>1</sup> Unlike an independent special district, a dependent special district is part of the budgetary process of the County.

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California Water Code empowered the District to pursue various activities including the control of flood and storm waters and the conservation of such waters for beneficial use, to cooperate with other Federal, State, and local agencies, and to review the adequacy of the drainage plans for new subdivisions within the County.

Today, the District's major programs involve channel maintenance, design and construction of capital improvements, review of new development, and operation of a hydrological data collection and flood warning system.

### Channel Maintenance Program

There are about 265 miles of channels and storm drains and 80 retention/recharge/debris basins in Santa Barbara County. Maintenance of these channels, debris basins, dams and storm drain facilities prevents minor storm problems from causing major flooding.

The District prepares and executes an annual routine maintenance plan that is extensive in its scope and level of detail. The documented plan for fiscal year 2005-2006 is three inches thick and includes individual plans for 24 channels. Each individual plan addresses environmental issues such as vegetation, wildlife, air quality, noise, and water quality as well as engineering and hydrology issues. As an example of the level of detail in the plans, Exhibit 1 shows the tasks identified for Hospital Creek, which originates in the foothills of the Santa Ynez Mountains and drains a 900-acre watershed capable of producing a 1,400 cubic feet per second flow during a 100-year-return-period precipitation event. The creek was inspected by District staff on April 30, 2005.

Exhibit 1. The Annual Maintenance Plan details the work to be done on each channel in preparation for winter storms. This is an excerpt from the 2005-2006 Plan for Hospital Creek.

#### **Engineering Analysis:**

Maintenance activities on Hospital Creek include obstructive vegetation removal and realignment of the creek just upstream of Calle Real. Obstructive vegetation removal will be performed to maintain the flood capacity of the flow area of the creek for protection of adjacent property. Obstructive vegetation removal will reduce the potential for plugging the relatively small bridge located at the upstream end of the Social Services building parking lot and the culvert under Calle Real and Highway 101. This bridge has plugged in the past resulting in localized flooding. Removing the material from the creek that is most likely to plug the bridge is recommended.

The lower section of Hospital creek, just upstream of Calle Real, is not aligned to flow straight into the culvert that passes water under Calle Real and Highway 101, which causes the flows to slow down and could cause erosion and localized flooding during high rainfall events. Realignment of the creek will allow for more efficient conveyance of flood flows and reduce the chance of flooding, erosion of the creek banks and plugging of the culvert.

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### **Project Description:**

#### Section 1:

A downed willow has fallen across the creek in this section. The tree will be cut up in small pieces and left on the banks.

#### Section 2:

A downed willow has fallen across the creek in this section. The tree will be cut up in small pieces and left on the banks.

#### Section 3:

A downed willow has fallen across the creek in this section. The tree will be cut up in small pieces and left on the banks.

#### Section 4:

Willow limbs are projecting into the active channel along a 200' section of the creek. The willow limbs will be trimmed and removed from the creek.

#### Section 5:

This section of Hospital Creek is out of alignment with the culvert that passes water under Calle Real and Highway 101. In order to fix the alignment, an excavator will work from the west bank to reshape the length of this section to remove the 90-degree turn in the creek located approximately 75 feet upstream from Calle Real. No native riparian species are growing along the section of creek to be realigned. Once the realignment is completed this section will be revegetated as described in Section 6.

#### Section 6:

Once the realignment is completed as described in Section 5, approximately 300 feet of the east and west banks will be revegetated with native riparian species. This will create 12,000 square feet of riparian habitat and will protect the banks from future erosion. In anticipation of this work, several hundred square feet of ice plant was removed from the east bank in 2004.

The District operates and maintains 22 debris basins on the creeks in the County. A debris basin is a specially constructed facility in the channel, upstream of property and floodplains, that collects silt, rocks, sand, and organic debris such as trees from the flowing water. Restraining this material in the debris basin prevents it from cascading downstream and potentially blocking drainage channels and causing flooding.

The District performs routine scheduled clearance and disposal of debris from the basins. Following a heavy rainfall District personnel inspect the basins and, where necessary, take immediate action to remove debris before the next storm arrives. During the heavy 2005 winter rains the Army Corps of Engineers cleaned five debris basins at the request of the District because District personnel would be unable to do the work quickly enough. Five-year permits were approved by regulatory agencies within the past three years to streamline the permitting process for routine debris control activities.

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After each severe winter, the District prepares a comprehensive report documenting its experience to provide a lessons-learned resource for future reference. Reports were prepared following the 1995, 1998, and 2005 flood seasons.

The Grand Jury finds that the channel maintenance program of the District is proactive, comprehensive, and well planned and documented. Lacking the credentials and experience to make such judgments, the Grand Jury did not attempt to assess the technical quality of either the plans or the work.

### Capital Improvement Projects

In addition to its annual maintenance activities, the District initiates major projects to construct solutions to flood control problems. Exhibit 2 lists a sample of the capital projects in the 2005-2006 Capital Improvement Plan.

Exhibit 2. Examples of projects in the 2005-2006 Capital Improvement Plan

Project	Description	Start Date	End Date	Estimated Total Cost
Carpinteria Salt Marsh	Flood control improvements to Franklin Creek and the Salt Marsh.	6/1/1997	10/31/2006	\$5,148,000
Mission Creek, Santa Barbara	Improve the channel with widenings and bridge replacements.	1/1/1994	9/30/2008	\$28,080,000
Foster Road Storm Drain, Orcutt	Construct 5,800 feet of underground storm drain along Foster Road.	10/1/1999	11/30/2008	\$1,150,000
Santa Maria River Levee Riparian Enhancement	Plant willow trees along sections of the levee that are vulnerable to river erosion.	10/1/2002	12/31/2008	\$492,000
Las Vegas / San Pedro Creeks, Goleta	Construct reinforced concrete box culverts to increase the capacity of the drainage system.	3/1/2000	6/30/2009	\$5,225,000
Bradley Channel, Santa Maria	Line two sections with a concrete trapezoidal channel.	7/1/2008	10/31/2009	\$1,323,000
Atascadero Creek, Goleta	Construct a sheetpile cutoff wall to protect the concrete slope.	7/1/2008	10/31/2009	\$810,000

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Project	Description	Start Date	End Date	Estimated Total Cost
Blosser Basin	Construct a pipe to drain the Basin to the Santa Maria River without allowing the water to flow within the Blosser Ditch.	7/1/2008	10/31/2009	\$334,000

The Board of Supervisors authorizes all improvement projects at public hearings. If the work is to be done in an incorporated city, the District obtains the appropriate city concurrence and permits as part of the planning process.

The District's maintenance and construction activities are reviewed for their environmental impacts in compliance with California Environmental Quality Act (CEQA) requirements. District maintenance activities are typically regulated by the following jurisdictions and regulations:

- Army Corps of Engineers and the Regional Water Quality Control Board pursuant to the Clean Water Act,
- California Department of Fish and Game pursuant to Section 1600-1616 of the Fish and Game Code,
- California Coastal Commission, County of Santa Barbara, City of Santa Barbara, and City of Carpinteria pursuant to the Coastal Act and corresponding local coastal plans.

The Grand Jury finds that the District plans and manages its capital improvement projects with attention to environmental concerns and inter-agency coordination. Again, the Grand Jury did not attempt to assess the technical quality of the plans or the work.

### Emergency Response

The District has developed and maintains an Operation Plan that specifies the responsibilities of key personnel during three phases of an emergency:

- imminent flooding
- acute flooding
- sustained emergency

In addition the District has developed and maintains a Flood Emergency Response Manual, which is updated annually with information including personnel, available

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heavy mobile equipment, vehicles assigned to the District, status of radio equipment, a calling chain, and an emergency numbers list.

During a period of heavy rain, the District performs the following activities:

- monitors rainfall and stream flows, including computer modeling and flood flow forecasting
- patrols the Santa Maria levee
- provides sandbags to the public
- responds to calls from the public

During flood events, District staff perform pre-planned routines such as the monitoring of all flood facilities and equipment and the operation of dams and channel gates, and they provide logistics support, field operations headquarters and emergency response.

Following a storm the District acts to return the flood control system to the state of readiness that existed prior to the storm, including the removal of debris from access roads, reservoirs, debris basins and channels, and reconstruction and repair as necessary.

Private sector services and equipment are often used to augment District resources for emergency debris removal and facilities repair. Repair of storm damage to District facilities on a rush priority basis is important since subsequent storm activity could further damage the facilities and areas outside the facilities. Delays in corrective measures would increase the potential for further losses to the public. Some of these emergency costs may be partially reimbursed by State or Federal disaster assistance, but from a cash flow standpoint the District must have emergency reserve funds immediately available for this purpose. The District has accumulated over \$1 million in a reserve account for emergency repairs in the South Coast flood zone.

The Grand Jury found a well-planned, tested emergency response capability for occasions when heavy flows do occur.

### **Dams**

The County of Santa Barbara water storage system comprises a series of reservoirs and dams constructed and maintained to catch and store runoff from precipitation during the rainy season of October to April. The trapping and storage of the rain water is vital, especially during the inevitable dry cycles when users can rely only on the storage of past seasons' remaining surplus.

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The reservoir system within the County of Santa Barbara includes a series of dams of various construction under the control of different governmental jurisdictions (see Exhibit 3). The most significant dams are Twitchell (Twitchell Reservoir), Bradbury (Lake Cachuma), Juncal and Gibraltar. Juncal and Gibraltar are dams upstream of Bradbury. Twitchell and Bradbury are control dams, with gates to allow controlled release of water downstream.

The U.S. Department of the Interior, Bureau of Reclamation, has jurisdiction over all the dams except Gibraltar, Juncal, and Alisal. However, the Santa Maria Valley Water Conservation District is responsible for the operation of Twitchell. Juncal and Gibraltar are included in Area 9, Southern Region, of the State of California Division of Safety of Dams. Juncal is the responsibility of the Montecito Water District while Gibraltar is the responsibility of the City of Santa Barbara. Alisal Reservoir is maintained by the Alisal Ranch, a private enterprise. Exhibit 3 shows the key characteristics of each of these dams.

Exhibit 3. Dams in Santa Barbara County

<b>Dam</b>	<b>Jurisdiction</b>	<b>Type</b>	<b>Construction Date</b>	<b>Capacity (Acre-Feet)</b>
Twitchell	Bureau of Reclamation	Earthfill	1956-1958	224,300
Bradbury	Bureau of Reclamation	Earthfill	1950-1953	190,409
Gibraltar	City of Santa Barbara	Concrete	1913-1922	7,264
Juncal	Montecito Water District	Concrete	1921-1930	5,291
Alisal	Alisal Ranch	Earthfill	1970	2,770
Lauro	Bureau of Reclamation	Earthfill	1951-1952	640
Glen Anne	Bureau of Reclamation	Earthfill	1950-1953	470
Carpinteria	Bureau of Reclamation	Earthfill	1951-1953	44

An acre-foot is 325,851 gallons of water, equivalent to the amount of water consumed annually by 10 people in an urban environment.

Dams can fail. The Teton Dam, an earthfill dam 44 miles northeast of Idaho Falls in southeastern Idaho, failed abruptly on June 5, 1976. It released nearly 300,000 acre feet of water, which flooded farmland and towns downstream with the eventual loss of 14 lives and with a cost estimated to be nearly \$1 billion.

The Grand Jury was concerned about the safety of the dams located in Santa Barbara County, especially during a period of heavy precipitation and runoff as well as upon

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the occurrence of a significant seismic event. To this end, members of the Grand Jury contacted responsible County, State and Federal officials knowledgeable about the condition of the dam system and conducted field visits to Bradbury Dam, at Lake Cachuma, and Twitchell Dam near Santa Maria.

The State of California Division of Dam Safety physically inspects Juncal and Gibraltar Dams no less than once a year. The Grand Jury learned that the state inspector often visits dams twice a year depending on their size, age, height, capacity and potential for damage.

The Bureau of Reclamation maintains a staff of “Dam Tenders” who manage the operation at Bradbury Dam. The Bureau is responsible for the constant oversight of all other Federal dams within Santa Barbara County as well. The Grand Jury’s field visit to Bradbury Dam made it apparent that once a potential problem is identified at a Federal dam, steps are taken to remedy the problem. For example, the Bureau in 1998 completed construction of a large berm at the base of Bradbury Dam to reinforce it against earthquake-induced slope failure. The bridge structure supporting the gates and providing access to the dam was also strengthened. The Bureau has an ongoing annual review schedule for all dams under its jurisdiction.

The information provided by the County of Santa Barbara Public Works Department-Water Resources Division, the State of California Division of Dam Safety and the Bureau of Reclamation reassured the Grand Jury of the structural and seismic integrity of the dam system in our County.

Although Bradbury Dam was built originally to create Lake Cachuma as a water supply resource, not as a flood control system, the Bureau and the District have taken steps to improve its effectiveness in controlling flooding in the Santa Ynez Valley. Originally the strategy was to spill water downstream in response to the rate of inflow. In a period of heavy inflow this could – and did – result in large releases. Data provided by Bureau personnel indicate that the peak release flow was typically about 90% of the peak inflow. Thus, a heavy inflow could result in excessive downstream flows in the Santa Ynez River.

With the objective to “flatten” the peak releases – lower peak flow over a longer interval – the District collaborated with the Bureau to develop the Modified Storm Operation procedure. Three techniques were assessed in the fall of 1997:

- Precautionary releases before a predicted storm (if the watershed is already wet)
- Pre-releases of measured precipitation (as the rain is falling, before runoff)
- Hold gate opening constant during peak inflow (follow the lake level up and down)

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These strategies were used in February 1998 and in three storms were found to reduce peak downstream flows by 40%. In 2005 the two peak releases were 53% and 61% of the respective peak inflows. The availability of better weather forecasting, real-time data from sensors, satellites, and radar about rainfall and inflows, and computer modeling made this innovation possible.

The Grand Jury was informed that the failure of Gibraltar Dam, upstream of Bradbury, would not pose a flood threat. Gibraltar holds about 14,000 acre-feet of water, less than 8% of the capacity of Lake Cachuma. Even if Gibraltar were to experience a sudden failure, the impact on Cachuma would be similar to that of a storm inflow. Indeed, on April 5, 2006 the inflow to Lake Cachuma resulting from recent rains was over 16,000 acre-feet of water, more than would be released by the failure of Gibraltar. This inflow was controlled without incident.

Twitchell Dam is both a flood control and water conservation dam. It stores floodwaters of the Cuyama River in Twitchell Reservoir, thus limiting potentially dangerous flows in the Cuyama, Sisquoc and Santa Maria Rivers. This water is subsequently released at a controlled rate to recharge the aquifer in the Santa Maria Valley Basin.

The Cuyama River, with its principal tributaries Alamo Creek and Huasna River, is the main source of water to the reservoir. The drainage basin, comprising approximately 1,135 square miles above Twitchell Dam, lies along the southern boundary of San Luis Obispo County and the northern edge of Santa Barbara County.

Twitchell Dam is an earthfill structure on the Cuyama River about 6 miles upstream from its junction with the Sisquoc River. The Bureau of Reclamation constructed Twitchell Dam and Reservoir, originally called Vaquero Dam and Reservoir.

Because the objective is to release water as quickly as it can be percolated into the Santa Maria Valley aquifer, Twitchell Reservoir is empty much of the time. Recreation and fishing facilities are not included in the project, though the Grand Jury was told that extreme skateboarders consider the overflow tunnel a superb (though illegal and dangerous) venue for their sport.

The Santa Maria Valley Water Conservation District operates the dam with the objective to both control flooding and maximize the recharge of the aquifer. One of the Water Conservation District's greatest challenges is the silt that flows into and accumulates in the reservoir. The silt is a very fine-grained clay that suspends readily in moving water but settles to the bottom in the reservoir's still water. The accumulation of silt in the reservoir reduces its capacity and, left alone, will eventually block the water inlet to the control gates.

The Water Conservation District has excavated the silt from around the inlet and told the Grand Jury it will do so again as necessary. Because this is an expensive process,

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an operational procedure is used to flush some silt downstream when opening the control gates. This procedure reduces the rate of silt accumulation in the reservoir, but it deposits the silt in the downstream channel with the potential to block and divert the downstream flows. The Water Conservation District is seeking funding to clear the downstream channel of the silt.

The Grand Jury recommends that the Santa Maria Valley Water Conservation District continue to address the silting issue at Twitchell Dam.

Although it was not originally believed that Twitchell Dam was located within one mile of a fault, a 1983 SEED Report (Safety Evaluation of Existing Dams) stated that recent seismotectonic studies suggested that "blind thrust" faults capable of quakes of a 7.0 (Richter Scale) or more may exist near Twitchell. The SEED report stated, furthermore, that based on descriptions of the dam's foundation materials consisting of poorly-graded, uncompacted sands and gravel, "there appears to exist a significant potential for seismic-induced liquefaction of the foundation of Twitchell Dam." These problems have since been mitigated and the dam's safety classification grade is satisfactory. The Grand Jury concludes that dam safety is carefully managed in the County, based on the existing construction of the dams; the ongoing program of physical inspections by highly qualified representatives of the County, State and Bureau of Reclamation; and the professional way in which the dams are operated.

### **Santa Maria Levee**

The Santa Maria River used to flood the City of Santa Maria during periods of heavy flow. At least five documented floods occurred there during the first half of the 20th century. As a result, the building code in Santa Maria formerly required that structures be built two feet or more above grade level. In 1959 the Army Corps of Engineers started construction of a levee to protect the City and nearby agricultural land from these floods. The levee was completed in 1963.

Although the Corps of Engineers built the levee originally, the Flood Control and Water Conservation District owns and operates it. Nevertheless, the Corps maintains oversight responsibility and inspects the levee annually.

The approximately 24 miles of Santa Maria levee is intended to protect the City of Santa Maria and the greater Santa Maria Valley from storm waters that drain from the Cuyama and Sisquoc River sheds into the Santa Maria River. The Santa Maria River flows within a broad, shallow, poorly defined riverbed. The average width of the riverbed is about 2,000 feet; at Suey Bridge it is about 1,100 feet.

Because the natural channel is so wide, flood flows do not fill the channel but meander within it, frequently changing direction and striking the levee and exposed riverbanks, and sometimes causing considerable damage to the levee and jeopardizing adjacent properties. Levee damage occurred in December 1966, January 1969,

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February 1980, and February 1998. In each of the first three damage events, the District was able to prevent a complete breach of the levee. In 1998, however, the Santa Maria River shifted course and struck directly against the north levee, causing a 1,000-foot breach near Bonita School Road and flooding of adjacent farmland (see Exhibit 4). The breach cost over \$1 million to repair.

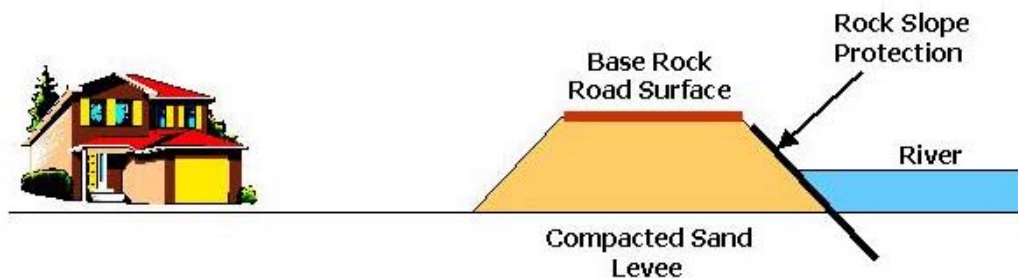
Exhibit 4. Photograph of the 1,000-foot breach in 1998 that flooded adjacent farmland.



Public officials expressed concern to the Grand Jury that there is a serious risk of such a breach adjacent to the City of Santa Maria. The Grand Jury visited the levee to see the situation first-hand, reviewed a report prepared in January 2006 by the District with technical assistance from Penfield & Smith Engineers, Inc., and interviewed officials in the Public Works Departments of the County and the City of Santa Maria.

The Santa Maria levee is a berm constructed of sand and gravel taken from the river channel and faced with rock on the slope facing the riverbed. Its height varies from 16 to 22 feet. See Exhibit 5.

Exhibit 5. The levee is a berm constructed of sand and gravel and faced with rock.



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Unlike the impact of Hurricane Katrina on the New Orleans levees in 2005, there is virtually no danger of the Santa Maria River overtopping the Santa Maria levee. Instead, failure has occurred, and is likely to occur in the future, when the meandering flow of the river strikes directly against the levee. When this happens, a local scour action undermines the protective rock at the toe of the levee. Once this protective layer slumps and fails, there is only compacted earth to resist the water. If the flow continues, it quickly scours and erodes the exposed material to create a localized breach. Unless the breach is identified and filled immediately, it rapidly grows both up- and downstream, allowing the river to inundate the area behind the levee as happened in 1998. Exhibit 6 shows the estimated inundation area in the event of a breach near the Suey Bridge superimposed on an aerial photo of Santa Maria. A large area of the city would endure flooding should such a breach occur.

Exhibit 6. A levee breach near the Suey Bridge would flood a large portion of the City of Santa Maria.



District staff patrol the levee when the river is flowing. Two people patrol in a vehicle, with one driving and one looking for impending failure (using a spotlight at night). They drive the levee about once each hour, 24 hours per day, when the flow is heavy. After the river recedes they patrol twice each day. When a potential breach is spotted, rock is trucked in to reinforce the levee.

The Santa Maria levee is at risk primarily because the rock used on its face is deteriorating. Because the core of the levee is primarily sand, the rock face is the

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only material that protects the levee from failure. Even during construction, the rock facing on portions of the levee rapidly deteriorated, resulting in the Corps of Engineers replacing the rock facing in those areas.

The original rock facing has not been replaced or augmented along most of the levee, except near the Suey Bridge. Just west of the bridge large limestone rocks from near Lake Cachuma have been set on the levee face – dense, hard rocks, ideally suited to the purpose. In contrast, the rock that was originally used on the levee is basalt with quartz veins running through it. This rock spontaneously decomposes into smaller fragments by fracturing along fault lines, presumably due to the action of moisture and thermal stress. The smaller the pieces of rock, the less protection the rock provides to the face of the levee.

When the Grand Jury visited the levee, the deterioration of the rock facing was clearly visible. The contrast between the original rock and the reinforced area near the Suey Bridge was striking. The levee has failed before, the rock facing continues to deteriorate, and the City of Santa Maria is at risk.

The District is aggressively pursuing protective measures to increase the reliability of the levee. The study report identifies measures appropriate to each segment of the levee, resulting in a total cost estimate of \$38.25 million. Of this amount \$34.34 million is required for just two segments, between Bradley Canyon and Suey Road and between Suey Road and Blosser Road. These segments protect the City of Santa Maria from inundation.

The District is seeking State and Federal funding for this work, working with elected officials and the Corps of Engineers to gain support. During the preparation of this report in March 2006, newspaper articles have appeared reporting that State and Federal officials are paying increased attention to the safety of the Santa Maria levee.

Until a more permanent reinforcement of the levee can be constructed, the District is pursuing interim solutions, including the following:

- Planting willow trees in the riverbed to control river flows at the levee to velocities that will not scour its face or toe.
- Installing chain link fencing in the riverbed along the levee to dissipate the energy of the flow at the levee face.
- Cutting a pilot channel in the riverbed to keep low flows in the middle of the river and away from the levee.
- Adding fresh rock to the levee face, the strongest interim solution but also the most costly.

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The District has a reserve account for the levee of about \$1 million. Even if the District will eventually be reimbursed by State or Federal government sources, this reserve account allows the District to immediately fund the response to emergency situations.

On a lighter note, the District has developed a creative solution to controlling ground squirrels, whose burrows can weaken the levee. There are marker poles along the levee that serve as mileposts for reporting position. When the ground squirrels became a problem and poison was an undesirable solution, the District placed perches on the marker poles for raptors. Now hawks and other birds of prey keep the squirrel population under control, though poison bait may be used if natural measures prove inadequate.

### **FINDINGS**

#### **Finding 1**

The channel maintenance and capital improvement program of the District is proactive, comprehensive, and well planned and documented.

#### **Finding 2**

The District has a well-planned, tested emergency response capability for occasions when heavy flows do occur.

#### **Finding 3**

Dam safety is carefully managed in the County, based on the existing construction of the dams; the ongoing program of physical inspections by highly qualified representatives of the County, State and Bureau of Reclamation; and the professional way in which the dams are operated.

#### **Finding 4**

Silt accumulation in Twitchell Reservoir and the downstream channel is an ongoing problem.

#### **Finding 5**

The deterioration of the rock facing on the Santa Maria levee exposes the City of Santa Maria to the risk of widespread flooding.

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## RECOMMENDATIONS

### Recommendation 1

Now that a comprehensive engineering study of the Santa Maria levee is available, the funding to reinforce the levee should be secured and applied to the solutions recommended in the study report.

### Recommendation 2

The Santa Maria Valley Water Conservation District should continue to address the silting issue at Twitchell Dam.

## REQUEST FOR RESPONSE

In accordance with Section 933(c) of the California Penal Code, each agency and government body affected by or named in this report is requested to respond in writing to the findings and recommendations in a timely manner. The following are the affected agencies for this report, with the mandated response period for each:

### Santa Barbara County Board of Supervisors – 60 days

Finding	5
Recommendation	1

### Santa Barbara County Public Works Department – 90 days

Findings	1, 2, 3, 4, 5
Recommendations	1, 2

### Santa Maria Valley Water Conservation District – 60 days

Finding	4
Recommendation	2

### Public Works Department of Santa Maria – 90 days

Finding	5
Recommendation	1