Attachment 7 – Technical Justification of Projects

Attachment 7 is mandatory. See Exhibit C for detailed guidance on the preparation of this attachment. There is no page limitation for Attachment 7; however, applicants are encouraged to be specific, clear, and concise.

Scoring for Attachment 7 will be based solely on the technical justifications of the project(s) with respect to the claimed physical benefits (i.e., technical basis of the project and capability of yielding the benefits). Documentation may include, but is not limited to: technical reports, feasibility studies, needs assessments, expert opinion or local knowledge, journals, etc. The magnitude of physical benefits will not be scored under this criterion. Please note that the magnitude of project benefits relative to costs will be evaluated based on the information provided in Attachment 8.

This attachment has been prepared to document that by completing the City of East Palo Alto's Runnymede Storm Drain Phase II and O'Connor Pump Station Outfall Project (Runnymede Phase II), measurable physical benefits that are technically justified will be accomplished. In order for this project to be completed as is intended, the City of East Palo Alto is seeking funding from the State of California, Department of Water Resources' Proposal Solicitation Package for Stormwater Flood Management Grants, funded by Proposition 1E. The sections below will provide a summary of the project, state the physical benefits of the project, provide a narrative description of all the expected physical benefits, summarize the "with project" and "without project" conclusions, and provide tables that depict the annual project physical benefits.

Project Summary

Documented flooding within the City of East Palo Alto (City) has been occurring since the 1940s with the most damage occurring when heavy rainfall results in overtopping of San Francisquito Creek levees. The City is at the flattest, most downstream end of the 47 square mile (30,100 acre) San Francisquito Creek watershed, and even relatively frequent rainfall events can cause localized flooding especially when they coincide with high tide events. The Runnymede Storm Drain System, during low tides, discharges water to marshes that lead to the Bay through two, 48-inch diameter TideFlex backflow valves that are connected to a box culvert at the terminus of the system. During higher tides, the discharge capacity of the TideFlex valves decreases until it can discharge only minimal amounts of stormwater. At this point stormwater is diverted through a bypass structure to a conveyance channel (South Channel) that conveys stormwater to a detention pond where the O'Connor Pump Station pumps the water to be discharged into San Francisquito Creek. The South Channel was under the jurisdiction of San Mateo County until 2005 and it had not been adequately maintained for a number of years, which resulted in sediment accumulation and decreased stormwater conveyance capacity. In addition, there is no berm on the west side of the South Channel which allows high flows to pond in the low lying neighborhoods. During a storm event in which there is also a high tide, the stormwater cannot adequately be conveyed and localized flooding occurs in the low-lying neighborhoods near the Runnymede outfall structure and the conveyance channel and detention pond. The City currently operates and maintains the South Channel and seeks to implement improvements to the benefit of its citizens.

The Runnymede Phase II Project will increase the conveyance capacity of the South Channel and detention pond by excavating/dredging accumulated sediments and then using the excavated spoils to construct a formal flood control berm to the west of the South Channel and the pond that will add further protection to the neighborhoods from flooding by creating an engineered channel for the Runnymede system flows. This newly constructed berm will also contain a path for recreational users, and areas that are affected by construction will be restored to salt marsh wetland to the largest extent practicable. This project will also result in wetland mitigation in another area of the South Bay.

Ultimately, the Runnymede Phase II Project will result in Flood Damage Reduction because of the increased capacity of the local system to discharge stormwater. In recent years, the San Francisquito Creek Joint Powers Authority (SFCJPA) has raised the height of the levees of San Francisquito Creek where overtopping of regional flood water has occurred. Other projects by the SFCJPA to further minimize flood risk to the City are in the planning stages. This Runnymede Phase II Project, in conjunction with SFCJPA's regional efforts, will further reduce the chance of localized flooding which has plagued the disadvantaged community for years.

Project Physical Benefits for the Runnymede Storm Drain Phase II and O'Connor Pump Station Outfall Project

- Primary Benefit- Flood Damage Reduction (FDR)
    - Flood Damage Reduction will be achieved by increasing the conveyance capacity of the Runnymede South Channel and detention pond (which discharges stormwater runoff to San Francisquito Creek through the O'Connor Pump Station) and building a new flood protection berm to the west of the South Channel (which will also assist in increasing the conveyance capacity of the channel for a 100-year event). Both these projects will lead to a decreased flood inundation area and reduced flood water level depths for any size storm event compared to current conditions.
    - The primary physical benefit of the Runnymede Phase II Project is the reduction in physical damage that has been caused by past flood events and that continues to be a threat to the residential area of East Palo Alto near the project location. To justify the Flood Damage Reduction benefit, past events were analyzed and storm event calculations were performed to understand flood scenarios associated with the Runnymede Storm Drain System and damages that can occur "with project" and "without project." Four flood events during times of 6-foot to 6.8-foot high tides were considered for use to perform the FDR analysis for 2-year, 10-year, 25-year, and 45-50-year storm events.

      2-year Flood Event: The first flood event used in the Flood Damage Reduction benefit analysis, occurred on December 19, 2010. Information from this event was gathered through interviews and photographs from staff with the City of East Palo Alto. Data was also collected by retrieving historical rainfall/flood data, and the event was found to be of a 2-year interval frequency. This storm event coincided with a high tide event that would have allowed little, if any, discharge through the TideFlex valves to the salt marsh which leads to the Bay. The flooding was deemed to be "nuisance flooding" because storm drains in the low laying areas could no longer intake water which caused flooding in roadways and sidewalks as shown on Figure 7-1. There was no recorded damage or associated damage costs due to this nuisance flooding. Using Figure 7-1 to estimate a water surface elevation based on location and 2006 GIS topography data obtained from a digital terrain model (DTM) performed for Santa Clara County by Optimal Geomatics data found on Figure 7-2, it was estimated that the water surface elevation was to the 5.0-foot contour. Figure 7-1 confirms that there would be flooding in the streets, however no properties are likely to incur damage.

View East- Flooding at Cypress Street during December 19, 2010 storm.

View North- High tide inundates TideFlex valves at the Runnymede Storm Drain System outfall during December 19, 2010 storm.

Photos Provided by Jay Farr,
Maintenance Division Manager,
City of East Palo Alto

City of East Palo Alto
San Mateo County

Runnymede Storm Drain Phase II
December 2010- 2-year Storm Event

January 2013

Figure No. 7-1

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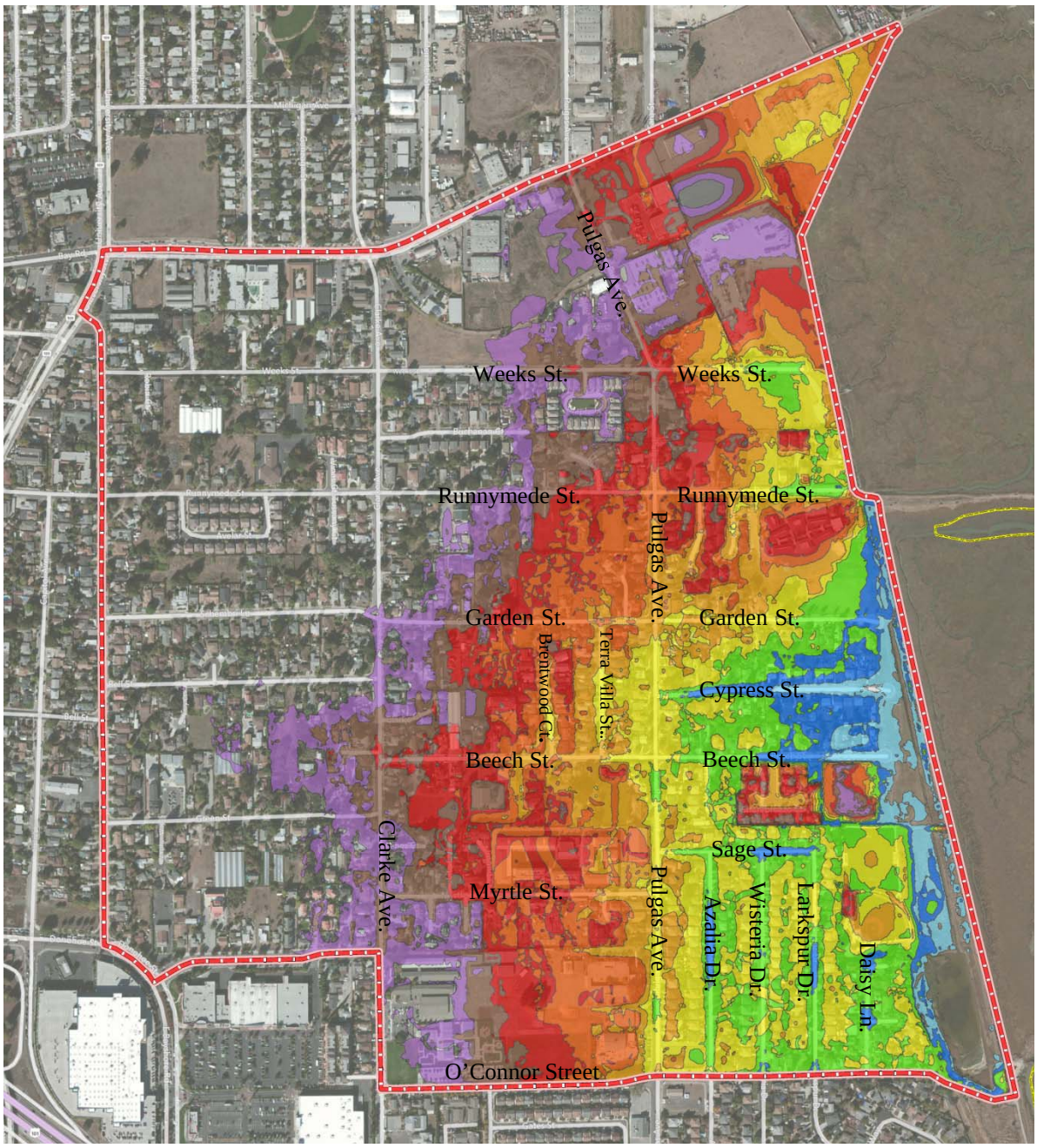

Legend

Elevation Contour

Range in Feet

- 4.0 - 4.99 (278,477.9 sqft)
- 5.0 - 5.99 (403,960.09 sqft)
- 6.0 - 6.99 (1,096,399.93 sqft)
- 7.0 - 7.99 (1,430,582.95 sqft)
- 8.0 - 8.99 (1,194,209.78sqft)
- 9.0 - 9.99 (1,432,442 sqft)
- 10.0 - 10.99 1,526,158.3 sqft)
- 11.0 - 11.99 (1,288,418.03 sqft)
- 12.0 - 12.99 (1,335,545.95 sqft)
- City Limits
- Area Of Interest

N

GIS topographic data from Santa Clara County digital terrain model by Optimal Geomatics, Inc., April-March 2006

City of East Palo Alto
San Mateo County

Runnymede Storm Drain Phase II
Area of Interest Boundary
and Contour Map

January 2013

Figure No. 7-2

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10-year Flood Event: The second flood event considered and used in the analysis was a 10-year event. Wilsey-Ham prepared a series of correspondences (letters and e-mails found in Exhibit 7-1) to the City in 2009 that provided flow rates from the Runnymede Storm Drain system for 10-year, 25-year and 100-year events as well as flow capacities under certain water surface and tidal elevations.

Wilsey-Ham estimates that the flowrate at the downstream end of the Runnymede Storm Drain System for a 10-year storm would be 229 cubic-feet per second (cfs). In addition, Wilsey-Ham estimates that the TideFlex valves have a maximum discharge flowrate under high tide conditions of 10 cfs, and the conveyance channel, in current conditions, has a capacity of 60 cfs when the detention pond is full to 6 feet elevation. Therefore, the volume of floodwater that would flood the surrounding neighborhoods is estimated at 2,862,000 cubic feet based on 159 cfs (229 cfs minus 10 cfs minus 60 cfs) flowing into the neighborhood with no means of escape for a 5-hour duration. A 5-hour duration is appropriate because it is the length of time that the tidal level is greater than 6-feet. Tidal data are from the nearby Dumbarton Bridge National Oceanic and Atmospheric Administration tide station and a sample daily tide cycle for a high tide event is provided on Exhibit 7-2.

In a "without project" scenario, it was calculated that flooding would occur approximately to the 7.0-foot contour. Review of USGS gauge data indicate that a runoff event occurred in the San Francisquito Creek watershed on December 31, 2005 that had a flow of 4,840 cfs which is slightly greater than the 10-year return interval event of 4,500 cfs as documented in a flow frequency curve provided in Exhibit 7-3. This coincided with a high tide event exceeding 6 feet at the Dumbarton Bridge tidal gauge station. Based on the 2006 GIS topography data data shown on Figure 7-2, the area of inundation would be approximately 25 acres with flood water up to the 7.0' contour. Water depths in neighborhoods with ground surface elevation from 4 to 6 feet are estimated to have flood depths ranging from 0.5-ft to 2.0-ft. Approximately 93 homes would be damaged from the flooding.

The "with project" scenario shows that the increased conveyance capacity in the South Channel and detention pond, in conjunction with the new flood protection berm, would result in no flooding or damages due to a storm event with this frequency of occurrence.

25-year Flood Event: The third flood event considered and used in the analysis was a 25-year event. Wilsey-Ham stated that the flowrate at the downstream end of the Runnymede Storm Drain System for a 25-year storm would be 277 cubic-feet per second (cfs). Wilsey-Ham estimated that the TideFlex valves would have a maximum discharge flowrate under high tide conditions of 10 cfs, and also estimated that the conveyance channel, in current conditions, has a capacity of 60 cfs when water surface in the detention pond is at elevation 6-feet. Therefore, about 207 cfs of flow (277 cfs minus 10 cfs minus 60 cfs) cannot leave the low lying areas and results in ponding and flooding.

The volume of floodwater that would flood the surrounding neighborhoods was calculated at 3,726,000 cubic feet using a 207 cfs flow over a 5 hour duration which is

consistent with a tidal cycle where the tidal elevation is over 6-feet restricting flow through the TideFlex valves to 10 cfs.

In a "without project" scenario, it was calculated that flooding would occur approximately to the 7.3-foot contour. Based on the 2006 GIS topography data data shown on Figure 7-2, the area of inundation would be approximately 33 acres with flood water up to the 7.3' contour. Water depths in neighborhoods with ground surface elevation from 4 to 6 feet are estimated to have flood depths ranging from 0.3-ft to 2.3-ft. Approximately 131 homes would be damaged from the flooding.

The "with project" scenario shows that the increased conveyance capacity in the South Channel and detention pond, in conjunction with the new flood protection berm, would result in no flooding or damages due to a storm event of this magnitude.

45-year to 50-year Flood Event: The fourth event considered for the analysis was a 45-year return interval storm that occurred on February 3,1998. According to the Santa Clara Valley Water District's Report on Flooding and Flood Related Damages in Santa Clara County (1998), this storm produced the highest ever recorded flow rate at the USGS streamflow station on San Francisquito Creek near the Stanford Golf Course, upstream of East Palo Alto and was estimated to be between 6,500 cubic-feet per second (cfs) and 8,000 cfs. The flow in East Palo Alto would likely be significantly greater. This storm, and the resulting flooding resulted in East Palo Alto being declared a Disaster Area and property damages were estimated to be $12.1 million. 50 homes were destroyed, 105 other homes suffered major damages, and about 500 others suffered some damage (Palo Alto Weekly, February 6, 1998). The flooding from this storm was the result of overtopping of the San Francisquito Creek levees in addition to the failure of the Runnymede Storm Drain system and had an estimated water surface elevation of 10-feet. Figure 7-3 shows the Federal Emergency Management Agency (FEMA) Flood maps with the 100-year flood plain elevation of 11 feet to provide an approximate area of inundation for the February 1998 event.

In an effort to discern flood damage resulting from local drainage deficiencies from those of the overtopping of San Francisquito Creek, an analysis of Runnymede Storm Drain system flow and elevation data was conducted. Using estimates of flow for 10-year, 25-year and 100-year events from the Runnymede Storm Drain system provided by Wilsey-Ham, a flow estimate of a 50-year event, to align with the 45-year February 1998 event, was prepared using a logarithmic line of best fit based on the flowrate estimates provided by Wilsey-Ham.. A 50-year flood event is estimated to produce 309 cfs of flow from the Runnymede Storm Drain system. Therefore, about 239 cfs of flow (309 cfs minus 10 cfs minus 60 cfs) cannot leave the low lying areas and results in ponding and flooding. Over a 5 hour duration, this is about 4,302,000 cubic feet of water.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA Boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet* / Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- Culvert, Flume, Penstock or Aqueduct
- Road or Railroad Bridge
- Footbridge
- 97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4376000mE — 1000-meter Universal Transverse Mercator grid values, Zone 10
- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, Zone II (FIPSZONE 0402), Lambert Conformal Conic Projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP PANEL
OCTOBER 16, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

FEMA Panels 0307 and 0309 are joined to create the above map.

City of East Palo Alto
Santa Mateo County

Runnymede Storm Drain Phase II
FEMA 100-year Event
Flood Insurance Rate Map

January 2013

Figure No. 7-3

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Under current conditions (i.e. the decreased conveyance capacity of the South Channel) and in a "without project" scenario, if a 45-year to 50-year interval frequency storm event were to occur concurrently with a high tide and no overtopping of the levees occurs, about 57 acres of residential land could be inundated with flood water up to the 7.5' contour. Water depths in the neighborhoods with ground surface elevation from 4 to 6 feet as shown on Figure 7-2 are estimated to range from 0-ft to 3.5-ft. This would result in potential damage to approximately 156 homes.

In a "with project" scenario where the conveyance channel and detention pond capacities are increased to convey a 100-year storm event, flooding will likely be minimal, and no property damage is expected.

- The FDR benefit would be measured by recording the absence of flooding after storm events. City of East Palo Alto Staff will record the date of significant storm events, photograph any amount of flooding should it occur, and record the interval frequency of the storm/flood event by using local weather station data.

- Secondary Benefit- Protection of O'Connor Pump Station Outfall
  - The outfall at the O'Connor Pump Station has been undermined by scouring from San Francisquito Creek and is not discharging stormwater as intended. From observations, the outfall structure has experienced some differential settlement and a majority of the flow is spilling over one side of the outfall. Without the Runnymede Phase II project, it is highly likely that the stormwater will continue to discharge along the settled side of the outfall structure and will continue to erode the foundation below it. If this continues, it could compromise the entire outfall structure. A major failure in the outfall structure could lead to O'Connor Pump Station shut downs with associated flooding, a high construction repair costs, and environmental mitigation. The "with project" scenario would reestablish the intended elevations of the outfall by pressure grouting below the concrete structure. In turn, the discharged stormwater would enter San Franciquite Creek as intended without undermining the outfall structure. Rip Rap would also be placed at the bottom of the outfall to reduce the chance of any more scouring.

- Secondary Benefit- Increased Recreational Opportunity/Space
  - The Runnymede Phase II Project includes the construction of a new flood protection berm on the western edge of the detention pond and conveyance channel that also increases conveyance capacity. Currently, this land is unmaintained open space that is overgrown with weeds and grasses. The new berm that would be constructed in the "with project" case, would include a new recreational path on top of the berm. The public would be able to access this path via the end of several Cul-de-sacs including Runnymede Street, Garden Street, Cypress Street, Beech Street. Marin Luther King Jr. Park, and O'Connor Street. This recreation path along the berm will give further access to other bay trails in the vicinity. It is expected that the path may be used for the following activities: walking, running, biking, and wildlife observation. In the "without project" case, the land to the west of the conveyance channel and drainage pond will remain as an unutilized floodplain that serves no recreational purpose.

- Secondary Benefit- Ecosystem Improvement
  - The Runnymede Phase II Project is within a known area classified as a wetlands. With the project, any areas that will be affected by the excavation/dredging operations and the flood protection berm construction will be restored to the amount practicable as salt marsh habitat. Extensive environmental measures will be adhered to in order to protect fish, wildlife, and sensitive habitats and species. In compliance with section 404 of the Clean Water Act and the U.S. Environmental Protection Agency and U.S. Army Corps of Engineer's revised regulations, the project will obtain Mitigation Credits to help restore and enhance wetlands elsewhere in the South Bay so that there is "no net loss of wetlands." Without the Runnymede Phase II project, the area would remain as it is.

- Secondary Benefit- Increased local property values
  - Local property values are anticipated to increase as a result of the reduced flood risk, resulting from both the Runnymede Phase II project as well as the regional SFCJPA projects.

- Secondary Benefit- Protection of existing road infrastructure
  - Extend saturation of road ways from standing water as occurs in flood events will increase the rate of deterioration of the asphalt and road base. Reducing the flooding, especially from frequent storm events, will extend the longevity of the roads and reduce the costs to the City and its citizens.

Table 1: Annual Project Physical Benefits

Table 1 that follows (PSP Table 7) presents the physically quantifiable benefits of the Runnymede Storm Drain Phase II and O'Connor Pump Station Project.

References

BKF, 2003, Draft Storm Drainage Master Plan.

City of East Palo Alto. December 19, 2010 flood event photos.

Department of Water Resources, Division of Flood Management, November 2008, Flood Rapid Assessment Model Development and User Manual.

NHC, 2004, San Francisquito Creek Bank Stabilization and Revegetation Demonstration Report, Flow Frequency Curve (Exhibit 7-3)

NOAA Tides and Currents
http://tidesandcurrents.noaa.gov/get_predictions.shtml?year=2006&stn=1813+San+Francisco&secstn=Dumbarton+Highway+Bridge&thh=%2b0&thm=50&tlh=%2b1&tlm=15&hh=*1.51&hl=*1.05 (Exhibit 7-2)

Optimal Geomatics, Inc., April-May 2006, LiDAR Topographic data files,

U.S. Geological Survey Stream Gauge Data
http://nwis.waterdata.usgs.gov/ca/nwis/uv/?site_no=11164500&agency_cd=USGS

Wilsey-Ham, 2009. Letters and e-mails. (Exhibit 7-1)

Table 1 – Annual Project Physical Benefits							
Project Name: _Runnymede Storm Drain Phase II and O'Connor Pump Station Outfall Project____							
Type of Benefit Claimed: Flood Damage Reduction							
Measure of Benefit Claimed (units) : Reduced area of inundation (FT^2) and Average Flood Water Depth (FT)							
Additional Information About this Measure: GIS contour/elevation data and flood volumes were used to find inundation areas and average depths for flood events							
(a)	(a2)	(b)	(b2)	(c)	(c2)	(d)	(d2)
		Physical Benefits					
Hydrologic Event	Interval Probability	Without Project		With Project		Change Resulting from (b) – (c) (FT^2)	Change Resulting from (b2) – (c2) (FT)
		Inundation Area (FT^2)	Avg. Flood Water Depth (FT)	Inundation Area (FT^2)	Avg. Flood Water Depth (FT)		
2-year		278,478	0	0	0	278,478	0
10-year	0.4	1,778,838	1.5	0	0	1,778,838	1.5
25-year	0.06	2,208,013	1.8	0	0	2,208,013	1.8
50-year	0.02	2,494,129	2	0	0	2,494,129	2
Comments:							

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Exhibit 7-1: Wilsey Ham

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WILSEY HAM
ENGINEERING ■ PLANNING ■ SURVEYING

July 14, 2009

Sean Charpentier
City of East Palo Alto
1960 Tate Street
East Palo Alto, CA 94303

WH No: 702-003

Reference: Runnymede Street Storm Drain Deficiencies

Dear Sean:

I have reviewed the drainage system within the Runnymede shed area and the total flows to the outfall structure at the end of Runnymede Street. These flows are carried to the outfall through a 72" RCP pipe. The outfall discharging to the San Francisco Bay is through two TideFlex, anti-backflow, gates. The existing Runnymede area discharge to this outfall is 342-cfs for the 100-year storm, 277-cfs for the 25-year storm and 229-cfs for the 10-year storm.

The preliminary design for the future Ravenswood Business District (RBD) project shows the flows from the RBD 130-acre site will also be discharging through the Runnymede outfall structure. The 100-year future flow from the RBD to this location will be an additional 160-cfs over the existing 342-cfs. The bypass structure design, when including the RBD flows are added, will bypass the high flows through the new structure to the existing channel to the south, which flows to the existing detention pond at the end of O'Conner Street and the large pump station.

The existing outfall structure at Runnymede is controlled by the tidal cycles of San Francisco Bay, which initiated the requirement for the twin 48-inch diameter TideFlex gates that are now in place. At this location low tide ranges from about El 0.0 to El -1.8, and high tide ranges from about El +4.6 to a maximum of El +9.5. The tide gate invert elevations are El 3.6 and the tide gate crown elevations are at El 7.6.

The TideFlex gates, per the manufacturer's Gate Rating Curves, have a capacity of 64.5-cfs each, for a total of 129-cfs, under a free outfall condition at low tide. With high tide at or above El 7.6, (i.e., top of the gates) the gates are shut off completely, causing a backup in the storm drain system. With high tide at El 4.6, the gates' capacity is reduced to about 30-cfs each (60-cfs total). Once high tide reaches the elevation of the street, El 6.8, the gates capacity is further reduced to about 5-cfs each and local flooding will occur in the neighborhoods at the end of Runnymede. During the range of high tides the capacity of the gates (129-cfs) will be reduced from 50% to 100%.

This bypass structure will improve the situation by allowing some of the high flows to discharge to the existing channel to the south. The improvements are required as an emergency measure because the capacity drops by more than 50% during any high tide. During high tides with a rain storm, the bypass will allow the existing storm drain system to regain some of the capacity lost due to the rising tide waters. The bypass does not to increase the capacity of the south channel by more than 20%, the level noted by HUD.

393 Vintage Park Drive, Suite 100 ■ Foster City, CA 94404 ■ 650/349-2151■ Fax 650/345-4921

The weir, or operable slide gates on the Runnymede pipe bypass system, can be set to bypass any flows desired, (e.g. 20% of capacity). Therefore, an operable slide gate or fixed weir, can be designed to allow 20% of the 129-cfs = 25-cfs to flow to the existing channel to the south. The idea for the movable slide gate was to hold back the normal flows and discharge them through the TideFlex gates while allowing some higher flows (the 20%) over the gate to the channel. This would allow the City to open the bypass fully when an emergency occurs from a large storm along with high tide causing large flooding upstream in the streets. In an emergency the bypass double box system can carry the full 342-cfs to the south channel.

The south channel is not changed by the bypass work and is not a part of the construction of the bypass box project. The bypass structure will only allow flows that previously reached this channel by overland means, to now reach the channel without flooding the neighborhood.

The south running channel presently has about a 350-cfs capacity at the beginning of a large storm event under the existing vegetation and cross section conditions. The 350-cfs bypass flow plus the existing channel restrictions would bring the channel water surface to about El 6.0 in the upper end of the channel. The flows would then continue down stream towards the pond, all the time decreasing in depth as the pool spreads out and fills the pond. The pond also fills at the south end from O'Conner St storm drain discharge. If the storm is large enough the whole channel and pond area will finally fill, bringing the surface elevation up to EL 6.3, while still accepting all flow from the new box bypass structure.

	Current Capacity	Capacity after Bypass is implemented.	## Difference	% Difference
Runnymede System at Outfall	129-cfs	155-cfs	25-cfs*	19%
Canal to O'Connor	350	350	0	0

* With weir allowing only 25-cfs; without weir double box carries 400-cfs.

Still, the construction with the bypass and new box structure does not change the capacity of the existing channel and detention pond.

With the future construction of the RBD, the south channel will need to be dredged for the additional capacity needed then. After the future dredging of the channel; the capacity of the upper end of the channel to accept flows would be the full 650-cfs.

Very truly yours,

WILSEY HAM

Kenneth Selby, P.E.
CA Reg. #C25726

cc. Jeff Peterson

P:\PROJECT\702 East Palo Alto\702-003 - Runnymede\Correspondance\Sean C July 9 HUD Memo.doc

393 Vintage Park Drive, Suite 100 ■ Foster City, CA 94404 ■ 650/349-2151 ■ Fax 650/345-4921

Kamal Fallaha

From: Ken Selby, PE [kselby@wilseyham.com]
Sent: Tuesday, July 07, 2009 3:14 PM
To: Sean Charpentier
Cc: Jeff Peterson, PE; Kamal Fallaha; Lucy Chen; Carlos Martinez
Subject: RE: EPA Storm Drain - HUD Permits- Capacity

Sean

The existing discharge from Runnymede is through the twin TideGates. The Rating Curve for this gate shows that as the street begins to flood to Elevation 7.0 (present AC surface is at 6.8) the gates have a capacity of 64.5-cfs each, or 129-cfs total. This is at low tide, with the number dropping to a maximum of 30-cfs at high tide.

The existing Runnymede system is calculated to discharge 342-cfs to this outfall structure. That's 342-cfs for the 100-year storm, 277-cfs for the 25-year storm and 229-cfs for the 10-year storm. The 100-year future flow from the RBD to this same location will be 160 additional cfs.

The weir or operable slide gates on the Runnymede pipe bypass system can be set to bypass any flows desired, say the 20%. Therefore, a bypass gate can be design to allow the 20% of 129-cfs = 25-cfs. The idea with the slide bypass gate was to hold back the normal flows and discharge through the TideFlex gates, but to allow the City to open the bypass fully when an emergency occurs. In an emergency the bypass double box system can carry the full 342-cfs to the south channel.

The south running channel presently has about a 350-cfs capacity at the beginning of the storm event; that's with the existing vegetation and cross section. This flow would bring the water surface to about El 6.0 in the upper end of the channel pool, at the bypass discharge. The flows will continue down stream towards the pond all the time decreasing in depth as the pool spreads out and fills from the high end to the pond. If the storm is long enough in duration the whole channel pool area will fill bringing the surface elevation up to 6.0, which will reduce the channel inflow capacity at the upper end to about 60-cfs. Still, the construction of the bypass does not change the capacity of the existing channel at all.

	Current Capacity	Capacity after Bypass is implemented.	## Difference	% Difference
Runnymede System at Outfall	129-cfs	155-cfs	25-cfs	19%
Canal to O'Connor	350	350	0	0

After the future dredging of the channel, the capacity of the channel to accept flows would be 650-cfs.

Is the HUD environmental exemption for the Runnymede Strom Drain work or for the dredging of the channel needed for RBD?

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Kamal Fallaha

From: Ken Selby, PE [kselby@wilseyham.com]
Sent: Friday, June 05, 2009 5:48 PM
To: Sean Charpentier; Kamal Fallaha; Jeff Peterson, PE
Cc: Lily Lee; Lucy Chen; Carlos Martinez
Subject: RE: Cost for Box Culvert system miss calc'ed

Sean

I am planning to do the design with a double box section from the Runnymede cul-de-sac to the existing channel with the gate for the maintenance crew to open in emergence. This double box will be the final section for the future RBD system and will be constructed to the elevations and dimensions needed for the RBD system. There will be a sediment pit in the new structure on the existing 72-inch pipe with a weir to transfer some of the higher Runnymede flows to the channel.

These improvements should come in at the approximate cost 0f $360,000 which is well below the $600,000 figure as talked about in our meeting of June 4, 2009 at City Hall.

If you need any additional information for your talk please let me know.

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From: Sean Charpentier [mailto:scharpentier@cityofepa.org]
Sent: Friday, June 05, 2009 2:53 PM
To: Kamal Fallaha; Ken Selby, PE; Jeff Peterson, PE
Cc: Lily Lee; Lucy Chen; Carlos Martinez
Subject: RE: Cost for Box Culvert system miss calc'ed

Jeff and Ken:

I need to brief Alvin (City Manager) on this item on Monday.

I need to tell him if we are designing and planning for the interim RCP option or the future box system.

Based on Kamal's email below, is the box system going to be incorporated into the future RBD Drainage system?

Thanks,

Sean Charpentier
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(650) 853-3158 (fax)
scharpentier@cityofepa.org

From: Kamal Fallaha
Sent: Thursday, June 04, 2009 3:53 PM
To: Ken Selby, PE; Jeff Peterson, PE
Cc: Sean Charpentier; Lily Lee; Lucy Chen
Subject: RE: Cost for Box Culvert system miss calc'ed

Ken,

Thanks for the clarification regarding the cost of 200' culvert box. I has a feeling we added extra zero somewhere in our calculations. As far as the design

If the box system (in lieu of the short term RCP) will ultimately be incorporated into the future RBD Drainage System, then **it make sense to consider the Box culvert scenario with the flow control gate we discussed today**. Obviously, the system will be more effective after dredging the canal. We still need to perform a hydrology analysis of the canal taking into account the additional flow from the future RBD and the overflow of the existing Runnymede drainage system. This will help us determine any potential flooding and dredge the canal to mitigate such flooding. I realize that a hydrology analysis was performed as part of the Engineering Study, However, now we are considering the overflow of the existing Runnymede system in addition to the runoff from the RBD.

Thanks,
Kamal Fallaha, P.E.
Senior Project Manager
Public Works/Engineering Department
City of East Palo Alto
650-853-3117
kfallaha@cityofepa.org

From: Ken Selby, PE [mailto:kselby@wilseyham.com]
Sent: Thursday, June 04, 2009 2:32 PM
To: Ken Selby, PE; Kamal Fallaha; Jeff Peterson, PE
Cc: Sean Charpentier; Lily Lee
Subject: Cost for Box Culvert system miss calc'ed

Same e-Mail as a few minutes ago, but I've changed the subject line to catch your attention.

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From: Ken Selby, PE
Sent: Thursday, June 04, 2009 2:24 PM
To: 'Kamal Fallaha'; Jeff Peterson, PE
Cc: Sean Charpentier; Lily Lee
Subject: RE: Meeting Regarding Runnymede SD Project

Kamal

After I returned from our meeting this morning, I recalculated the cost for the 200 feet of box culvert.

Conc. Box = 200' x (6'x10' box is 32 cu-ft per foot or 1.2 cu yd per foot of box) = 240 cu yd of concrete required @ $1500 / CY = $360,000. Not the $3 million we were discussing.

You were noting that the $1500/cu yd was high and we could get the pre-cast boxes for less; maybe half this cost. Therefore, we could probably put in the box system now with the hand-operating gate at the end for the $300,00 funding.

Shall we not start on the pipe to the channel until we talk?

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From: Kamal Fallaha [mailto:kfallaha@cityofepa.org]
Sent: Tuesday, June 02, 2009 10:41 AM
To: Jeff Peterson, PE; Ken Selby, PE
Cc: Sean Charpentier; Lily Lee
Subject: Meeting Regarding Runnymede SD Project

Jeff,

This is to confirm our meeting on Thursday June 4th at 11:00 am at the City Chamber, City Hall.

Thanks,

Kamal Fallaha, P.E.
Senior Project Manager
Public Works/Engineering Department
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From: Sean Charpentier [mailto:scharpentier@cityofepa.org]
Sent: Monday, July 06, 2009 5:04 PM
To: Ken Selby, PE
Cc: Jeff Peterson, PE; Kamal Fallaha; Lucy Chen; Carlos Martinez
Subject: RE: EPA Storm Drain - HUD Permits- Capacity

Ken and Jeff:

I am working on the HUD environmental exemption for the Storm drain project.

One problem is that we can only claim an exemption if the project does not increase capacity by more than 20%. See shaded area below. In order to get an exemption, somebody would need to certify that the project will not increase capacity by more than 20%.

1. Acquisition, repair, improvement, reconstruction, or rehabilitation of public facilities and improvements (other than buildings) when the facilities and improvements are already in place and will be retained in the same use without change in size or capacity for more than 20 percent. Examples: ▪ Replacement of water or sewer lines ▪ Reconstruction of curbs and sidewalks ▪ Repaving of streets

Can we honestly say that the bypass is not going to increase capacity of the Runnymede system or the Canaly by 20%?

Do you have the following numbers?

	Current Capacity	Capacity after Bypass is implemented.	## Difference	% Difference
Runnymede System at Outfall	????	????	????	????
Canal to O'Connor	????	????	????	????

Please let me know if you have a good suggestion about how to make the case to HUD that we are not increasing the capacity by 20%.

Can we fix or size the operable gate so that it will only add 20% more capacity?

Thanks,

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scharpentier@cityofepa.org

From: Ken Selby, PE [mailto:kselby@wilseyham.com]
Sent: Thursday, July 02, 2009 3:41 PM
To: Sean Charpentier
Cc: Jeff Peterson, PE
Subject: RE: construction Costs

Sean

While researching the easements and property lines we find that the properties on both sides of Runnymede extend to the Rancho Line at the existing City channel westerly fence. Because of this we will have to align the new box so that it remains within the street right-of-way. To do this I rearranged the boxes to begin at the location where the 72" pipe passes under the levee. This reduced the overall length of the double box so the estimate for the boxes reduces slightly. We think that the area to the east of the Rancho Line is Palo Alto property but since the 72" pipe and the outfall structure are over the Line already that the City can acquire permitting to do the dredging and to build the dike along the channel. The channel also runs within a PG&E easement for the overhead high tension power lines.

The attached spread-sheet shows the revised box costs.

I ran the analysis for the pond size required for the Detention from the earlier report; 1,300,000-cu-ft storage. From this we define the amount of dredging needed, the final 100-year storm water surface elevation, and the size for the dike to be constructed along the channel. I then tried to balance the amount of materials dredged with the amount needed to construct the dike.

The attached table shows the preliminary estimate using locally available costs for the work items:

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From: Sean Charpentier [mailto:scharpentier@cityofepa.org]
Sent: Monday, June 29, 2009 2:30 PM
To: Ken Selby, PE
Cc: Jeff Peterson, PE
Subject: RE: construction Costs

Ken and Jeff:

The cost estimate is helpful.

Alvin wanted to know if you could have a cost estimate for the entire project (canal and the bypass structure below) by the end of this week.

Also, what is the progress on the analysis of the pump station?

Also- Jeff- What about the wetlands delineation? Do you have a scope and budget for it? What is the shelf life for a wetlands delineation?

Thanks,

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scharpentier@cityofepa.org

From: Ken Selby, PE [mailto:kselby@wilseyham.com]
Sent: Thursday, June 25, 2009 3:22 PM
To: Sean Charpentier
Cc: Jeff Peterson, PE
Subject: construction Costs

Sean

Hear is the estimate for the bypass structure. The structure is approximately 150-feet long, using double 8' x 4' celled concrete box sections.

I received a quote from a manufacturer for the 150-foot structure at $117,955, delivered to the job site, and added some off handling and placing costs.

East Palo Alto -- Runnymede St Bypass Structure to South Channel

Wilsey
Ken S
Proj. N
0(
June 2:

Preliminary Construction Cost Estimate

Item No.	Spec. Section	Description	Unit	Estimated Quantity	Unit Price	Total A
1		Mobilization (not to exceed 10% of total bid)	LS	1	$38,500	$38,
2		Traffic Control	LS	1	$1,500	$1,
3		Storm Water Pollution Prevention Program	LS	1	$2,500	$2,
4		Survey	LS	1	$2,500	$2,
5		Pump Existing System Out	LS	1	$3,000	$3,(
6		Excavate Trench -- Transport and Store	CY	900	$85	$76,
7		Twin 4' x 8' Precast Conc Box by 8' Lg	Each	18	$6,000	$108
8		Twin 4' x 8' Precast Conc Box Corner Sections	Each	2	$10,000	$20,
9		Twin 4' x 8' Precast Conc Box by 6' Lg	Each	1	$10,000	$10,
10		Import Backfill AB	CY	210	$100	$21,
11		Concrete Footing	CY	20	$750	$15,
12		Trail Replacement AC	Sq-Ft	300	$3.50	$1,(
13		Sawcut Existing Pipe top	LF	50	$5	$2

Attachment 7- Exhibit 7-1

14		Remove and Replace Bay Shore Trail Sign	Each	1	$500	$5
15		Support in place Joint Utility Poles	Each	2	$1,000	$2,(
16		Rip Rap Outfall	Ton	15	$150	$2,:
17		Slide Gates -- Weir Structure	Each	2	$20,000	$40,
18		Remove & Dispose 100-LF 15" RCP and Manhole	LS	1	$600	$6
19		Remove and Reinstall Bollards	Each	3	$500	$1,:
20		Remove and Replace Chain Link Fence	LF	20	$45	$9
21		Manhole Frame and Cover	Each	2	$1,200	$2,(
					Total	$349
					15% Contingency	$52,
		Total for Bid Comparison		Total		$402

Pumping out	2 Labors plus Super plus Operator	2 days	Hr	60	$50	$3,(

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From: Sean Charpentier [mailto:scharpentier@cityofepa.org]
Sent: Monday, June 22, 2009 10:22 AM
To: Ken Selby, PE; Jeff Peterson, PE
Cc: Lucy Chen; Carlos Martinez
Subject: RE: Can you make 11:30 instead of 11am? -East Palo Alto Runnymede Storm Drain

Ken:

Can you be there at 11:30 instead of 11am?

Anthony's schedule has changed.

Thanks,

Sean Charpentier
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City of East Palo Alto Redevelopment Agency

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From: Ken Selby, PE [mailto:kselby@wilseyham.com]
Sent: Tuesday, June 16, 2009 8:51 AM
To: Sean Charpentier; Jeff Peterson, PE
Cc: Lucy Chen; Carlos Martinez
Subject: RE: East Palo Alto Runnymede Storm Drain

Sean

Yes, I can make the meeting, 11-am Monday the 22nd. I'll have the flows intended for the channel for the various design conditions.

Lucy

I need to get the information for City owned underground utilities (also, overhead if there are any) in the areas of the project work; i.e., at the end cul-de-sacs on Runnymede, Garden, Cypress, Beech, and O'Conner, and also along the west side of the levee at the existing channel. I've already contacted PG&E for Electric and Gas and AT&T for phone.

If you could tell me whom to contact at Engineering I could pick up the info any time, maybe Monday when I there for the meeting.

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From: Sean Charpentier [mailto:scharpentier@cityofepa.org]
Sent: Monday, June 15, 2009 4:28 PM
To: Jeff Peterson, PE; Ken Selby, PE
Cc: Lucy Chen; Carlos Martinez
Subject: re: East Palo Alto Runnymede Storm Drain

Jeff and Ken:

I briefed Alvin about the storm drain project.

He had many questions about the project that I could not answer in a level of detail that satisfied Alvin and Anthony. The questions included:

- How much water is going to flow down the canal?
- Can the canal support the additional water?
- How much water will be diverted to the canal?

Can you be at the next internal public works meeting at 11am on Monday June 22nd?

Also, do you have any preliminary drawings of the improvements? If not, when do you think you will have them?

Ken- I would ask Lucy about utility questions at the end of the Runnymede. I copied her on this email.

Sincerely,

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Exhibit 7-2 – Tidal curve

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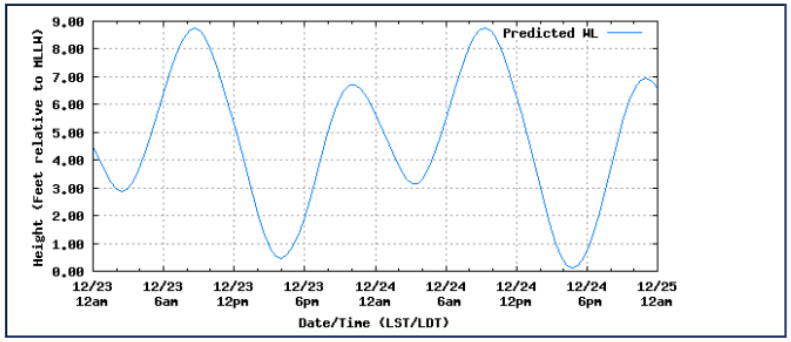
Attachment 7, Exhibit 7-2

Help Print

NOAA/NOS/CO-OPS
Daily Tide Prediction for DUMBARTON BRIDGE,CA
StationId 9414509
From: 2012/12/23 - 2012/12/24
Units: Feet Time Zone: LST/LDT Datum: MLLW



Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

High/Low Tide Predictions

Station Name: DUMBARTON BRIDGE,CA
Parameter: Daily
Product: Tide Prediction
Start Date & Time: 2012/12/23 12:00AM
End Date & Time: 2012/12/24 11:59PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Harmonic
Datum: MLLW
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2012/12/23	Sun	02:29 AM	2.86 L	08:41 AM	8.74 H	03:55 PM	0.47 L	10:04 PM	6.72 H
2012/12/24	Mon	03:21 AM	3.12 L	09:21 AM	8.78 H	04:41 PM	0.11 L	10:57 PM	6.96 H

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Exhibit 7-3 Flow Frequency Curve

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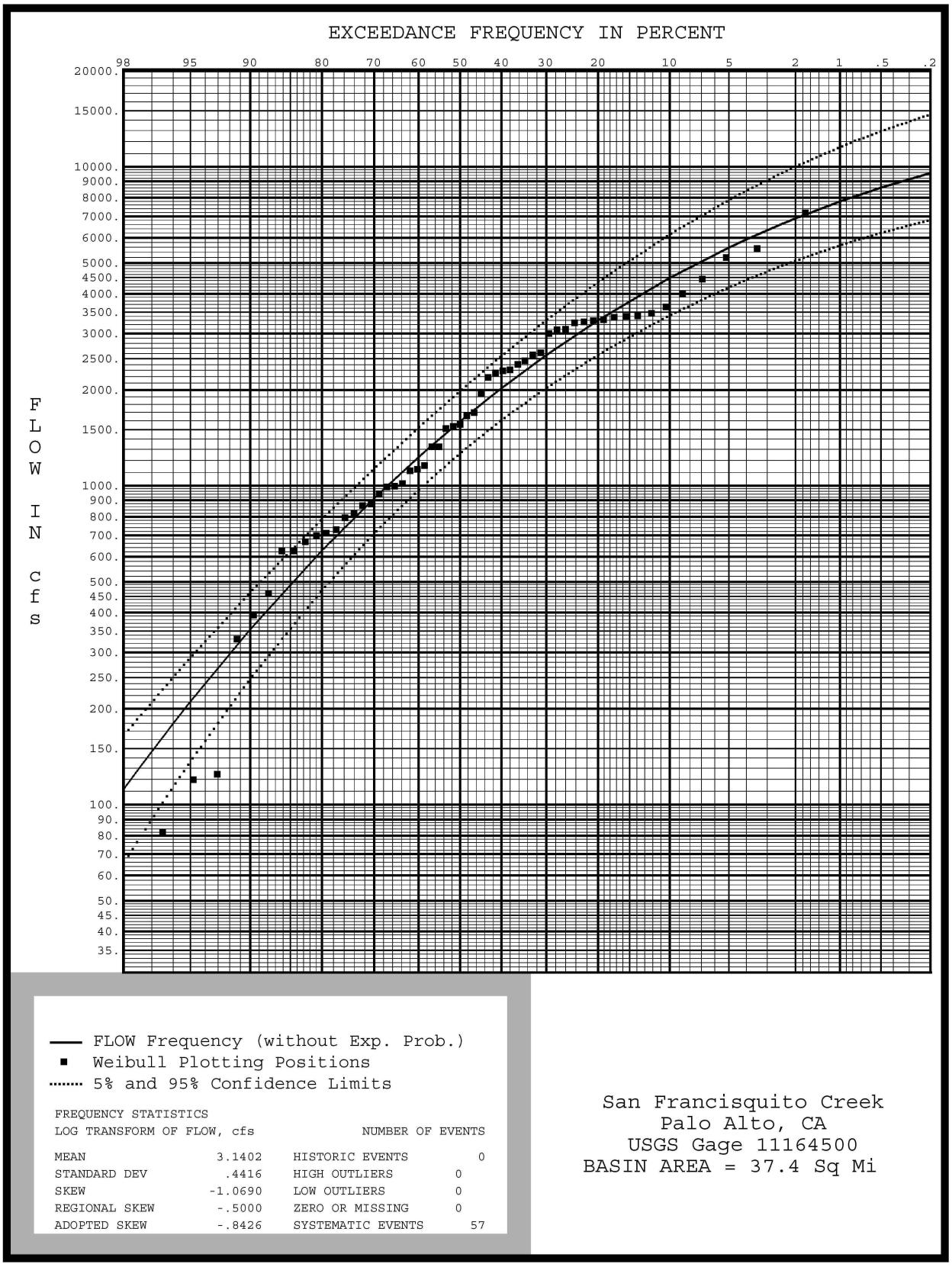

Figure 2.1. San Francisquito Creek Flow Frequency Curve