

Appendix G

Supplemental Data on Exempt Channels

Appendix G

Supplemental Data on Exempt Channels

Introduction

Per Permit Provision C.3.f.ii., projects located within areas that drain to stream channel segments that are unlikely to erode or experience other impacts from increased flows are exempt from HMP requirements. Chapter 5 of the HMP Report provides a description of project exemptions based on the condition of the channels to which they discharge. Channel segments and tributary catchment areas considered exempt from HMP requirements are shown on Figure 5-1. There are four criteria for project exemption based on channel condition:

1. Project area drains to a stream channel within the tidally influenced area.
2. Project area drains to a non-earthen stream channel that is hardened on three sides and extends continuously upstream from the tidally influenced area.
3. Project drains to Sunnyvale East or West Channels
4. Project drains to an underground storm drain that discharges directly to San Francisco Bay.

This appendix provides additional information supporting exemption of projects under Criteria 2 and 3 above.

1. Project area drains to a non-earthen stream channel that is hardened on three sides and extends continuously upstream from the tidally influenced area.

Stream channels that have already been hardened on all sides are not susceptible to erosion. Permit Provision C.3.f.ii states that channels that are continuously hardened downstream to their outfall to the Bay are exempt from HMP controls. Intermittent hardened segments further upstream that discharge to a non-hardened segment are not exempt.

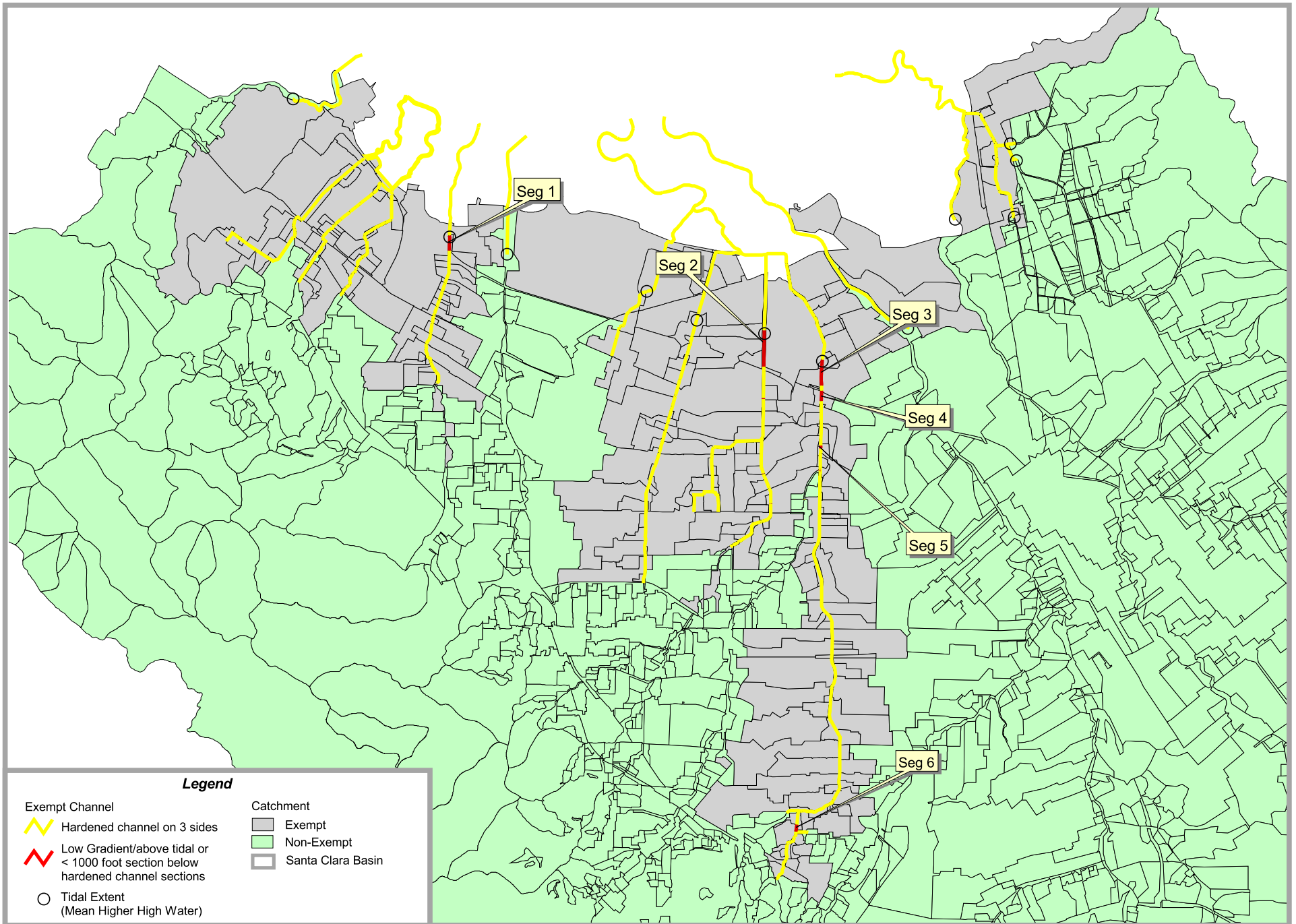
The designation of hardened channel segments on Figure 5-1 is based on the following data sources. The SCVWD's Water Ways Management Model (WWMM) is the primary available information source for channel type and channel material. Specifically, information about channel materials contained in attributes that describe channel bottom and channel sides was used (e.g., concrete, gabion, or rock). For stream segments that did not contain information on channel materials, the channel type attribute was used to identify hardness of channels. Analysis of the data showed that certain channel types were typically hardened on all three sides (i.e., occurred for more than 90% of the records). These channel types included culverts (e.g., box,

pipe) and concrete channels (e.g., trapezoidal and rectangular). Where these channel types had no channel material information, they were assumed to be hardened on all three sides.

In addition, six non-hardened channel segments were considered exempt because they were either 1) low gradient channels (within 0.5 miles upstream of a tidal area) and had hardened channel segments above them, or 2) less than 1,000 feet in length and had hardened channel segments above and below them. These segments are listed in Table G-1 below and their location identified on Figure G-1.

Table G-1. Characteristics of non-hardened channel segments identified as exempt

Segment Number	Creek Name	Segment Length (feet)	Channel Type	Exemption Criteria	Length of hardened channel above segment (mi.)
1	Permanente	1,400	Levee/earth excavated	Low gradient	2.45
2	Calabazas	3,250	Levee	Low gradient	6.94
3	San Tomas	2,395	Gabion sides (earth bottom)	Low gradient	9.85
4	San Tomas	919	Rock sides (earth bottom)	Short section below long section of hardened channel	9.77
5	San Tomas	295	Rock sides (earth bottom)	Short section below long section of hardened channel	8.79
6	Smith	659	Excavated earth	Short section below long section of hardened channel	1.19



2. Project drains to Sunnyvale East or West Channels

The Sunnyvale East and West Flood Control Channels and areas draining to them are considered exempt from HMP requirements. These channels were constructed by the Water District in 1964-1967 and 1959, respectively, to provide drainage for a large area of Sunnyvale between Stevens Creek and Calabazas Creek, where natural channels did not historically exist.

Additional information supporting the exemption of projects draining to Sunnyvale East and West Channels from HMP requirements is presented below.

Purpose and History of Construction

In the early days of Sunnyvale, rainfall and resulting storm water would naturally drain to either Stevens Creek or Calabazas Creek. With the ground surface subsidence in the northern portion of the City that occurred from artesian wells and groundwater well pumping for agriculture in the early 1900's to 1950 time period, the natural surface drainage pattern was disrupted. The City began importing water from the Hetch Hetchy system in 1952 to help reduce the potential for additional subsidence and provide a reliable water source for the community.¹

In December 1955, a significant flood occurred in the areas between Calabazas Creek and Stevens Creek that inundated the northern portions of Sunnyvale. This was partly due to the eight to ten feet surface subsidence of land in the northern part of the City, where the creek mouths for Calabazas and Stevens Creek were below the normal Bay tide level.² There was also a lack of adequate drainage outlets to the Bay in the central portion of Sunnyvale as the dikes of the salt ponds (owned by the Leslie Salt Company at that time) held the runoff behind them until low tides let the water drain into the Bay.

About 1955, the Santa Clara County Flood Control and Water Conservation District (now the SCVWD) established the North Central Zone for flood protection that included the cities of Santa Clara, Sunnyvale, Saratoga, Cupertino, and parts of Los Gatos and San Jose. The "natural" creeks listed for this area at that time were Saratoga, Calabazas, and San Tomas Aquino. The District decided at that time that two artificial channels should be constructed to provide drainage for a significant portion of Sunnyvale between Calabazas Creek and Stevens Creek to help prevent flooding. These are now the Sunnyvale West and Sunnyvale East Channels, which empty into the Moffett Channel and Guadalupe Slough, respectively.³

Channel Construction

Sunnyvale East and West Channels were constructed as storm water conveyances and were not natural creeks that have been modified to deal with storm water flow impacts (such as Calabazas Creek).

Sunnyvale West is constructed of compacted earthen fill from its connection to the Moffett Channel to the Mathilda Avenue Crossing. Reinforced concrete box culverts occur at each road crossing. South of the Highway 101 crossing, the channel is contained in a 78-inch reinforced concrete pipe until it meets the extent of the SCVWD jurisdiction at the Mathilda Avenue crossing. The excavated channel has a bottom width ranging from 3.0 to 3.5 feet with side slopes

of 2:1 or 1.5:1 respectively.⁵ The channel is 3.2 miles in length and drains approximately 4.1 square miles of the City.⁹

Sunnyvale East was constructed in an almost straight line that extends from the northernmost border of the City on the Guadalupe Slough to its southern border with the City of Cupertino. It is 6.4 miles in length and drains approximately 6.35 square miles of the City.⁸ It is also constructed with alternating stretches of compacted earthen dikes and reinforced box culverts at road crossings. The excavated areas have channel bottom widths ranging from 35 feet at its entry into the Guadalupe Slough to 4 feet at its start and have side slope ratios from 2:1 to 1.5:1. There is an extensive underground portion (box culvert) containing Sunnyvale East in the El Camino Real (Highway 82) area and it is enclosed in a 72" concrete pipe in the southernmost section adjoining the Junipero Serra channel next to Highway 280.⁵ The Junipero Serra Channel (in Cupertino) discharges into Calabazas Creek.

Construction for Sunnyvale West was initiated by the SCVWD in 1959 from Highway 101 to the Moffett Channel. Extensions of the channel to Maude Avenue from Highway 101 started in 1964. Construction of Sunnyvale East from the Guadalupe Slough to Highway 101 began in 1964, as well. The Channel was extended from Highway 101 to Highway 280 in 1967.⁶

Impacts of Tidal Influence

Both Sunnyvale East and Sunnyvale West have significant areas of tidal influence in their northern sections. Tidal influence in Sunnyvale East extends south of Highway 237 to the Tasman Drive crossing. Tidal influence in Sunnyvale West extends to the Bordeaux Avenue crossing, less than 1,000 ft before the channel enters a box culvert that extends under Mathilda Avenue and into Moffett Field.⁴

According to SCVWD staff, most of the sediment removal that is done in both channels occurs in the areas of tidal influence.⁷ The fine bay muds enter the channels on the tidal prism and deposit in the northern portions of the channels. Since most areas of Sunnyvale are relatively flat and there is not enough year-round flow to prevent the sediment from depositing in the tidally influenced areas, most of the dredging work done as a part of channel maintenance occurs in these areas.

Beneficial Uses Listed for Sunnyvale East and Sunnyvale West Channels

Neither Sunnyvale East nor Sunnyvale West have beneficial uses listed in the 1995 San Francisco Bay Basin Plan or amendments included since that time.⁸

Restoration Potential

Since the main purpose of these channels is water conveyance during both dry weather and wet weather flows as a part of the Santa Clara Basin's flood control system, it is extremely unlikely that they would be "filled in" to restore them to the state that areas were in prior to their construction. In order to maintain their flood conveyance function, the SCVWD does not allow for trees to be planted on levees unless additional fill is placed against the levee.¹⁰ Maintenance of the levees by the SCVWD includes removal of burrowing animal species and vegetation that could undermine the structural integrity of the levee system.

Based on the requirements described above for the channels, the restoration potential is low and would relate not to habitat restoration, but to structural restoration, as the channels were not natural creeks. Significant amounts of money would need to be spent to increase habitat that could (at some point in time) lead to the support beneficial uses. (Again, no beneficial uses are listed for these channels in the Basin Plan.) Limited restoration funds that are available would be better spent on work in other natural streams in the area (e.g., Stevens Creek or Calabazas Creek) to protect or restore critical habitat.

Erosion and Sediment Removal History

As stated above, most of the sediment removal in the two channels is done in response to sediments depositing in the areas impacted by the tidal prisms at the northern outfalls.

However, some erosion has occurred in the levees and channel access roads over time, and the SCVWD has conducted maintenance on them. In July 2004, the SCVWD completed a bank maintenance project on Sunnyvale East Channel from the Central Expressway to Iris Avenue, just north of the El Camino Real (Highway 87) crossing. This area is in the central portion of the City and has been fully developed for a long time (almost 40 years). Failure of some sackcrete-reinforced banks had occurred as well as some erosion of the earthen banks and levees. Existing concrete rubble was being replaced with rock.¹¹

Based on discussions with SCVWD staff, the last time any maintenance was done in this area occurred over 5 years ago.¹¹ The soils in the drainage channel consist of fine clay muds that easily erode. Some of the erosion was due to overshelving from the top of the bank. There are continuous groundwater flows seeping into the channel in this area, making it difficult to dewater and make repairs.

Based on this information, it appears that some erosion of the fine mud sediment has occurred, but has not caused adverse impacts to beneficial uses, since no beneficial uses are listed in the 1995 Basin Plan for this Channel.

Potential for Increased Flows to Channels from New and Redevelopment Projects

The potential for new development (or significant redevelopment) that will add additional impervious surfaces to either the Sunnyvale East or Sunnyvale West Channels is very limited. The City is over 97% built out and has less than 30 acres of currently undeveloped land in the entire City available for new development.¹²

Based on the general trends for new development and redevelopment observed over the past two years, more landscaping and “pervious” areas are being added to projects in response to the requirements for stormwater treatment prior to discharge to the storm water conveyance system.¹³

Provision C.3.f.ii allows for exemptions from HMP requirements in highly developed watersheds, and the areas draining into both Sunnyvale East and West Channels are “highly developed” (i.e. greater than 95% built out).

References:

1. The Sunnyvale Story: City of Sunnyvale Report to Citizens for Winter, 1973.
<http://sunnyvale.ca.gov/local/ss5.jpg>
2. 1981. Water in the Santa Clara Valley: A History. California History Center, De Anza College, Local Histories Studies Vol. 27 p. 88
3. Ibid. p.91
4. SCVWD – GIS layer – Tidal Prism at Mean High High Water.
5. SCVWD “Yellow Book” showing channel construction features.
6. SCVWD – Bill Springer. Pers. Comm. with Kristy McCumby Hyland, May 17, 2004 based on his review of historic plans/maps of the channels
7. SCVWD – Jason Christie. Pers. Comm with Kristy McCumby Hyland, August 31, 2004.
8. Volume 1 Watershed Characteristics Report (Unabridged) prepared by the Santa Clara Basin Watershed Management Initiative, February 2001 – Chapter 7.3.2 and Table 7-9 (Table 2.5 of the 1995 SFBWQCB Water Quality Control Plan).
9. Volume 1 Watershed Characteristics Report (Unabridged) prepared by the Santa Clara Basin Watershed Management Initiative, February 2001 Chapter 7.2.2 Table 7-6.
10. Santa Clara Valley Water District Collaborative: Proposed Guidelines and Standards for Land Use Near Streams (August 2, 2004 revision) Standard VI .A4, p. 8
11. SCVWD – Ray Bramer. Pers. Comm. with Kristy McCumby Hyland, September 28, 2004.
12. City of Sunnyvale Housing and Community Revitalization Sub-Element of the General Plan. January 1999 – June 2006. <http://sunnyvale.ca.gov/NR/rdonlyres/3A1EFC49-6A0E-4B7B-B56A-E588AAF635B8/0/HousingSubElement.pdf>
13. City of Sunnyvale – SCVURPPP Annual Reports FY 02-03 and FY 03-04, Attachment E, Planning Procedures sections. Table 1, Parts 1 and 2.