

## **USE ATTAINABILITY ANALYSIS**

### **SANTA ANA-DELHI CHANNEL – REACHES 1 AND 2**



**OCTOBER 4, 2013**

**SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD**

## Table of Contents

		<u>Page</u>
1.0	Executive Summary	5
2.0	Segment Description	6
2.1	Location	6
2.2	Proximate Land Uses	7
2.3	Channel Characteristics	9
2.3.1	Reach 1 Morphology	9
2.3.2	Reach 2 Morphology	11
2.4	Regulatory Status	14
2.4.1	Beneficial Use Designations	14
2.4.2	303 (d) Listings and Total Maximum Daily Loads (TMDLs)	15
3.0	Use Attainability Analysis – Factors Analysis	16
3.1	Regulatory Framework – UAAs and Beneficial Use Designations	16
3.2	40 CFR 131.10(g) Factor Assessment	18
3.2.1	Natural, Ephemeral, Intermittent and Low Flows Preclude the Recreational Use (40 CFR 131.10(g) Factor 2)	18
3.2.1.1	Methods and Fieldwork	18
3.2.1.2	Findings and Conclusions	19
3.2.2	Dams, Diversions and Hydrologic Modifications Preclude the Recreational Use (40 CFR 131.10(g) Factor 4)	21
3.2.2.1	Methods and Fieldwork	21
3.2.2.2	Findings and Conclusions	21
3.3	REC2 Designation	22
4.0	Existing Use Analysis	23
4.1	Evaluation of Actual Recreational Activities	23
4.1.1	Assessment Methods	23
4.1.2	Photo Reconnaissance Survey	24
4.1.3	Physical Surveys and Other Information	29
4.2	Evidence re Historical Recreational Use	30
4.2.1	Probable Future Use	30
4.2.2	Summary – Evidence of Past, Present or Probable Future Recreational Use	31
4.3	Evaluation of Ambient Water Quality	31
4.3.1	Assessment Methods	31
4.3.2	Findings and Conclusions	36
4.3.3	Probable Future Water Quality	36
5.0	Protection of Downstream Uses	41
5.1	Regulatory Requirements	41
5.2	Compliance Strategies	41
6.0	Triennial Review Requirements	43
6.1	Regulatory Requirements	43
6.2	Reassessment Procedures	43
7.0	References	44

## List of Figures

		<u>Page</u>
Figure SAD-1	Santa Ana-Delhi Channel Watershed	6
Figure SAD-2	Santa Ana-Delhi Channel Characteristics and Adjacent Land Uses	8
Figure SAD-3	Reach 1 of the Santa Ana-Delhi Channel in the City of Newport Beach	10
Figure SAD-4	Reach 1 of the Santa Ana-Delhi Channel in the City of Costa Mesa	11
Figure SAD-5	Reach 2 of the Santa Ana Delhi Channel at Sunflower Avenue and Flower Street, looking Upstream	12
Figure SAD-6	Reach 2 of the Santa Ana-Delhi Channel	13
Figure SAD-7	Channel Depth Curve for the Santa Ana-Delhi Channel at Irvine Avenue (1991-2008)	20
Figure SAD-8	Photo of the Camera View at the Recreational Use Survey Location for Santa Ana-Delhi Channel at Mesa Drive, looking downstream	25
Figure SAD-9	Photo of Activity at Santa Ana-Delhi Channel at Mesa Drive (Reach 1), 7/8/2006	25
Figure SAD-10	Photo of the Camera View of the Recreational Use Survey Location for Santa Ana-Delhi Channel at Sunflower Avenue (Reach 2)	27
Figure SAD-11	Photo of Activity at Santa Ana-Delhi Channel at Sunflower Avenue (Reach 2), 7/8/2006	27
Figure SAD-12	Demens Flood Control Channel	28
Figure SAD-13	Anza Park Flood Control Channel	29
Figure SAD-14	Santa Ana Delhi Channel Mesa Drive/Irvine Avenue Proposed Diversion Site Plan	42

## List of Tables

Table SAD-1	Reach Identification	7
Table SAD-2	Land Uses in the Santa Ana-Delhi Channel Watershed	8-9
Table SAD-3	Reach 1 & 2 Channel Characteristics of the Santa Ana-Delhi Channel	13
Table SAD-4	Water Depth Measurements of Reach 1 and Reach 2 of the Santa Ana Delhi Channel	20
Table SAD-5	Recreational Use Survey Duration and Number of Images Collected	24
Table SAD-6	Recreational Activity Recorded for the Santa Ana-Delhi Channel	26
Table SAD-7	Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Irvine Avenue 1973-1976 (OCHCA)	33

Table SAD-8	Summary of Monthly <i>E. coli</i> at the Santa Ana Delhi Channel (2004-2006) (Orange County Coastkeeper)	34
Table SAD-9	Summary of Monthly <i>E. coli</i> Data for the Santa Ana Delhi Channel (2004-2006) (Orange County Coastkeeper)	35
Table SAD-10	Evaluation of BMP Alternatives for Effective Control of Bacteria	38-40

# UAA ANALYSIS: SANTA ANA-DELHI CHANNEL - REACHES 1 AND 2

## 1.0 Executive Summary

This analysis demonstrates that the REC1 use does not exist and is not attainable in the proposed Reaches 1 and 2 of the Santa Ana-Delhi Channel. The REC2 use is not attained in Reach 1. The uses are described as:

Water Contact Recreation (REC1) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

Non-contact Water Recreation (REC2) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

Reaches 1 and 2 are generally characterized by alternating segments of open, concrete-lined, vertical walled channel (3.75 miles in total) and channel with earthen bottom and either earthen or rip-rapped side slopes (1.15 miles in total). Reach 1 includes two closed, concrete-lined culverts that run under roadway, commercial and industrial areas. Public access is prohibited by law and prevented by chain link fencing and locked gates throughout the length of these Reaches. During dry weather conditions, flows in the channel are typically less than ~8 inches and contained in a low flow channel/swale.

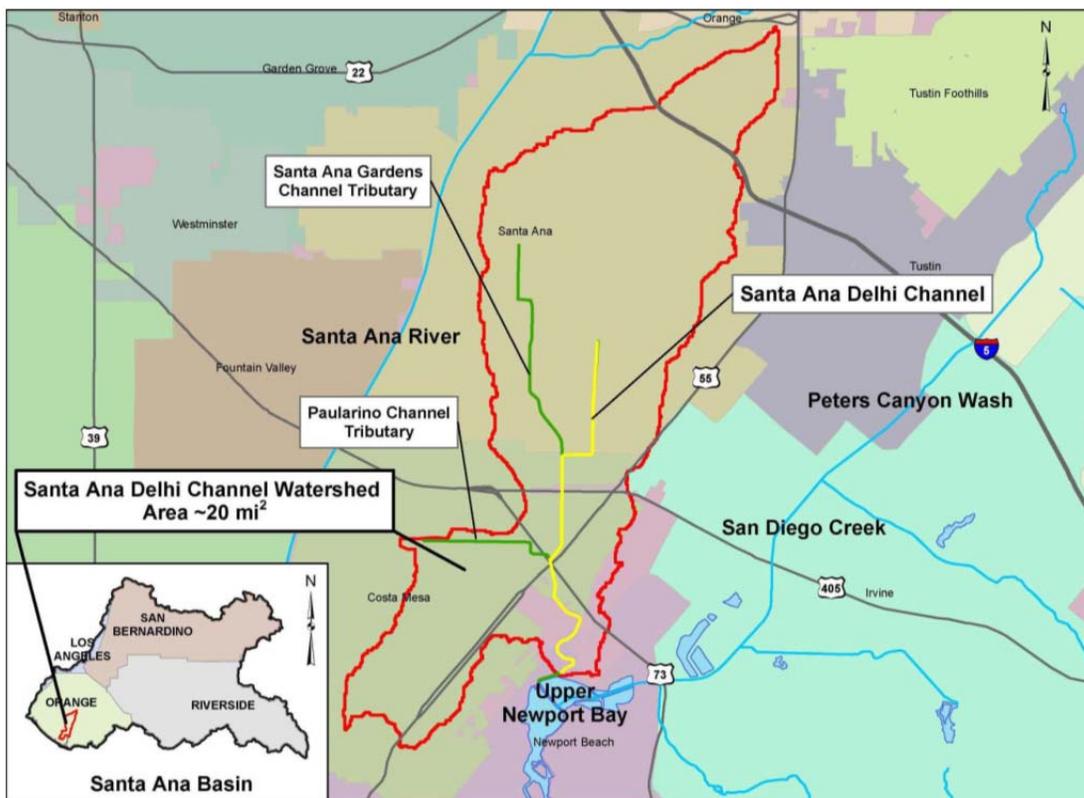
Extensive photographic evidence, field surveys and interviews of knowledgeable local authorities indicate that water contact recreation (REC1) does not occur and has not occurred in these Reaches of the Santa Ana-Delhi Channel. REC1 uses cannot occur in the channel because low flow conditions and flood control modifications preclude attainment of these uses. REC2 use in Reach 1 is also precluded, given these and other factors.

Analysis of historical water quality monitoring data indicates that the bacterial objectives are not being met. However, recreational uses cannot be attained by imposing more stringent effluent limitations or requiring additional Best Management Practices (BMPs) to control non-point sources because factors other than water quality will continue to preclude these uses. Reach 1 and Reach 2 of the Channel should not be designated REC1. In addition, Reach 1 should not be designated REC2.

## 2.0 Segment Description

### 2.1 Location

The Santa Ana-Delhi Channel (SAD) watershed (approximately 20 mi<sup>2</sup>) is located in Orange County and includes portions of the cities of Santa Ana, Costa Mesa, and Newport Beach. See Figure SAD-1. The channel starts in the midsection of the City of Santa Ana and empties into the Upper Newport Bay Ecological Reserve in the City of Newport Beach. Currently, the Santa Ana-Delhi Channel is not listed in the Basin Plan. Three reaches of the Channel are proposed to be identified and included in the Basin Plan: the Tidal Prism, which is the subject of a UAA reported in a separate document, and Reaches 1 and 2 of the Channel. This document reports the results of the UAA conducted for Reaches 1 and 2.



**Figure SAD-1 Santa Ana-Delhi Channel Watershed** (Source: Use Attainability Analysis Technical Report for the Santa Ana-Delhi Channel, CDM, August 2010 Figure 2-1)

The downstream boundary of Reach 1 is the upper boundary of the Tidal Prism, located 1,036 ft. upstream of the Bicycle Bridge at the terminus of University Drive in the City of Newport Beach. The Bicycle Bridge is at the boundary of the Upper Newport Bay Ecological Reserve. Reach 1 extends to immediately upstream of the intersection of Sunflower Avenue and Flower Street in the City of Santa Ana. Reach 2 stretches from the intersection of Sunflower Avenue and Flower Street to Warner Avenue.

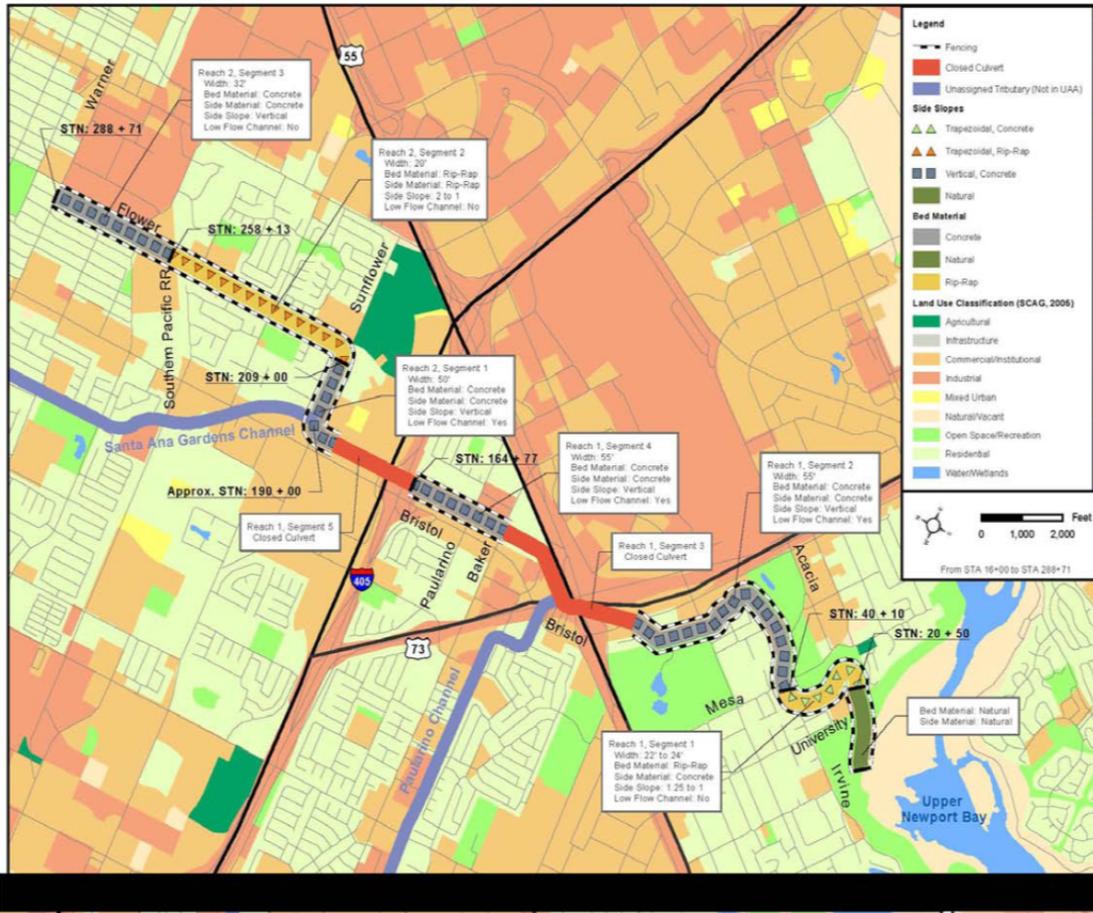
**Table SAD-1  
Reach Identification**

<b>Reaches</b>	<b>Boundaries</b>
Tidal Prism  (see SAD Tidal Prism UAA)	Bicycle Bridge (at Upper Newport Bay Ecological Reserve) to 1,036 ft. upstream
Reach 1	Upper boundary of Tidal Prism (1,036 ft. upstream from Bicycle Bridge) to immediately upstream of intersection of Sunflower Avenue and Flower Street, Santa Ana
Reach 2	Upstream of intersection of Sunflower Avenue and Flower Street to Warner Avenue

**2.2 Proximate Land Uses**

Reaches 1 and 2 are located in a heavily developed watershed, with a mix of residential, commercial and industrial land uses. See Figure SAD-2 and Table SAD-2. Two golf courses border the lower portion of Reach 1. Most of Reach 1 is out of the view of residences and the public because of fencing (the entire length of the channel), dense vegetation, commercial and industrial land uses adjacent to the channel that discourage or preclude access to the fenced channel, earthen berms and dense vegetation on the golf course west of the channel, and the enclosed nature of segments of the Reach (in closed culverts underneath Interstate Highway 405 (San Diego Freeway), the Orange County Performing Arts Center and associated entertainment/business complex, and the State Highway Route 55 and 73 interchange). A little-used bicycle trail lies adjacent to the concrete-lined section of Reach 1 for about 1/3 mile between Bristol Street and Irvine Avenue near Mesa Drive. The trail is separated from the channel by the channel fencing.

Reach 2 is bounded by Flower Street on the west side of the channel, residences, some industrial and commercial development, an elementary school, and an intermediate school. In the upstream concrete-lined section of this Reach, a bike trail lies adjacent to the east side of the channel for about a city block. Again, the channel is fenced.



**Figure SAD-2: Santa Ana-Delhi Channel Characteristics and Adjacent Land Uses**  
 (Source: Use Attainability Analysis Technical Report for the Santa Ana-Delhi Channel, CDM, August 2010 Figure 2-9) **Note to reader: Increase the zoom level of this page to enhance the readability of this figure.**

**Table SAD-2: Land Uses Adjacent Santa Ana-Delhi Channel<sup>1</sup>**  
**Reach 1**

Land Use	Linear Ft.	% of Channel Length
Commercial, Institutional, Industrial, Mixed	20,180	54%
Parks, Natural, Open Space	8,217	22%
Residential	8,865	24%
<b>TOTAL</b>	<b>37,262</b>	<b>100%</b>

**Table SAD-2: Land Uses Adjacent Santa Ana-Delhi Channel (continued)**

**Reach 2**

<b>Land Use</b>	<b>Linear Ft.</b>	<b>% of Channel Length</b>
Commercial, Institutional, Industrial, Mixed	14,930	77%
Parks, Natural, Open Space	0	0%
Residential	4,364	23%
<b>TOTAL</b>	<b>19,294</b>	<b>100%</b>

<sup>1</sup> CDM Smith Technical Memo – Land Use Adjacent to UAA Reaches, October 2013

**2.3 Channel Characteristics**

The Santa Ana-Delhi Channel (SDC), including the proposed Reaches 1 and 2, was originally constructed by agricultural interests. In 1870 the community of Delhi was founded in what is now the southern section of the city of Santa Ana near the location of the present day Warner Avenue. The land in this area was used for the production of sugar beets. As farming increased it became necessary to drain this area of natural sumps and swamps. As a result, in the 1890's a drainage ditch was dug from this area to Upper Newport Bay<sup>1</sup>. Reaches 1 and 2 follow the alignment of the original drainage ditch.

**2.3.1 Reach 1 Morphology**

Reach 1 extends from the upper end of the Tidal Prism upstream to immediately upstream of the intersection of Sunflower Avenue and Flower Street in the City of Santa Ana. Representative photographs are shown in Figures SAD-3 and 4. Channel characteristics are summarized in Table SAD-3. As shown in Table SAD-3, Reach 1 is dominated by vertical concrete walls and a concrete bottom. Reach 1 is approximately 3.4 miles in length.

The downstream section of Reach 1 continues the 20-24 foot wide and 15 foot deep, earthen-bottomed channel from the upper end of the proposed Tidal Prism to Mesa Drive, a distance of about ¼ mile. See Figure SAD-3. The right side slope (facing upstream), bordering a golf course, is earthen and heavily eroded, while the left side slope is reinforced concrete. The remainder of Reach 1 consists of a reinforced concrete rectangular channel that is 55 feet wide with vertical walls from 15 to 18 feet high. The concrete-lined section of this Reach includes a shallow, trapezoidal 10 foot wide pilot low flow channel. See Figure SAD-4. The channel is confined in fully enclosed culverts under the SR 55 / SR 73 interchange for approximately 2100 feet, and north of Interstate 405 for approximately half a mile as the channel runs beneath a business/entertainment complex in the city of Costa Mesa. Upstream of this closed culvert, the channel resumes its open, reinforced concrete rectangular channel configuration for the short distance to the upper end of Reach 1 just upstream of the intersection of Sunflower Avenue and Flower Street.

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<sup>1</sup> County of Orange Environmental Management Agency. April 1993. Draft Environmental Impact Report #527, Santa Ana-Delhi Channel System.



**Figure SAD-3. Reach 1 of the Santa Ana-Delhi Channel in the City of Newport Beach.** The most downstream segment of Reach 1 is earthen on the northeast slope and bottom and concrete on the southwest slope as shown in this Figure taken at Mesa Drive looking downstream. This earthen segment is approximately ¼ mile in length. Regional Board Staff photograph, June 2011.



**Figure SAD-4. Reach 1 of the Santa Ana-Delhi Channel in the City of Costa Mesa.**  
Regional Board staff photograph, June 2010.

### **2.3.2 Reach 2 Morphology**

Reach 2 extends from upstream of the intersection of Sunflower Avenue and Flower Street to Warner Avenue (where the channel transforms into an underground culvert), a distance of 1.45 miles. The entire reach is in the City of Santa Ana. Representative photographs are shown in Figures SAD-5 and 6. Channel characteristics are summarized in Table SAD-3.

From the intersection of Sunflower Avenue and Flower Street, Reach 2 consists of an earthen trapezoidal channel with fully rip-rapped 2:1 side slopes for about 0.9 miles. See Figure SAD-5. The bottom is approximately 20 ft. wide and the height of the channel is approximately 14 ft. Upstream of the earthen section, Reach 2 consists of a reinforced concrete, rectangular (vertical walls 15 ft. in height) channel for approximately 0.55 mile. The width is approximately 32 feet. See Figure SAD-6. In this section, the low flow channel is a shallow swale in the middle of the channel. Reach 2 terminates at Warner Avenue in the City of Santa Ana.



**Figure SAD-5. Reach 2 of the Santa Ana Delhi Channel at Sunflower Avenue and Flower Street, looking upstream.** This earthen riprap-sided segment transitions to a concrete rectangular segment approximately 0.9 mile upstream from this point. Low flows are approximately six inches deep at this point. Regional Board staff photograph, June 2010



**Figure SAD-6. Reach 2 of the Santa Ana-Delhi Channel.** The most upstream section of Reach 2 features a vertical wall concrete channel for approximately 0.55 mile in length. There is a low flow swale mid-channel. In the distance is the upstream boundary of Reach 2, Warner Avenue.

**Table SAD-3 Channel Characteristics - Reaches 1 and 2 of the Santa Ana Delhi Channel**

Reach 1	~15' high, 20-24 ft. wide earthen bottom; eroded earthen side slope along the right channel bank along the golf course; left bank reinforced concrete side slope	1,036 ft. upstream of Bicycle Bridge to Mesa Drive; a distance of approximately 0.25mile.
Reach 1	Reinforced concrete rectangular channel (open with vertical walls from 15 to 18ft in height; channel width 55'), except for reinforced concrete box culverts (closed box) under streets and a ½ mile segment north of interstate 405. V-shaped low flow channel.	Mesa Drive to immediately upstream of intersection of Sunflower Avenue and Flower Street, Santa Ana; a distance of 3.19 miles.
Reach 2	Earth trapezoidal channel with 2:1 riprap side slopes, bottom width of 20 ft. and height of 14 ft.	Sunflower Ave / Flower Street upstream 0.9 mile
Reach 2	Reinforced concrete rectangular channel, (open with vertical walls 15 ft. in height; channel width ~32') with low flow swale	0.55 mile length to Warner Ave, Santa Ana

## 2.4 Regulatory Status

### 2.4.1 Beneficial Use Designations

No portion of the Santa Ana-Delhi Channel is currently identified or included in the Santa Ana Region Basin Plan. It is proposed that the Tidal Prism, Reach 1, and Reach 2 of the Channel be added to the Basin Plan. The following beneficial use designations or exceptions are recommended for Reaches 1 and 2.

#### Reach 1:

- **WILD** (Wildlife Habitat): Birds such as mallard ducks and other wildlife are noted to use the downstream segment of Reach 1 as habitat.
- **WARM** (Warm Water Habitat): Small, perennial flows that consist largely of urban runoff and rising groundwater and that typically occupy the low flow channel create warm water habitat (albeit poor, with very limited vegetation).

**MUN** (Municipal and Domestic Supply): MUN is **not** an existing use and cannot be attained. As described above, the channel has been heavily modified to convey storm water runoff from the urbanized watershed. An exception from the MUN designation is appropriate pursuant to the Sources of Drinking Water Policy.

- **REC1 and REC2** (Contact and Non-Contact Recreation): Results from a comprehensive Use Attainability Analysis demonstrate that contact and non-contact recreation are **not** existing or attainable uses in Reach 1. A more detailed explanation is provided in Section 3 of this document.
- **RARE** (Rare, Threatened, or Endangered Species): The western pond turtle (*Emys marmorata*), listed as a species of special concern by the California Department of Fish and Wildlife (CDFW) was reported in this reach. A 1998 survey conducted for the Natural Community Conservation Plan reported that a western pond turtle (*Emys marmorata*) was captured in the earthen section of the channel from the Bicycle Bridge to Mesa Avenue. United States Geologic Survey (USGS) staff from the Western Ecological Research Center reported to Regional Board staff in 2010 that although western pond turtles were not captured during a 2003 survey of the channel they believe the turtles exist in the channel. In addition, the federally-listed California Least Tern (*Sterna antillarum*) is reported to forage in the most downstream segment of Reach 1<sup>2</sup>.

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<sup>2</sup> Orange County Environmental Management Agency. April 1993. Draft Environmental Impact Report #527, Santa Ana-Delhi Channel System.

## Reach 2:

- **MUN** (Municipal and Domestic Supply): MUN is not an existing use nor can this use be attained in the future. As described above, the channel has been heavily modified to convey storm water runoff from the urbanized watershed. An exception from the MUN designation is appropriate pursuant to the Sources of Drinking Water Policy.
- **WILD** (Wildlife Habitat): Wildlife is commonly observed in this area of the channel, including small finned fish, crayfish, and waterfowl such as herons, egrets and mallard ducks. Vegetation occasionally grows large enough (between channel maintenance activities) to enhance the habitat value in the earthen section of the channel.
- **WARM** (Warm Freshwater Habitat): Perennial flow typically comprised of urban runoff and rising/seeping groundwater provides support for an aquatic habitat. As noted, small fish and crayfish are observed in the channel waters.
- **REC 2** (Non-contact Water Recreation); Individuals from adjacent schools, businesses, parks and neighborhoods, and on sidewalks that bridge the channel, are able to view this Reach. There are opportunities for aesthetic enjoyment of the water and viewing the wildlife attracted to it. Large wading birds such as blue herons and egrets and colorful birds such as mallards and red wing blackbirds are often observed in this proposed reach.

### 2.4.2 303(d) Listings and Total Maximum Daily Loads (TMDLs)

The Santa Ana-Delhi is listed on the 2010 303 (d) list as impaired for indicator bacteria. As discussed above, the Santa Ana-Delhi Channel flows into Upper Newport Bay, which is also 303(d) listed for indicator bacteria. The Regional Board adopted and is implementing a fecal coliform (bacteria indicator) TMDL for Newport Bay that includes wasteload and load allocations for bacteria indicator inputs from tributaries, including the Santa Ana-Delhi Channel. Bacterial investigations in the Channel have been conducted and BMPs have been and will be implemented in response to TMDL and stormwater permit requirements (Orange County Areawide Urban Storm Water Runoff Management Program NPDES permit (Order No. R8-2009-0033, NDPEs CA 8618030, as amended) to improve bacteria indicator quality conditions in the Channel and to assure that the Channel, the second largest tributary to the Bay, does not cause or contribute to the impairment downstream in the Bay. Re-designation of Reaches 1 and 2 (and the Tidal Prism, as recommended in a separate UAA document) would allow focused implementation of BMPs in downstream areas adjacent or close to the Bay, which is expected to enhance their effectiveness in protecting downstream recreational uses<sup>3</sup>.

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<sup>3</sup> Experience with a media filtration and UV treatment facility for Aliso Creek (in the San Diego Region) shows that such treatment can be highly effective in reducing bacteria at the end of the pipe, but that the treatment effect is or may be negated by bacteria in the receiving water. Thus, the location of the BMP is critical to assure that bacteria reductions occur where needed.

## 3.0 Use Attainability Analysis – Factors Analysis

### 3.1 Regulatory Framework – UAAs and Beneficial Use Designations

Section 101 (a) (2) of the CWA states that “it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983”. The CWA and implementing federal regulations provide special protection for these “fishable/swimmable” uses by establishing a rebuttable presumption that all surface waters should support these uses and should be so designated as part of states’ water quality standards.

To overcome this presumption, the states are required to conduct a Use Attainability Analysis (UAA) and demonstrate that attaining the use(s) is not feasible based on one or more of the six factors identified in federal regulations (40 CFR 131.10(g)):

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301 (b) (Effluent Limitations) and 306 (National Standards of Performance) of the Act would result in substantial and widespread economic and social impact.

A UAA is a structured scientific assessment of the factors affecting the attainment of the use(s), which can include physical, chemical, biological, and economic factors as described in 40 CFR 131.10 (g)(1)-(6), above .

Federal regulation at 40 CFR 131.10(h) prohibits States from removing designated uses if:

1. They are existing uses, as defined in 40 CFR 131.3, unless a use requiring more stringent criteria is added; or
2. Such uses will be attained by implementing effluent limits required under sections 301 (b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

"Existing uses" are those uses actually attained in the water body on or after November 28, 1975 (the date of USEPA's initial water quality standards regulation), whether or not they are included in the water quality standards.<sup>4</sup> Guidance provided by USEPA in 1985 indicates that an "existing" primary contact recreational use<sup>5</sup> can be established by demonstrating that swimming has actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur, unless there are physical problems that prevent the use regardless of water quality.<sup>6</sup> Suitable water quality is demonstrated by consistent, not merely sporadic, attainment of applicable water quality objectives. More recent USEPA guidance states that USEPA considers an "existing" use to mean the use and water quality necessary to support the use that have been achieved in the waterbody on or after November 28, 1975.<sup>7</sup> USEPA states that: "It is appropriate to describe the existing uses of a waterbody in terms of both actual use and water quality because doing so provides the most comprehensive means of describing the baseline conditions that must be protected."

USEPA has indicated that where there is very limited actual primary contact use and the physical and/or water quality characteristics of the water body do not and are not likely to support that use, then it would be appropriate to conclude that primary contact recreation is not an "existing" use.<sup>8</sup> In making such determinations, federal guidance recommends that states should consider a **suite of factors** such as the actual use (present and historic), existing water quality, potential water quality conditions, access, recreational facilities, location (e.g., proximity to suitable recreational alternatives), safety considerations, as well as the physical conditions of the water body.<sup>9</sup> However, states are not required to evaluate all six factors identified in 40 CFR 131.10(g) as part of every UAA.

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<sup>4</sup> 40 CFR 131.3

<sup>5</sup> "Primary contact" recreation is equivalent to California's REC1 (water contact recreation) beneficial use

<sup>6</sup> USEPA. Questions & Answers on Antidegradation, August 1985.

<sup>7</sup> USEPA, Letter w/attachment from Denise Keehner (Director, Standards and Health Protection Division) to Derek Smithe, State of Oklahoma, September 5, 2008. (Cited as updated information in USEPA Water Quality Standards Handbook, Second Edition. EPA-823-B-12-002, Chapter 4)

<sup>8</sup> USEPA. 63 FR 36752 (July 7, 1998)

<sup>9</sup> USEPA. 63 FR 36756 (July 7, 1998)

In designating the uses of a water body, and in considering changes to those designations, states must take into consideration the water quality standards of downstream waters and ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters. (40 CFR 131.10(b)).

Finally, decisions to remove or not designate REC1 uses for surface waters are subject to reconsideration as part of the Basin Plan Triennial Review process. Where new information and/or changed conditions warrant the REC1 designation, then the Basin Plan must be amended accordingly.

### **3.2 40 CFR 131.10(g) Factor Assessment**

Reach 1 and Reach 2 of the Santa Ana Delhi Channel are incapable of supporting water contact recreation because:

Natural, ephemeral intermittent or low flow conditions or water levels prevent the attainment of the use (see Section 3.2.1); and.

Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use (see Section 3.2.2).

#### **3.2.1 Natural, Ephemeral, Intermittent and Low Flows Preclude the Recreational Use (40 CFR 131.10(g) Factor 2)**

##### **3.2.1.1 Methods and Fieldwork**

To evaluate flow conditions in the SAD Channel Reaches 1 and 2, the data collected from an Orange County Public Works (OCPW) gauging station just upstream of Irvine Avenue (Reach 1) were analyzed and direct measurements were taken in both Reaches. Estimates of flow depths were also made as part of recreational use surveys.

CDM (now CDM-Smith), serving as a consultant to the Task Force, prepared a UAA Technical Report for the Santa Ana Delhi Channel.<sup>10</sup> The report assesses and summarizes key attributes of the Channel, including flow conditions, channel morphology and other characteristics relevant to the UAA process. CDM developed a rating curve for the concrete-lined portion of Reach 1 by field calibrations of flow at varying depths. The rating curve defines the relationship between depth of flow and flow rate. Data collected at the Irvine Avenue stream gauge between 1991 and 2008 were used to generate cumulative frequency curves of flow rate and depth. See CDM Technical Report, Sec. 4.2.1.

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<sup>10</sup> CDM. Use Attainability Analysis Technical Report for the Santa Ana - Delhi Channel. August 2010 (CDM Technical Report)

Regional Board staff measured depths in Reach 2, near the Sunflower and Flower Street intersection, in 2006, 2009 and 2013. OCPW staff measured depths in Reach 1, at Mesa Drive, in 2011. Regional Board staff measured depth at this location in 2013. In 2010, OCPW staff measured flow and gauge height at the gauging station near Irvine Avenue (Reach 1) on a monthly basis during the dry season (June through September). Estimates of flow depth were made by Task Force members who conducted recreational use surveys at the Mesa Drive and Sunflower/Flower Street crossings in 2006.

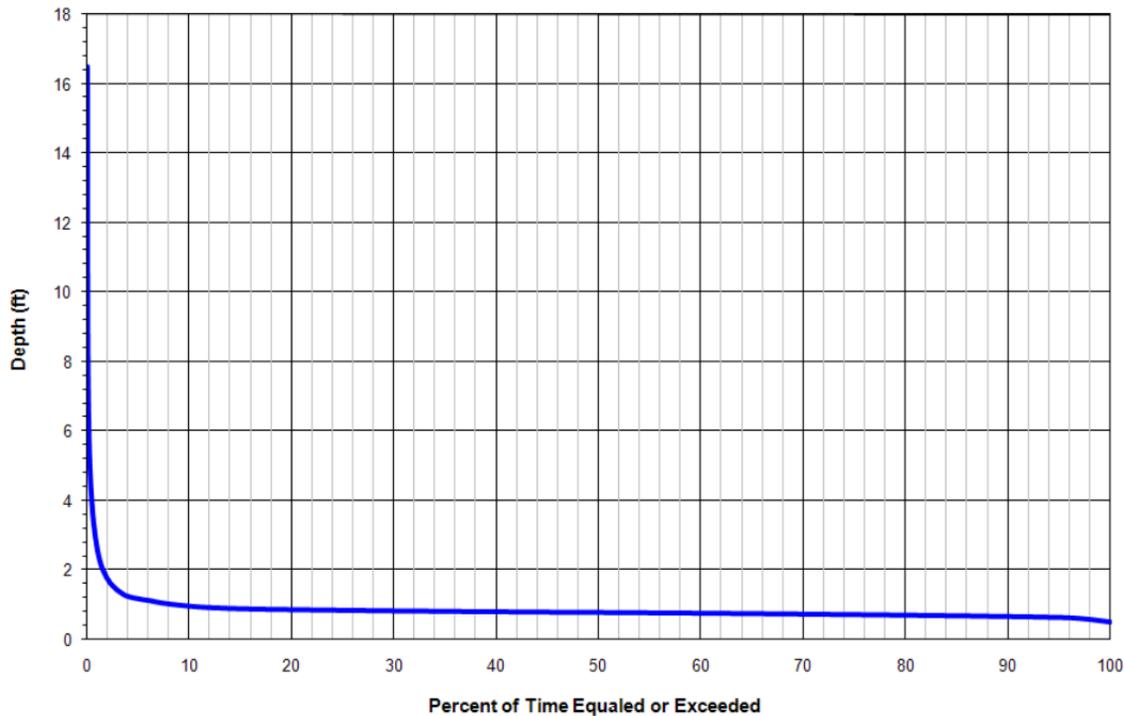
### **3.2.1.2 Findings and Conclusions**

As reported in the CDM Technical Report, given the hydrologic patterns in Southern California, dry weather flow is the predominant condition in the Santa Ana Delhi Channel. Dry weather runoff consists of urban nuisance flows and groundwater that rises into unlined portions of the channel or enters lined portions of the channel via weepholes. There are also periodic groundwater dewatering and groundwater well discharges to the channel. Precipitation-derived runoff typically occurs for only relatively short, episodic periods during and shortly after rainfall events within the tributary watershed. These events typically occur almost entirely during the wet season.

CDM's analysis of the cumulative frequency curves of flow rate and depth in Reach 1 showed that more than 90 percent of the time, flow rates and depths are characteristic of dry weather flow conditions. As shown in Figure SAD-7, flow depths during 1991-2008 were less than 2 feet approximately 95 percent of the time and less than 1 foot approximately 90 percent of the time.

These findings are consistent with direct measurements made by Regional Board and OCPW staff in 2006, 2009, 2010, 2011 and 2013. See Table SAD-4. As shown in this table, depths in both Reach 1 and Reach 2 were typically less than ~8 inches. In Reach 1, the measured flows were confined to the low flow pilot channel. Similarly, the flows were confined to the low flow swale in the concrete-lined section of Reach 2.

Recreational use surveyors estimated the depth of the water at Mesa Drive and the Sunflower Avenue/Flower Street remote camera locations (see discussion of photographic evidence below). The water was frequently reported as murky, which complicates such estimations. Nevertheless, most surveyors reported estimated depths that were knee-deep or less at both locations; most reported ankle deep or less depth.



**Figure SAD-7 Channel Depth Curve for the Santa Ana-Delhi Channel at Irvine Avenue (1991-2008)**  
 (Source: Use Attainability Analysis Technical Report for the Santa Ana-Delhi Channel, CDM, August 2010, Figure 4-4)

**Table SAD-4**

Water Depth Measurements<sup>1</sup> of Reach 1 and Reach 2 of the Santa Ana Delhi Channel

Date	Reach 1 Mesa Drive	Reach 2 Sunflower Ave/Flower St.
August 5, 2006		4 – 6 inches
June 5, 2009		6-8 inches
June 11, 2009		5 inches
June 18, 2009		7 inches
June 25, 2009		7 inches
June 29, 2009		7 inches
July 12, 2011 <sup>2</sup>	6 inches	
July 18, 2011 <sup>2</sup>	6.8 inches	
July 29, 2011 <sup>2</sup>	6 inches	
August 4, 2011 <sup>2</sup>	6.6 inches	
March 5, 2013	7.5 inches <sup>3</sup>	10 inches

1 Measurements by Regional Board staff unless otherwise noted. Measurements were taken where flows were deepest.

2 Measurements by OCPW staff where flows were deepest.

3 Measurement made just upstream of Mesa Drive near Irvine Avenue in the low flow channel

Wet weather runoff in these reaches can result in high velocity, bank-to-bank flows that reach within a few feet of the maximum channel depth. The gauging station near Irvine Boulevard showed a flow depth of over 16 ft. on one occasion between 1991 and 2008, which was close to breaching the vertical walls of the channel. Such flows create conditions that are unsafe for recreational use. (The temporary suspension of recreational standards under certain high flow conditions is proposed; see Section 5.5 of the January 12, 2012 Staff Report for the recreation standards amendments).

Based on the preceding stream depth data and analyses, Regional Board staff concludes that low flow conditions preclude attainment of water contact recreation in Reach 1 and Reach 2 of the Santa Ana-Delhi Channel. The water is too shallow to support swimming or other forms of primary contact recreation in the stream.<sup>11</sup> Therefore, Reach 1 and Reach 2 should not be designated for REC1 in Table 3-1 of the Santa Ana Basin Plan. See 3.3 for discussion of the REC2 use.

### **3.2.2 Dams, Diversions and Hydrologic Modifications Preclude the Recreational Use (40 CFR 131.10(g) Factor 4)**

#### **3.2.2.1 Methods and Fieldwork**

As previously noted, CDM prepared a UAA Technical Report (August 2010) that, in part, assesses and summarizes key attributes of the channel morphology. In addition, Regional Board staff made over 13 field visits to the Santa Ana-Delhi Channel between 2009 and 2013 to confirm channel conditions. In addition, Regional Board staff reviewed a report<sup>12</sup> by OCPW that summarized hydrologic modifications to the channel and fencing/access conditions.

#### **3.2.2.2 Findings and Conclusions**

As described in Section 2.2, Reach 1 and Reach 2 of the Santa Ana-Delhi Channel have been significantly modified to provide greater flood control protection. Reach 1 is almost completely a vertical walled, concrete-lined box channel that is 15-18 feet deep and 55 feet wide. The vertical-walled configuration comprises 2.96 miles (92%) of the total length of Reach 1 (3.19 miles). This includes two underground culverts that run under roadways and commercial developments. The vertical walls make it virtually impossible, and extremely unsafe, to gain access to the water for casual recreation activities. Reach 1 is fenced with locked gates to prevent access to the channel. In addition, the concrete channel bottom drains quickly, as it is designed to do, preventing pooling of flows that might support recreational opportunities if access was feasible.

The most downstream section of Reach 1 has an earthen bottom and earthen and rip-rap side slopes (see Figure SAD-4). The earthen side slope is heavily eroded, such that the

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<sup>11</sup> Federal Cooperative Instream Flow Service Group (members include: U.S. Fish & Wildlife Service, U.S. EPA, U.S. Heritage Conservation and Recreation Service, & U.S. Bureau of Reclamation). Methods of Assessing Instream Flows for Recreation. FWS/OBS-78/34 (June, 1978) pg. A-7.

<sup>12</sup> OCPW. Santa Ana Delhi Channel (F01) Access Ramps. March 1, 2013.

slope is nearly vertical. The rip-rap side slope is also very steep. Once again, access to the water in the channel in this area would be extremely unsafe.

As discussed in Section 2.2, Reach 2 consists of an earthen trapezoidal channel with fully rip-rapped 2:1 side slopes for about 0.9 miles. The bottom is approximately 15 ft. wide. Upstream of the earthen section, Reach 2 consists of a reinforced concrete, rectangular (15 foot high vertical walls) channel for approximately 0.55 mile. These steep/vertical conditions render access to water in the channel extremely unsafe. Like Reach 1, this Reach of the channel is completely fenced, with locked access gates. The entire length of the Santa Ana Delhi Channel is posted to advise that access is not allowed and is considered trespassing. One would have to scale the fence and rappel down the 15-18 ft. walls in most sections of Reaches 1 and 2 while avoiding county maintenance workers who would prohibit such activity, to reach the predominantly limited amount of water found on the Channel bottom.

As discussed previously, the Santa Ana Delhi Channel was originally designed and constructed to drain marshy areas for agricultural purposes. With the almost total urbanization of the watershed, the Channel has been modified over time to provide flood protection. Concrete-lining was found necessary to maintain the proper channel gradient, prevent further erosion, and protect nearby homes and businesses.

It is not feasible to restore the Channel to a more natural condition without compromising its primary purpose - flood protection. Further, the public benefit that would derive from attempting to do so would be limited at best, given that there are far superior opportunities for water contact recreation available just a short distance away in Upper and Lower Newport Bay and along the Pacific Coast. For example, the Newport Dunes Resort, the city of Newport Beach Aquatic Center, and public beaches located in Upper Newport Bay provide nearby public beach access and opportunities for recreational activities.

Based on the preceding analysis, Regional Board staff has concluded that the existing dams, diversions and other hydrological modifications preclude attainment of water recreation activities in Reach 1 and Reach 2 of the Santa Ana-Delhi Channel. Regional Board staff has further concluded that it is not possible to restore the channel to a more natural condition or to operate the facilities in a way that would allow recreational activity, or even safe recreational access to occur in the Santa Ana-Delhi Channel. Consequently, Reach 1 and 2 should not be designated for REC1 in Table 3-1 of the Santa Ana Basin Plan.

### **3.3 REC2 Designation**

In Reach 1, REC2 (non-contact recreation) is not attainable for all of the same reasons that REC1 (contact recreation) is precluded. REC2 activities include, but are not limited to: "picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities". Channel morphology, low flow conditions, access limitations, and aesthetic conditions are not conducive to any of these activities. While two golf courses and some residential units border Reach 1, there is very limited sight view of the entire Reach. A

thick screen of trees and golf course design limit any view of the Reach from the golf courses, where observation of the channel might be most expected. A little-used bicycle trail adjoins the concrete-lined, vertical wall section of Reach 1 between Irvine Boulevard and Bristol Street for approximately 1/3 of a mile. The bicycle trail is separated from the box channel by a 6 six ft. high chain link fence. Just beyond the upstream end of the bicycle trail the channel is underground for 2100 ft. to cross under Bristol Street and the SR55 and 73 interchange. (See Figure SAD-2). From just north of SR55 upstream to Reach 2, the channel goes through a commercial/ industrial area where public access even to the proximity of the channel is very limited: the only views allowed of the channel for the public are from the street bridges that cross the channel and that receive little if any pedestrian traffic. A portion of this segment is underground and obviously not visible to the public. Because of limited flows and the concrete-lining that dominates the channel, there is very limited habitat that offers any opportunity for wildlife viewing or aesthetic enjoyment. The principal observations of wildlife are in the most downstream section of Reach 1, with the earthen bottom. However, as described above, the opportunity to view this part of the Channel is severely restricted by fencing and dense vegetation. Photographic evidence, streamside surveys and interviews of knowledgeable local authorities all confirm that no recreation of any kind is occurring in the SAD Channel Reach 1. Thus, Board staff recommends that Reach 1 not be designated REC2.

## **4.0 Existing Use Analysis**

As noted in Section 3.1, states may not remove the recreational use designation if it is an "existing use." Nor can recreational uses be de-designated if such uses will be attained by implementing effluent limits required under sections 301(b) and 306 of the Clean Water Act and by implementing cost-effective and reasonable Best Management Practices for non-point source control.<sup>13</sup> A formal analysis was conducted to evaluate both of these conditions.

This analysis consisted of numerous site visits by Regional Board and CDM staff, extensive digital photo REC surveys, on-site field surveys, interviews of Orange County Public Works (OCPW) staff, Park Rangers and an analysis of all representative and reliable water quality data.

### **4.1 Evaluation of Actual Recreational Activities**

#### **4.1.1 Assessment Methods**

A number of methods were employed to assess existing recreational use. A remote photo reconnaissance recreation survey was conducted for a one year period at two locations, one in Reach 1 and the other in Reach 2. Observations made in the field during weekly camera maintenance visits by CDM were recorded. In addition, Regional Board staff and other Stormwater Quality Task Force members conducted recreational use surveys.

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<sup>13</sup> 40 CFR 131.10(h)

Finally, Regional Board staff surveyed public agency staff who visit the Channel for maintenance and monitoring to obtain information concerning any recreational use they observed in the Channel.

#### 4.1.2 Photo Reconnaissance Survey

Digital cameras were installed at Mesa Drive (Reach 1, facing downstream) and at the Sunflower Avenue/Flower Street intersection (Reach 2, facing upstream). See Figures SAD-8 and 9. These cameras were programmed to collect one image every 15 minutes during daylight hours. Electronic photos were transmitted, over the cellular phone network, to a secure network server for storage and further analysis.

The duration of the survey and number of images collected for each location on the channel are shown in Table SAD-5.

**Table SAD-5  
Recreational Use Survey Duration and Number of Images Collected**

<b>Survey Location</b>	<b>Start Date</b>	<b>End Date</b>	<b>Number of Images</b>
Mesa Drive	6/20/2005	7/13/2006	21,284
Sunflower Avenue	7/7/2005	7/9/2006	20,978

Any image containing a person or persons within channel fencing or boundaries was defined as a recreation event. If a person or persons were observed within channel fencing or boundaries during the weekly on-site surveys, these were also considered events. An event could include one or more persons. For each event each person's activity and the estimated duration of the event were logged. If an activity was captured on



**Figure SAD-8**

**Photo of the Camera View at the Recreational Use Survey Location for Santa Ana-Delhi Channel at Mesa Drive looking downstream. (Reach 1)**

(Source: UAA Technical Report – Santa Ana-Delhi Channel, CDM. August 2012, Figure 3-10)



**Figure SAD-9**

**Photo of Activity at Santa Ana-Delhi Channel at Mesa Drive (Reach 1), 7/8/2006 14:30**

(Source: UAA Technical Report for Santa Ana-Delhi CDM, August 2010 Figure 3-11)

only one image, an activity duration was reported as <30 minutes. Likewise, if the same activity by the same person or persons was observed in two consecutive fifteen-minute interval images, the duration was reported as <45 minutes.

Table SAD-6 presents a summary of the activity recorded at the two camera locations. The seasonal periods defined in southern California NPDES stormwater permits were used to categorize the observations by season: dry season (April 1 to September 30) and wet season (October 1 to March 31). During the year-long REC photo surveys, six individuals were observed at Mesa Drive walking in the channel and seven individuals at Sunflower Avenue were captured walking in the channel. In no case at either location was there evidence of contact with water. At the Mesa Drive location (Reach 1), the individuals recorded were likely OCPW staff and Task Force Members conducting maintenance activities, monitoring or completing recreational use surveys. See Figure SAD- 9. At the Sunflower Avenue site (Reach 2) seven images were captured of young adults inside the channel fencing. Most of these individuals were walking in the channel; there was no evidence of contact with the water. One of these observations was of a young adult standing on rocks/rip-rap in the channel and bending down to observe the water, an activity considered to be REC2. See Figure SAD-11.

Location	Number of Individuals			Estimated Duration (min)	Type of Activity
	Total	Dry Season	Wet Season		
Mesa Drive	6	4	2	180	Walking, Bicycling <sup>1</sup>
Sunflower Avenue	7	4	3	210	Walking

<sup>1</sup> One image showed a bicycle on the access ramp leaning against the fence. Since the access gate is locked it is unclear how the bicycle got there. The image with the bike was counted as a non-contact event, less than 30 minutes. No one was seen in the water. There was only one such image for the duration of the survey.



**Figure SAD-10**

**Photo of the Camera View of the Recreational Use Survey Location for Santa Ana-Delhi Channel at Sunflower Avenue (Reach 2)**

(Source: UAA Technical Report Santa Ana-Delhi Channel, CDM August 2010, Figure 3-4)



**Figure SAD-11**

**Photo of Activity at Santa Ana-Delhi Channel at Sunflower Avenue (Reach 2), 7/8/2006 14:30.** (Source: UAA Technical Report for Santa Ana-Delhi CDM, August 2010 Figure 3-7)

Results from the cameras installed in the SAD Channel are consistent with the photographic evidence collected at similar concrete-lined boxed flood control channels in the Santa Ana Region. More than 21,000 pictures were taken in the Demens Channel located in a residential neighborhood in the city of Upland (see Figure SAD-12). No water contact recreation was observed in these photographs, nor in the nearly 24,000 photos taken in the Anza Channel adjacent to a public park (see Fig. SAD-13).



**Figure SAD-12: Demens Flood Control Channel**  
(Source: Recreational Use Survey – Demens Channel CDM, 7/2009)



**Figure SAD-13: Anza Park Flood Control Channel**  
(Source: Recreational Use Survey – Anza Channel CDM, 4/2010)

#### **4.1.3 Physical Surveys and Other Information**

Regional Board staff has made at least twelve visits to Reaches 1 and 2 of the Santa Ana-Delhi Channel during the last five years to observe conditions and obtain evidence regarding recreational use. No individuals have been observed by staff in the channel during any of those visits.

Task Force members performed eleven separate recreation field surveys of the Santa Ana-Delhi Channel. Each site visit was conducted on a summer weekend in order to maximize the opportunity to observe any recreational activity (particularly by children) that might occur in the Channel. Six surveys were completed in July and August of 2006. Five surveys were conducted in July and August of 2011.

Surveyors were required to remain on station for at least 30 minutes and to record all relevant observations on a standardized form. The observations recorded include: date and time of the visit, the weather conditions, an estimate of the depth and clarity of water in the channel, the number of people and nature of any recreational activities observed. The surveys were conducted at the remote camera locations described above. No individuals were observed in the channel by the Task Force members during these surveys, and no evidence of recreational activity was reported.

Weekly field surveys were also conducted by CDM staff as they performed regular maintenance at the remote camera locations. The maintenance crews were required to complete a written log documenting their observations during each site visit. CDM staff

visited the Mesa Avenue site and completed a log entry 41 times between August 16, 2005 and June 30, 2006. The crews observed no individuals in the channel. CDM staff recorded 41 visits to the Sunflower Avenue and Flower Street location between August 16, 2005 and June 30, 2006. Again, staff reported no individuals in the channel.

Both Regional Board staff and CDM interviewed staff of local agencies with channel maintenance/monitoring responsibilities and/or whose work routine provides exposure to the channel. No observations of people engaged in recreational activity in the channel were reported. In particular, Orange County Public Works staffs regularly visit the area to maintain the channel. These maintenance crews stated that they have never encountered any unauthorized persons within the confines of the Channel (i.e., "inside the chain link fence"). Orange County Harbors, Beaches, and Parks employees working at the Upper Newport Bay Ecological Reserve also report never observing any individuals in the lower segment of Reach 1.

## **4.2 Evidence re Historical Recreational Use**

In addition to the collection of current information regarding human presence in the Channel from local agency staff who frequent or are familiar with the channel, other efforts were made to obtain any information concerning historic recreational use. As discussed in the preceding section, local agency staff consistently reported that they had not observed unauthorized individuals within the Channel. CDM conducted inquiries to local agencies, online searches of California newspaper archives, databases (engineering and environmental trade journals) and search engines such as Google News archive and Lexis-Nexis to identify any accounts or references to recreational activities in the Santa Ana-Delhi Channel. No historical use information was identified from these searches.

Finally, the Regional Board received no written comments and no public testimony during the public hearing process for the recreation standards amendments, including UAAs for various waters, documenting any past or present recreational activity in the Santa Ana-Delhi Channel.

### **4.2.1 Probable Future Use**

Information regarding potential future recreational uses for the Santa Ana-Delhi Channel was obtained through discussions with local agencies and review of relevant county and municipal master plans. The Cities of Costa Mesa, Newport Beach, and Santa Ana were contacted, as was the County of Orange. Based on these inquiries, proposed planned uses were documented, as presented below.

According to the Orange County Public Works, facilities that could support water contact recreation are not planned for the channel. Areas immediately adjacent to downstream sections of the channel (proposed Tidal Prism and parts of proposed Reach 1) are included in the proposed Santa Ana Heights Regional Trail System and a trail has been planned to extend from Upper Newport Bay to the Orange County Fairgrounds. As noted previously, approximately 1/3 mile of this trail, along the channel from roughly Bristol Street to Irvine Avenue, is already in limited use. The trail is separated from the Channel by fencing.

The City of Santa Ana Department of Parks and Recreation Services is planning to construct a bicycle trail along the Santa Ana-Delhi Channel between Warner Avenue and Sunflower Avenue. The bicycle trail is proposed to be constructed on an existing OCPW maintenance road between the channel and adjacent properties. Construction was expected to commence before 2010. As of early 2011, construction has not been initiated.

The City of Costa Mesa has preliminary design concept plans for a multipurpose trail to be constructed along the Santa Ana-Delhi Channel. This trail is proposed to also be constructed on the existing OCPW maintenance road along portions of the channel within the City's jurisdiction. Again, no construction has been initiated.

In 2011, planning staff for the County provided updated planning information. While there remain plans for riding, hiking and biking trails adjacent to the Channel, there are no firm plans for implementation or funding. There are no plans to provide recreational facilities that would support water contact recreation in the channel itself.

#### **4.2.2 Summary – Evidence of Past, Present or Probable Future Recreational Use**

In summary, there is no evidence of any actual or historic REC1 use in Reaches 1 and 2 of the Santa Ana-Delhi Channel. Photographic surveys, field surveys and information provided by public agency staff members who routinely visit the Channel all corroborate this conclusion. Nor is there evidence of REC2 activity in Reach 1. There is no evidence of historic recreational use in either Reach.

The absence of any observed water-related recreation in Reaches 1 and 2 is a reflection of the various characteristics of the Reaches described above. These include the extensive hydrologic modifications of these reaches for flood control purposes and the low flow conditions that predominate. In addition, the Channel is fenced throughout its length, there is signage to prohibit access, and maintenance access gates are locked. Easily accessible and far more appealing recreational areas are in close proximity (Newport Bay and Pacific Ocean beaches).

### **4.3 Evaluation of Ambient Water Quality**

#### **4.3.1 Assessment Methods**

The Orange County Health Care Agency (OCHCA) has performed water quality monitoring of the Santa Ana-Delhi Channel since 1973. From August 1973 through February 1976, fecal coliform grab samples were collected approximately monthly at Irvine Blvd., which is near the lower boundary of the proposed Reach 1. See Table SAD-7.

Between 2004 and 2006, Orange County Coastkeeper also performed *E. coli* monitoring at Mesa Drive (in proposed Reach 1) and at MacArthur Boulevard (within proposed Reach 2). Samples were collected from one to three times per month at both sample locations. These data are presented in Tables SAD-8 and 9.

Regional Board staff sampled at Sunflower Avenue (proposed Reach 2) for *E. coli* in June 2009. Five samples were taken in a 30 day period and a geometric mean of 722 MPN/100mL was determined. See Table SAD-9.

Where insufficient fecal coliform data (i.e., less than 5 sample results/30 day period) were available to calculate geometric means, these coliform data were compared generally to that part of the existing REC1 fecal coliform objective that specifies that not more than 10% of the samples exceed 400 organisms/100mL for any 30-day period.

For *E. coli*, insufficient data were collected to compare to the *E. coli* geometric mean recommended in the recreation standards amendments. The recommended geometric mean requires that at least 5 samples be collected during a 30-day period. Accordingly, the available *E. coli* data were evaluated based on the recommended criteria in USEPA's 2012 Recreational Water Quality Criteria document. These new criteria include the geometric mean of 126/100mL, to be calculated based on the number of samples collected during any 30-day period (no minimum number of samples during that period is specified). In addition to the geometric mean, the 2012 Criteria include a Statistical Threshold Value (STV) of 410/100mL that is not to be exceeded in more than 10% of the samples collected during the same 30-day interval used to assess the geometric mean.

Table SAD-7 Summary of Monthly Fecal Coliform at the Santa Ana Delhi Channel at Irvine Avenue 1973-1976 (OCHCA)				
Fecal Coliform				
Month and Year	Number of Samples Collected	Sample results MPN/100mL	Percent greater than 400 / 30 day period <sup>1)</sup>	Geometric means (5 samples/30 day period <sup>2)</sup>
Santa Ana Delhi Channel at Irvine Avenue (Reach 1)				
8/1973	1	<b>46,000</b>	100%	
4/1974	2	43, <b>930</b>	50%	
6/1974	1	43	0%	
7/1974	1	<b>430</b>	100%	
8/1974	1	39	0%	
9/1974	1	210	0%	
10/1974	1	<b>460</b>	100%	
12/1974	2	<b>430, 4,300</b>	100%	
1/1975	1	90	0%	
3/1975	1	75	0%	
4/1975	2	43, <b>23,000</b>	50%	
5/1975	1	<b>930</b>	100%	
6/1975	1	<b>430</b>	100%	
7/1975	1	230	0%	
8/1975	1	<b>1,100</b>	100%	
9/1975	1	<b>460</b>	100%	
10/1975	1	<b>9,300</b>	100%	
11/1975	2	46, <b>93,000</b>	50%	
12/1975	1	<b>430</b>	100%	
2/1976	1	<b>460</b>	100%	

Notes:

1. Basin Plan REC1 objective: logmean <200 organisms/100mL based on 5 or more samples/30-day period and not more than 10% of samples exceed 400 organisms/100 mL for any 30-day period.
2. It was not possible to calculate geometric means as there were no 30 day periods when five samples were taken.
3. Sample results in bold indicate exceedances of Basin Plan REC1 objective.

Table SAD-8 Summary of Monthly <i>E. coli</i> Data for the Santa Ana Delhi Channel (2004-2006) (Orange County Coastkeeper)				
<i>E. coli</i>				
Month and Year	Number of Samples Collected	Sample Results (MPN/100mL)	Percent Exceedance of STV (410 cfu/100mL)	Geometric Means that exceed USEPA 2012 criterion (126cfu/100mL)
<b>Santa Ana Delhi Channel at Mesa Drive (Reach 1)</b>				
3/2004	3	100; 100; 100	0%	
4/2004	1	100	0%	
5/2004	1	310	0%	<b>310</b>
6/2004	1	310	0%	<b>310</b>
7/2004	2	100; 100	0%	
10/2004	1	<b>2,180</b>	100%	<b>2,180</b>
11/2004	1	100	0%	
12/2004	1	100; <b>4160</b>	50%	<b>4160</b>
1/2005	1	135	0%	
2/2005	1	<b>1590</b>	<b>100%</b>	<b>1590</b>
3/2005	2	<b>12,590; 100</b>	<b>100%</b>	<b>1,122</b>
4/2005	1	<b>630</b>	<b>100%</b>	<b>630</b>
5/2005	1	<b>5,610</b>	<b>100%</b>	<b>5,610</b>
6/2005	1	63	0%	
7/2005	1	<b>447</b>	<b>100%</b>	<b>447</b>
8/2005	1	100	0%	
11/2005	1	100	0%	
12/2005	2	<b>520; 1040</b>	<b>100%</b>	<b>742</b>
1/2006	2	<b>1340; 10</b>	<b>50%</b>	<b>116</b>
2/2006	1	<b>850</b>	<b>100%</b>	<b>850</b>
3/2006	3	<b>2430; 100; 4950</b>	<b>67%</b>	<b>1063</b>

Notes:

1. Sample results in bold exceed USEPA 2012 Recreational Water Quality Criteria (2012 Criteria) recommended Statistical Threshold Value (STV) (410 cfu/100mL) corresponding to recommended geometric mean of 126 cfu/100mL
2. USEPA 2012 Criteria recommend that the geometric mean not be exceeded in any 30-day interval. No minimum number of samples for the geometric mean calculation is identified.

<b>Table SAD-9</b>				
<b>Summary of Monthly <i>E. coli</i> at the Santa Ana Delhi Channel (2004-2006) (Orange County Coastkeeper)</b>				
<i>E. coli</i>				
<b>Santa Ana Delhi Channel at MacArthur Boulevard (Reach 2)</b>				
<b>Month and Year</b>	<b>Number of Samples Collected</b>	<b>Sample Results MPN/100ml</b>	<b>Percent Exceedance STV (410cfu/100mL)</b>	<b>Geometric Means that Exceed USEPA 2012 criterion (126cfu/100mL)</b>
3/2004	2	100; 100	0%	
4/2004	1	310	0%	310
6/2004	1	100	0%	
7/2004	1	<b>630</b>	100%	630
8/2004	1	100	0%	
10/2004	1	<b>2,130</b>	100%	2,130
11/2004	1	<b>740</b>	100%	740
12/2004	1	<b>3050</b>	100%	3050
1/2005	1	300	0%	300
2/2005	1	<b>700</b>	100%	700
3/2005	1	310	0%	310
4/2005	1	<b>740</b>	100%	740
5/2005	1	<b>4130</b>	100%	4130
6/2005	1	<b>833</b>	100%	833
7/2005	1	<b>472</b>	100%	472
8/2005	1	<b>1080</b>	100%	1080
11/2005	1	200	0%	200
12/2005	2	<b>1560; 1100</b>	100%	1310
1/2006	2	<b>1480; 100</b>	50%	385
2/2006	1	<b>1610</b>	100%	1610
3/2006	3	<b>2430; 410; 4040</b>	67%	1591
<b>Summary of <i>E. coli</i> Data (MPN/100mL) for Santa Ana Delhi Channel at Sunflower Avenue and Flower Street (Reach 2) (completed by Regional Board Staff)</b>				
6/2009	<b>5</b>	<b>3,500; 800; 200; 700; 500</b>	<b>80%</b>	<b>722</b>

Notes:

1. Sample results in bold exceed USEPA 2012 Recreational Water Quality Criteria (2012 Criteria) recommended Statistical Threshold Value (STV) (410 cfu/100mL) corresponding to recommended geometric mean of 126 cfu/100mL
2. USEPA 2012 Criteria recommend that the geometric mean not be exceeded in any 30-day interval. No minimum number of samples for the geometric mean calculation is identified.

### 4.3.2 Findings and Conclusions

As reflected in Table SAD-7, insufficient samples were collected within a 30 day period to calculate geometric means in conformance with the established fecal coliform objective for REC1 waters. Consequently, the data were compared to that part of the fecal coliform objective that specifies that no more than 10% of the samples shall exceed 400 organisms/100 mL for any 30 day period. As shown in Table SAD-7, there is inconsistent compliance with this objective in Reach 1 of the Channel: two-thirds of the grab sample results analyzed for fecal coliform from 1973 to 1976 exceeded the 400 fecal coliform per 100 mL objective

The *E. coli* geometric mean determined from samples collected in June 2009 at Sunflower Avenue, in Reach 2, was 722 *E. coli* organisms per 100/mL, which exceeds the proposed REC 1 geomean objective of 126 *E. coli* organisms per 100 mL (based on five or more samples during a 30-day period). This value also exceeds both *E. coli* geometric means identified in USEPA's 2012 Recreational Water Quality Criteria (100 and 126/100mL).

As shown in Table SAD-8, *E. coli* concentrations at both Mesa Drive (Reach 1) and MacArthur Boulevard (Reach 2) frequently exceeded USEPA's recommended geometric mean (126 cfu/100mL) and associated Statistical Threshold Value of 410/100 mL.

To summarize, sampling conducted at locations in Reach 1 and Reach 2 showed that the existing fecal coliform and Regional Board proposed/USEPA recommended *E. coli* geomean and single sample objectives are not consistently achieved.

### 4.3.3 Probable Future Water Quality

BMPs, including inspections for illegal discharges/illicit connections and public education, are being implemented pursuant to the Orange County Urban Storm Water Runoff permit (MS4 Permit). The area tributary to the Santa Ana-Delhi Channel is sewered and septic tanks are not considered a source of bacteria inputs. Sewer system leaks have not been demonstrated to be a contributor to bacteria densities in the Channel. OCPW has conducted an extensive review of Best Management Practices (BMPs) for bacteria control (see Table SAD-10). Very few BMPs provide the level of effectiveness required to achieve consistent compliance with bacteria water quality standards. Those BMPs that are most effective (e.g. percolation ponds and artificial wetlands) require large amounts of land that is not available in the fully-developed watershed draining to the Santa Ana-Delhi Channel. Given the constraints of land availability, significant water quality improvement that results in consistent compliance with bacteria quality objectives as the result of BMP implementation is likely to be highly problematic. As part of the recreation standards amendments for inland waters, antidegradation targets for *E. coli* were calculated for Reach 2 by Regional Board staff (see discussion in Section 5.2 of the January 12, 2012 staff report for the recreation standards amendments). The intent of these targets and accompanying monitoring requirements is to assure that water quality conditions do not degrade in Reach 2 should REC1 not be designated and, accordingly, REC1 objectives not apply. A diversion is being planned near the downstream end of Reach 1 to address

the indicator bacteria and other established TMDLs and improve quality conditions in both the immediate and downstream receiving waters. See further discussion in Section 5.2.

Imposing stringent effluent limitations pursuant to Section 301(b) and 306 of the Clean Water Act would have no effect on water quality in Reach 1 or Reach 2. No municipal publicly-owned treatment works (POTW) discharge to the Channel in these reaches. There are periodic discharges of groundwater to these Reaches as the result of dewatering and/or well production activities, but these discharges do not have the reasonable potential to contribute to bacteria indicator densities in these surface waters and thus bacteria indicator effluent limitations would be inappropriate.

Most important, even if water quality was in compliance with the bacterial objectives, REC1 use would continue to be precluded by the same hydrologic modification and low flow constraints that exist today. To protect public safety, access to the Channel is prohibited. The entire length of the Channel, including Reaches 1 and 2, is fenced and gated to deny entry. Warning signs are displayed stating that access is prohibited. Regular site visits by maintenance crews help ensure compliance. For these reasons, the REC1 use cannot be attained by imposing more stringent effluent limitations or requiring additional BMPs to control non-point sources.

**Table SAD-10: Evaluation of BMP Alternatives for Effective Control of Bacteria**

Bacteria BMP Type	Parameter	Mean Influent #/100 mL	Mean Effluent #/100 mL	n	Percent Removal	Source
<b>Water Treatment BMPs</b>						
Wet Basins (Retention ponds, wet ponds, wet extended detention ponds, stormwater ponds, retention basins). Retains permanent pool.	FC	11700	100	NR	99	CalTrans (2004) study in SoCal
	FC	4400	20	NR	99	CalTrans (2004) study in SoCal
	FC	1929	515	9	73	BMP dB; Fremont, CA
	FC	58	5	24	91	BMP dB; Largo, FL
	FC	4231	2475	16	41.5	BMP dB; Valhalla, NY
	FC	NR	1779	10	90	Schueler (2000); ON
	FC	NR	2858	10	64	Schueler (2000); ON
	<i>E. coli</i>	NR	NR	10	86	Schueler (2000); ON
	<i>E. coli</i>	NR	NR	10	51	Schueler (2000); ON
	FC	152	63	84	58	Mallin et al. (2002); NC
Dry Basins (Dry ponds, detention or extended detention basins or ponds). Designed to empty within several days.	FC	900	2000	NR	-122	CalTrans (2004) study in SoCal; storm
	FC	6700	7500	NR	-12	CalTrans (2004) study in SoCal; storm
	FC	27	27	8	0	USGS (2004) study in USVI
	FC	3412	724	35	79	Harper et al. (1999) study in FL
	<i>E. coli</i>	563	515	18	9	MSAR (2009)
	FC	957	738	18	23	MSAR (2009)
	<i>E. coli</i>	149	204	12	-37	MSAR (2009)
Constructed Wetlands (Stormwater wetlands, wetland basins, shallow marshes, extended detention wetlands). "Essentially shallow wet basins."	FC	33.8	7.4	5	78	Hinds et al. (2004); Columbus
	FC	760	80	10	89	LN & COO (2004); Laguna Niguel
	FC	1915	116	9	94	LN & COO (2004); Laguna Niguel
	FC	5178	101	12	98	LN & COO (2004); Laguna Niguel
	<i>E. coli</i>	4163	27	10	99	LN & COO (2004); Laguna Niguel
	<i>E. coli</i>	1897	107	9	94	LN & COO (2004); Laguna Niguel

**Table SAD-10: Evaluation of BMP Alternatives for Effective Control of Bacteria (Continued)**

Bacteria BMP Type	Parameter	Mean Influent #100mL	Mean Effluent #100 mL	n	Percent Removal	Source
<b>Water Treatment BMPs</b>						
	<i>E. coli</i>	630	73	9	88	LN & COO (2004); Laguna Niguel
Media Filters	FC	5800	1400	NR	76	CalTrans (2004) study in SoCal
	FC	NR	18528		-85	City of Austin (1997)
	FC	NR	NR		36	Glick et al. (1998); Austin, TX
Disinfection (UV, ozone, chlorine)	FC	32800**	16**		99.9% (inversely proportional to turbidity)	**County of Orange (2008)
Diversions					100% of diverted fraction	RBF (2003)
Vegetated Swales or Channels (Grassed channels, dry swales, retention swales). Only includes those features with little to moderate soil infiltration.	FC	386	459	NR	-19	BMP dB; Altadena, Caltrans (2004)
	FC	84853	47	NR	99.9	BMP dB; Carlsbad, Caltrans (2004)
	FC	490	1122	NR	-129	BMP dB; Cerritos, Caltrans (2004)
	<i>E. coli</i>	20651	717	18	97	MSAR (2009); dry
	FC	16293	675	18	96	MSAR (2009); dry
	<i>E. coli</i>	2448	2904	12	-19	MSAR (2009); wet
	FC	3954	4196	12	-6	MSAR (2009); wet
	FC	65	105	NR	-62	BMP dB; Downey, Caltrans (2004)
	FC	9460	9168	NR	3	BMP dB; Lakewood, Caltrans (2004)
FC	1366	239	NR	82	BMP dB; Vista, CA, Caltrans (2004)	
<b>Volume Reduction BMPs</b>						
Infiltration Basins & Trenches	FC	80-5000	<23	9	>99	LASGRWC (2005)
	<i>E. coli</i>	20-1300	<6.9	9	>99	
	FC	500	ND-800	8		
	FC	ND-13000	11-110	8		
	<i>E. coli</i>	ND-120	ND	8	>99	

**Table SAD-10: Evaluation of BMP Alternatives for Effective Control of Bacteria (continued)**

<b>Bacteria BMP Type</b>	<b>Parameter</b>	<b>Mean Influent #100 mL</b>	<b>Mean Effluent #100 mL</b>	<b>n</b>	<b>Percent Removal</b>	<b>Source</b>
Infiltration Basins & Trenches	FC	230	ND	5	>99	
					100% for infiltration fraction	USEPA (1999); Arvind & Pitt (2006)
Low Impact Development (LID)					No data	

NR = Not Reported; ND=Not detected

Shaded percent removal values were not statistically significant

## 5.0 Protection of Downstream Uses

### 5.1 Regulatory Requirements.

In designating the uses of a water body, and in considering changes to those designations, states must take into consideration the water quality standards of downstream waters and ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.<sup>14</sup> The proposed Reaches 1 and 2 of the Santa Ana-Delhi Channel are tributary to the proposed Tidal Prism, which is proposed to be designated REC2, but not REC1, pursuant to the findings of a separate UAA. The Tidal Prism flows into Upper Newport Bay, which is designated REC1.

### 5.2 Compliance Strategies

Currently a diversion facility is being designed to capture and divert low flow from the Santa Ana-Delhi Channel, at the lower end of Reach 1<sup>15</sup>. The diversion, sponsored by the cities of Newport Beach, Costa Mesa, and Santa Ana, is planned to address surface water quality in accordance with the Orange County Areawide Urban Storm Water Runoff Management Program NPDES permit (Order No. R8-2009-0033, NDPES CA 8618030, as amended) and the current TMDLs for Upper Newport Bay, including those for fecal coliform, nutrients and selenium. The diversion would be constructed just upstream of the Tidal Prism reach and just downstream of the concrete apron of the Mesa Drive road crossing and culvert. The diversion would remove low flow to be pumped into a nearby Orange County Sanitation District (OCWD) sanitary sewer system outlet and/or to be used for golf course irrigation. It is anticipated that the diversion will improve the water quality of the downstream tidal prism and Upper Newport Bay by removing from inflow waters not only pathogens but also nutrients which have been found to support regrowth of pathogen microscopic organisms.<sup>16</sup> See Figure SAD-14.

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<sup>14</sup> 40 CFR 131.10(b)

<sup>15</sup> TMDL Compliance Alternatives Santa Ana Delhi Watershed, URS May 22, 2012

<sup>16</sup> Recent studies have shown that nutrients at excessive levels in urban runoff have been found to encourage regrowth of fecal indicator bacteria in streambed sediments and salt marshes (Grant et al. 2001 and Litton et al. 2010).

**Figure SAD-14. Santa Ana Delhi Channel Mesa Drive/Irvine Avenue Proposed Diversion Site Plan.** The diversion would divert low flows into the sanitary sewer or to be used as irrigation for the adjacent golf course. URS August 2012



## 6.0 Triennial Review Requirements

### 6.1 Regulatory Requirements

Section 101(a)(2) of the Clean Water Act states: "it is the national goal that wherever attainable, an interim goal of water quality which provides for ... recreation in and on the water be achieved..." Federal regulations [40 CFR 131.6(a)] requires states to enact water quality standards and "use designations consistent with the provisions of section 101(a)(2)."

A Use Attainability Analysis (UAA) must be conducted when "the State designates or has designated uses that do not include the uses specified in section 101(a)(2) of the Act" [40 CFR 131.10(j)]. In addition, in accordance with 40 CFR 131.20(a)(1): "Any water body segment with water quality standards that do not include the uses specified in section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly."

### 6.2 Reassessment Procedures

If Reaches 1 and 2 of the SAD Channel are not designated REC1 or REC2, the Regional Board will re-examine this decision every three years as part of the regular Triennial Review process. The focus of this review will be to determine whether there has been any substantial change to the factors supporting the original determination. However, it is not necessary to conduct an entirely new UAA as part of this review.

In preparation for the Triennial Review, Regional Board staff will visit Reaches 1 and 2 of the SAD Channel to confirm that the existing hydromodifications and access restrictions remain in place and unaltered, and to assess whether flow conditions have changed. Finally, the Regional Board will solicit any new information concerning actual or potential recreational use of the SAD Channel when public notice is given for the Triennial Review.

If new evidence indicates that recreation in or on the water may be attainable because the factors previously precluding the use have changed, the Regional Board may elect to: 1) designate SAD Reaches 1 and 2 for REC1 and/or REC2; or 2) require that a new UAA be conducted in order to determine whether Reach 1 should continue to not be designated REC1 or REC2, and whether Reach 2 should continue to not be designated REC1. The Regional Board retains the authority and discretion to re-examine the issue of appropriate use designations for the Santa Ana-Delhi Channel more frequently than once every three years when warranted.

## 7.0 References

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