JOINT EMERGENCY ACTION PLAN FOR SEVERE STORM AND FLOOD RESPONSE IN CITY OF SAN JOSÉ

VOLUME 2 – APPENDICES

Last Revised:

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SANTA CLARA VALLEY WATER DISTRICT

VOLUME 2 – APPENDICES

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STRUCTURE OF THIS EMERGENCY ACTION PLAN

The plan is organized in three sections split between two volumes:

BASE PLAN

The Base Plan identifies the roles, responsibilities and actions assigned to the Multi-Agency Coordination (MAC) Group and is included in Volume 1.

ATTACHMENTS

Attachments are in Volume 1 and include information and checklists useful in any Severe Storm or Flood Incident.

APPENDICES

Provides specific details on each water way. Volume 2 of the EAP contains Appendices A through F.

ACRONYMS

Readers of this plan may find it useful to understand the Acronyms used in the document.

Acronym	What is it
AC	Agency Coordinator
ALERT	Automated Local Evaluation in Real Time
AP	Action Plan
AR	Agency Representative
CalOES	California Office of Emergency Services
City	City of San José
DCC	Departmental Command Center
DOC	Department Operations Center
DWR	California Department of Water Resources
EAP	Joint Emergency Action Plan Emergency Action Plan for Severe Storm and Flood Response in City of San José Volumes 1 & 2
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPIWCC	Emergency Public Information Warning Core Capability
FEMA	Federal Emergency Management Agency
FIT	Field Information Team
IAP	Incident Action Plan
IC	Incident Command(er)
ICS	Incident Command System
IPAWS	Integrated Public Alert Warning System
JIC	Joint Information Center
JIS	Joint Information System
LFO	Lookout field observation
LHMP	Local Hazard Mitigation Plan
LRAD	Long Range Acoustical Device
MAA	Mutual Aid Agreement
MAC	Multi-Agency Coordination
MAC Group	Multi-Agency Coordination Group
MEOC	Mobile Emergency Operations Center
NWS	National Weather Service
OEM	Office of Emergency Management
OES	Office of Emergency Services
PIO	Public Information Officer
SME	Subject Matter Expert
UC	Unified Command(ers)
Valley Water	Santa Clara Valley Water District
vMAC	Virtual Multi-Agency Coordination Group

GLOSSARY OF TERMS

Readers of this plan may find it useful to understand some terms that may be used in the Joint Emergency Action Plan or may be used before or during an event or training exercise.

TERM	DEFINITION
After Action Report (AAR)	An After Action Report (AAR) is the final product of an exercise or actual event. The AAR has three components: 1. Summary of exercise objectives and actual events; 2. Observations and recommendations based on the exercise objectives or actual event as associated with the capabilities and tasks; and 3. A section that identifies specific corrective/improvement recommendations.
Boil/Seepage	When the floodwaters are higher than the land, the groundwater, under pressure from the river, exerts an upward pressure on the land inside the levee or floodwall. With time this increased “head pressure,” as it is known to engineers, can drive water through or under a levee/floodwall to the surface as seepage. When flood waters remain high for a long time though, seepage can increase in volume and velocity and begin the destructive process of moving sand/soil from the foundation, through the ground, to the surface, forming boils.
Channel Capacity	The maximum flow which can pass through a channel without overflowing the banks.
Channel Improvements or Channelization	The improvement of the water carrying capacity or flow characteristics of a natural or artificial channel by clearing, excavation, bank stabilization or other means. Also referred to as channel alterations.
Collaboration Software	Collaboration software enables the sharing, processing and management of files, documents and other data types among several users and/or systems. This type of software allows two or more remote users to jointly work on a task or project and/or to view the same data.
Community Rating System (CRS)	A program developed by FEMA to provide incentives for those communities in the Regular Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.
Critical Facility	For some activities and facilities, even a slight chance of flooding is too great a threat. Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, and similar facilities. These facilities should be given special consideration when formulating regulatory alternatives and floodplain management plans. A critical facility should not be located in a floodplain if at all possible.
Cubic Feet per Second (CFS)	The rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and equivalent to 7.48 gallons per second or 448.8 gallons per minute.
Design	The term “design flood” is used to denote the maximum flood flow used for design and operation of flood control structures and other protective measures. The Design is often set as the 100 year or 1% flow rate, but it may be set at other levels.

TERM	DEFINITION
Design Stage	The term “design stage” is used to denote the maximum level (generally denoted in feet) above the channel bottom or above sea level at the specific location for which flood control structures and other protective measures are designed. The design stage is based on a design that is often set as the 100 year or 1% flow rate, but it may be set at other levels.
Design Storm	Design storm means a hypothetical discrete rainstorm characterized by a specific duration, temporal distribution, rainfall intensity, return frequency, and total depth of rainfall.
Discharge	The amount of water that passes a point in a given period of time. Rate of discharge is usually measured in cubic feet per second (cfs).
Emergency Communications Plan	An emergency communications plan (EC plan) is a document that provides guidelines, contact information and procedures for how information should be shared during all phases of an unexpected occurrence that requires immediate action.
Erosion	The collapse, undermining or subsidence of land along the bank of a body of water. Erosion is caused by waves or currents of water and can result in flooding or failure of adjacent structures.
Federal Emergency Management Agency (FEMA)	The Federal agency under which the National Flood Insurance Program (NFIP) is administered. In March 2003, FEMA became part of the newly created U.S. Department of Homeland Security. An agency within the U.S. Department of Homeland Security charged with responding to Presidentially-declared disasters.
Flash Flood or Flashy System	A flood that reaches its peak flow in a short length of time (hours or minutes) after the storm or other event causing it. Often occurs in watersheds with mostly storm drain runoff and is often characterized by high velocity flows.
Flood Control	Keeping flood waters away from specific developments and/or populated areas by the construction of flood storage reservoirs, channel alterations, dikes and levees, bypass channels, or other engineering works.
Flood Fighting	Actions taken immediately before or during a flood to protect human life and to reduce flood damages such as evacuation, emergency sandbagging and diking, and provision of assistance to flood victims.
Flood Flow	The discharge at which a body of water begins to flow over its banks and onto dry land, usually expressed in cubic feet per second (cfs).
Flood Forecasting	The process of predicting the occurrence, magnitude and duration of an imminent flood through meteorological and hydrological observations and analysis.
Flood Frequency	A statistical expression of the average time period between floods equaling or exceeding a given magnitude. For example, a 100-year flood has a magnitude expected to be equaled or exceeded on the average of once every hundred years; such a flood has a one-percent chance of being equaled or exceeded in any given year . Often used interchangeably with “recurrence interval”.
Flood Insurance Rate Map (FIRM)	An official map of a community on which the Federal Insurance Administration has delineated the area in which the purchase of flood insurance is require under the National Flood Insurance Program.
Flood Stage	The level at which a body of water begins to flow over its banks and onto dry land, usually expressed in feet above channel bottom or above sea level at a specific location.

TERM	DEFINITION
Flooding – Fluvial or Riverine	Fluvial, or riverine flooding, occurs when excessive rainfall over an extended period of time causes a river to exceed its capacity.
Flooding – Surface or Local Drainage	When rain hits the ground quicker than it can drain or flow away, water builds up and develops the potential to flood streets and properties. In some places, it forms isolated puddles in ground depressions and in others it accumulates and flows downhill towards streams. Typically, surface water flood events have localized effects, impacting properties in close proximity to where the rain fell and for a short amount of time until it can drain into a stream, be pumped into a stream, percolate into the ground, or evaporate.
Floodplain	Any land area susceptible to being inundated by floodwaters from any source. The channel of a stream or watercourse is part of the floodplain.
Floodplain Management	The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to, emergency preparedness plans, flood-control works and floodplain management regulations. Floodplain management is a decision-making process that aims to achieve the wise use of the nation's floodplains. "Wise use" means both reduced flood losses and protection of the natural resources and function of floodplains.
Floodplain Management Regulations	A general term for the full range of codes, ordinances, and other regulations relating to the use of land and construction within stream channels and floodplain areas. The term encompasses zoning ordinances, subdivision regulations, building and housing codes, encroachment line statutes, open-space regulations, and other similar methods of control affecting the use and development of these areas.
Freeboard	A margin of safety added to the flood elevation to account for waves, debris, miscalculations, or lack of data. This term is often used when describing distance of the water surface to top of bank of a stream or in determining the level at which a structure's lowest floor must be elevated or floodproofed to be in accordance with state or community floodplain management regulations.
High Flow Stage	The depth of water when a stream flood control facility is nearing flood stage or design stage.
Incident Commander	The Incident Commander is the individual responsible for all incident response activities, including the development of strategies and tactics and the ordering and release of resources. The Incident Commander has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.
Levee or Dike	Permanent or temporary mounds of earth (often engineered with maintenance roads on top) and/or fill, such as sand, sandbags or gravel, piled along a body of water to prevent it from overflowing onto dry land.
Long Range Acoustical Device (LRAD)	LRAD is a high powered speaker system that emits a shrill sound followed by spoken instructions such as “shelter in place” or “flooding is imminent, evacuate now”. The speakers are strategically mounted to cover wide areas as needed. This system cannot only wake you up, but inform you as to what's going on.

TERM	DEFINITION
Multi-Agency Coordination (MAC)	The primary function of MAC is to coordinate activities above the field level and to prioritize the incident demands for critical or competing resources, thereby assisting the coordination of the operations in the field. A MAC consists of a combination of elements: personnel, procedures, protocols, business practices, and communications integrated into a common system. For the purpose of coordinating resource and support between multiple jurisdictions, a MAC can be implemented from a fixed facility or by other arrangements outlined within the system.
National Flood Insurance Program (NFIP)	The program of flood insurance coverage and floodplain management administered under the Act and applicable federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.
Recovery Activities	Activities that include the development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; individual, private-sector, nongovernmental, and public-assistance programs to provide housing and to promote restoration; long-term care and treatment of affected persons; additional measures for social, political, environmental, and economic restoration; evaluation of the incident to identify lessons learned; post-incident reporting; and development of initiatives to mitigate the effects of future incidents.
Stage or Gauge Height	The water-surface elevation referred to some arbitrary datum. The stage or gauge height represents the water-surface elevation above the channel bottom elevation at a specific location. For example, the elevation of the datum (channel bottom) of the gauge might be 100.00 feet, which, when added to a stage of 12.50 feet, represents a water-surface elevation of 112.50 feet at that location.
Top of Bank	Top of Bank means the point along the bank of a stream where an abrupt change in slope is evident, and where the stream is generally able to overflow the banks and enter the adjacent floodplain during an annual flood event. For steep and narrow valleys, it will generally be the same as the top of slope.
Unified Command	A unified command is established when incidents under an area command are multi-jurisdictional. It is a method for all agencies or individuals who have jurisdictional responsibility, or in some cases who have functional responsibilities at the incident, to contribute to: determination of overall objectives for the incident, and selection of strategies to achieve the objectives.

APPENDIX A
Coyote Creek

PURPOSE

This Appendix to the City, Valley Water and other Stakeholders Joint Emergency Action Plan (EAP) for Severe Storms and Flooding is meant to provide additional guidance specific to Coyote Creek. It will not duplicate information already in an EOP or the EAP, but will provide Coyote Creek specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

COYOTE CREEK DESCRIPTION

The Coyote watershed is located on the east side of Santa Clara County and encompasses an area of over 320 square miles, including three reservoirs located in the upper watershed areas. The watershed drains from south to north and includes the entire City of Milpitas, eastern portions of San José, portions of Morgan Hill and unincorporated lands within eastern Santa Clara County. Water flows into Coyote Creek through local drainage systems and through 29 tributaries, of which Upper Penitencia Creek, Berryessa Creek, Lower Silver Creek, Upper Silver Creek and Fisher Creek flow directly into Coyote Creek below the reservoirs.

Below the reservoirs, Coyote Creek is about 42 miles in length and is crossed by Highways 101 and 237, Interstates 880 & 280, Metcalf Road, Silver Creek Valley Road, Yerba Buena Road, Capitol Expressway, Tully Road, Story Road, East William Street, San Antonio Road, Santa Clara Street, Julian Street, Mabury Road, Berryessa Road, Oakland Road, Brokaw Road, Montague Road, and Tasman Drive.

About 32 miles of Coyote Creek is unimproved, much of it heavily vegetated, with a variety of adjacent land uses, such as, golf courses, open space, parks, residences and businesses. Over 5 miles of improvements between the San Francisco Bay and Montague Expressway were constructed in 1995 to protect North San José, Alviso, and Milpitas from a 100-year flood. In addition, a short section of levee and floodwall were constructed to provide about 25-year flood protection for the Golden Wheel and South Bay Mobile Home Parks downstream of Berryessa Road. And there have been other modifications that add up to about 5 miles of additional improvements.

COYOTE CREEK FLOOD THREATS

The flood prone areas exist where the creek is in a more natural state, with significant vegetation, and are under a variety of ownerships that include a significant amount of private property. In the improved portions of the creek, there is a comprehensive management program to provide the design objectives of the modified creek. The unimproved areas of the creek do not have a comprehensive management program due to lack of: environmental clearances, public ownership, and a defined level of flood protection.

The two most recent flood events along Coyote Creek since the upstream reservoirs were constructed occurred in 1997 and 2017. Both of these floods primarily impacted three flood hotspots along the creek: (1) Golden Wheel and South Bay Mobile Home Parks downstream of Berryessa Road; (2) a single-family residential neighborhood near East William Street; and (3) a high-density residential neighborhood in the Rock Springs Drive area downstream of Tully Road. These floods caused considerable damage requiring evacuations and demonstrated the inherent uncertainty in estimating flood flows in a natural stream system.

In addition to the three main flood hotspots, there are other locations that are considered flood hotspots or may be considered a flood risk requiring attention during high flow events. The main areas of concern are included in the Coyote Flood Thresholds & Condition Levels section, but areas still at risk that are not considered flood hotspots are the improved reaches downstream of Montague Expressway that are protected by levees. Because of the flood risk, these areas are important to monitor and inspect before, during and after storm events These areas are shown on FEMA Flood Insurance Rate Maps (FIRMs) as Zone X – Area with Reduced Flood Risk due to Levee. The FIRMs can be found at https://msc.fema.gov/portal/search.

FLOOD EVENT DETECTION

There are several detection methods that are described in the EAP that include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Coyote Creek are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Coyote Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations on Coyote Creek and for all major tributaries downstream of the reservoirs. Upstream gauges will provide valuable information for flood events occurring downstream and may give many hours' notice to take action. Table 1A shows approximate travel times between key points along Coyote Creek.

The following is a summary of the current stream gauge program.

1. Annually sites will be prioritized for manual gauging and teams are assigned.

2. After every high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration on Coyote Creek gauges was done after the 1997 event and again after the 2017 event.

3. ***The Madrone gauge is considered more accurate for prediction downstream flood depths when Anderson reservoir spills due to the channel characteristics.*** The Edenvale gauge is sometimes used and is part of the NWS forecast modeling; however, it has a lower level of confidence due to potential backflow conditions.

APPENDIX A
Coyote Creek (continued)

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots and facilities that should be visually checked during high flows. Supplementing with visual observations from staff deployed in the field (i.e., Field Information Teams) and other field reporting is an important component to detection.

To allow additional information to be accurately gathered, several visual stream stage monitoring locations have been installed for observations. These are located at:

Rock Springs:

- Lookout location is driveway entrance to stables.
- The 'circuit' for this monitoring station will include the entire Rock Springs area, including Bevin Brook Court.

East William Street:

- Stage gauge installed on pedestrian bridge.
- Lookout location will be from the vehicular bridge.
- Circuit would include William Street Park, Selma Olinder Park, school, and surrounding neighborhood.

Mabury Road:

- Stage gauge installed on middle pier of the bridge.
- Lookout location on the northeast side.
- Circuit would include Watson Park, City Yard, Trailer Park and Truck Driving School.

Berryessa Road:

- Stage gauge installed on bridge pier.
- Lookout location on northeast side by trailhead.
- Circuit would include Industry areas on west side of the creek and the Mobile Home Park.

Charcot Road:

- Stage gauge installed on bridge pier.
- Lookout location can be on either side of the creek.
- Circuit would be the bridge location.

Valley Water operates Field Information Teams (FITs) that are assigned to specific locations during storms and high flow events to provide this valuable information. In addition, the City also deploys FIT teams in a coordinated way to assure that all critical locations are being monitored. Locations of FIT deployment by the City and Valley Water may overlap during storm and flood events. The MAC Group will coordinate this effort through the Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Valley Water Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change
2. Known Flood Hot-Spots (Attachment 11 pages 51-56)
3. Real-time Flooding—documenting flooding
4. Bridge Piers—checking for debris blockages
5. Trash Racks—checking for debris blockages
6. Mobile Home Park Levee downstream of Berryessa Road—check for stability
7. Sandbag sites—checking for supply and access issues
8. Previously repaired or other project sites—checking for performance
9. Raw water facilities—dams and canals

COYOTE FLOOD CONDITION LEVELS AND SEVERITY

Sometimes an event is a flash flood that occurs suddenly without much early notice. However, with weather forecasting and Coyote Creek modeling there is often an ability to estimate flood events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures, however, this information should be used as guidance only and not with absolute certainty.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response and a level of potential severity for areas subject to flooding to assist the Agency's in planning and implementing appropriate actions. Because of the uncertainties of modeling in the future, a condition of Watch will be used when flood stage is estimated about 24 to 72 hours or more in the future. If flooding is estimated within about 24 hours, the threat level will be elevated to Warning. In addition, an unexpected situation may occur during high flows that may result in a change in condition level (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level).

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

When the threat level is at a Watch or Warning, there is an expectation that flooding will occur or is occurring at some locations. The severity of the situation at specific locations is determined by the flood stage. The areas subject to flooding for different stream stages are estimated utilizing hydraulic models and flood maps from the 1997 and 2017 floods.

Flood severity categories are defined by the NWS as:

Action	An established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
Moderate Flooding	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

A 2017 flood inundation map of Coyote Creek is shown in Figure 1A and the associated Flood Thresholds Table 2A on the following page. The map is the Federal Emergency Management Agency (FEMA) 1 percent flood map. This map is based on the best available information and modeling when it was created and should be considered approximate due to the difficulty in estimating an actual event and the changing conditions of the creek.

Table 3A is a flood severity table for the Madrone Gauge that is used to estimate areas that will be subject to flooding on Coyote Creek. Mapping associated with this table will be provided to Agency Stakeholders. By utilizing the Table 1A for travel times and actual measurements at Madrone, the time for a flood flow to reach a given location can be estimated.

The flood stage can either be estimated by using weather forecasts to model stream depths at that location or may be based on actual measurements. This information would be used to establish Condition Levels and Severity Levels for specific areas subject to flooding. Valley Water and City will coordinate with the National Weather Service to be consistent in the threat level and severity category. Below are examples of how the tables should be used.

EXAMPLE 1

Situation: Stream depth at the Madrone gauge is currently at 5 feet and estimated to reach 10 feet in 24 hours.

Analysis: Using Table 3A the 5-foot stage is below flood stage, however, the Flood Severity for a 10-foot stage predicted to occur in 24 hours would be described as **Moderate Flooding**. And, because the 10-foot stage is expected in 24 hours at Madrone Gauge and all travel times to flood hotspots are less than 17 hours from this gauge, the Condition Level would be set as **Flood Watch** (24 to 72 hours). The specific areas subject to flooding are described in Table 3A for 10-foot stage and below.

EXAMPLE 2

Situation: Stream depth at the Madrone gauge is currently measured at 13 feet.

Analysis: Table 3A describes the Flood Severity as **Major Flooding** for a 13-foot stage at the Madrone gauge. And, the Condition Level should be set as **Flood Warning**, since travel times shown on Table 1A are less than 24 hours.

EXAMPLE 3

Situation: Stream gauge at William Street Bridge is observed to be at 23 feet.

Analysis: Using information from Table 2A, the Condition Level would be **Flood Warning** for ID#'s 4a & 4b (three low-lying structures on 17th Street along the creek bank and the park east of Coyote Creek), and **Flood Watch** for ID# 4c (low lying homes on the west side of Coyote Creek).

The figures and tables on the following pages identify flood thresholds and triggers for actions at the flood hot-spots.

Notifications and Activity/Actions: Based on the condition level and flood severity level, notification activity/actions will be taken by both the City, Valley Water and other Stakeholders. The level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

It should be noted that a future project is planned to allow Valley Water to significantly increase Anderson Dam outlet capacity. This will allow Valley Water to lower water levels rapidly and provide more flood storage. However, the high discharge capacity will increase base flows resulting in an increase in water elevations in the downstream reaches. Prior to the project completion, Anderson Dam outlet discharge thresholds should be developed to provide guidance for flood releases. The following are tables providing guidance on the types of notifications and actions that should take place for Coyote Creek.

APPENDIX A
Coyote Creek (continued)

INFRASTRUCTURE AT RISK

There are important infrastructure and facilities at risk of flooding. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. The facilities below are within the area where people, property, and infrastructure may be at risk:

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOL	Olinder Elementary School San José Unified School District	890 East William Street San José, CA 95116	(408) 535-6000
	McKinley Elementary School Franklin-McKinley School District	651 Macredes Avenue San José, CA 95116	(408) 283-6000
	San José High School San José Unified School District	275 North 24th Street San José, CA 95116	(408) 535-6000
	Empire Gardens Elementary School San José Unified School District	1060 East Empire Street San José, CA 95112	(408) 535-6000
UTILITIES	PG&E Metcalf Transmission Substation	150 Metcalf Road San José, CA 95138	(800) 743-5000
OTHER	Hibbit's Family Stables	1896 Senter Road San José, CA 95112	(408) 998-2872 or (408) 478-9182

APPENDIX A
Coyote Creek (continued)

TABLE 1A
Coyote Creek Travel Times

Estimated Peak Travel Times for 2017 February Flood Event (rounded to the nearest half hour)											
	Madrone Gauge (Anderson Spillway)	**Coyote Creek Golf Drive**	**Edenvale Gauge**	**Singleton Road Crossing**	**Tully Road**	**Rock Springs**	**East William Street**	**Watson Park**	**Berryessa Road**	**South Bay MHP**	**Charcot Road**
Madrone Gauge (Anderson Spillway)	-	-	-	-	-	-	-	-	-	-	-
Coyote Creek Golf Drive	4:00	-	-	-	-	-	-	-	-	-	-
Edenvale Gauge	5:30	1:30	-	-	-	-	-	-	-	-	-
Singleton Road Crossing	8:00	4:00	2:30	-	-	-	-	-	-	-	-
Tully Road	10:00	6:00	4:30	2:00	-	-	-	-	-	-	-
Rock Springs	10:30	6:30	5:00	2:30	0:30	-	-	-	-	-	-
East William Street	13:00	9:00	7:30	5:00	3:00	2:30	-	-	-	-	-
Watson Park	15:00	11:00	9:30	7:00	5:00	4:30	2:00	-	-	-	-
Berryessa Road	15:30	11:30	10:00	7:30	5:30	5:00	2:30	0:30	-	-	-
South Bay MHP	16:00	12:00	10:30	8:00	6:00	5:30	3:00	1:00	0:30	-	-
Charcot Road	17:00	13:00	11:30	9:00	7:00	6:30	4:00	2:00	1:30	1:00	-
Highway 237 USGS Gauge	17:30	13:30	12:00	9:30	7:30	7:00	4:30	2:30	2:00	1:30	0:30

Disclaimer: The peak travel times in this table are based on data collected during the February 2017 flood event. Flood may happen before flow peaks. The data may be preliminary and should be used for general analysis purposes. Use care while interpreting results.

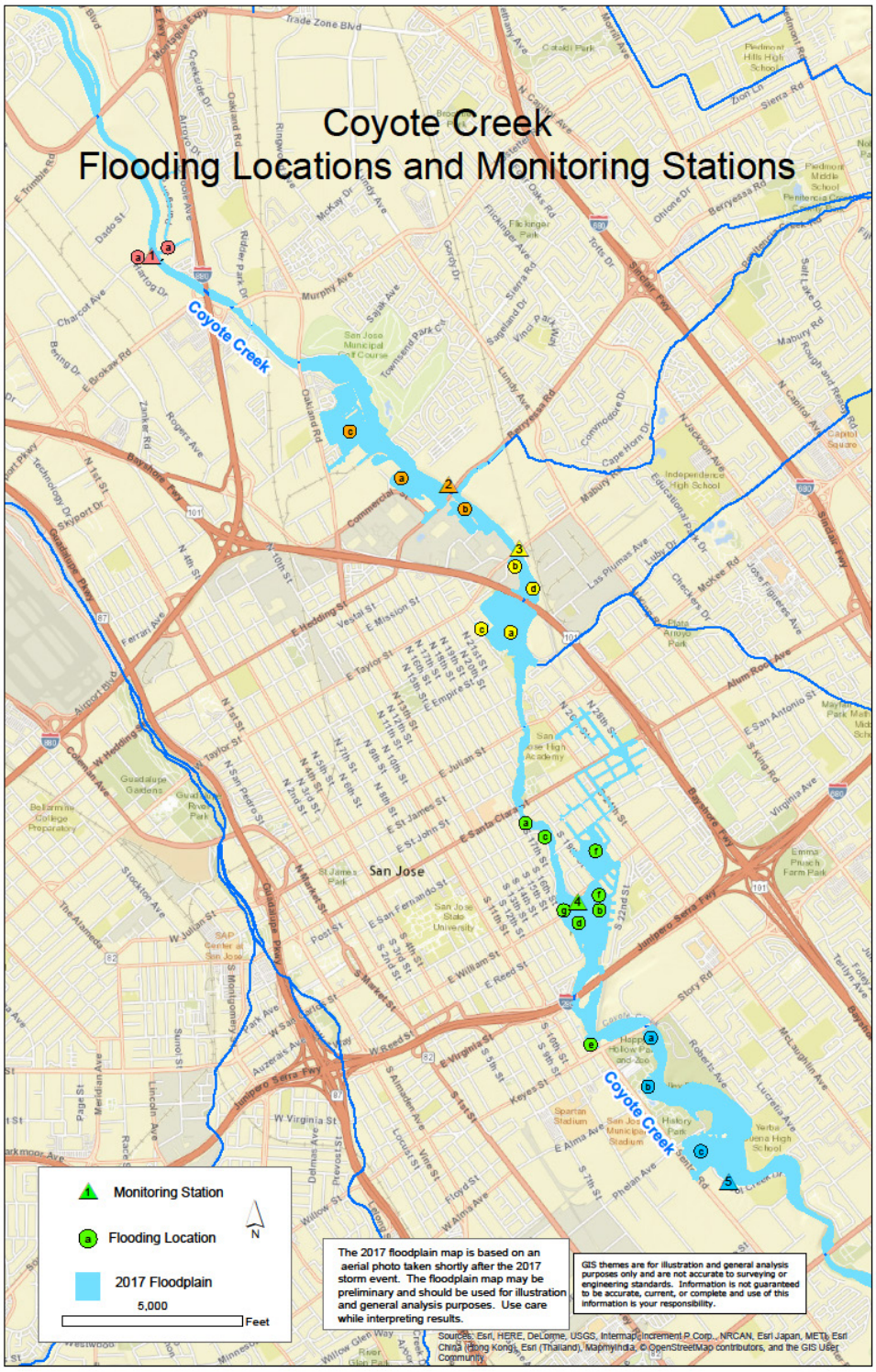


FIGURE 1A
Coyote Creek Flooding Locations and Monitoring Stations

TABLE 2A
Coyote Creek Flood On-Site Monitoring Thresholds

ID#	Index Location	Flooding Description	FLOOD THREAT STAGE AT MONITORING LOCATION				MONITORING LOCATIONS	PHOTO
			50% Capacity	70% Capacity	100% Capacity	2017 Flood High Water Mark		
1a	Charcot	Charcot Bridge overtops, flooding in streets and eventually threatening nearby businesses.	14’ to 15’	16’ to 17’	18’ to 1’9’	18.9’	Charcot Road Bridge	
2a	Downstream Berryessa Rd—Industrial	Businesses west of Coyote Creek floods. Automotive junkyard and concrete plant at risk.	5’ to 6’	6’ to 7’	8 ‘to 9’	16.1’	Berryessa Road Bridge	
2b	Upstream Berryessa Rd—Industrial	Industrial area west of Coyote Creek floods threatening businesses.	10’ to 11’	12’ to13’	13’ to 14’			
2c	Mobile Home Parks	Levee to the west of Coyote Creek overtops, flooding streets and homes. Businesses near the railroad tracks at risk.	12’ to 13’	14’ to 15’	15’ to 16’			
3a	Watson Park	Dog park begins to flood first, followed by the Watson Park.	12’ to 13’	13’ to 14’	15’’to 16’	22.0’	Mabury Road Bridge	
3b	RV Storage Lot	RV Lot west of Coyote Creek flooded.	13’ to 14’	16’ to 17’	18’ to 19’			
3c	Watson Park Neighborhood	Streets immediately to the west of Watson park begin to flood.	15’ to 16’	18’ to 19’	20’ to 21’			
3d	CSJ Mabury Yard	Coyote Creek overtops the east bank, flooding the city of San José Yard.	17’ to 18’	19’ to 20’	22’ to 23’			

ID#	Index Location	Flooding Description	FLOOD THREAT STAGE AT MONITORING LOCATION				MONITORING LOCATIONS	PHOTO
			50% Capacity	70% Capacity	100% Capacity	2017 Flood High Water Mark		
4a	17th Street—Lowest Homes	Three low-lying structures begin to flood.	15’ to16’	18’ to 19’	20’ to 21’	33.3’	William Street Bridge	
4b	Selma Park	Park east of Coyote Creek begins to flood.	18’ to 19’	21’ to 22’	24’ to 25’			
4c	17th St & Arroyo Way	Several low-lying homes located very near the Creek on the west side begin to flood.	19’ to 20’	22’ to 23’	25’ to 26’			
4d	William Street Park	Coyote Creek Trail & Park, including Olinder School baseball field, begin to flood.	22’ to 23’	25’ to 26’	28’ to 29’			
4e	NE of 12th & Keyes Streets	Car ports – located on the first floor of two-story apartment buildings – begin to flood.	14’ to 15’	16’ to 17’	17’ to 18’			
4f	Olinder Neighborhood and School	Selma park fills and overflows to the northeast, flooding streets, the school, and homes. Water does not return to creek and flows northeasterly through streets.	26’ to 27’	29’ to 30’	31’ to 32’			
4g	Area northwest of E. William St.	E. William St. overtops on the west side of Coyote Creek, flooding homes, backyards, and streets.	27’ to 28’	30’ to 31’	32’ to 33’			

ID#	Index Location	Flooding Description	FLOOD THREAT STAGE AT MONITORING LOCATION				MONITORING LOCATIONS	PHOTO
			50% Capacity	70% Capacity	100% Capacity	2017 Flood High Water Mark		
5a	Happy Hollow Zoo	Low lying areas, including animal enclosures begin to flood.	13’ to 14’	15’ to 16’	17’ to 18’	20.6’	Rock Springs Stable Drive	
5b	Kelley Park	Park begins to flood.	14’ to 15’	16’ to 17’	17’ to 18’			
5c	Rock Springs Neighborhood	Homes and streets begin to flood.	17’ to 18’	19’ to 20’	20’ to 21’			

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the February 2017 flood event. Hydraulic modeling results are estimates. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

TABLE 3A
Madrone Gauge Flood Severity Thresholds (NWS Model)

Madrone Gauge Thresholds	Stage (ft)	Description
Action	**6**	• Low flow crossings across Coyote Creek will be inundated.
Minor Flooding	**7**	• Flooding to low lying businesses northwest of Berryessa Road and Coyote Creek.
Minor Flooding	**8**	• Horse Ranch opposite the Rock Springs Neighborhood at risk of flooding. • Watson Park and Coyote Creek Trail at Selma Park begins to flood. • Homes in the creek along Arroyo Way and 17th Street northwest of East William Street begin to flood. • Flooding to businesses northwest of Berryessa Road and Coyote Creek.
Moderate Flooding	**9**	• Apartments that back onto Coyote Creek at the intersection of Keyes Street and South 12th Street begin to flood lower level garages. • Watson and Selma Parks flooding. • Homes along Arroyo Way and 17th Streets, and homes northwest of William Street and the creek flood. • Flooding beings at Williams Street Park, Happy Hollow Zoo and Kelley Park. • Berryessa Road is at risk of localized street flooding, with business northwest of Berryessa Road and Coyote Creek flooding.
Moderate Flooding	**10**	• Sycamore Avenue accessing the Boys Ranch Detention Facility at risk of inundation. • Low areas in Happy Hollow Zoo affecting structures and animals flood. • Rock Springs Neighborhood at risk of flooding. • Apartments that back onto Coyote Creek at the intersection of Keyes Street and South 12th Street at risk. • Homes located near the creek along Arroyo Way and 17th Street, Brookwood Avenue, S 16th Street and East William Street, 19th Street between San Antonio and Calhoun are at risk. • Olinder school begins to flood. • Watson, Selma, Kelley, and William Street Parks are flooding. Low areas of Roosevelt Park are flooded. • Woodborough Drive starts to become inundated. • A few homes located in the RV storage lot south of Maybury Drive may flood. • Business northwest and southwest of Berryessa Road and Coyote Creek flood.

Madrone Gauge Thresholds	Stage (ft)	Description
Major Flooding	**11**	• Sycamore Avenue accessing the Boys Ranch Detention Facility flooded. • Kelly Park, and Happy Hollow Zoo flooding. Apartment buildings at Keyes Street and South 12th Street possibly flooded. • Homes along Arroyo Way and 17th Street, homes north of William Street on South 16th Street and East William, homes along Brookwood Avenue, and 19th Streets are at flood risk. • Selma Park inundated and overflows into Olinder Neighborhood. • Minor flooding at Olinder School. • William Street Park is inundated. • Watson Park inundated and begins to flood Monfernio Drive. • RV Storage lot north of US-101 flooded. • Flooding in the offices and industrial areas north and south of Berryessa Road west of the creek. • The floodwall on the south side of Golden Wheel and South Bay Mobile Home Parks begin to overtop.
Major Flooding	**12**	• Sycamore Avenue accessing the Boys Ranch Detention Facility flooded, and adjacent Malaguerra Avenue intersections inundated. • Flooding to Kelley Park, and Happy Hollow Zoo. • Rock Springs neighborhood levee is overtopped. • Apartments that back onto Coyote Creek at the intersection of Keyes Street and South 12th Street flooded at lower levels. • Flooding in the Olinder Neighborhood, to houses located along Arroyo Way and 17th Street. • Selma Park and William Street Park flooded. • Moderate flooding to homes north of East William Street west of the Creek and to Olinder School. • Minor flooding occurs at the neighborhood on Monfernio Drive located west of Watson Park, with the park being flooded. • Mobile homes located in the RV storage lot north of US-101 flood. • Flooding to commercial businesses north and south of Berryessa Road on the west side of the Creek. • Flooding in the Golden Wheel and South Bay Mobile Home Parks. • Minor street flooding occurs at Charcot Ave due to bridge overtop.
Historical High Water	**12.06'**	February 2017

Madrone Gauge Thresholds	Stage (ft)	Description
Major Flooding	**13**	• Hellyer Park has significant flooding. • Major flooding in the Rock Springs Neighborhood and adjacent horse ranch. • Happy Hollow Zoo and Kelley Park flooded. • Lower levels of apartment buildings at Keyes and 12th Street are flooded. • East William/Olinder Neighborhood (South 22nd Street, South 21st Street, Brookwood Avenue and 19th, 20th, and 21st Street) flood with flows moving northeast towards US-101 and Lower Silver Creek. • Ponding of concern on the Southside of Lower Silver Creek at West Court and Anne Darling Elementary School, South 16th Street and East William near the Creek, Brookwood Avenue, Arroyo Way and South 17th Street, and Gilthero Court. • Flooding for Olinder Elementary School, and San José Community Middle and High Schools. • East Taylor Street and Kellogg Plant on Eggo Way flooding. • RV storage park north of US-101 flooding. • US-101 flooding near Mabury Road. • Commercial and industrial area near Berryessa Road are significantly flooded. • Major flooding in the Mobile Home Parks. • Spill at Charcot Avenue Bridge escapes to the east of Charcot Avenue Bridge toward I-880 and CA-237, and escapes to the west toward Montage Expressway and North 1st Street.
Major Flooding	14	• Disastrous flooding occurs along Coyote Creek downstream of Tully to the San Francisco Bay. • Rock Springs Neighborhood and adjacent horse ranch inundated. • Apartment buildings at the intersection of Keyes Street and S. 12th Street flooded. • Happy Hollow Zoo and Kelley Park flooded. • Spills from Selma Park flow northerly to flood a large area east of the creek, continuing northward to Upper Penitencia Creek, overflowing Hwy 101. • West bank outbreaks at Watson Park, N 20th Street, Roosevelt Street, N. 19th Street at its southern end, N 18th Street, East St. John Street, East Santa Clara Street and S. 17th Street. • The neighborhood located northwest of Watson Park may be flooded. • Floodwaters converge to the Commercial Street Neighborhood around N. 4th Street and N. 10th Street to cause flooding north of I-880 in San José, California. • Businesses north and south of Berryessa Road and west of the creek are inundated. • The South Bay and Golden Wheel Mobile home parks are inundated; there is risk that floodwaters could overtop and flood homes to the west. • Charcot Bridge overtopping on both right and left banks flowing away from the Creek flooding an area roughly between Coyote Creek and Guadalupe River, and between Montague Expressway to CA-237. • Japantown, Hyde Park, and Northside San José are possible flooded.
Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the February 2017 flood event. Hydraulic modeling results are estimates. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.		

APPENDIX B
Guadalupe River

PURPOSE

This Appendix to the Joint Emergency Action Plan (EAP) for Severe Storms and Flooding Response in the City of San José (City) is meant to provide additional guidance specific to Guadalupe River. It will not duplicate information already in an Emergency Operations Plan (EOP) or the EAP, but will provide Guadalupe River specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

GUADALUPE RIVER DESCRIPTION

The Guadalupe River begins about a half mile upstream of Blossom Hill Road at the confluence of Guadalupe Creek and Alamitos Creek and flows about 20 miles through Santa Clara County and the City of San José. Adjacent land uses are predominantly residential and commercial and includes the urban areas of downtown San José. Its watershed drains about 170 square miles of Santa Clara County and City of San José and is bounded on the south and southwest by the Santa Cruz Mountains, on the west by San Tomas and Saratoga Creeks watershed, and on the east by Coyote Creek watershed. The three major tributaries that flow into the river are: Los Gatos Creek; Canoas Creek; and Ross Creek. Six reservoirs in the upper watershed area of Guadalupe River that store water primarily for ground water recharge are: Lake Elsman, Lexington Reservoir and Vasona Reservoir along Los Gatos Creek; Guadalupe Reservoir on Guadalupe Creek; Almaden Reservoir on Alamitos Creek; and Calero Reservoir on Calero Creek.

The river is crossed by many major roadways that include: Highways 85, 87, 101 and 237; Interstates 880 & 280; Blossom Hill Road; Capitol Expressway; Almaden Expressway; West San Carlos Street; West Santa Clara Street; West Taylor Street; Montague Expressway; and Tasman Drive. There are also bike/pedestrian paths along a majority of the river length, light-rail that runs along some of its length with several crossings, and it is crossed by three wooden railroad trestles.

All of the Guadalupe River has been modified over the years for purposes either beneficial to adjacent land owners (e.g., flood protection, water conservation or land reclamation) or by governmental agencies to provide the community flood protection and/or environmental restoration/protection. Projects that provide 100-year (1 percent) flood protection have been completed from the San Francisco Bay to about a half mile upstream of Interstate 280. The remaining upstream reaches of the Guadalupe River are currently being studied by the Santa Clara Valley Water District (Valley Water) and U.S. Army Corps of Engineers for flood protection improvements.

GUADALUPE RIVER FLOOD THREATS

Flooding threats exist along all of Guadalupe River from the San Francisco Bay to Blossom Hill Road with the greatest risk of flooding in the Upper Guadalupe River upstream of Interstate 280 where flood protections improvements have not been completed. Because the flood protection improvements north of I-280 include levees, floodwalls, and many roadway crossings, these areas are still considered a threat for flooding due to potential failures, unforeseen channel blockages, or unusually large storm events.

There are several flood hotspots on the Upper Guadalupe River. Two of the more severe threats are flooding from Ross Creek and Canoas Creek caused by high water levels in Guadalupe River. Waters that overbank Ross Creek due to high water in Guadalupe River flows northerly on the west side of the river through residential/commercial properties towards the interchange of Highway 87 and Interstate 280. Waters that overbank Canoas Creek due to Guadalupe River flow northerly on the east side of the river through residential, commercial, and industrial properties towards the same interchange area. In addition, major flooding can occur from the Guadalupe River between Willow Glen Way and Willow Street. The flood hotspots on Guadalupe River are listed below (Figure 1B):

- North bank of Ross Creek near Almaden Expressway,
- North bank of Canoas Creek near Nightingale Drive,
- East side of Guadalupe River between Branham Lane and Capitol Expressway,
- West bank of Guadalupe River from Malone Road to Alma Road, and
- East Bank of Guadalupe River from Willow Glen Way to Willow Street.

The Ross Creek and Guadalupe River at Alma flood locations are primarily affected by storm drain runoff and reach peak stage very quickly. These are considered flashy systems.

Land uses at risk of flooding include mostly homes and businesses, however there is some significant infrastructure also at risk of flooding. Deep floodwaters could enter Highway 87 and Interstate 280 near their interchange resulting in major highway closures and traffic disruptions that could last several days. The Valley Transportation Authority light rail service could also be disrupted in this area until flood waters recede and the tracks are cleaned.

The most recent flood along Guadalupe River that caused significant damages and disruptions occurred in 1995. There were two separate flood events that year, which impacted Highway 87, VTA's light rail, homes/businesses south of I-280, and many areas of downtown and north San José.

Even though there are no river-related flood hotspots north of I-280 because of the flood protection improvements, flood risks still exist due to interior drainage issues behind the levees and potential for extreme storm events, levee failures, or unanticipated channel blockages. The City also operates storm water pump stations in the leveed areas in this reach of Guadalupe River. During high creek flows, the additional pumping could add to already high flows and could increase risk of overtopping or add to flooding that may be occurring. The adjacent land uses that would be impacted by a flood due to an unforeseen event in this area north of I-280 include many residential, industrial, commercial, and critical governmental infrastructure (e.g., sewage treatment facility). Because of the significant threat to public health and safety and

disruptions if this would occur, this section is considered a potential flood threat and should be monitored and inspected during high flow conditions. Figure 2B and Figure 3B show the approximate areas at threat to flooding due to a complete hypothetical levee failure in this reach.

FLOOD EVENT DETECTION

There are several detection methods that are described in the EAP that include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Guadalupe River are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Guadalupe Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations on Guadalupe River and for all major tributaries downstream of the reservoirs. Upstream gauges will provide valuable information for flood events occurring downstream and may give several hours' notice to take action. Gauges in the downstream reaches will show the flood risk at specific locations and whether any unexpected event is occurring (e.g., channel blockage).

The following is a summary of the current stream gauge program.

1. Annually, sites will be prioritized for manual gauging and teams are assigned.

2. After every high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration on gauges in the Guadalupe River watershed was done after the 1995 flood event and again after the high flows of February 2017.

3. Predicting flood condition levels in advance of flooding requires modeling of the watershed specific to the storm forecast. This prediction of the flood condition levels will be done in coordination with the NWS forecast modeling; however, Valley Water's prediction may differ from the NWS forecast. Therefore, those tools should be used for guidance.

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots and facilities that should be visually checked during high flows. Therefore, supplementing with visual observations from staff deployed in the field (i.e., Field Information Teams) and other field reporting is an important component to detection.

To allow additional information to be accurately gathered, several visual stream stage monitoring locations have been installed for observations. These are located at:

1. Guadalupe River at Montague Expressway
2. Guadalupe River at West Alma Avenue
3. Guadalupe River at Branham Lane
4. Canoas Creek at Nightingale Drive
5. Ross Creek at Cherry Avenue

Valley Water operates Field Information Teams (FITs) assigned to monitor specific locations during storms and high flow events to provide valuable information for detection and for calibrating computer models. In addition, the City deploys FITs in a coordinated way to assure that all critical locations are being monitored. The Multi-Agency Coordination (MAC) Group AC convened per the EAP and/or each jurisdictions Emergency Operations Center (EOC) will coordinate this effort through their Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change
2. Known Flood Hotspots (Attachment 11 pages 72-77)
3. Real-time Flooding—documenting flooding
4. Bridge Piers—checking for debris blockages
5. Trash Racks—checking for debris blockages
6. Levees—check for stability
7. Sandbag sites—checking for supply and access issues
8. Previously repaired or other project sites—checking for performance
9. Raw water facilities—dams and canals

GUADALUPE RIVER FLOOD CONDITION LEVELS AND SEVERITY

Sometimes an event is a flash flood that occurs suddenly without much early notice. However, with weather forecasting and Guadalupe River modeling, there is some ability to estimate flood events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response and a level of potential severity for areas subject to flooding to assist the Agency's in planning and implementing appropriate actions. Because of the uncertainties of forecasting future conditions, a condition of Watch will be used when flood stage is estimated about 24 to 72 hours or more in the future. If flooding is estimated within about 24 hours, the threat level will be elevated to Warning. In addition, an unexpected situation may occur during high flows that may result in a change in condition level (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level).

APPENDIX B
Guadalupe River (continued)

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours. • Stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

When the threat level is at a Watch or Warning, there is an expectation that flooding will occur or is occurring at some locations. The severity of the situation at specific locations is determined by the flood stage. The areas subject to flooding for different stream stages are estimated utilizing hydraulic models and flood maps.

Flood severity categories are used to describe the level of flood risk posed by the storm and are defined by the National Weather Service as:

Action	An established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
Moderate Flooding	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

A flood inundation map of Guadalupe River is shown in Figure 1B and the associated Flood Thresholds in Table 1B. The map is the Federal Emergency Management Agency (FEMA) 1% flood map. This map is based on the best available information and modeling when it was created and should be considered approximate due to the difficulty in estimating an actual event and the changing conditions of the creek. Figure 2B and Figure 3B show the approximate areas at threat to flooding due to a complete hypothetical levee failure in the reach north of I-280. Additional floodplain mapping may be developed as needed by Valley Water for use by the MAC.

Table 2B is a flood severity table based on the Almaden Expressway ALERT Gauge that is used to estimate areas that will be subject to flooding on Guadalupe River. Because there is very little notice for flooding based on this gauge, flood conditions will often utilize predictive methods based on weather forecast and watershed conditions.

These tables along with the actual or modeled data would allow Valley Water or MAC to establish threat levels for specific areas subject to flooding. Mapping associated with this table will be provided to Agency Stakeholders. This information will be made available for notifications and will be coordinated with the National Weather Service to be consistent in the dissemination of threat level and severity information.

There is also a deployment level that may be set for temporary flood barriers to protect downtown San José from flooding that occurs upstream and flows overland. These barriers were a component of the Downtown Guadalupe River Flood Protection Project to protect downtown San José from the design flood while not inducing flooding. Below is guidance for setting the deployment level.

Prepare	• **Flood Condition Level is set at Watch and** • **Flood Severity Level is set at Moderate or greater**.

Mobilize	• Flood Condition Level is set at Warning and
	• Flood Severity Level is set at Major with flooding expected to occur on:
	  ○ Guadalupe River between Willow Street and Willow Glen Way and/or
	  ○ Canoas Creek at Nightingale Drive.

Deploy	• Major overland flooding is occurring:
	  ○ Floodwaters have reached Alma Avenue and/or
	  ○ Floodwaters are at Lick Avenue near the Caltrain Tamien Station parking lot.

NOTIFICATIONS AND ACTIVITY/ACTIONS

General notifications and actions are described in the EAP which describes threat level and severity, notifications and activity/actions to be taken by the City, Valley Water and other Stakeholders. The general level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

The City operates storm water pump stations in the leveed areas of Lower Guadalupe River north of I-280. During high creek flows the additional pumping could add to already high flows and could increase risk of overtopping or add to flooding that may be occurring. In a situation where Flood Condition Severity Levels are at Watch or Warning, consideration should be given to modifying pump station operations.

In addition, there are specific actions and notifications that are to be taken for the Guadalupe River because of the possibility of temporary flood barrier deployments to protect Downtown San José. The deployment of temporary flood barriers was planned as part of the Downtown Guadalupe River Flood Protection Project to protect downtown San José without impacting other areas for the design flood. The actions and responsibilities are described on Table 3B and deployment locations and sandbag sites are shown in Figure 4B and Figure 5B. In addition, Valley Water Operations & Maintenance DOC has a more detailed Standard Operating Procedure that will guide them in their responsibilities related to the deployment.

APPENDIX B
Guadalupe River (continued)

INFRASTRUCTURE AT RISK

There are no Federal Emergency Management Agency (FEMA) defined critical facilities located in the floodplain, however, there are other important infrastructure where people, property, and important facilities may be at risk. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. Below is a listing of some of that infrastructure.

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOLS	Galarza Elementary School San José Unified School District	1610 Bird Avenue San José, CA 95125	(408) 535-6000
	Canoas Elementary School San José Unified School District	880 Wren Drive San José, CA 95125	(408) 535-6000
	Schallenberger Elementary School San José Unified School District	1280 Koch Lane San José, CA 95125	(408) 535-6000
	Hacienda Elementary School San José Unified School District	1290 Kimberly Drive San José, CA 95118	(408) 535-6000
	Washington Elementary School San José Unified School District	100 Oak Street San José, CA 95110	(408) 535-6000
UTILITIES	Interstate 280 and Highway 87	Caltrans and California Highway Patrol	911 or (800) 835-5247 (if non-emergency); (707) 648-4180 (local Division of CHP)
	Light Rail at Virginia Street and near Interstate 280 where flood stop logs are installed (Figure 2B)	VTA	911 or (408) 321-2300
UTILITIES (cont'd)	Caltrain	1355 Lick Avenue San José, CA 95110	(877) 723-7245
	Southern Pacific Railroad		911 or (888) 877-7267
OTHER	Elks Lodge	444 West Alma Avenue San José, CA 95110	(408) 298-3880

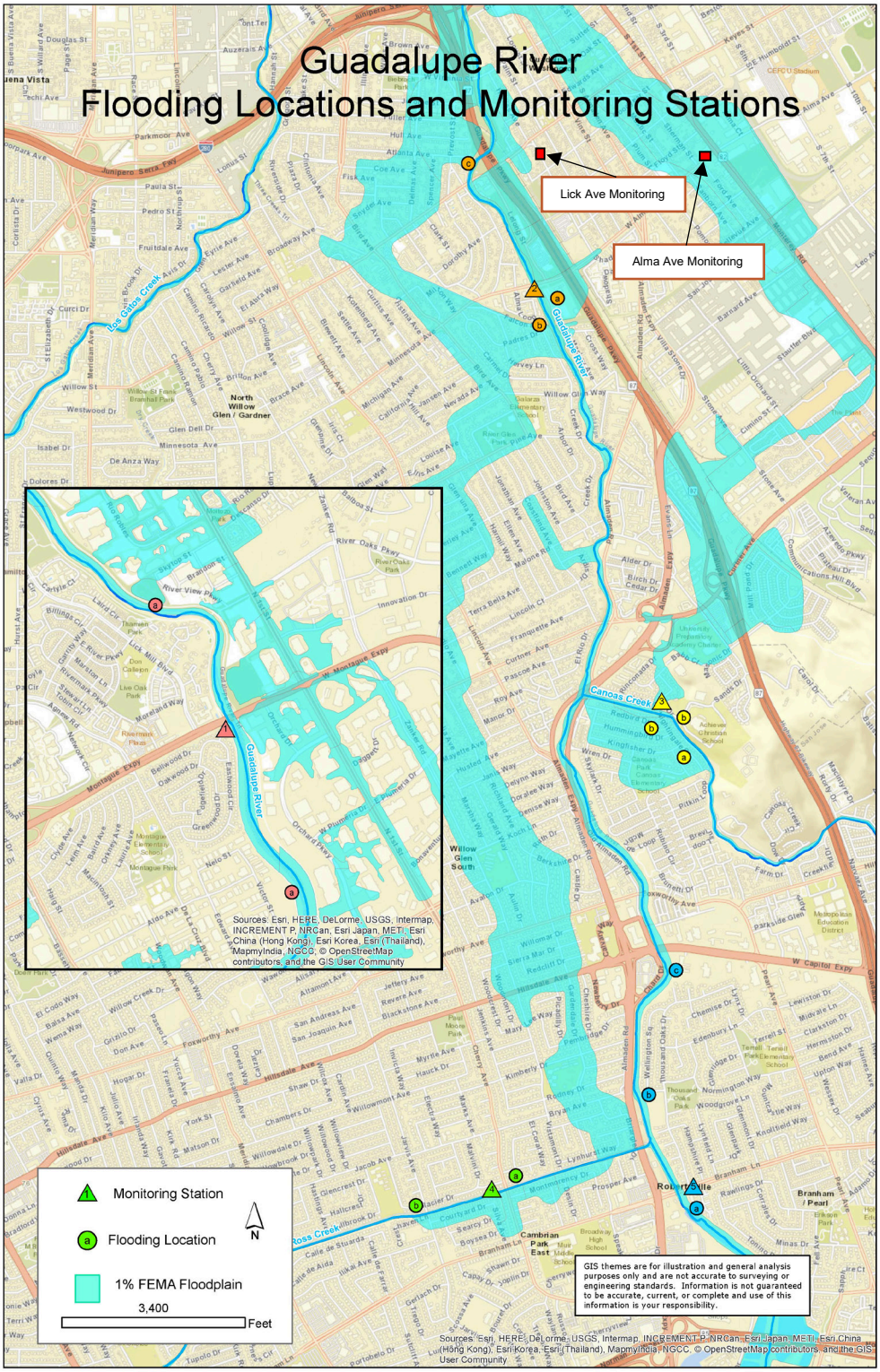


FIGURE 1B
Upper Guadalupe River 1% Floodplain

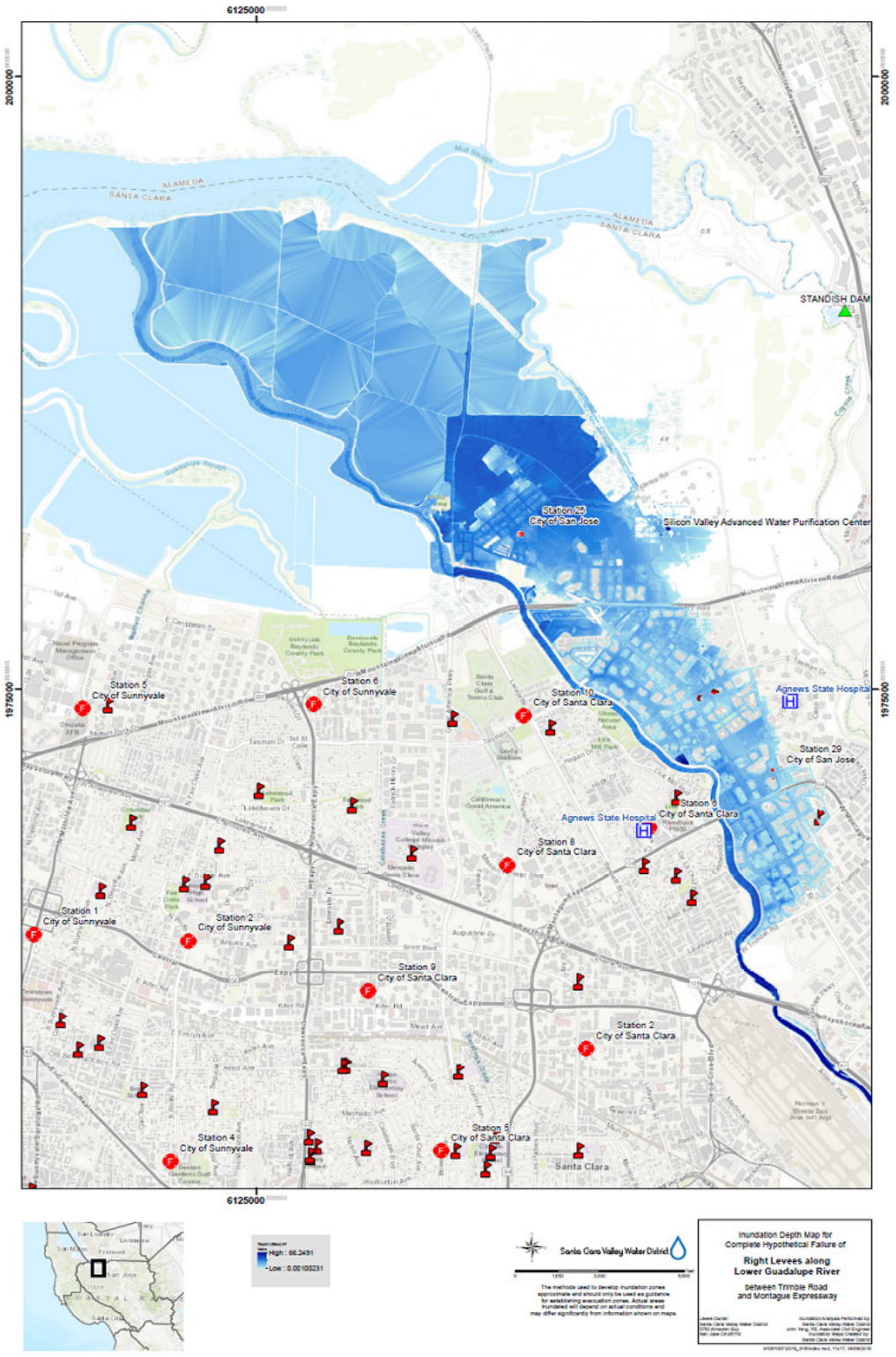


FIGURE 2B
Lower Guadalupe River
Right (East) Levee Failure Floodplain

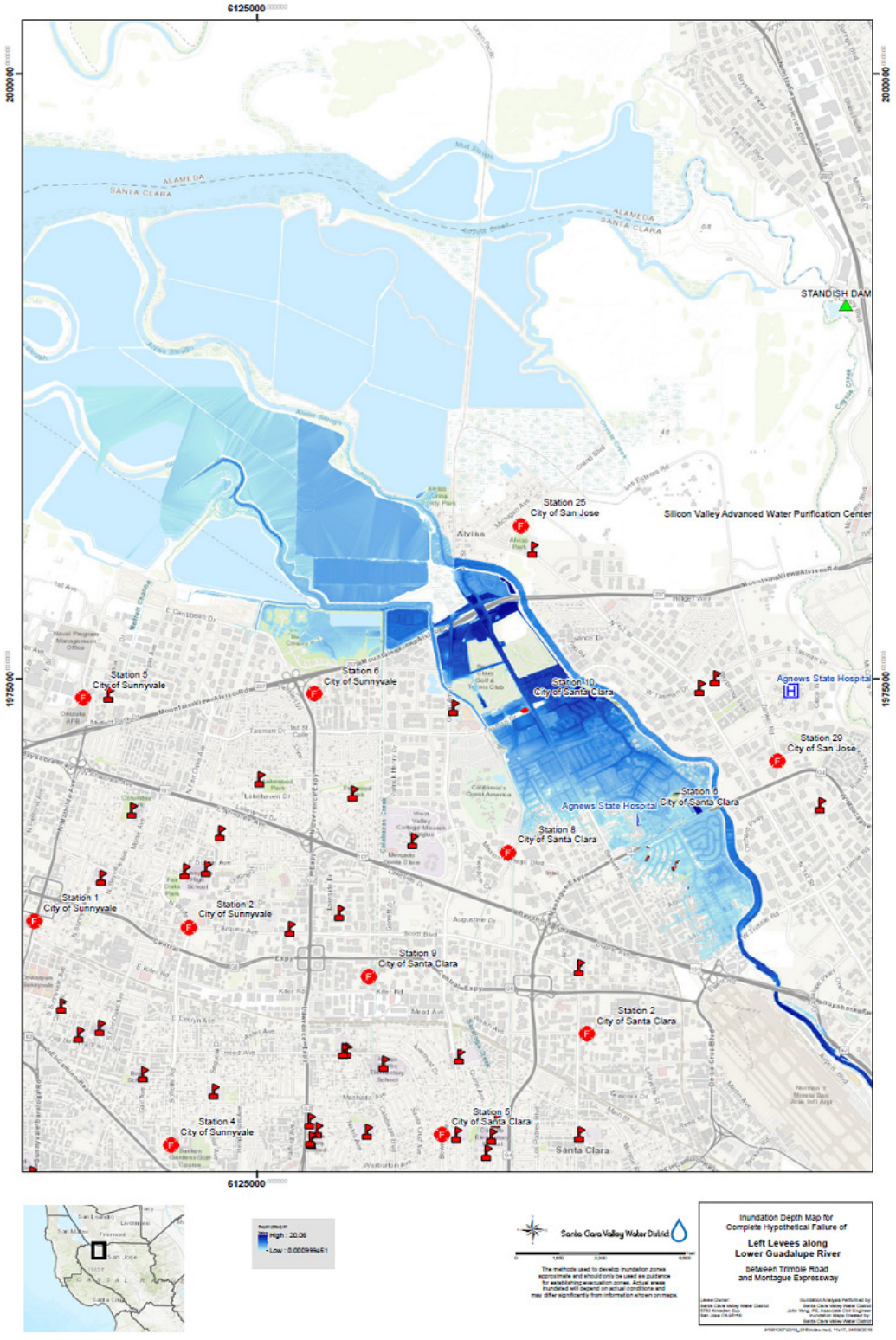


FIGURE 3B
Lower Guadalupe River
Left (West) Levee Failure Floodplain

APPENDIX B
Guadalupe River (continued)

TABLE 1B
Guadalupe River Flood On-Site Monitoring Thresholds

ID #	Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Monitoring Locations	Photo
			50% Capacity	70% Capacity	100% Capacity		
1a	Upstream and downstream of Montague Expressway, with the highest risk between Montague Expressway and Trimble Road	Levees overtop on both sides of the creek, flooding nearby homes and businesses. Once levees overtop, levee failure may occur, causing sudden and catastrophic damage.	20'-21'	24'-25'	30'-31'	Montague Expressway Bridge (Guadalupe River)	
2a	Upstream of Alma Avenue on the East Bank near Elk's Lodge	Water overtops upstream of Alma Avenue and floods Elks Lodge, as well as near the RxR crossing, flowing northward along Lelong Street towards Alma Ave underpass.	12'-13'	14'-15'	17'-18'	West Alma Avenue Bridge (Guadalupe River)	
2B	Water overtops upstream of Alma Avenue and floods Elks Lodge, as well as near the RxR crossing, flowing northward along Lelong Street towards Alma Ave underpass.	Water breaks out and spills towards away from the River.	12.5'-13.5'	14.5'-15.5'	18'-19'		
2c	Upstream of CA-87 on the West Bank	Water overbanks on the west side near Minnesota Avenue and Mills Court.	14'-15'	16'-17'	19'-20'		

APPENDIX B
Guadalupe River (continued)

ID #	Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Monitoring Locations	Photo
			50% Capacity	70% Capacity	100% Capacity		
3a	Few hundred feet upstream of Nightingale Drive on the southwest bank	Water overtops the southwestern levee and spills into the residential neighborhood.	7'-8'	10'-11'	13'-14'	Nightingale Drive Culvert (Canoas Creek)	
3b	Nightingale Drive Culvert and southern levee downstream of Nightingale Drive	Water overtops the southern levee and the Nightingale Drive culvert and inundates the neighborhood.	7'-8'	10'-11'	14'-15'		
4a	Cherry Avenue	Water spills out just upstream of the Cherry Avenue Culvert, as well as along the levees upstream and downstream.	5'-6'	7'-8'	9'-10'	Cherry Avenue Culvert (Ross Creek)	
4b	Jarvis Avenue	Water spills out upstream of the Jarvis Avenue Culvert, as well as along the levees downstream and upstream.	5'-6'	7'-8'	9'-10'		

APPENDIX B
Guadalupe River (continued)

ID #	Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Monitoring Locations	Photo
			50% Capacity	70% Capacity	100% Capacity		
5a	Upstream Branham Lane	Water spills out upstream Branham Lane on both sides.	14'-15'	17'-18'	20'-21'	Branham Lane Bridge (Guadalupe River)	
5b	East bank near Thousand Oaks Park	Low spot near Thousand Oaks Park becomes flooded, eventually spreading to the residential homes.	15.5'-16.5'	18'-19'	21,5'-22.5'		
5c	Upstream Capitol Expressway	Water spills out upstream of Capitol Expressway, flooding businesses along the road.	14'-15'	16.5'-17.5'	19.5'-20.5'		

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the historical flood events. Hydraulic modeling results may be preliminary and should be used for general analysis purposes. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

TABLE 2B
Almaden Expressway Gauge Flood Severity Thresholds (NWS Model)

Almaden Expressway Gauge Thresholds	Stage (ft)	Description
Action	**8.0**	Additional flow from Canoas Creek watershed or increased reservoir spills may bring river to flood stage
Minor Flooding	**9.5**	River begins to overtop upstream of Alma Avenue Bridge into the Elks Lodge, spilling north, as well as near the RxR on the east bank.
Moderate Flooding	**11.5**	River continues to overtop upstream of Alma Avenue Bridge into the Elks Lodge, spilling north along Lelong Street. Alma Avenue/CA87 viaduct is flooded. Creek overbanks west near Minnesota Avenue downstream of Alma Avenue. Properties south of the old UPRR alignment in the Northern Cross Neighborhood also at risk.
Historical High Water	**11.73**	January 1995
Major Flooding	**15**	Flooding continues to spill near Alma Avenue, flowing northward and crossing east under Willow Street and Alma Avenue viaducts, continuing to flow north. Overbanking occurs at Atlanta Avenue just upstream of CA-87. The Willow Glen Neighborhood bounded by Willow Street and Minnesota Avenue sees overland flooding. Overbanking occurs in various locations between Alma Avenue and Willow Glen Way. Potential flooding on Ross and Canoas creeks due to high backwater caused by Guadalupe River.
Major Flooding	**17**	Washington/Guadalupe, Tamien, and Alma/Almaden Neighborhoods east of CA-87 inundated from floodwaters traveling under street viaducts from the west. Widespread flooding in the eastern Willow Glen Neighborhood, as well as the Gardner and Atlanta/Bird neighborhoods. CA-87/I-280 interchange at risk from overland flow spilling onto the roadway. Possible overtopping of Guadalupe River near Capitol Expwy on the east side, flowing towards Pearl Ave. Additionally, possible overtopping near Thousand Oaks Park and upstream of Branham Lane, flowing along streets flooding businesses and the Erikson Neighborhood. If flood is sustained or increasing, car dealerships along Capitol Expressway may be inundated as well. Potential flooding on Ross and Canoas creeks due to high backwater caused by Guadalupe River.

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the February 2017 flood event. Hydraulic modeling results are estimates. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

TABLE 3B
Temporary Flood Barrier Progressive Responsibilities/Activity

Flood Barrier Deployment Level	Responsibility/Activity	Stakeholder
Prepare (Orange)	Prepare action plan for possible deployment if needed (may include the following actions).	MAC, EOC's, or DOC's
	Recommend establishing a Field Command and deploying Operations staff to monitor conditions along Guadalupe River south of Interstate 280 to Willow Glen Way and on Canoas Creek at Nightingale Drive.	MAC or Valley Water EOC/DOC
	Consider deploying FITs as necessary to assist Operations for monitoring Guadalupe River to gather information to determine deployment level.	City and Valley Water will coordinate
	Alert Operational Area of preparation level of deployment and possibilities of road closures (I-280 off-ramp, Highway 87) and impact to light rail due to possible flooding and barrier deployment. Agencies to contact include: San José (EOC, OEM Duty Officer, Police, Fire), Santa Clara County EOC, California Highway Patrol, Caltrans, and Valley Transportation Authority. Contact information is located in Volume 1 as Attachment 1.	MAC, EOC Management/Operational Area
	Consider directing Field Command or Operations to implement the following tactical actions as appropriate: • Check sites for potential flood barrier placement and consider positioning materials to prepare for deployment (Valley Water), • Position traffic controls to prepare for deployment (City), • Continue bridge obstruction clearing procedures (Valley Water), • Evaluate need for freeboard extension procedure (Valley Water), and • Prepare a site for delivery of sandbags for deployment shown in Figure 5B (City or Valley Water).	MAC or Valley Water EOC/DOC Operations. Each Stakeholder is lead for their responsibility
	Prepare materials for delivery near deployment area for Field Command to use (sandbags and sheeting needed for partial sealing of drainage inlets).	Valley Water
Mobilize (Red)	Prepare or update action plan to mobilize for deployment if appropriate (may include the following action).	MAC, EOC's, or DOC's
	Deploy FIT, Operations staff, or implement other detection methods to: • Observe/monitor riverbank/bridge freeboard in river reaches between I-280 and Willow Glen Way and Canoas Creek at Nightingale Drive, and/or • When stage is nearing or exceeds 100% at visual gauge locations field observations will shift to floodplain monitoring to monitor overland flows progress towards I-280. Provide information to determine extent of the condition to Field Command/EOC/DOC.	Valley Water and City
	Advise Agencies of imminent flooding and plan to mobilize for deployment of barriers and possibilities of road closures (I-280 off-ramp, Highway 87) and impact to light rail due to possible flooding and barrier deployment. Agencies to contact include: San José (EOC, OEM Duty Officer, Police, Fire), Santa Clara County EOC, California Highway Patrol, Caltrans, and Valley Transportation Authority. Contact information is located in Volume 1 as Attachment 1.	MAC, EOC Management/ Operational Area

Flood Barrier Deployment Level	Responsibility/Activity	Stakeholder
Mobilize (Red)	Field Command may be directed to implement actions in preparation for deployment of barriers and traffic detours that could include the actions below: • Position traffic control and detours (City). • Position temporary water inflated flood barriers near Vine Street, Almaden Avenue and Almaden Boulevard (Figure 4B) in preparation of filling/installing. Each barrier is stored on-site in a container adjacent to each deployment location. The containers also store the necessary attachments, assembly tools, and sandbags. Keys and contact information are located in the Valley Water DOC library in a binder containing a copy of deployment procedure and a copy of this EAP (Valley Water). • **Partially** sandbag storm drains flowing north in vicinity of temporary flood barriers (Duane Street near State Street - Figure 5B; likely to be performed by City). • Continue bridge obstruction clearing procedure (Valley Water). • Consider implementing freeboard extension procedure (Valley Water).	Valley Water and City Field Command
	Provide Police assistance if necessary for any evacuations of unhoused individuals located in flood areas or in areas needed for deployment.	City
	Prepare public messages and initiate public outreach to alert affected areas of potential flooding and deployment of barriers and traffic detours/road closures.	City with Valley Water support
	Notify Elected Officials of intent to mobilize for deployment as appropriate.	City and Valley Water is lead for their Elected Officials
Deploy (Purple)	Review and, if necessary, revise action plan for deployment of barriers.	MAC, EOC's, or DOC's
	Advise Agencies of planned deployment of barriers, implementation of traffic detours and possible road closures due to flooding that includes I-280 off-ramp, Highway 87 and light rail. Agencies to contact include: San José (EOC, OEM Duty Officer, Police, Fire), Santa Clara County EOC, California Highway Patrol, Caltrans, and Valley Transportation Authority. Contact information is located in Volume 1 as Attachment 1.	MAC, Valley Water & City EOC/DOC
	If available, direct a FIT, other Operations staff, or other event detection method to monitor and report conditions at the following locations in the floodplain as determined necessary: • Curtner Avenue at Highway 87, • Little Orchard Street between Curtner Avenue and Barnard Avenue, • West Alma Avenue west of Monterey Street (Figure 1B) this is a location that may trigger deployment, • Alma Avenue at Highway 87/Caltrain underpass, • Willow Street at Highway 87/Caltrain underpass, and • Lick Avenue near the Tamien Caltrain parking lot between Willow Street and Alma Avenue (Figure 1B) - this is a location that may trigger deployment.	MAC, Valley Water & City EOC/DOC, or Valley Water Field Command

Flood Barrier Deployment Level	Responsibility/Activity	Stakeholder
Deploy (Purple)	**Direction to deploy barriers should be made 2-4 hours before major overland flow would reach the barrier locations. The following are sites that may be monitored to assist in making the decision for deployment**: 1. Floodwaters cross West Alma Avenue west of Monterey Street (Figure 1B), which is an indicator that overland flooding may reach the temporary barriers within 2 hours. 2. Floodwater flow east of the Caltrain tracks and near Lick Avenue (Figure 1B), which is an indicator that overland flooding may reach temporary barriers within 2 hours.	MAC, Valley Water & City EOC/DOC, or Valley Water Field Command
	If directed and determined appropriate, Field Command will implement traffic detours and install temporary barriers at locations shown in Figure 4B. and complete the blockage of storm drains. The following are the sequence of steps to take for deployment: • Implement traffic detours (City), • Assure that storm drainage inlets have been partially blocked on Duane Street, leaving an open area allowing flows from gutters to enter as long as possible (shown in Figure 5B and will likely be performed by staff from the City of San Jose), • Deploy water filled flood barriers K and L (Vine Street and Almaden Boulevard) keeping the closure at M (Almaden Avenue) open as long as possible (deploy approximately 1 hour before floodwaters reach the location) to allow for evacuation of residents (Valley Water), • Complete blockage of drainage inlets (Figure 5B) approximately 1 hour before overland flows arrive (City), and • Either deploy or visually monitor VTA light rail crossing and when imminent overtopping will occur (water reaches rails) deploy stop log closure structure at D (light rail crossing shown on Figure 4B), which should take approximately 30 minutes (Valley Water and VTA).	Valley Water, City & VTA
	Evacuate unhoused individuals located in flood areas or in areas needed for deployment as necessary.	City Police
	Review/revise public messages and continue public outreach to alert affected areas of potential flooding and deployment of barriers.	City with Valley Water support
	Notify Elected Officials of intent of deployment as appropriate.	City and Valley Water is lead for their Elected Officials

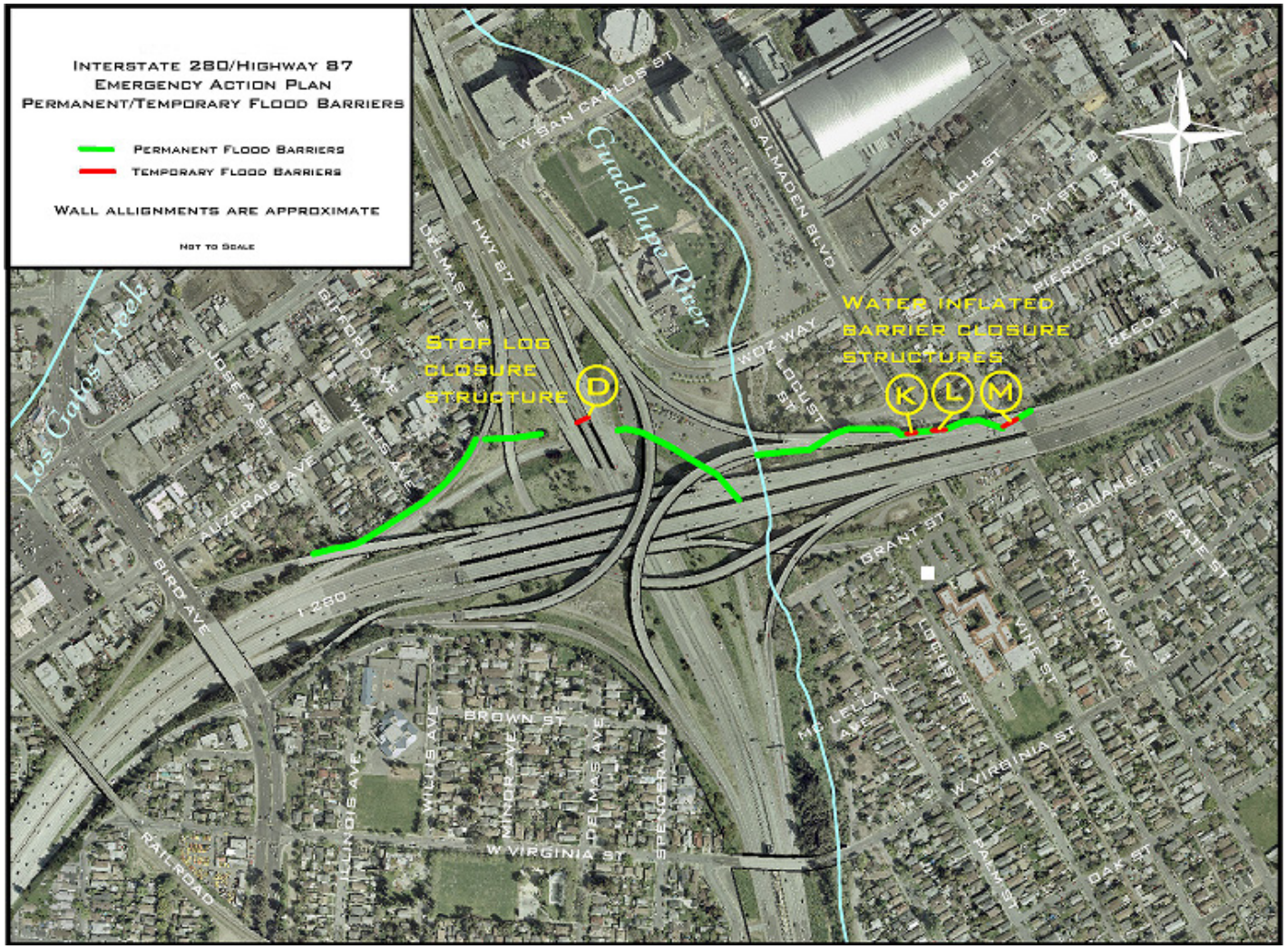


FIGURE 4B
Temporary Flood Barrier Locations

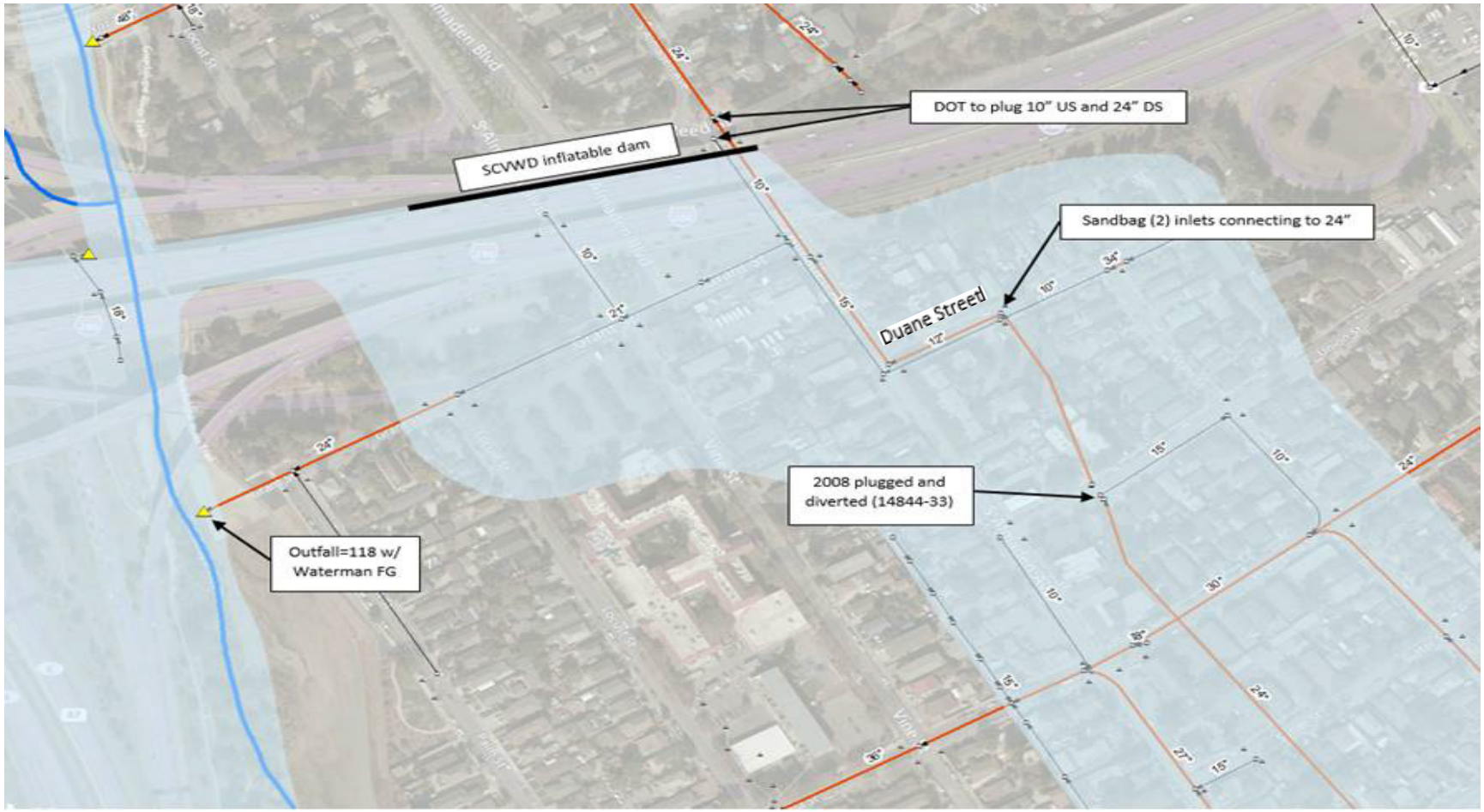


FIGURE 5B
Temporary Sandbagging of Storm Drain Inlets

APPENDIX C
Canoas Creek

PURPOSE

This Appendix to the City, Valley Water and other Stakeholders Joint Emergency Action Plan (EAP) for Severe Storms and Flooding is meant to provide additional guidance specific to Canoas Creek. It will not duplicate information already in an entities Emergency Operations Plan (EOP) or the EAP, but will provide Canoas Creek specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

CANOAS CREEK DESCRIPTION

Canoas Creek begins at Cottle Road and flows 7.4 miles through South San José before it discharges into Guadalupe River just upstream of Almaden Expressway. Adjacent land uses are predominantly residential and commercial property. The creek is crossed by several major roadways that include: Highways 87 and 85, Capitol Expressway, Blossom Hill Road, and Santa Teresa Boulevard. The Canoas Creek watershed drains about 18.6 square miles of Santa Clara County and City of San José and is bounded on the south by the Almaden hills, on the west by Guadalupe River Watershed and on the east by Coyote Creek Watershed (Monterey Road). The channel was improved around 1970 and is generally trapezoidal with a 10'-12' wide concrete channel bottom and 1.5 to 1 earthen side slopes. There are levees from Guadalupe River to about 2,500 feet upstream near a farm bridge. From that point to the upstream limit of the creek at Cottle Road the top of bank is generally the same or slightly higher than adjacent ground.

CANOAS CREEK FLOOD THREATS

The major flood threat occurs near Nightingale Drive and is primarily caused by a backwater from high flows in Guadalupe River. The flooding begins by spilling south over the levee into a low residential area and possibly into Canoas Elementary School. As flow depth increases the spills occur over the north levee area and flow northward towards downtown San José east of Almaden Expressway and west of Monterey Road. The Light Rail station at Curtner Avenue floods and water flows under Highway 87 into the Mill Pond Neighborhood. Highway 87 downstream of Curtner Avenue is elevated, but 21 36" pipe culverts allow floodwaters to pass under the roadway into commercial and industrial areas that include San José Unified School District's Bus Yard and Maintenance Department. Floodwaters continue to flow through residential, commercial and industrial areas and end up at Interstate 280 near Almaden Road where temporary flood barriers are to be deployed to divert floodwaters back to Guadalupe River (see Appendix B regarding deployment of temporary flood barriers).

In addition, the creek may spill overbank upstream of culverts at Snell Avenue, Tillamook Drive, Blossom Avenue, and Calero Avenue. However, the major issue in the upstream area is that the creek does not have 100-year flood capacity and storm water is not able to enter the creek. This results in a shallow floodplain flowing along streets starting near Dunn Avenue to Highway 87. This floodplain varies in width and narrows at Blossom Hill Road, Highway 85, and

Capitol Expressway. Waters in this shallow floodplain are not expected to enter structures, but rather to flow through the streets.

Flood events occurred in 1911, 1981, 1982, 1985 and 1995. The 1995 flooding overtopped the levees near Nightingale Drive and backflowed through the local drainage system into the adjacent low-lying neighborhood to the south flooding into residential structures. This event was the highest recorded event at the Canoas Creek flow gauge at Almaden Expressway since the creek was improved.

FLOOD EVENT DETECTION

There are several detection methods that are described in the EAP that include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Canoas Creek are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Guadalupe Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations in the watershed including on Canoas Creek.

The following is a summary of the current stream gauge program.

1. Annually sites will be prioritized for manual gauging and teams are assigned.

2. After every high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration on Canoas Creek gauges was done after the 1995 event and again after the 2017 storm event.

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots that do not have ALERT gauges that may be visually checked during high flows. Supplementing with visual observations from staff deployed in the field (i.e., Flood Information Teams) and other field reporting is an important component to detection.

To allow additional information to be accurately gathered a visual stream stage monitoring location has been installed for observations. This is located at Nightingale Drive.

Valley Water operates Field Information Teams (FITs) that are assigned to specific locations during storms and high flow events to provide this valuable information. In addition, the City also deploys FIT teams in a coordinated way to assure that all critical

locations are being monitored. Locations of FIT deployment by the City and Valley Water may overlap during storm and flood events. The EAP Multi-Agency Coordination (MAC) Group will coordinate this effort through the Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Valley Water Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change
2. Known Flood Hot-Spots (Attachment 11 pages 79-81 of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1)
3. Real-time Flooding—documenting flooding
4. Levees—check for stability
5. Bridge Piers—checking for debris blockages
6. Trash Racks—checking for debris blockages
7. Sandbag sites—checking for supply and access issues
8. Previously repaired or other project sites—checking for performance
9. Raw water facilities—dams and canals

CANOAS FLOOD CONDITION LEVELS AND SEVERITY

Sometimes an event is a flash flood that occurs suddenly without much early notice. However, with weather forecasting and Guadalupe River and Canoas Creek modeling there is often an ability to estimate flood events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response and a level of potential severity for areas subject to flooding to assist the Agency's in planning and implementing appropriate actions. Because of the uncertainties of forecasting future conditions, a condition of Watch will be used when flood stage is estimated about 24 to 72 hours or more in the future. If flooding is estimated within about 24 hours, the threat level will be elevated to Warning. In addition, an unexpected situation may occur during high flows that may result in a change in condition level (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1).

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as:

	• Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

When the threat level is at a Watch or Warning, there is an expectation that flooding will occur or is occurring at some locations. The severity of the situation at specific locations is determined by the flood stage. The areas subject to flooding for different stream stages are estimated utilizing hydraulic models and flood maps.

APPENDIX C
Canoas Creek (continued)

Flood severity categories are defined by the NWS as:

Action	An established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
Moderate Flooding	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

A flood inundation map of Canoas Creek is shown in Figure 1C and the associated Flood Thresholds Table 1C on the following page. The map is the Federal Emergency Management Agency (FEMA) 1 percent flood map. This map is based on the best available information and modeling when it was created and should be considered approximate due to the difficulty in estimating an actual event and the changing conditions of the creek.

Table 2C is a flood severity table for the Almaden Expressway Gauge that is used to estimate areas that will be subject to flooding. Because there is very little notice for flooding based on this gauge, flood conditions will often utilize predictive methods based on weather forecast and watershed conditions.

These tables along with the actual or modeled data would allow Valley Water or MAC to establish threat levels for specific areas subject to flooding. Mapping associated with this table will be provided to Agency Stakeholders. This information will be made available for notifications and will be coordinated with the National Weather Service to be consistent in the dissemination of threat level and severity information.

Notifications and Activity/Actions: Notifications and actions are described in the Joint EAP which describes threat level and severity, notifications and activity/actions to be taken by both the City, Valley Water and other stakeholders. The level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

APPENDIX C
Canoas Creek (continued)

INFRASTRUCTURE AT RISK

There are no Federal Emergency Management Agency (FEMA) defined critical facilities located in the floodplain, however, there are other important infrastructure where people, property, and important facilities may be at risk. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. The facilities below are within the area where people, property, and infrastructure may be at risk:

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOL	Canoas Elementary School	880 Wren Drive San José, CA 95125	(408) 535-6391
	Santa Teresa High School	6150 Snell Avenue San José, CA 95123	(408) 347-6200
UTILITIES	Light Rail Stations at Curtner Avenue	2348 Canoas Garden Avenue San José, CA 95125	(408) 321-2300
OTHER	San José Unified Bus Yard and Maintenance Department	2230 Unified Way San José, CA 95125	(408) 535-6330

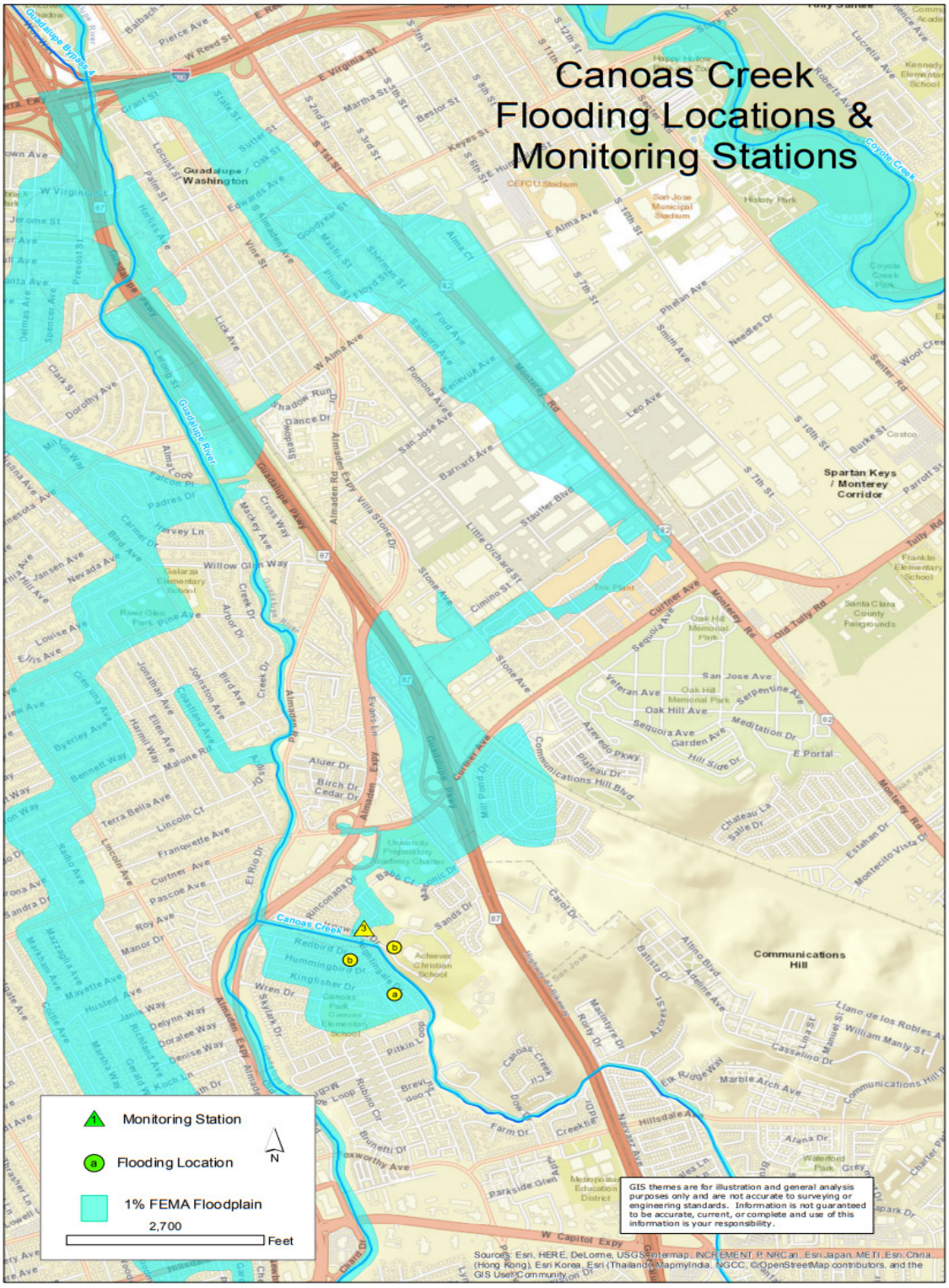


FIGURE 1C
Canoas Creek Flood Map and Inspection Locations

TABLE 1C
Canoas Creek Flood On-Site Monitoring Thresholds

ID #	Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Monitoring Locations	Photo
			50% Capacity	70% Capacity	100% Capacity		
3a	Few hundred feet upstream of Nightingale Drive on the southwest bank	Water overtops the southwestern levee and spills into the residential neighborhood.	7'-8'	10'-11'	13'-14'	Nightingale Drive Culvert (Canoas Creek)	
3b	Nightingale Drive Culvert and southern levee downstream of Nightingale Drive	Water overtops the southern levee and the Nightingale Drive culvert and inundates the neighborhood.	7'-8'	10'-11'	14'-15'		
5c	Upstream Capitol Expressway	Water spills out upstream of Capitol Expressway, flooding businesses along the road.	15'-16'	17'-18'	19'-20'		

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the historical flood events. Hydraulic modeling results may be preliminary and should be used for general analysis purposes. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

TABLE 2C
Canoas Creek at Almaden Expressway Gauge Flood Severity Thresholds (NWS Model)

Almaden Expressway Gauge Thresholds	Stage (ft)	Description
Action	9.5	Calero Avenue and Blossom Hill Road could flood from high flow and/or debris buildup. Street flooding is possible. Canoas Creek begins experience a backwater condition when the Guadalupe River is at a stage of about 7' at the Almaden Expressway stream gauge.
Minor Flooding	13.5	Overtopping occurs upstream of Nightingale Drive.
Historical High Water	**13.8**	**January 1995**
Moderate Flooding	15	Significant flooding in the Canoas Garden Neighborhood near Nightingale Drive occurs. Waters start flowing north towards Curtner Avenue and Almaden Expressway. Canoas Elementary School and the Mill Pond Neighborhood are at risk.
Major Flooding	16	Entire Canoas Gardens Neighborhood impacting Canoas Elementary School. Floodwaters flow northward and inundate the Mill Pond Neighborhood and may impact the Light Rail Station at Curtner Avenue. Flood areas are primarily west of Highway 87, East of Almaden Expressway and south of Curtner Avenue, however, some water may continue northward across Curtner Avenue.
Major Flooding	17	Major flooding occurs as floodwaters continue north of Curtner Avenue towards the Highway 87 and Interstate 280 interchange. Almaden Terrace Apartments, Guadalupe Almaden Neighborhood, and Northern Cross Neighborhood are inundated. Water may cross east of CalTrain Railroad Tracks that are just east of Highway 87 and continue through industrial and commercial areas bounded by Curtner Avenue and Barnard Avenue. Floodwaters flow towards Monterey Road and if flooding continues the floodwater will reach 1st Street and require temporary flood barriers to be deployed near Interstate 280 to protect Downtown San José (Appendix B).
Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the January 1995 and February 2017 storm events. Hydraulic modeling results are estimates. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.		

APPENDIX D
Ross Creek

PURPOSE

This Appendix to the City, Valley Water and other Stakeholders Joint Emergency Action Plan (EAP) for Severe Storms and Flooding is meant to provide additional guidance specific to Ross Creek. It will not duplicate information already in an EOP or the EAP, but will provide Ross Creek specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

ROSS CREEK DESCRIPTION

Ross Creek begins in the Town of Los Gatos upstream of Blossom Hill Road and discharges about 6.1 miles later into the Guadalupe River at Almaden Expressway about 1,000 feet north of Branham Lane in the City of San José. The watershed is part of the Guadalupe River Watershed and drains about 10 square miles of primarily medium density residential areas in the City of San José and Town of Los Gatos and is bounded on the south by the Guadalupe Creek, and on the west and north by Los Gatos Creek.

Ross Creek is predominantly a constructed trapezoidal earth channel with 8 ft to 12 ft bottom width and side slopes ranging from 1.5:1 to nearly vertical due to erosion. Maintenance roads of about 17 ft in width are present along most of the creek. There are culverts at road crossing with the major roads crossings including Blossom Hill Road, Los Gatos Almaden Road, Leigh Avenue, Highway 85, Camden Avenue, Meridian Avenue, Cherry Avenue and Almaden Expressway.

ROSS CREEK FLOOD THREATS

Ross Creek is a very flashy drainage area and depth of flow can change quickly. It can also be influenced by high water in Guadalupe River and may flood due to that influence. The flood prone areas are generally located upstream of culverts at Jarvis Avenue and Cherry Avenue due to constriction of the flows. These areas flood adjacent residential areas. However, the most significant flooding is upstream of Briarglen Drive between Jarvis Avenue and Almaden Expressway that can be exacerbated by a backwater from high flows in Guadalupe River. Flooding in this area causes minor impacts to a residential area south of the creek and major impacts to the north. The floodplain to the north flows west of Almaden Expressway and east of Cherry Avenue up to Curtner and then east of Lincoln Avenue north of Pine Street. This flooding continues through Willow Glen to Interstate 280 west of Highway 87 and can flood three elementary schools and a community center. Flooding can also impact the Interstate 280 and Highway 87 interchange. Figure 1D shows the Federal Emergency Management Agency (FEMA) 100-year (1 percent) floodplain for Ross Creek.

FLOOD EVENT DETECTION

The flood event detection methods include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Ross Creek are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Guadalupe River Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations in the watershed. Upstream gauges will provide valuable information for flood events occurring downstream and may give hours' notice to take action. However, the ALERT gauges on Ross Creek at Cherry Avenue and on Guadalupe River at Almaden Expressway will be the primary gauges used for determining the flood condition on Ross Creek.

The following is a summary of the current stream gauge program:

1. Annually sites will be prioritized for manual gauging and teams are assigned.

2. After every high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration on Guadalupe Watershed gauges was done after the 1995 event and some were completed after the 2017 winter high flows.

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots and facilities that should be visually checked during high flows. Supplementing with visual observations from staff deployed in the field and other field reporting is an important component to detection.

Valley Water operates Field Information Teams (FITs) that are assigned to specific locations during storms and high flow events to provide this valuable information. In addition, the City also deploys FIT teams in a coordinated way to assure that all critical locations are being monitored. Locations of FIT deployment by the City and Valley Water may overlap during storm and flood events. The EAP Multi-Agency Coordination (MAC) Group and/or the jurisdictions EOC will coordinate this effort through the Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Valley Water Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change
2. Known Flood Hot-Spots (Attachment 11 pages 82-86 of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1)
3. Real-time Flooding—documenting flooding
4. Bridge Piers—checking for debris blockages
5. Trash Racks—checking for debris blockages
6. Levees downstream of Highway 101—check for stability
7. Sandbag sites—checking for supply and access issues
8. Previously repaired or other project sites—checking for performance
9. Raw water facilities—dams and canals

To aid in accurately gathering information, a visual stream stage monitoring location has been installed at Cherry Avenue on Ross Creek.

ROSS CREEK FLOOD CONDITION LEVELS AND SEVERITY

Sometimes an event is a flash flood that occurs suddenly without much early notice. However, with weather forecasting and computer modeling of the watersheds there is often an ability to estimate flood events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response and a level of potential severity for areas subject to flooding to assist the Agency's in planning and implementing appropriate actions. Due to uncertainties of forecasting future conditions, a condition of Watch will be used when flood stage is estimated about 24 to 72 hours or more in the future. If flooding is estimated within about 24 hours, the threat level will be elevated to Warning. In addition, an unexpected situation may occur during high flows that may result in a change in condition level (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1).

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or

	• For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

When the threat level is at a Watch or Warning, there is an expectation that flooding will occur or is occurring at some locations. The severity of the situation at specific locations is determined by the flood stage. The areas subject to flooding for different stream stages are estimated utilizing hydraulic models, the FEMA flood map, and flood maps from the 1995 floods.

Flood severity categories are defined by the NWS as:

Action	An established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
Moderate Flooding	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

A 100-year (1 percent) flood inundation map of Ross Creek is shown in Figure 1D and the associated Flood Thresholds in Table 1D. The map is the Federal Emergency Management Agency (FEMA) 1 percent flood map. This map is based on the best available information and modeling when it was created and should be considered is approximate due to the difficulty in estimating an actual event and the changing conditions of the creek.

Table 2D is a flood severity table for the Ross Creek at Cherry Avenue Gauge that is used to estimate areas that will be subject to flooding. Because there is very little notice for flooding based on this gauge, flood conditions will often utilize predictive methods based on weather forecast and watershed conditions. In addition, the Guadalupe River gauge at Almaden Expressway is used to predict flooding. Refer to Appendix B of the EAP (Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1) for flood severity based on that gauge.

These tables along with the actual or modeled data would allow Valley Water or MAC to establish threat levels for specific areas subject to flooding. Mapping associated with this table will be provided to Agency Stakeholders. This information will be made available for notifications and will be coordinated with the National Weather Service to be consistent in the dissemination of threat level and severity information.

NOTIFICATIONS AND ACTIVITY/ACTIONS

Notifications and actions are described in the Joint EAP which describes threat level and severity, notifications and activity/actions to be taken by both the City, Valley Water and other stakeholders. The level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

INFRASTRUCTURE AT RISK

There are no Federal Emergency Management Agency (FEMA) defined critical facilities located in the floodplain, however, there are other important infrastructure where people, property, and important facilities may be at risk. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. The facilities below are within the area where people, property, and infrastructure may be at risk:

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOL	Hacienda Elementary School	1290 Kimberly Drive San José, CA 95118	(408) 535-6000
	Schallenberger Elementary School	1280 Koch Lane San José, CA 95125	(408) 535-6000
	Galarza Elementary School	1610 Bird Avenue San José, CA 95125	(408) 535-6000

APPENDIX D
Ross Creek (continued)

FACILITY TYPE	NAME	ADDRESS	PHONE
OTHER	Willow Glen Community and Senior Center	2175 Lincoln Avenue San José, CA 95125	(408) 448-6400

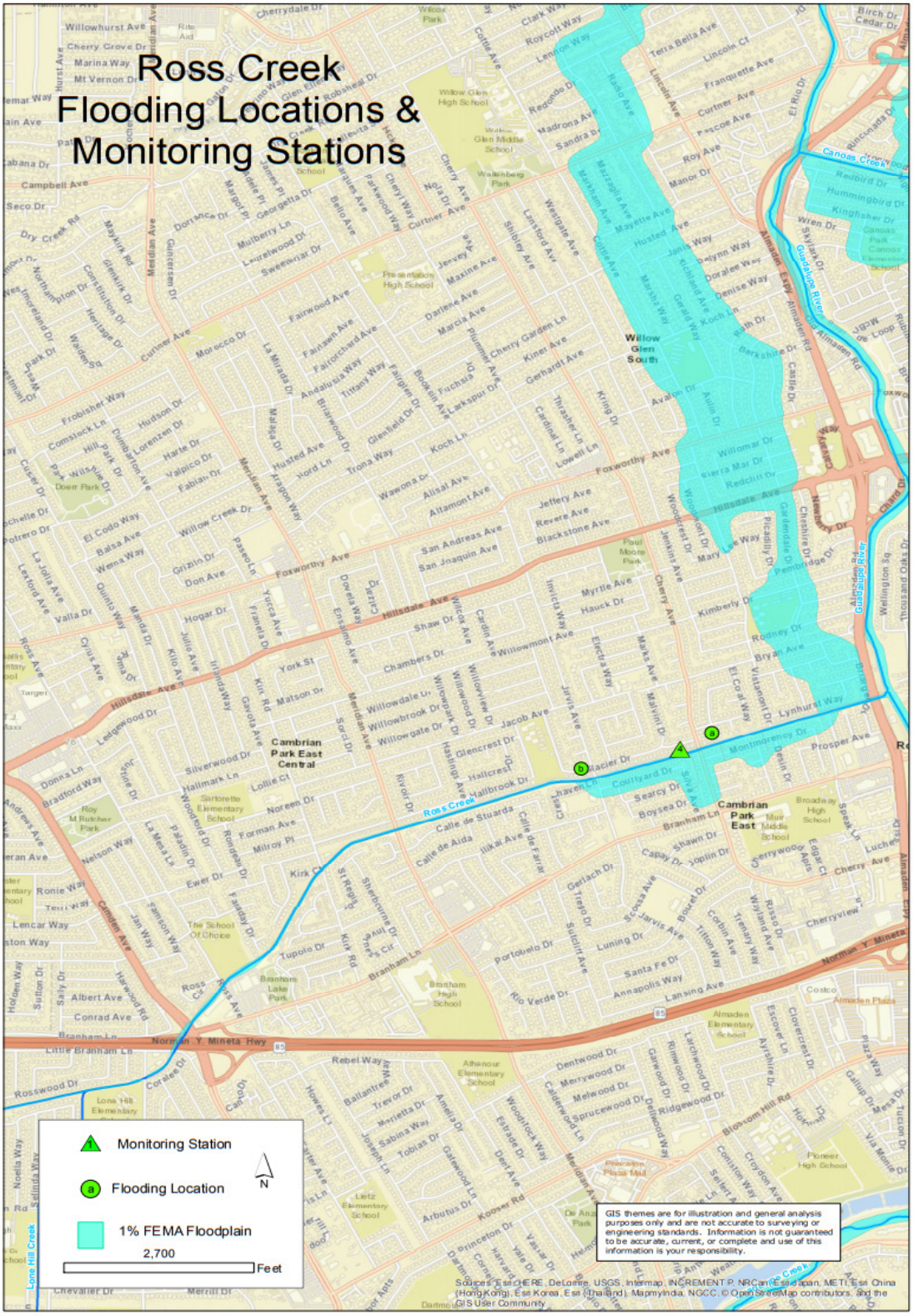


FIGURE 1D
Ross Creek Flood Map and Inspection Locations

APPENDIX D
Ross Creek (continued)

TABLE 1D
Ross Creek Flood On-Site Monitoring Thresholds

ID #	Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Monitoring Locations	Photo
			50% Capacity	70% Capacity	100% Capacity		
4a	Cherry Avenue	Water spills out just upstream of the Cherry Avenue Culvert, as well as along the levees upstream and downstream.	5'-6'	7'-8'	9'-10'	Cherry Avenue Culvert (Ross Creek)	
4b	Jarvis Avenue	Water spills out upstream of the Jarvis Avenue Culvert, as well as along the levees downstream and upstream.	5'-6'	7'-8'	9'-10'		

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the historical flood events. Hydraulic modeling results may be preliminary and should be used for general analysis purposes. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

APPENDIX D
Ross Creek (continued)

TABLE 2D
Cherry Avenue Gauge Flood Severity Thresholds (NWS Model)

Cherry Avenue Gauge Thresholds	Stage (ft)	Description
Action	**7.5**	Creek is flashy and can be quickly influenced by changes in localized rainfall and/or high flows in Guadalupe River.
Minor Flooding	**10**	Water begins to overtop Cherry Avenue Culvert onto Montmorency Drive to the south and at Jarvis Avenue Culvert staying in the adjacent area. Storm drains start backing up into low-lying neighborhoods causing local flooding of streets.
Historical High Water	**10.9**	May 1996
Moderate Flooding	**11**	Water begins spilling to north between Jarvis Avenue and Almaden Expressway and sheet flowing north through the neighborhood towards Hillsdale Avenue. Hacienda Elementary School may experience flooding.
Major Flooding	**12'+**	This is the stage of about the 100-year flood event. Significant flooding occurs between Jarvis Avenue and Almaden Expressway south of Hillsdale Avenue and backwater from Guadalupe River may contribute to additional flood duration. Depending on the duration of overtopping, waters may move north past Hillsdale Avenue flowing east of Cherry Avenue up to Curtner Avenue and then continuing east of Lincoln Avenue north of Pine Street towards the Interstate 280 and Highway 87 interchange. This flooding will likely impact Willow Glen Community Center and Hacienda, Schallenberger, and Galarza Elementary Schools.
Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the May 1996 and February 2017 flood event. Hydraulic modeling results are estimates. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.		

APPENDIX E
Lower Silver Creek and Lake Cunningham

PURPOSE

This Appendix to the Joint Emergency Action Plan (EAP) for Severe Storms and Flooding in the City of San José is meant to provide additional guidance specific to Lower Silver Creek and the associated detention function of Lake Cunningham. It will not duplicate information already in an EOP or the EAP, but will provide Lower Silver Creek and Lake Cunningham specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

LOWER SILVER CREEK AND LAKE CUNNINGHAM DESCRIPTION

The Lower Silver Creek Watershed is in the eastern portion of the City of San José (City) and in the unincorporated area of the County of Santa Clara and is bounded on the east by the Diablo Range and on the west by the Coyote Watershed. The upper regions of the watershed are located in steep foothills while the lower region is gently sloping. The lower and flatter area, which constitutes about one-third of the watershed and is the location of the six-mile long Lower Silver Creek, is highly urbanized. The watershed is approximately five miles wide at its downstream end and gradually narrows to a width of about one mile at its upstream end and covers an area of about 43 square miles (27,700 acres). There are several tributaries in the watershed with the largest being Thompson Creek, with a watershed of about 20.9 square miles (13,400 acres).

Santa Clara Valley Water District (Valley Water) completed improvements on Lower Silver Creek and Lake Cunningham to provide 100-year (1%) protection for flooding from Lower Silver Creek between its confluence with Coyote Creek to just upstream of Lake Cunningham. The flood protection improvements included channel widening, concrete u-frame channels, bridge improvements, construction of levees and floodwalls, and improvements of the detention facility at Lake Cunningham Park. Other improvements made were: incorporating fish passage features, planting natural vegetation to improve habitat, sediment transport features to improve maintenance to restore flow capacity, improving access for maintenance and inspections, and armoring areas of the channel to reduce potential for erosion.

Valley Water owns fee-title right of way on nearly the entire length of Lower Silver Creek. The exceptions are where it owns easement at bridges and at the City of San José's Plata Arroyo Park and Lake Cunningham Park. Figure 1E shows the creek location and project reaches and following that is a reach by reach description.

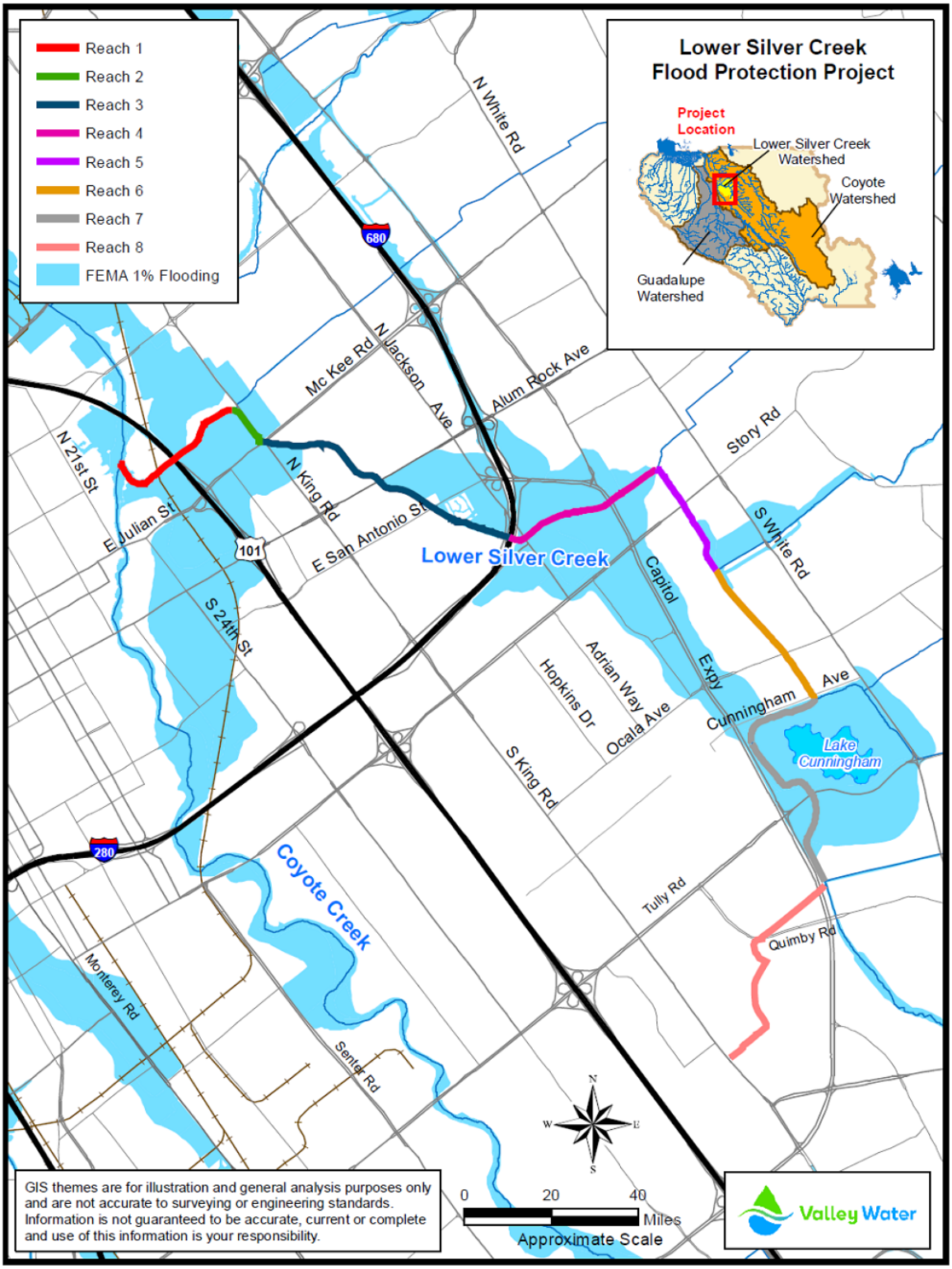


FIGURE 1E
Lower Silver Creek & Lake Cunningham Reach Map and FEMA Flooding

Reach 1 – Coyote Creek to Miguelita Creek

This 4,000 foot long reach consists of a combination of earth channel with a depressed maintenance road on the north side of a low-flow channel, vegetated gabion side slopes and over 1,000 feet of 2-foot to 3-foot high floodwall. The bottom of the channel is earth and generally has a 3-foot deep sediment transport channel, riparian vegetation and a vegetated bench. The channel invert supports emergent marsh and native riparian trees and shrubs have been planted on the top of both banks. There are grade control structures installed near the Coyote Creek confluence and Wooster Avenue Bridge. There is a channel constriction at the old Union Pacific Railroad (UPRR) bridge crossing, which has been removed, between Coyote Creek and Highway 101 just upstream of the Wooster Avenue Bridge.

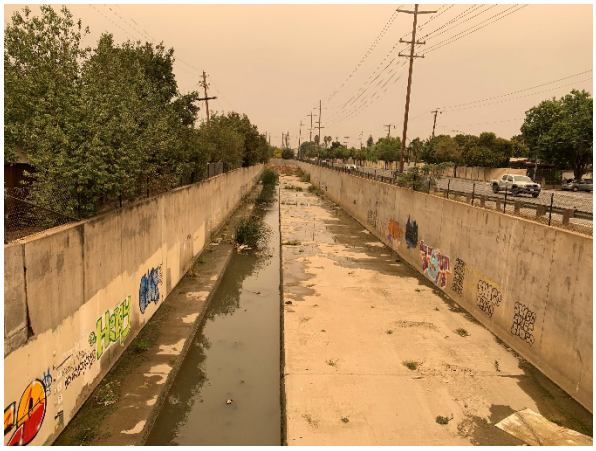
Looking upstream from Wooster towards the old UPRR crossing and Hwy 101

Looking upstream from Highway 101

Looking downstream from the upstream end of Reach 1

Reach 2 – Miguelita Creek to McKee Road

This reach runs about 1,200 feet adjacent to King Road and is an architecturally treated rectangular concrete channel with a low flow channel. Sediment expected to accumulate in the area will need to be periodically removed. Native trees and vines are planted on top of the south and north banks. Near the intersection of King Road and McKee Road, the channel transitions to a concrete box culvert. There is a trash boom installed at the downstream end of the reach.



Looking downstream from near McKee Road

Reach 3 – McKee Road to Interstate 680

The channel transitions from the existing box culvert beneath the King and McKee Road intersection into an earth channel with emergent marsh vegetation for about 1,200 feet upstream. A 4-foot high floodwall protects adjacent residential areas to the north and a combination of levees and overland flow in Plata Arroyo Park are on the opposite side. The north bank includes a maintenance road with an adjacent grass covered floodplain. A pedestrian bridge provides access to the park from the residential areas across the creek.

Looking downstream at the McKee Road culvert

Upstream of Plata Arroyo Park the widened earthen channel transitions to a concrete channel for about 2,200 feet to Alum Rock Avenue. The concrete section of channel includes a low-flow channel to allow continuity of base flows. Native trees, shrubs, and vines have been planted along parts of the top of bank through this area.

Looking upstream along Checkers Drive towards Alum Rock Avenue

From Alum Rock Avenue upstream about 1,700 feet to San Antonio Road the channel is earthen with some bank protection and a depressed maintenance road on the north side. Sunset Avenue and a pedestrian bridge cross the channel in this area. There is a stream gauge just downstream of San Antonio Road bridge.

Looking upstream from Sunset Avenue

Looking downstream of San Antonio Road (stream gauge on right)

From San Antonio Road upstream for about 2,200 feet to Interstate 680 (I-680) the channel is generally an earthen trapezoidal with vegetation on the south bank and a top of bank maintenance road on the north bank that ends at I-680. There is a pedestrian bridge located at Kammerer Avenue and a maintenance road turn-around at I-680. Adjacent land-use on the north side is residential with the south side including; Lee Mathson Middle School, Mayfair Community Center and Our Lady of Guadalupe Church.

Looking upstream from San Antonio Road

Looking upstream from Kammerer Pedestrian bridge towards I-680

Reach 4 – I-680 to North Babb Creek

The approximately 4,400 foot long reach consists a 240-foot U-frame concrete channel with a sediment trap and low flow channel from I-680 to South Jackson Avenue crossing, which transitions to a widened earthen channel with a vegetated bench on the south side and a 20 foot wide aggregate maintenance road 2.5 feet above the sediment transport channel bottom on the remainder of the channel section. Capitol Expressway crosses the creek upstream of Jackson Avenue and there is a pedestrian bridge connecting Dobern Avenue and Bambi Lane. Flood walls of approximately 2 to 4 ft above grade are required for this entire section with a gradual height decline further upstream.

Looking downstream of the Dobern Ave-Bambi Ln pedestrian bridge

Reaches 5 & 6 – North Babb Creek to Lake Cunningham (Cunningham Avenue)

These reaches extend about 7,400 feet from the end of the end of Reach 4 at North Babb Creek to Lake Cunningham (Cunningham Avenue). The channel throughout this area has an earthen bottom a vegetated west bank and an east bank that contains a 20 foot wide aggregate base maintenance road 2.5 feet above the earthen channel bottom. Rock protects the toe of both banks of the earthen channel bottom and floodwalls extend along both banks up to 5 feet in height. A full-span pedestrian bridge is located at the downstream end of the reach and there are road crossings at Story Road, Murtha Drive, Moss Point Drive and Ocala Avenue. Adjacent land uses are a combination of residential, commercial and educational (Alum Rock Middle School and Adelante Academy).

Looking upstream from Story Road

Looking upstream from Ocala Avenue

Reach 7 – Lake Cunningham Park to Thompson Creek

Lower Silver Creek flows about 7,200 feet around the west side of Lake Cunningham Park upstream and crosses under Tully Road until it meets Thompson Creek. There are levees along portions of the creek to protect the residential areas to the north while allowing high flows to discharge into the Lake Cunningham Park. Lake Cunningham Park functions as a detention facility starting at about a 5-year flow event (stage is 4.4' at the Thompson Creek Quimby Road ALERT gauge) to reduce 1% peak flows downstream of Cunningham Avenue to about 2,700 cubic feet per second (cfs). A floodwall, levees and outlet control structure of the culvert at Cunningham Avenue have been designed along with the lower improvements to provide 100-year (1%) flood protection for downstream properties. Lower Silver Creek is a widened earth channel upstream of Tully Road. Valley Water owns easement in Lake Cunningham Park and fee title upstream.

Looking west down floodwall and levee at Cunningham Avenue (culvert on right)

Looking south and east at Cunningham Avenue headwall and floodwall

Looking upstream of Tully Road

Reach 8 – Thompson Creek to King Road

Lower Silver Creek flows in an earthen trapezoidal channel for about 1,065 feet from King Road to the City's Meadowfair Park. At Meadowfair Park the creek flows through a trash rack and into a reinforced concrete pipe for about 5,000 feet until it discharges into an open earthen channel at the confluence with Thompson Creek near intersection of Capitol Expressway and Eastridge. Valley Water owns fee-title right of way in the open channel section and easement for much of the pipe alignment.

Beginning of Reach 8 at Confluence with Thompson

Upstream end of Reinforced Concrete Pipe at Mayfield Park

APPENDIX E
Lower Silver Creek and Lake Cunningham (continued)

LOWER SILVER CREEK FLOOD THREATS

Lower Silver Creek is a very flashy drainage area and depth of flow can change quickly. Reach 1 can also be influenced by high water in Coyote Creek and may experience high water levels due to that influence. The areas prone to flooding from Lower Silver Creek, shown in Figure 1E, have all been provided with 100-year (1%) flood protection primarily by construction of floodwalls, levees, enlarging the channel section, and improving upstream detention. Valley Water and the City are requesting a Letter of Map Revision to Federal Emergency Management Agency (FEMA) to remove the 1% flood areas from the map. However, flooding can still occur during larger storm events and unexpected channel conditions (e.g., floodwall failure).

Because flooding is still possible due to higher than 1% flows or other unexpected events (Attachment 12 of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1), the existing FEMA 1% flood inundation map of Lower Silver Creek (Figure 1E) will provide one way to identify areas that could be at flood threat. In addition, flood areas for 6 potential levee failure scenarios at the Lake Cunningham upstream detention facility have been mapped. Figure 2E shows three smaller levee failure scenarios and Figures 3E, 4E and 5E show the flooding due to those failures. Figure 6E shows three additional larger levee failure scenarios, where entire levee reaches were failed, with the flooding due to those breaches shown on Figures 7E, 8E and 9E. These maps give the City some tools to help determine evacuation zones, should a levee breach occur.

FIGURE 2E
Modeled Levee Failure Locations at Lake Cunningham Detention Facility

APPENDIX E
Lower Silver Creek and Lake Cunningham (continued)

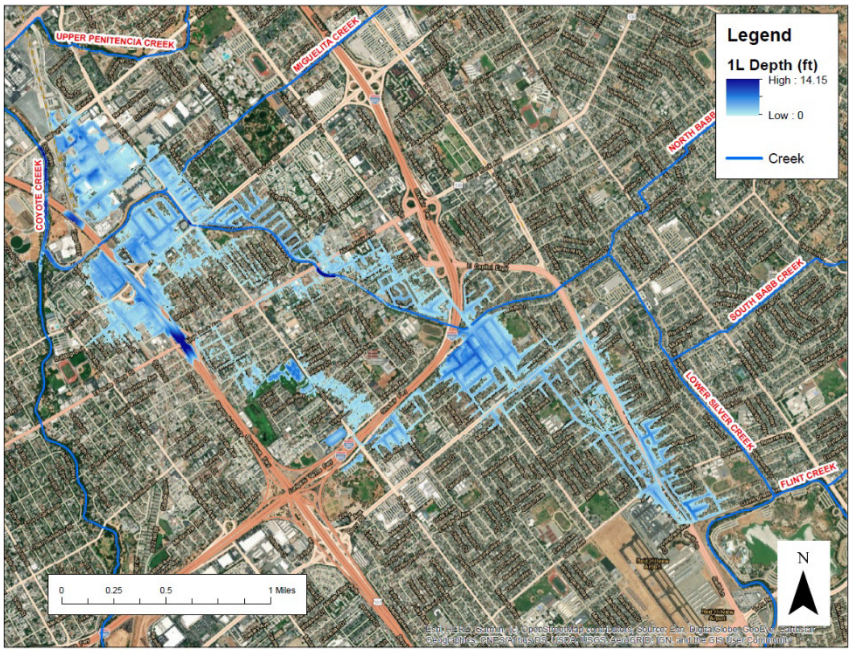


FIGURE 3E
Flooding due to Potential Levee Failure Location 1L at Lake Cunningham

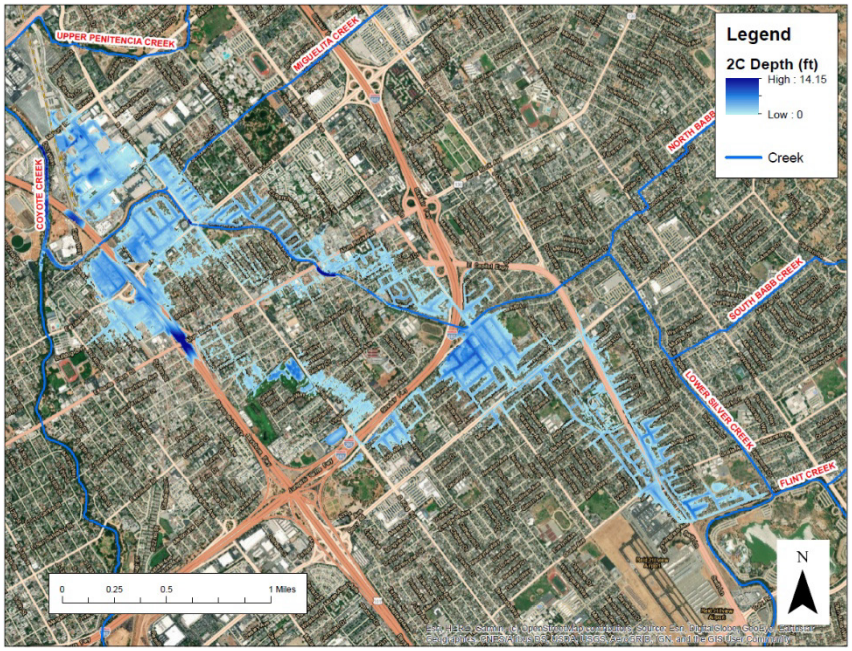


FIGURE 4E
Flooding due to Potential Levee Failure Location 2C at Lake Cunningham

APPENDIX E
Lower Silver Creek and Lake Cunningham (continued)

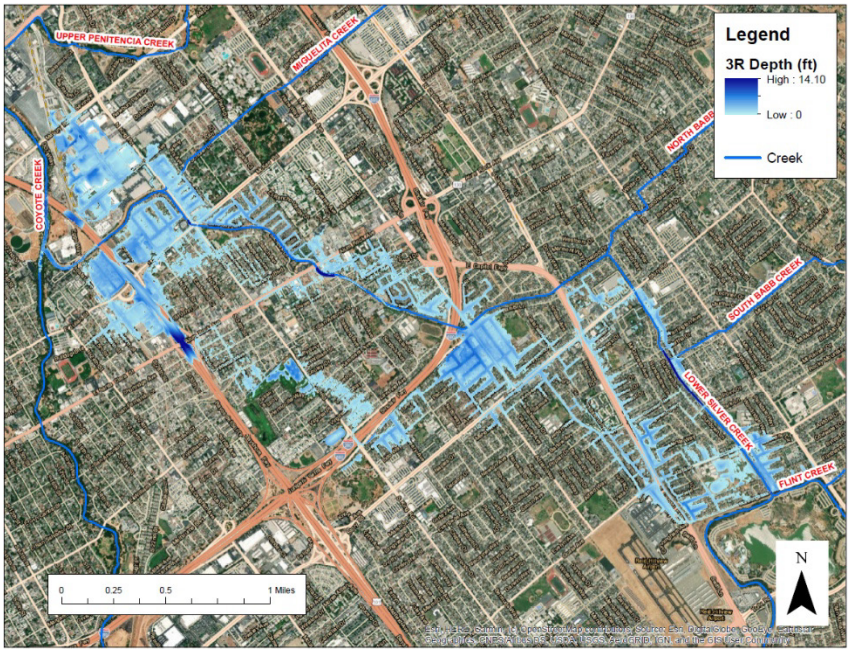


FIGURE 5E
Flooding due to Potential Levee Failure Location 3R at Lake Cunningham

FIGURE 6E
Modeled Large Levee Failure at Lake Cunningham Detention Facility

APPENDIX E
Lower Silver Creek and Lake Cunningham (continued)

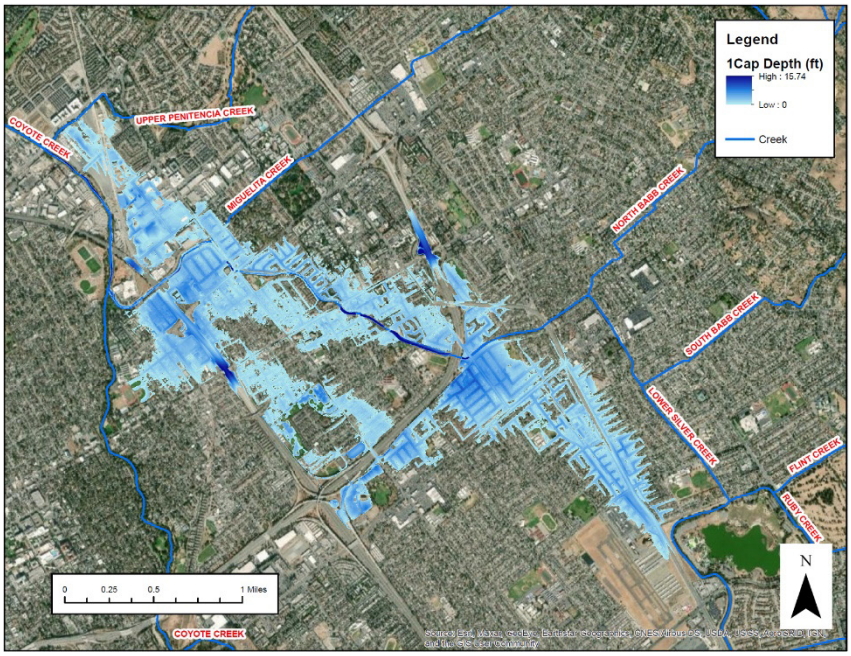


FIGURE 7E
Flooding due to Large Levee Failure Location 1Cap at Lake Cunningham

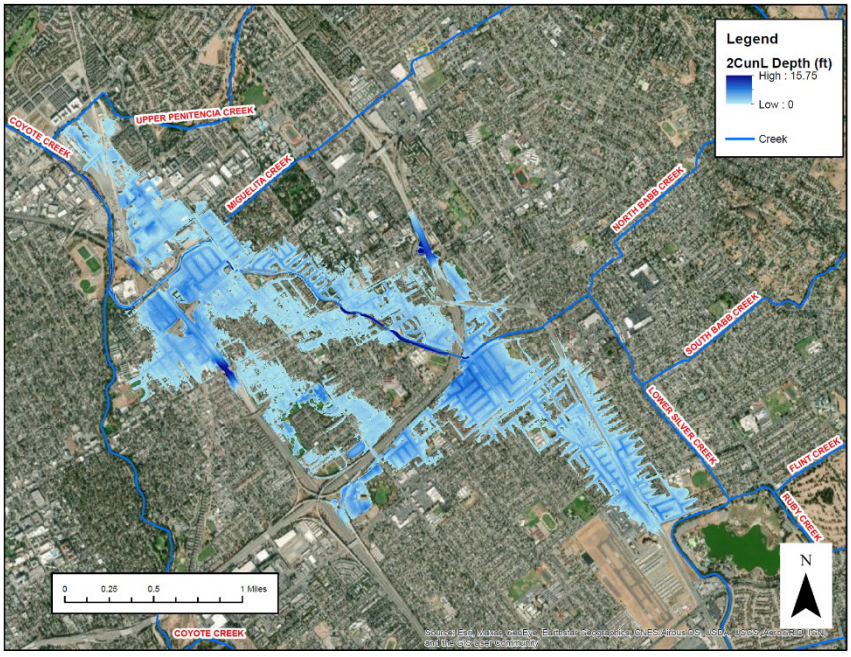


FIGURE 8E
Flooding due to Large Levee Failure Location 2CunL at Lake Cunningham

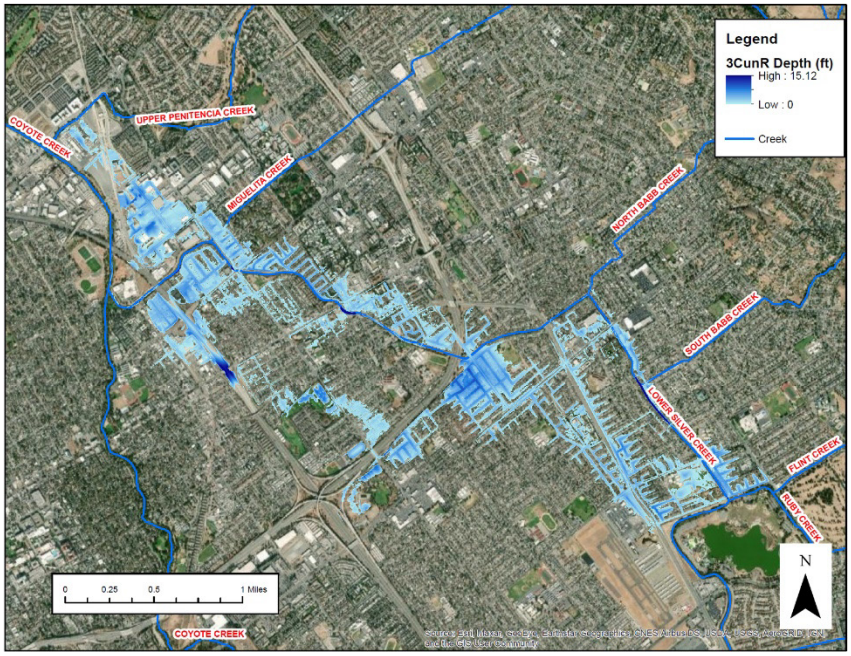


FIGURE 9E
Flooding due to Large Levee Failure Location 3CunR at Lake Cunningham

FLOOD EVENT DETECTION

The flood event detection methods include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Lower Silver Creek are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Coyote Creek Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations in the watershed. Upstream gauges will provide valuable information for flood events occurring downstream and may give advance notice to take action. However, the ALERT gauge on Thompson Creek at Quimby Road just upstream of the confluence will be the primary gauge used for determining the flood condition on Lower Silver Creek. The downstream gauge on Lower Silver Creek at San Antonio Road will be used as another indicator of the functioning of the Lake Cunningham detention facility and possible concerns in the downstream reaches of the creek.

The following is a summary of the current stream gauge program:

1. Annually sites will be prioritized for manual gauging and teams are assigned.

2. After every recorded high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration in the Coyote Watershed was done after the 1995 event and some were completed after the 2017 winter high flows.

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots and facilities that should be visually checked during high flows. Supplementing with visual observations from staff deployed in the field and other field reporting is an important component to detection.

Valley Water operates Field Information Teams (FITs) that are assigned to specific locations during storms and high flow events to provide this valuable information. In addition, the City Parks, Recreation & Neighborhood Services has staff that maintains, operates, and patrols Lake Cunningham Park and other City Departments deploy FIT teams in a coordinated way to assure that all critical locations are being monitored. Locations of FIT deployment by the City and Valley Water may overlap during storm and flood events. The EAP Multi-Agency Coordination (MAC) Group and/or the jurisdictions EOC will coordinate this effort through the Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Valley Water Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change
2. Known Flood Hot-Spots (Attachment 11 page 63 of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1)
3. Real-time Flooding—documenting flooding
4. Bridge Piers—checking for debris blockages
5. Trash Racks—checking for debris blockages
6. Levees downstream of Highway 101—check for stability
7. Sandbag sites—checking for supply and access issues
8. Previously repaired or other project sites—checking for performance
9. Raw water facilities—dams and canals

LOWER SILVER CREEK FLOOD CONDITION LEVELS

Sometimes an event is a flash flow that occurs suddenly without much early notice, which is the situation upstream of Capital Expressway on Lower Silver Creek. However, with weather forecasting and computer modeling of the watersheds there is often an ability to estimate high flow events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response to assist the Agency's in planning and implementing appropriate actions. Due to uncertainties of forecasting future conditions, a condition of Watch will be used when 90% to 100% of the 100-year (1%) flow stage is estimated about 24 to 72 hours or more in the future. If this high flow is estimated within about 24 hours, the threat level will be elevated to Warning**.** Table 1E shows the stage for flow rates at two ALERT monitoring gauges that can be used to set the threat level.

Since Lower Silver Creek and Lake Cunningham have been improved to provide 100-year (1%) flood protection, the highest condition level expected would be Monitoring (Yellow) except in an extreme storm event that would result in a 1% flow or during other unexpected conditions (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1). In addition, a level of severity would not be set as for other flood prone facilities because of the flood protection improvements.

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or

	• For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

NOTIFICATIONS AND ACTIVITY/ACTIONS

Notifications and actions are described in the Joint EAP which describes threat level, notifications and activity/actions to be taken by both the City, Valley Water and other stakeholders. The level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

INFRASTRUCTURE AT RISK

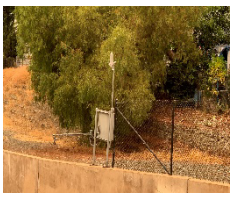
There are no Federal Emergency Management Agency (FEMA) defined critical facilities located in the floodplain, however, there are other important infrastructure where people, property, and important facilities may be at risk. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. The facilities below are within the area where people, property, and infrastructure may be at risk:

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOLS	Ann Darling Elementary School	333 N 33rd Street San José, CA 95133	(408) 535-6209
	Rocketship Elementary School	2249 Dobern Avenue, San José, CA 95116	(408) 824-5180

APPENDIX E
Lower Silver Creek and Lake Cunningham (continued)

FACILITY TYPE	NAME	ADDRESS	PHONE
	Aptitude Community Academy at Goss	2475 Van Winkle Lane, San José, CA 96116	(408) 928-7650
	Ryan Elementary	1241 McGinness Avenue San José, CA 95127	(408) 928-8650
OTHER	The San Jose Cambodian Buddhist Society	2751 Mervyns Way, San José, CA 95127	(408) 770-9171
	US Postal Service	1085 McGinness Avenue San José, CA 95127	(800) 275-8777

TABLE 1E
Lower Silver Creek ALERT Gauges – Flow Rate Stages

Index Location		Percent of 100-Year Stage at Monitoring Location			Photo
	50% of 100-Year	70% of 100-Year	90% of 100-Year	100-Year	
Thompson Creek at Quimby Road	4-5’ (1,645 cfs)	5.7’ (2,303 cfs)	6.3’ (2961 cfs)	6.6’ (3,290 cfs))	
Lower Silver Creek at San Antonio St.	7’ (1760 cfs)	7.9’ (2464 cfs)	8.8’ (3,168 cfs)	9.2’ (3,520 cfs)	

APPENDIX F
Upper Penitencia Creek

PURPOSE

This Appendix to the Joint Emergency Action Plan (EAP) for Severe Storms and Flooding in the City of San José is meant to provide additional guidance specific for Upper Penitencia Creek. It will not duplicate information already in an Emergency Operations Plan (EOP) or the EAP, but will provide Upper Penitencia Creek specifics for:

1. Incident detection
2. Evaluation and condition level classification
3. Notification and communications
4. Emergency actions

UPPER PENITENCIA CREEK DESCRIPTION

The Upper Penitencia Creek Watershed (Figure 1F) is in the eastern portion of the City of San José (City) and in the unincorporated area of the County of Santa Clara and is bounded on the east by the Diablo Range and on the west by the Coyote Watershed. The watershed is about 24 square miles (15,300 acres) and is best described by dividing it into 2 areas. The watershed upstream of Dorel Avenue is about 21 square miles and is in steep foothills relatively undeveloped while the 3 square mile region downstream of Dorel Avenue is in the highly urbanized gently sloping valley floor. The upper watershed is oblong in shape and is about 10 miles long and up to 5 miles wide. The lower and flatter area, which constitutes about 12% of the watershed, is rectangular and about 4.2 miles long and relatively narrow. It is highly urbanized with an extensive open space park system along the creek.

Arroyo Aguague is a major tributary that joins Upper Penitencia Creek about 7 miles upstream of the Coyote Creek confluence in the upper watershed area and is about 54% of the total watershed area. Arroyo Aguague continues for about 9 miles to the top of the watershed at an elevation of about 2,600 feet. The City owns and operates Alum Rock Park upstream of Dorel Avenue and the 500 acre-foot Cherry Flat Reservoir about 5 miles upstream of that road crossing.

Upper Penitencia Creek is generally an earth vegetated stream with highly valued wildlife and fishery habitat. Upper Penitencia Creek is an intermittent stream (generally dry in the summer months) and considered one of the better steelhead fish habitats in the south bay area because of the earth and gravel channel with significant vegetation.

Santa Clara Valley Water District (Valley Water) operates groundwater recharge facilities adjacent to the creek downstream of Toyon Drive that includes a diversion structure and overflow weir at the downstream end of the Gross Percolation Facility that are not currently operated.

Valley Water has worked for many years with the federal government to plan a flood project and have worked with the City and County of Santa Clara to preserve floodways in their park systems. Recent studies by the Army Corps of Engineers did not find sufficient economic benefit to justify federal participation.

As a result, in 2019, the Valley Water Board of Directors targeted the use of local funds to complete a project from the confluence with Coyote Creek to Capital Avenue. This project will protect about 1,250 parcels from 100-year (1%) flooding. An Upper Penitencia Creek reach map is shown in Figure 2F followed by reach descriptions.

FIGURE 1F
Upper Penitencia Creek Watershed Map

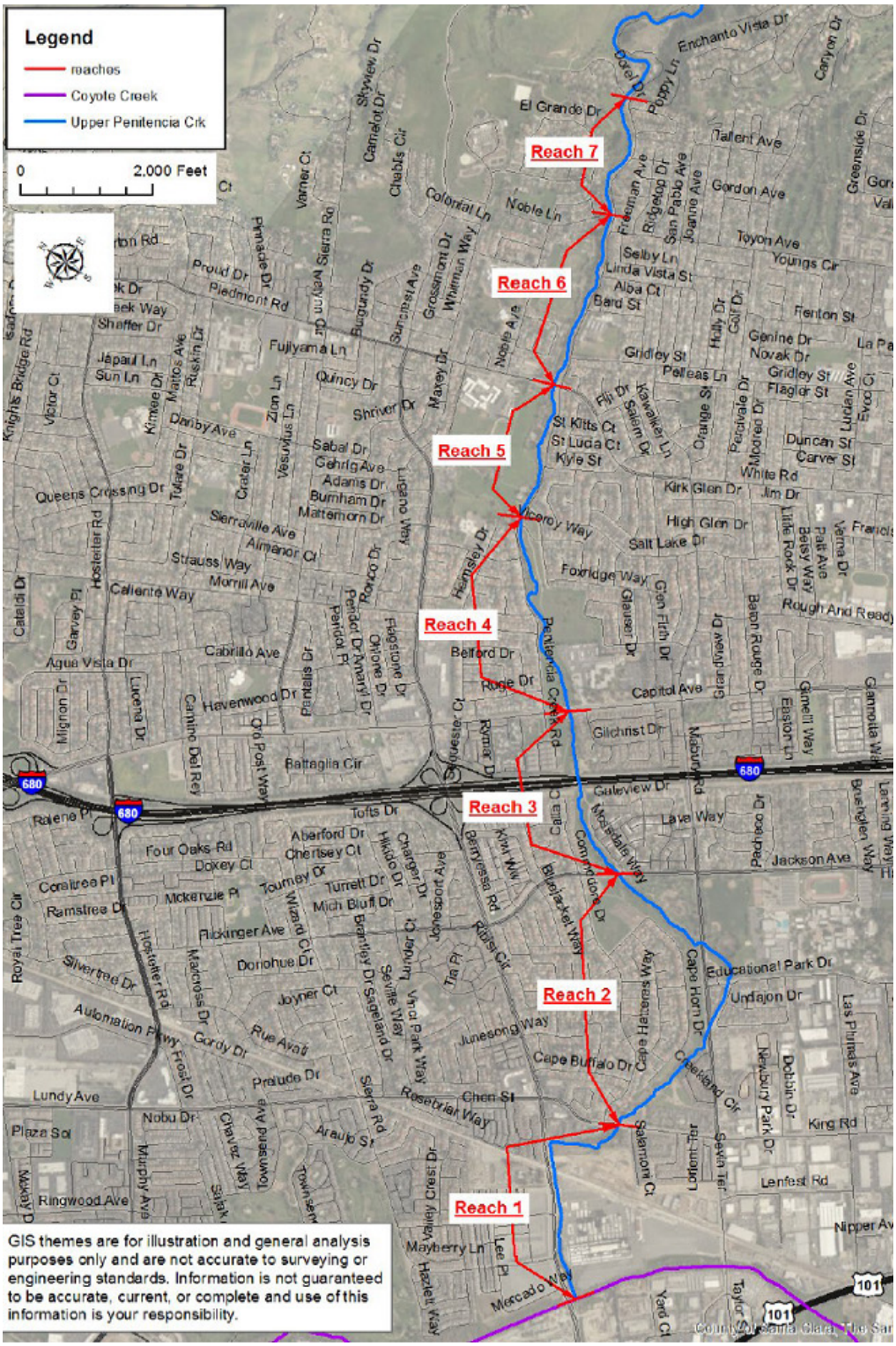


FIGURE 2F
Upper Penitencia Creek Reach Map

APPENDIX F
Upper Penitencia Creek (continued)

Upper Penitencia Creek has been divided into 8 reaches; the first 7 are shown in Figure 2F. Below is a listing of the reaches followed by descriptions and pictures of the reaches.

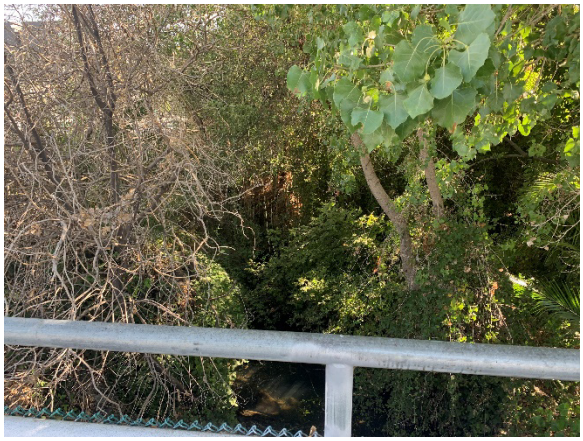
- Reach 1 – Coyote Creek to King Road
- Reach 2 – King Road to Jackson Avenue
- Reach 3 – Jackson Avenue to Capitol Avenue
- Reach 4 – Capitol Avenue to Viceroy Way
- Reach 5 – Viceroy Way to Piedmont Road
- Reach 6 – Piedmont Road to Noble Avenue
- Reach 7 – Noble Avenue to Dorel Road
- Reach 8 – Dorel Road to Limit of Jurisdiction

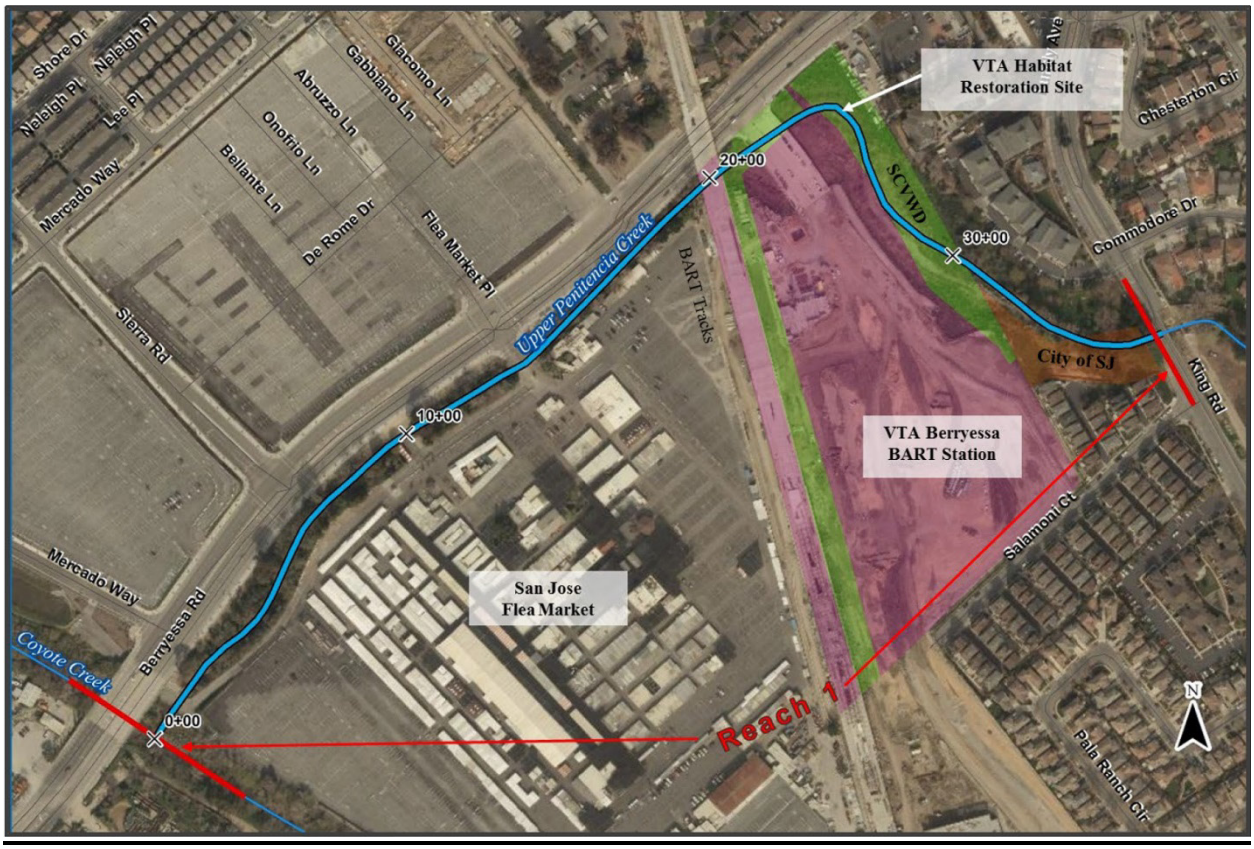
Reach 1 – Coyote Creek to King Road

The downstream portion of the reach from the confluence with Coyote Creek to upstream of Berryessa Station Way is a straight earthen channel with heavy vegetation. In this straight reach, Berryessa Road runs along the north side of the creek and the San José Flea Market is on the south. At the confluence with Coyote Creek the channel is in a 6-foot corrugated metal pipe (CMP) that is under a pedestrian undercrossing of Berryessa Road. There is a 110 degree bend in the channel upstream of the Bay Area Rapid Transit (BART) system's Berryessa Station Way bridge. In addition to the bridge at Berryessa Station Way, there are two small bridge crossings into the San José Flea Market. Valley Water's Central Pipeline crosses under the creek just upstream of the BART railway bridge crossing.

Adjacent land use is generally private owned commercial property except on the south side of the creek upstream of the elevated BART railway crossing where the Penitencia Creek Park trail begins. The creek is privately owned up to the BART railway where the trail and public right of way (including Valley Water fee and easement) begins and generally extends upstream for about 4 miles to Dorel Road. There are likely to be unregulated tent encampments near the confluence with Coyote Creek.


Looking downstream along Berryessa Road.


Looking upstream from San Jose Flea Market bridge



Reach 1 Map

Reach 2 – King Road to Jackson Avenue

The creek is predominantly a vegetated earthen channel through this reach connected to a wide 150- to 300 -foot wide overflow floodplain that bypasses the Mabury Road meander. The floodplain is to the north of the creek channel and Mabury Road and is slightly above bankfull elevation. Flows enter the floodplain at Jackson Avenue and over a lateral weir between Jackson Avenue and Mabury Road. The flows in the floodplain bypass can return to the main channel about 400 feet upstream of King Road.

There is a pedestrian bridge just upstream of King Road and an abandoned bridge crossing about 1200 feet upstream that provides pedestrian access across the creek into the floodplain. Between the two Mabury Road crossings the creek is trapezoidal earth with some sack rip rap, a bridge at Educational Park Drive and some unengineered farm levees.

There is a stream gage just downstream of the upstream Mabury Road crossing near a water diversion that provides water to an adjacent percolation pond and to ponds in Overfelt Gardens.

The creek upstream of Mabury Road is a shallow earthen channel and also has farm levees that are not in good condition. There is a park and pedestrian path on the south side of the creek and a lateral weir on the north side about 500 feet upstream of Mabury Road. The Jackson Avenue bridge spans the floodplain area to allow for high flows to pass under the roadway.

APPENDIX F
Upper Penitencia Creek (continued)

Valley Water owns a significant amount of easement and fee title in this reach that includes easement in the floodplain and fee title between the downstream Mabury Road crossing and Educational Park Drive. However, Valley Water does not have any property rights between Educational Park Drive and the upstream Mabury Road crossing, which is the location of the stream gage.

Reach 2 Map


Looking downstream at King Road & Ped bridge


Looking upstream from King Road Ped bridge

APPENDIX F
Upper Penitencia Creek (continued)

Looking east on Mabury Road from downstream crossing (Mabury Bypass is on left).

Looking upstream at Mabury Road upstream crossing from stream gage weir.

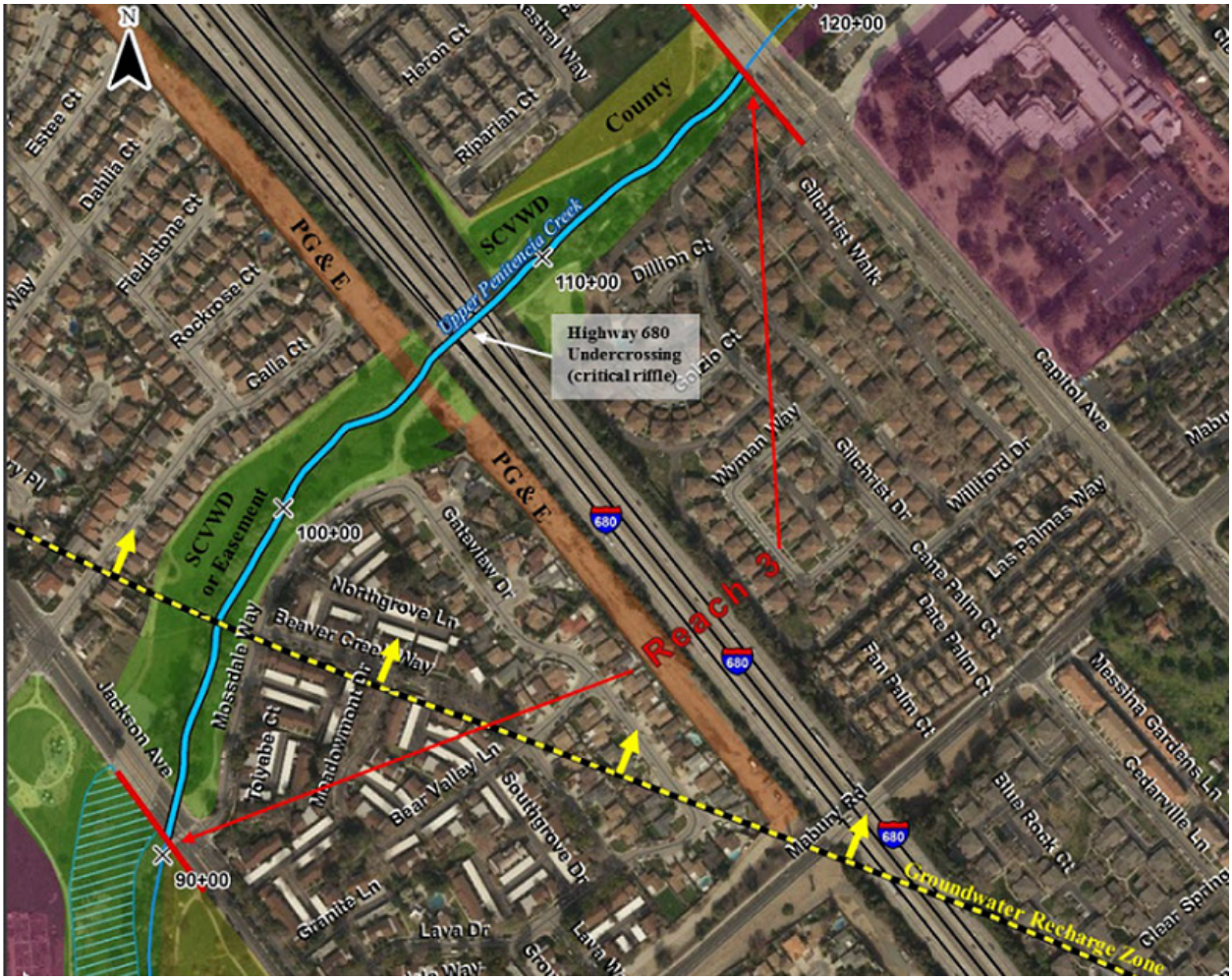
Looking upstream at upper Mabury Road crossing.

Looking upstream from Mabury Road (creek on left) along pedestrian path.

Looking downstream from Jackson Ave at Mabury Bypass.

Reach 3 – Jackson Avenue to Capitol Avenue

The stream channel is vegetated earthen channel with a floodplain adjacent to the top of bank. High flows can flow in the floodplain to the north of the creek channel upstream of Jackson Avenue and pass under the wide bridge. A pedestrian path continues on the south of the creek and crosses under the Interstate 280 bridge. There is a light rail station at the Capitol Avenue Bridge. Valley Water owns mostly fee-title property rights through this reach that includes the pedestrian path.



Reach 3 Map


Looking upstream across Jackson Ave bridge.


Upstream Jackson Ave culvert entrance.

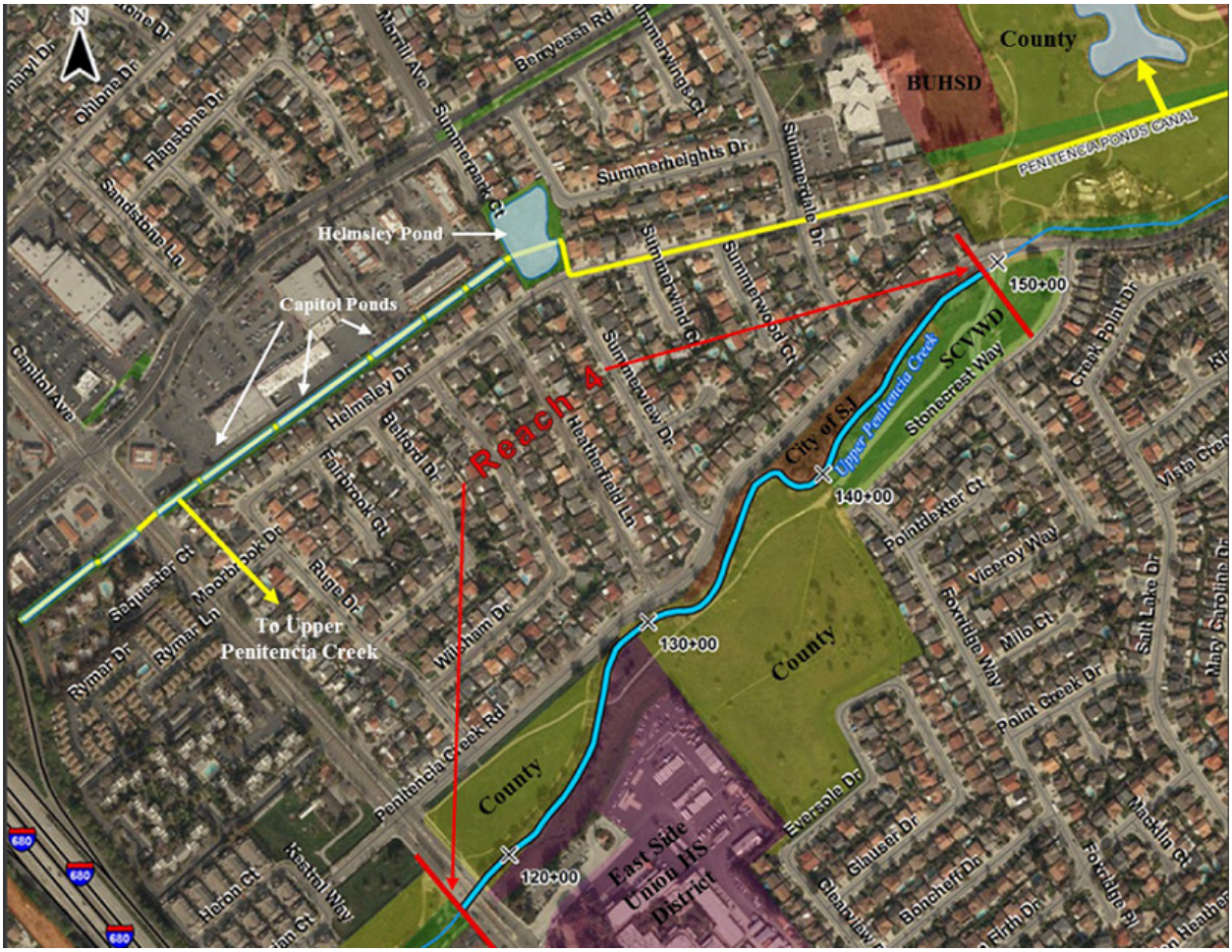

Looking upstream at I-680 (creek on left).


Looking upstream between I-680 and Capitol Ave.


Looking upstream across Capitol Ave.

Reach 4 – Capitol Avenue to Viceroy Way

Upstream of Capitol Avenue the creek continues as an earthen channel that meanders in a floodplain with County park lands on both sides and a parcel owned by East Side Union High School District. The pedestrian path starts on the north side of the creek at Capitol Avenue and then crosses over the creek about 800 feet upstream of Capitol Avenue. There is a levee along Stonecrest Way to the south in the upper part of the reach. Valley Water owns very little right of way in this reach except for fee-title on the floodplain and levee area along Stonecrest Way.



Reach 4 Map

APPENDIX F
Upper Penitencia Creek (continued)

Looking upstream from Ped bridge.

Looking at levee along Stonecrest Way at Viceroy Way intersection.

Looking downstream with Stonecrest Way levee on left and creek on right.

Reach 5 – Viceroy Way to Piedmont Road

Upstream of Viceroy the creek crosses Penitencia Creek Road and continues as a vegetated earthen channel. The creek is bordered on the south by the roadway and on the north by Penitencia Creek Park, Wildlife Center of Silicon Valley and a pedestrian path. There is a pedestrian crossing constriction in the creek about 1,000 feet downstream of Piedmont Road.

The park can act as a floodway during high flows. A stream gauge is located just downstream of Piedmont Road bridge.

Valley Water owns fee-title for about 900 feet starting upstream of the Penitencia Creek Road crossing. Most of the creek and the adjacent park are owned by the County of Santa Clara.

Reach 5 Map

APPENDIX F
Upper Penitencia Creek (continued)

Looking downstream at Penitencia Creek Rd.

Looking upstream in Penitencia Creek Park (creek is on the right)

Stream gage downstream of Piedmont Rd.

Reach 6 – Piedmont Road to Noble Avenue

Upper Penitencia Creek continues in this reach as a vegetated earthen channel bordered on the south by Penitencia Creek Road and on the north by the pedestrian trail and water diversion and settling ponds. The pedestrian path is immediately adjacent to a church and residential homes in the downstream sections and then goes through the Gross Percolation Facility before reaching Noble Avenue.

There is a non-functional water diversion and fish ladder just upstream of Noble Avenue that historically diverted water to the Bob Gross Percolation Ponds via the Penitencia Ponds Canal. Water is now supplied to the ponds from the South Bay Aqueduct, which flows through the three ponds. The downstream pond has an overflow weir to Upper Penitencia Creek and can also flow to the Piedmont Ponds. There is also an overflow into Upper Penitencia Creek at the downstream end of the Piedmont Ponds.

Valley Water owns about half of this reach in either fee-title or easement with the remainder owned by either the City, County of Santa Clara or Berryessa Union School District.

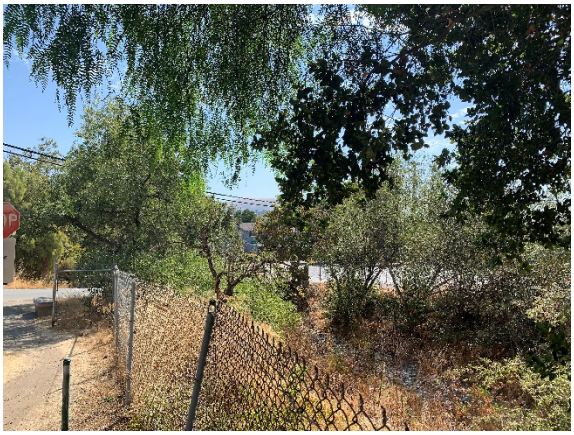
Reach 6 Map

APPENDIX F
Upper Penitencia Creek (continued)


Pond overflow to creek near Piedmont Rd.


Looking upstream Penitencia Pond Canal.


Pond overlow to creek at Bob Gross Ponds.


Looking upstream at Noble Ave (creek on right).

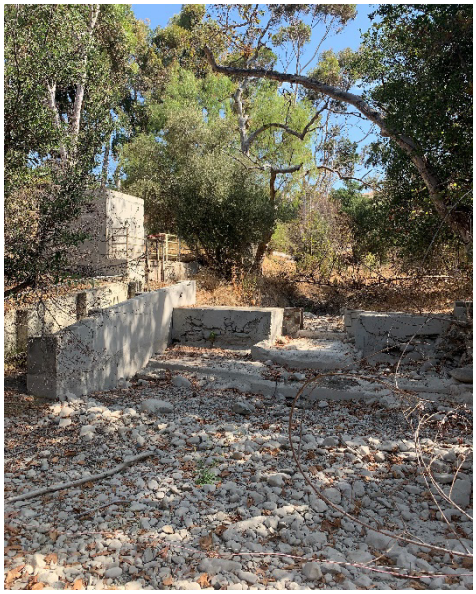

Looking east at Bob Gross Ponds (creek on right).

Reach 7 – Noble Avenue to Dorel Drive

Upstream of Noble Avenue the foothills begin to the north of the creek. The creek continues along Penitencia Creek Road with a pedestrian path between the top of bank and the road. There is an old water diversion structure and fish ladder no longer functional just upstream of Noble Avenue. A stream gauge is located just downstream of Dorel Drive. Valley Water owns fee-title from Noble Avenue to about 500 feet upstream. The remainder of the property in the reach is owned by the City including the stream gage at Dorel Drive.

Reach 7 Map

APPENDIX F
Upper Penitencia Creek (continued)


Looking upstream at Noble Diversion.


Looking upstream – Penitencia Creek Rd on right.


Dorel Drive stream gage.


Dorel Drive radar gage.

Reach 8 – Dorel Drive to Limit of Jurisdiction

Upper Penitencia Creek upstream of Dorel Drive passes some rural residential parcels and enters the City of San José's Alum Rock Park. The creek continues in a natural unmodified condition through the park and into the sparsley developed upper watershed area that has steep hills, deep and narrow canyons, and has numerous landslides. A pedestrian and trail system continues along or near the creek through much of the park. About 5 miles upstream is the 500 acre-foot Cherry Flat Reservoir owned by the City of San José. Valley Water owns some easement just upstream of Alum Rock park and some fee-title upstream of Cherry Flat Reservoir.

Just upstream Dorel Drive looking at a private bridge crossing.

UPPER PENITENCIA CREEK FLOOD THREATS

Upper Penitencia Creek has a long history of flooding with the greatest flood likely occurring in 1911 before stream gauge data existed. This flood was described in the local newspaper as overflowing the banks all the way from Alum Rock Canyon to the Coyote Creek. They reported that floodwater was three feet deep at Capitol Avenue and several bridges were washed away. Other significant flooding occurred in 1955, 1958, 1962, 1973, 1978, 1980, 1982, 1983, 1986, 1995, 1998.

The greatest flow recorded on Upper Penitencia Creek was estimated at about 3,730 cfs in 1958. This flow exceeded the capacity of the creek which generally ranges from about 500 cfs near King Road to 1,700 cfs between Jackson Avenue and Capitol Avenue. Below are creek capacities by reach.

Reach	Reach Description	Channel Capacities	Approximate Storm Event
1	Coyote Creek to King Rd.	500 cfs	2 to 5 year
2	King Rd. to Jackson Ave.	500 cfs	2 to 5 year
2a	Mabury Rd. Bypass	900 cfs	5 to 10 year
3	Jackson Ave. to Capitol Ave.	1700 cfs	10 to 25 year
4	Capitol Ave. to Penitencia Creek Rd.	1000 cfs	5 to 10 year
5	Penitencia Creek Rd. to Piedmont Ave.	1200 cfs	10 year
6	Piedmont Ave. to Noble Ave.	700 cfs	5 year
7	Noble Ave. to Dorel Dr.	1500 cfs	10 year

During a 100-year flood event, floodwaters would breakout at many locations causing localized flooding impacting about 8,000 to 9,000 parcels. Floodwaters will initially break out into the Mabury Road Bypass and could flow out onto Mabury Road and Cape Horn Drive. Overtopping at Piedmont Road will flow north towards the City of Milpitas. Flooding to the south will generally only extend to McKee Road with some flowing down Interstate 680 and Alum Rock Road.

Most flood depths are 1 foot or less in the sheet flooding areas with some deeper flooding in ponding locations, such as, Interstate 680 at Alum Rock Road and near the confluence of Lower Penitencia Creek and Berryessa Creek. Figure 3F shows the FEMA 100-year floodplain.

APPENDIX F
Upper Penitencia Creek (continued)

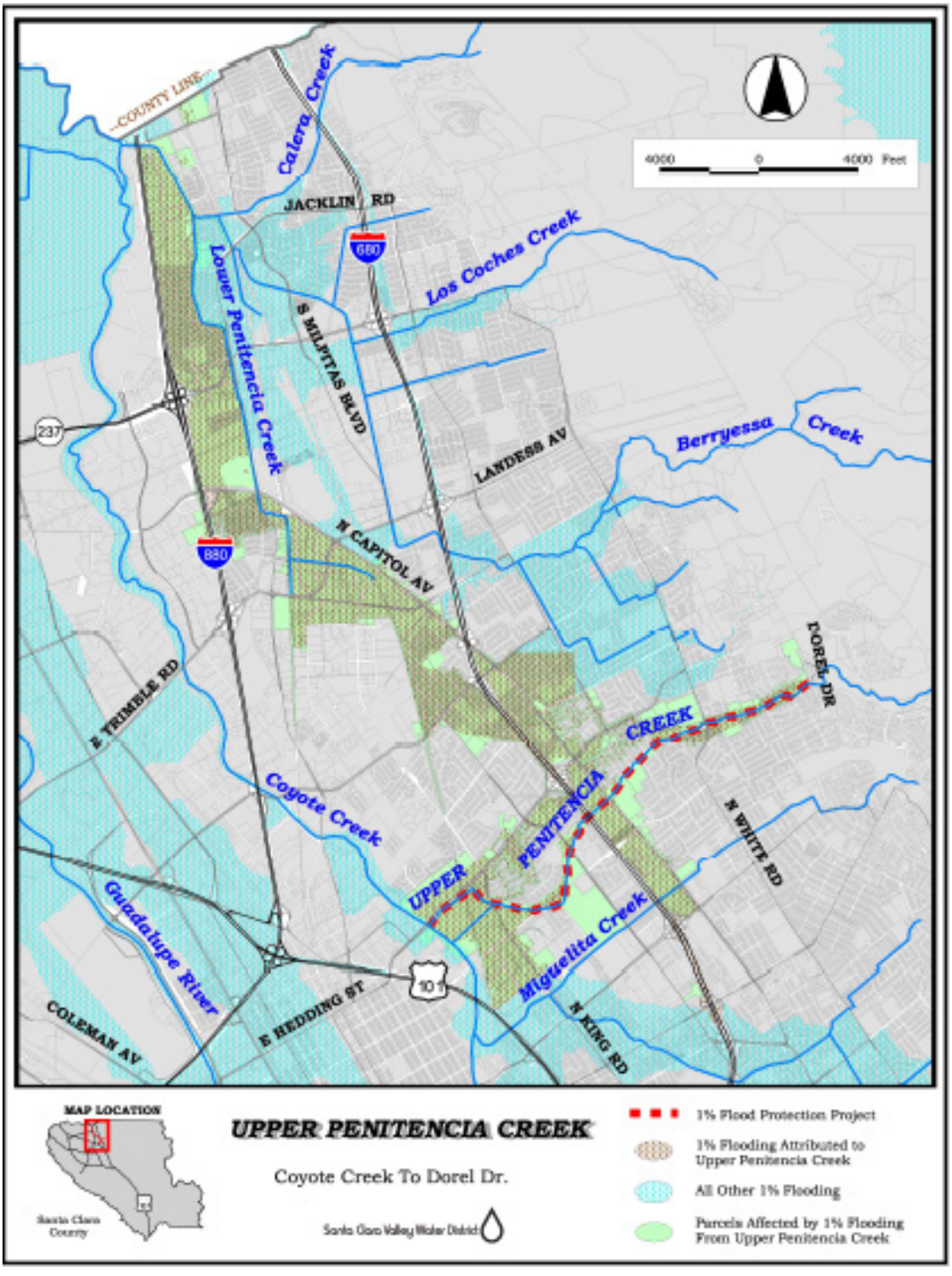


FIGURE 3F
Upper Penitencia Creek FEMA Flood Map

FLOOD EVENT DETECTION

The flood event detection methods include weather forecasts, hydrologic/hydraulic modeling, Automated Local Evaluation in Real Time (ALERT) stream/reservoir/precipitation gauge systems, and field observation of stage gauges and other areas of high flow.

Of these methods, the gauging and field observation methods specific to Upper Penitencia Creek are described below:

ALERT Gauge System

A listing of all ALERT gauges in the Coyote Creek Watershed can be found at http://alert.valleywater.org. These gauges provide data in near real-time at several locations in the watershed. Upstream gauges will provide valuable information for flood events occurring downstream and may give advance notice to take action. However, the ALERT gauge on Upper Penitencia Creek at Piedmont Road will be the primary gauge used for determining the flood condition. The Dorel Road gauge and the downstream gauge on Upper Penitencia Creek at Mabury Road may be used as other indicators of the functioning of creek and overflow area.

The following is a summary of the current stream gauge program:

1. Annually sites will be prioritized for manual gauging and teams are assigned.

2. After every recorded high flow event, the rule curves (depth versus discharge) are updated/calibrated. High flow calibration in the Coyote Watershed was done after the 1995 event and some were completed after the 2017 winter high flows.

Field Observations

Field observations can be critical to verify what is occurring because ALERT gauges are not always a reliable source of information and modeling information can vary from the actual condition. In addition, there are other known hot-spots and facilities that should be visually checked during high flows. Supplementing with visual observations from staff deployed in the field and other field reporting is an important component to detection.

Valley Water operates Field Information Teams (FITs) that are assigned to specific locations during storms and high flow events to provide this valuable information. In addition, the City Parks, Recreation & Neighborhood Services has staff that maintains, operates, and patrols Upper Penitencia Creek Park and other City Departments deploy FIT teams in a coordinated way to assure that all critical locations are being monitored. Locations of FIT deployment by the City and Valley Water may overlap during storm and flood events. The EAP Multi-Agency Coordination (MAC) Group and/or the jurisdictions EOC will coordinate this effort through the Planning/Intelligence Section so that resources are most effectively utilized and information is shared.

Valley Water Hot-Spots for possible FIT deployment are:

1. Visual stream gauges—checking for high water and rate of change. Bridges at King Road and Upstream Mabury Road crossing are good indicators of flooding downstream and an overlay of a gage is shown in Table 1F.

2. Known Flood Hot-Spots (Attachment 11 pages 60-62 of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1)

3. Real-time Flooding—documenting flooding

4. Bridge Piers—checking for debris blockages

5. Trash Racks—checking for debris blockages

6. Levees downstream of Highway 101—check for stability

7. Sandbag sites—checking for supply and access issues

8. Previously repaired or other project sites—checking for performance

9. Raw water facilities—dams and canals

UPPER PENITENCIA CREEK FLOOD CONDITION LEVELS

Sometimes an event is a flash flow that occurs suddenly without much early notice. However, with weather forecasting and computer modeling of the watersheds there is often an ability to estimate high flow events before they occur. This is extremely valuable when preparing for necessary evacuations and road closures.

To provide this advanced notice, a threat level will be used to provide an indicator of preparedness for a response to assist the Agency's in planning and implementing appropriate actions. Due to uncertainties of forecasting future conditions, a condition of Watch (orange) will be used when 70% to 100% of the bankfull flow stage is estimated about 24 to 72 hours or more in the future. If flooding is estimated within about 24 hours, the threat level will be elevated to Warning (red). In addition, an unexpected situation may occur during high flows that may result in a change in condition level (Attachment 12 – Guidance Table for Evaluating Facility During High Flow and Determining Condition Level of Joint Emergency Action Plan for Severe Storm and Flood Response in City of San José Volume 1).

Green	**Preparedness**—This is the base stage of readiness that will be the typical condition throughout most of the year. It is defined as: • Flood stage (Minor Flooding or greater) or 90% to 100% of design stage is not estimated within the next 72 hours or • Measured stream depth is below 70% of flood stage or design stage.
Yellow	**Monitoring**—This condition is variable and requires more intense monitoring and a heightened level of alertness. Minimal staff in each Stakeholder's Emergency Operations Center (EOC) may be activated. A virtual MAC could be activated. An informal EOC Action Plan (AP) could be initiated if activated. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or 90%-100% of design stage in 72 hours or more, or • Measured stream depth is at 50% to 70% of flood stage or 70% to 90% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or near design stage within 24 hours.
Orange	**Watch**—The Stakeholders' would increase staff in their EOCs, if they had been activated, and a MAC facility could also be established. If activated, a formal EOC AP will be drafted. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Stream depth is estimated to reach flood stage or greater than design stage within 24 to 72 hours, or • Measured stream depths are at 70% to 100% of flood stage, or • Measured stream depths are at 90% to 100% of design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within 6-12 hours.
Red	**Warning**—This is a more urgent situation. The Stakeholders' EOC may be activated along with a MAC that would monitor the situation, providing notifications and responding according to a written AP. Often for smaller watersheds with flashy creeks, an EOC or MAC will not be opened until the storm event is occurring. This condition (determined as described in Step 1 of 2.B. Determining Flood Condition Levels in Volume 1) is defined as: • Flood stage or greater than design stage or is occurring or is estimated to occur within 24 hours, or • Measured stream depths are 100% or greater than flood stage, or • Measured stream depths are greater than design stage, or • For areas that are controlled purely by storm drain runoff (flashy systems), the stream depth is estimated to reach flood stage or greater than design stage within minutes/hours or is occurring.
Note: Design stage is the depth of water that a facility design is based upon and flood stage is the depth of water at which a stream or facility begins flooding (see Glossary of Terms).	

When the threat level is at a Watch or Warning, there is an expectation that flooding will occur or is occurring at some locations. The severity of the situation at specific locations is determined by the flood stage. The areas subject to flooding for different stream stages are estimated utilizing hydraulic models, the FEMA flood map, and flood maps from recent modeling.

Flood severity categories are defined by the NWS as:

Action	An established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.
Minor Flooding	Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
Moderate Flooding	Some inundation of structures and roads near stream, evacuations of people and/or transfer of property to higher elevations.
Major Flooding	Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

A 100-year (1 percent) FEMA flood inundation map of Upper Penitencia Creek is shown in Figure 2F and the Flood Threat Stages at King Road and the upstream Mabury Road crossing are shown in Table 1F. The map is the Federal Emergency Management Agency (FEMA) 1 percent flood map. This map is based on the best available information and modeling when it was created and should be considered as approximate due to the difficulty in estimating an actual event and the changing conditions of the creek.

Table 2F is a flood severity table for the Upper Penitencia Creek at the Piedmont Road Gauge that is used to estimate areas that will be subject to flooding. Since there is very little notice for flooding based on this gauge, flood conditions will often utilize predictive methods based on weather forecast and watershed conditions. In addition, the gauge at Mabury Road may be used as additional information for potential flooding downstream.

These tables along with the actual or modeled data would allow Valley Water or MAC to establish threat levels for specific areas subject to flooding. Mapping associated with this table and any modeling will be provided to Agency Stakeholders if possible. This information will be made available for notifications and will be coordinated with the National Weather Service to be consistent in the dissemination of threat level and severity information.

NOTIFICATIONS AND ACTIVITY/ACTIONS

Notifications and actions are described in the Joint EAP which describes threat level, notifications and activity/actions to be taken by both the City, Valley Water and other stakeholders. The level of activity will be guided by the best information available to the Agency Subject Matter Experts (SMEs) and Agency Coordinators (ACs). The level of activity may mirror those activities of the individual jurisdictional Emergency Operations Centers (EOCs). As weather conditions merit and monitoring take place, the SMEs and ACs may be in their home

offices or their jurisdiction's EOC, if activated. The "call to action" may be a series of phone calls among the SMEs and ACs to determine the best approach to coordination.

INFRASTRUCTURE AT RISK

There are no Federal Emergency Management Agency (FEMA) defined critical facilities located in the floodplain, however, there are other important infrastructure where people, property, and important facilities may be at risk. Based on intelligence gathered during the storm event, the MAC will determine the risk and provide notifications as appropriate. The facilities below are within the area where people, property, and infrastructure may be at risk:

FACILITY TYPE	NAME	ADDRESS	PHONE
SCHOOLS	Toyon Elementary School	995 Bard Street, San José, CA 95127	(408) 923-1965
	Independence High School	617 N. Jackson Avenue, San José, CA 95133	(408) 928-9500
	East Side Union High School District Headquarters	830 N. Capitol Avenue, San José, CA 95133	(408) 347-5000
	Summerdale Elementary School	1100 Summerdale Drive, San José, CA 95132	(408) 923-1960
	Piedmont Middle School	955 Piedmont Road, San José, CA 95132	(408) 923-1945
FIRE STATIONS	San José Fire Station 23	1771 Via Cinco De Mayo, San José, CA 95132	(408) 794-7000
	San José Fire Station 34	1634 Las Plumas Ave., San José, CA 95133	(408) 794-7000
OTHER	Bay Area Rapid Transit Berryessa Station	1620 Berryessa Road, San José, CA 95133	(510) 464-6000
	VTA Light Rail – Penitencia Creek, Berryessa, Hostetter, and Cropley Stations	N. Capitol Ave.	911 or (408) 321-2300
	Wildlife Center of Silicon Valley	3027 Penitencia Creek Road, San José, CA 95132	(408) 929-9453

APPENDIX F
Upper Penitencia Creek (continued)

TABLE 1F
Upper Penitencia Creek Flood Threat Stages – Flow Rate Stages

Index Location	Flooding Description	Flood Threat Stage at Monitoring Location			Photo
		50% Capacity	70% of Capacity	100% Capacity	
Downstream of King Rd	Bank overtops on right side of the creek, flooding nearby homes and streets.	4.5'-5.5'	5.5'-6.5'	6.5'-7.5'	
Upstream Mabury Road (west)	Bank overtops on right side of the creek, flooding nearby homes and streets.	4.9'-5.9'	5.1'-6.1'	6.5'-7.5'	

Disclaimer: The flooding thresholds in this table are based on hydraulic modeling results calibrated with data collected during the historical flood events. Hydraulic modeling results may be preliminary and should be used for general analysis purposes. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.

APPENDIX F
Upper Penitencia Creek (continued)

TABLE 2F
Piedmont Road Gauge Flood Severity Thresholds (NWS Model)

Piedmont Avenue Gauge Thresholds	Stage (ft)	Description
Action	**3.5**	• Culvert debris can adversely affect capacity at Mabury Rd and Educational Park Drive.
Minor Flooding	**4.5**	• Bridges and surrounding areas near Mabury Road, Educational Park Drive, and King Road at risk of minor flooding.
Minor Flooding	**4.5**	• Neighborhood streets around Commodore Drive and Cape Horn Court at risk, as well as flow onto Educational Park Drive. • Overbanking begins to occur near Noble Ave along Penitencia Creek Road.
Moderate Flooding	**6.5**	• Flooding worsens along Penitencia Creek Road with overbanking occurring at multiple locations, mostly spilling southward upstream of Capitol Avenue. • The Commodore neighborhood experiences flooding. Neighborhood south of Educational Park Drive floods. • Flea Market and surrounding area along Berryessa Creek at risk.
Moderate Flooding	**7.5**	• Significant overbanking occurs on both sides of Upper Penitencia Creek throughout. • Widespread flooding occurs, sheet flowing along roads to both the north and the south, ponding against I-680.
Major Flooding	**8.5+**	• Sustained flooding would cause floodwaters to move northwesterly towards Capitol and I-680, as well as southwesterly toward McKee Road. • I-680 at risk of flooding under the McKee and Alum Rock interchanges. • Downstream of I-680, floodwaters move southwards toward Lower Silver Creek, and northwards following parallel to Coyote Creek, south of Lundy Avenue. Water may move further north toward Milpitas, crossing Montague Expwy and following Capitol Avenue toward I-880.
Disclaimer: The flooding depths in this table are based on hydraulic modeling results calibrated with data collected during the historical flood events. Hydraulic modeling results may be preliminary and should be used for general analysis purposes. Information is accurate within the model limitations and assumptions/data used for model development. Use care while interpreting results.		