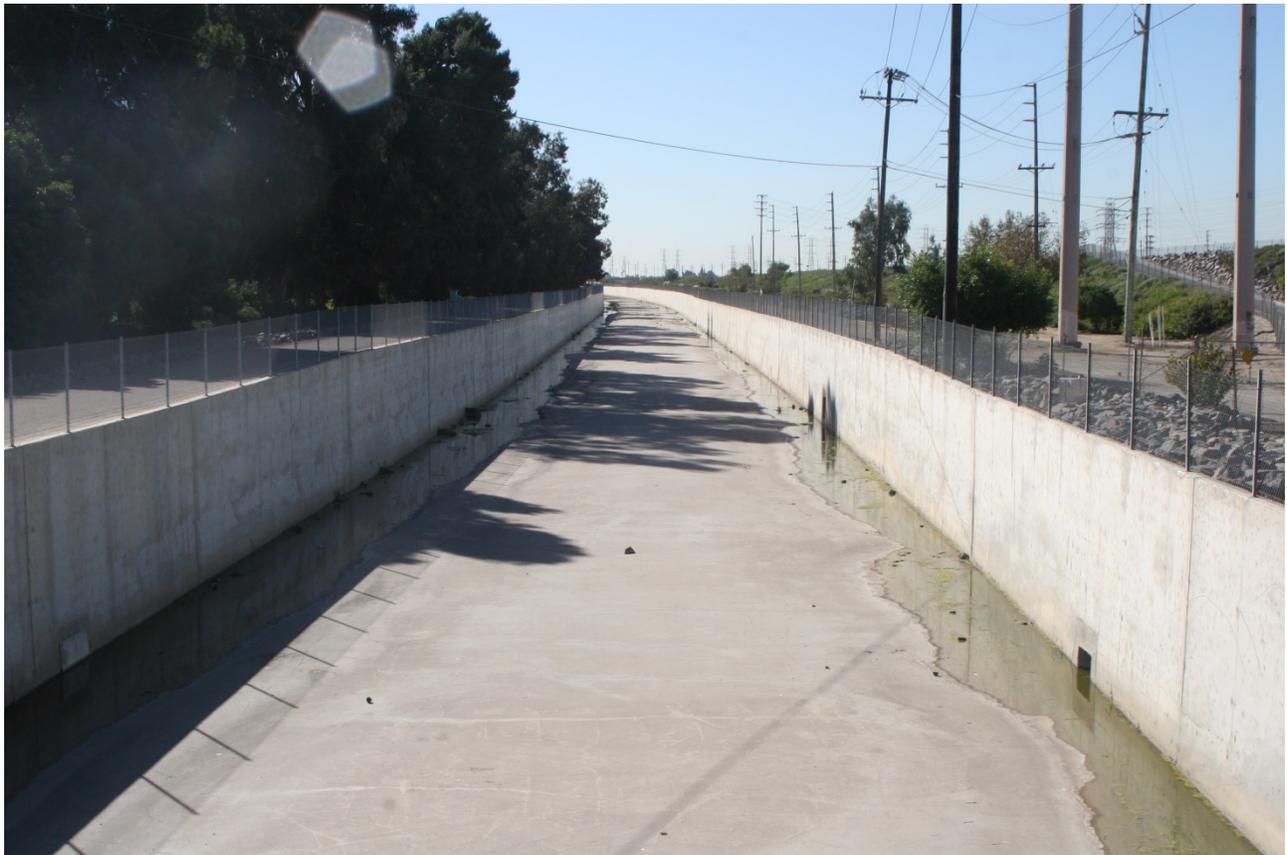


USE ATTAINABILITY ANALYSIS (UAA)
For
GREENVILLE-BANNING CHANNEL – REACH 1



Santa Ana Regional Water Quality Control Board

October 4, 2013

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UAA ANALYSIS: GREENVILLE-BANNING CHANNEL - REACH 1

1.0 Executive Summary

This analysis demonstrates that the REC1 and REC2 uses do not exist and are not attainable in Reach 1 of the Greenville-Banning Flood Control Channel. 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.

Greenville-Banning Channel is a man-made, concrete-lined flood control conveyance. For most of its length, the channel is 60-feet wide with vertical walls that are 20-feet high. There is a short (0.2 mile) section at the uppermost end of Reach 1 that has steep trapezoidal walls.

Public access is prohibited by law and prevented by chain link fencing and locked gates throughout its entire length. Extensive photographic evidence, field surveys and interviews of knowledgeable local authorities indicates that water recreation (REC1 or REC2) is not occurring and has not occurred in the Greenville-Banning Channel. REC1 and REC2 uses cannot occur in the channel because low flow conditions and flood control modifications preclude attainment of these uses.

During dry weather conditions, there is normally less than 1 cfs of natural stream flow in the channel. An inflatable dam and pump works have been installed in Greenville-Banning Channel to protect downstream ocean beaches. Urban runoff is intercepted and diverted to the Orange County Sanitation District for further treatment and final disposal. Some stream flow is also diverted to an artificial wetlands and riparian zone in a park adjacent to the Greenville-Banning Channel.

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. Therefore, Reach 1 of the Greenville-Banning Flood Control Channel should not be designated REC1 or REC2.

2.0 Segment Description

2.1 Location

The Greenville-Banning Channel (GBC) is a man-made flood control conveyance located in Orange County and is tributary to Reach 1 of the Santa Ana River. Stormwater runoff from the Cities of Costa Mesa and Santa Ana drains to the GBC (see Figure GB-1). Reach 1 of the GBC is located entirely within the City of Costa Mesa.

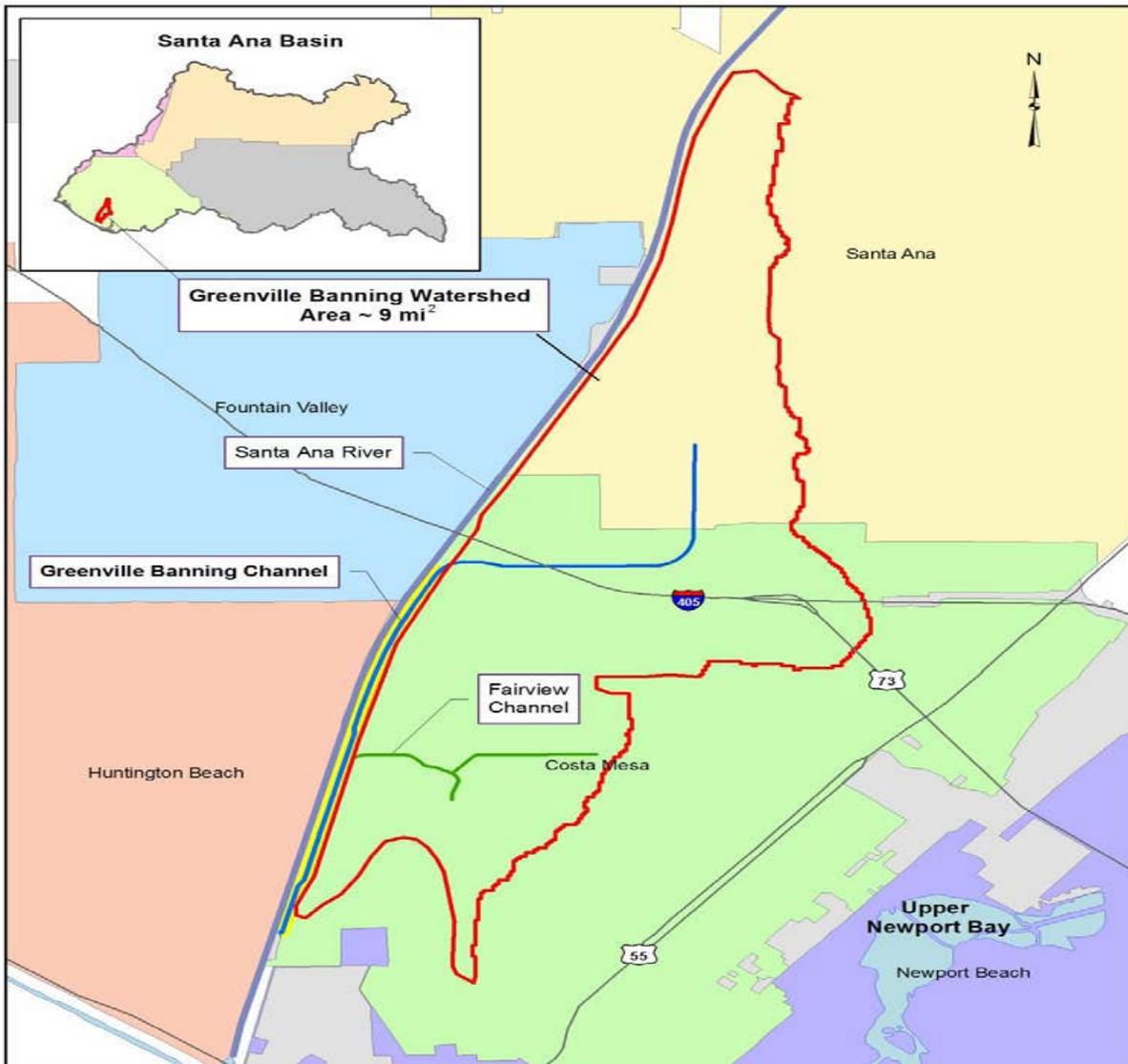


Figure GB-1: Map of Greenville-Banning Channel Watershed. (Source: Use Attainability Analysis Technical Report for Greenville-Banning Channel, CDM, August 2010, Figure 2-1)

GBC is 3.35 miles long and is divided into two segments (see Figure GB-2). The lower segment, called the Tidal Prism Reach, extends from the confluence with the Santa Ana River 1.2 miles upstream to an inflatable dam located near Fairview Park. The Pacific Ocean is 1.3 miles further downstream from the point where GBC joins the Santa Ana River. The upper segment, called Reach 1, begins at the inflatable diversion dam and ends where California Street crosses the stream channel - a distance of 2.15 miles. This Use Attainability Analysis focuses exclusively on Reach 1. The lower, Tidal Prism, reach is addressed in a separate UAA. The portions of GBC above California Street have not yet been added to the Basin Plan.



Figure GB-2: Proposed Tidal Prism and Reach 1 of the Greenville-Banning Channel. The Channel lies adjacent to the Santa Ana River from its confluence with the River to upstream of Gisler Avenue at the California Street crossing.

2.2 Proximate Land Uses

The Greenville-Banning drainage area encompasses a 9 square-mile urban area that has been fully developed (see GB-3). The Santa Ana River Channel borders all but 0.2 miles of the western side of Reach 1. A public park, private golf course and single family homes lie along the east side of Reach 1. Table GB-1 provides a detailed breakdown of land uses adjacent to Reach 1.

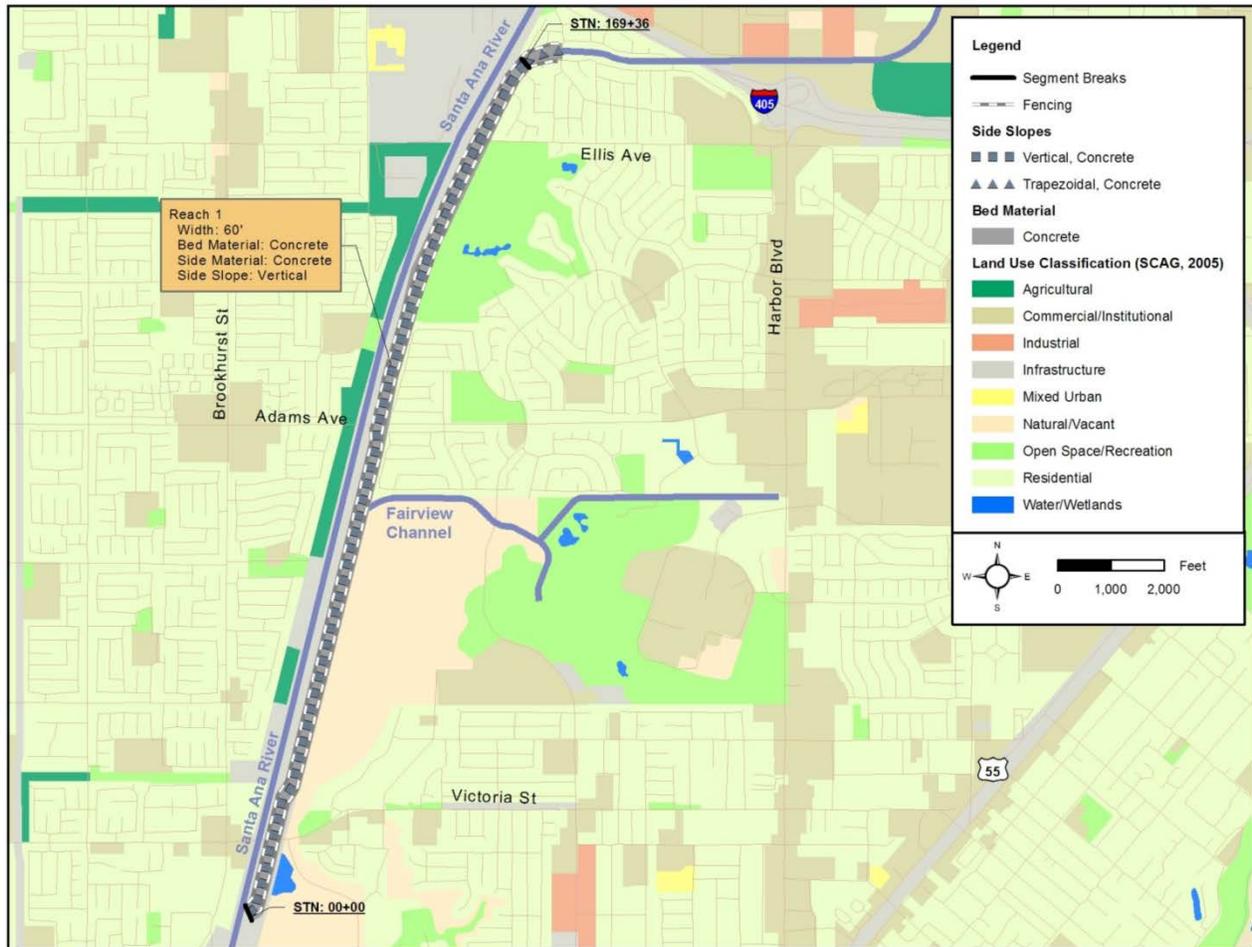


Figure GB-3: Greenville-Banning Channel Characteristics and Adjacent Land Uses
(Source: Use Attainability Analysis Technical Report for the Greenville Banning Channel, CDM, August 2010 Figure 2-4) **(Note to reader: Increase the zoom level of this page to enhance the readability of this figure.)**

Table TC-2. Land Use Adjacent to Reach 1¹

Land Use	Linear Feet	% of Channel Length
Santa Ana River Channel ²	9,681	45%
Parks and Recreation	4,644	22%
Residential	7,000	33%
Total	21,325	100%

¹ CDM Smith Technical Memo – Land Use Adjacent to UAA Reaches, October 2013

² The River Channel is fenced and posted to prohibit public access.

2.3 Channel Characteristics

The area surrounding the current GBC originally drained to the Santa Ana River. One hundred years ago, levees were constructed to prevent the Santa Ana River from flooding adjacent land areas. However, the levees also prevented local runoff from reaching the river. A channel, known as the Talbert Ditch, was constructed in the early 1900's to resolve these flooding issues. In 1959, the GBC was built to replace the Talbert Ditch.

Originally constructed as a trapezoidal earthen channel, the GBC Reach 1 and the tidal prism Reach have since been converted to a concrete-lined box channel to provide adequate flood protection. Most of the Greenville-Banning Channel Reach 1 is now fully-lined with a flat bottom that is 60 feet wide and vertical walls that are 20 feet high (see Figure GB-4). There is a short (0.2 mile) section at the uppermost end of Reach 1 that has steep trapezoidal walls and a small (8-9 ft. wide) low flow channel (see Figures GB-5 and GB-6 and Table GB-2).



Figure GB-4: Reach 1 of Greenville-Banning Channel, Looking Upstream During Dry Weather. The channel bottom width is 60 ft. and the vertical walls are 20 ft. in height. Dry weather flows characteristically are found mostly along the eastern side of the channel as shown in this photograph. The deepest depth of the low flow at this location as measured in April 2013 was measured to be 4 inches. In the distance, at the curve of the channel, is where the channel transforms to trapezoidal shape. Regional Board staff photograph, December 2010.



Figure GB-5: Proposed Reach 1 of the Greenville-Banning Channel, Facing Downstream. Trapezoidal to Vertical Channel Transition. (Source: Use Attainability Analysis Technical Report for the Greenville-Banning Channel, CDM, August 2010, Figure 2-9)



Figure GB-6: The Upper 0.20 mile Segment of Reach 1 Looking Upstream. Just upstream of the curve of the channel shown in this photograph is the proposed upstream boundary of Reach 1, the California Street crossing located in the city of Costa Mesa. The channel dimensions in this segment are approximately: bottom width 24 ft.; low flow channel width 8-9 ft.; and channel depth 20 ft. (Regional Board staff photograph, May 2010).

The dividing line between Reach 1 and the Tidal Reach of GBC is marked by the presence of an inflatable dam (see Figure GB-7). This dam was installed in the late 1990's as part of a project designed to prevent urban runoff from polluting popular beach areas. Water trapped behind the dam is pumped to Orange County Sanitation District's wastewater plant, on the opposite side of the Santa Ana River, for treatment. In addition, beginning in early 2013, impounded flows will also be diverted to an adjacent constructed wetland and riparian area.



Figure GB-7: Inflatable dam diversion at Greenville-Banning Channel. The inflatable rubber dam impounds low flows, shown in the background of the photo, which are pumped to the sanitary sewer system for treatment and to a nearby constructed wetland. The inflatable dam marks the downstream end of Reach 1. (Photograph from Orange County Public Works)

Table GB-2: Channel Characteristics for Reach-1 of Greenville-Banning Channel

Sub-Section	Boundaries	Description
Downstream Section (1.95 miles long)	Low flow diversion dam to 1125 ft. (0.21 mi.) upstream of Gisler Ave.	Fully concrete-lined, 60 ft. bottom width, 20 ft. high vertical walls.
Upstream Section (0.2 miles long)	1125 ft. (0.21 mile) upstream of Gisler Ave. to California St.	Concrete-lined; top ~10 ft. of slope is dirt lined) 24 ft. bottom width; 20 ft. vertical depth Trapezoidal walls w/ slope >45°

2.4 Regulatory Status

2.4.1 Beneficial Use Designations

No portion of the Greenville Banning Channel is currently identified or included in the Santa Ana Basin Plan. It is proposed that both the Tidal Reach and Reach 1 of the GBC be added to the Basin Plan. The following are recommendations regarding beneficial uses designations for Reach 1:

- **WILD** (Wildlife Habitat): Birds such as mallard ducks are noted to use the channel as habitat.
- **WARM** (Warm Water Habitat): Perennial flows of urban runoff and raising groundwater create a warm water habitat (albeit poor habitat; shallow flows with thick algae growth and concrete substrate)
- **MUN** (Municipal and Domestic Supply): MUN is **not** an existing use and cannot be feasibly attained. An exception from the MUN designation is appropriate pursuant to the Sources of Drinking Water Policy. As noted above the channel has been heavily modified to convey storm water runoff from the urbanized watershed. Therefore, in accordance with the statewide Sources of Drinking Water Policy, Reach 1 should not be designated MUN.
- **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.

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

The Greenville-Banning Channel is now proposed to be added to the Basin Plan. The Channel has not yet undergone a formal 303(d) assessment and no TMDLs have been adopted for this waterbody.

Huntington Beach State Park, located along the Pacific Coast downstream of the GBC, has had elevated levels of bacteria indicators detected in the past. The State Park was listed on the 2006 303 (d) list for enterococcus and bacteria indicators. The State Park was delisted in the 2010 303 (d) list for enterococcus and bacteria indicators because of an insufficient amount of water samples showing impairment.

In order to protect downstream water quality and prevent any future impairment of beneficial uses near Huntington Beach State Park, the Orange County Public Works Department (OCPW) installed the inflatable dam.(see Figure GB-7, above). This system, which intercepts and at times divert approximately 430,000 gallons per day of urban runoff, will be discussed in greater detail in Section 5 of this document.

3.0 Use Attainability Analysis - Factors Analysis

3.1 Federal Regulatory Requirements – 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 must be so designated.

A state may elect not to designate certain waterbodies to protect water contact recreation only after conducting a Use Attainability Analysis (UAA)¹ and demonstrating that attaining the use is not feasible based on one or more of the following six factors:²

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.

¹ 40 CFR 131.10(j)

² 40 CFR 131.10(g)

Federal regulations³ prohibit 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.⁴ Guidance provided by USEPA in 1985 indicates that an "existing" primary contact recreational use⁵ 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).⁶ Suitable water quality is demonstrated by consistent, not merely sporadic, attainment of applicable water quality objectives. More recent USEPA guidance states that EPA 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, 1975.⁷ 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 the primary contact recreation is not an "existing" use.⁸ 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.⁹ However, states are not required to evaluate all six factors identified in 40 CFR 131.10(g) as part of every UAA.

³ 40 CFR 131.10(h)

⁴ 40 CFR 131.3

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

⁶ USEPA. Questions & Answers on Antidegradation, August 1985. (USEPA Water Quality Standards Handbook, Second Edition. EPA-823-B-12-002. Appendix G)

⁷ USEPA, Letter w/attachment from Denise Keehner (Director, Standards and Health Protection Division) to Derek Smithee, 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)

⁸ USEPA. 63 FR 36752 (July 7, 1998)

⁹ 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 of the Greenville-Banning Channel is 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 Recreational Uses

3.2.1.1 Methods and Fieldwork

Two methods were used to evaluate flow depths in the Greenville-Banning Channel: subjective assessments and direct measurements. There is no gauging station located on the Greenville-Banning Channel. Direct access to the water is extremely difficult due to the vertical concrete walls, tall chain link fencing and locked gates.

In 2006 and 2011, field surveys were performed by members of the Storm Water Quality Standards Task Force (SWQSTF) on 11 different summer weekends. Surveyors were asked to estimate the depth of water from a vantage point 20-feet above the channel. In 2006, surveyors were asked to record whether the water depth appeared to be "ankle-deep" (e.g. a few inches), "calf-deep," (≈ 1 foot), "knee-deep," (≈ 18 "") "thigh-deep," (≈ 2 ft.) or "waist-deep" (≈ 3 ft.). In 2011, surveyors were asked to estimate depths in feet and inches rather than by reference to a hypothetical person standing in the channel.

In April of 2013, Regional Board staff measured the depth of flow at four locations in Reach 1 of the Greenville Banning Channel during conditions typical of the dominant dry weather pattern for this area. The four locations were: 1) immediately upstream of the inflatable dam, 2) at the Adams St. crossing, 3) at the Gisler St. bicycle bridge, and 4) at the California St. crossing. At each site, three measurements were taken across a transect: at one-third, one-half and two-thirds the channel width. Since the bottom of the channel is quite flat, the three measurements were very similar to one another.

It should be noted that operation of the diversion works installed at the bottom of Reach 1 has altered the natural depth of water that would otherwise occur in this segment. The dam is normally raised to impound all urban runoff from the watershed during dry weather conditions. When inflated, the dam stands nearly 4 feet tall. It is necessary to maintain an average depth of approximately 15-24" immediately behind the dam in order to ensure proper operation of the pumps used to transfer the water to OCSD's treatment plant and to a newly-created wetlands and riparian area adjacent to Fairview park. Were the dam to be removed, the depth of natural dry weather flows (usually < 1.5 cfs) would rarely rise more than an inch above the concrete channel bottom¹⁰.

3.2.1.2 Findings and Conclusions

In April of 2013, actual field measurements indicated that the stream flow in GBC was approximately 0.83 cfs (0.45 mgd) during dry weather conditions.¹¹ Water was impounded behind the inflatable dam up to about the Adams Street crossing - a distance of approximately 0.45 miles. Stream conditions in April of 2013 were typical of those observed by Regional Board staff during prior reconnaissance surveys over the last few years. The average water depth in the deepest section in each of the following areas of Reach 1 was: 15 inches just upstream of the inflatable dam; 6 inches at the Adams Street Bridge; 4 inches at the Gisler Street Bridge; and 4 inches at California Street Bridge crossing (see Fig. GB-8). Dry weather flows upstream of Adams Street were fully contained in a low flow notch that is about 8-9 ft. wide and 4 inches deep. As stated above, if the dam is not inflated, dry weather depths of an inch or less would be expected.

¹⁰ CDM Smith Technical Memo – Dry Weather Flow Analysis for Greenville-Banning Channel. October 3, 2013.

¹¹ Dr. Stan Grant previously estimated dry weather base flow in GBC at 0.16 MGD or 0.25 cfs. OCSD estimates the dry weather base flow is <0.7 cfs based on diversions at the inflatable dam.

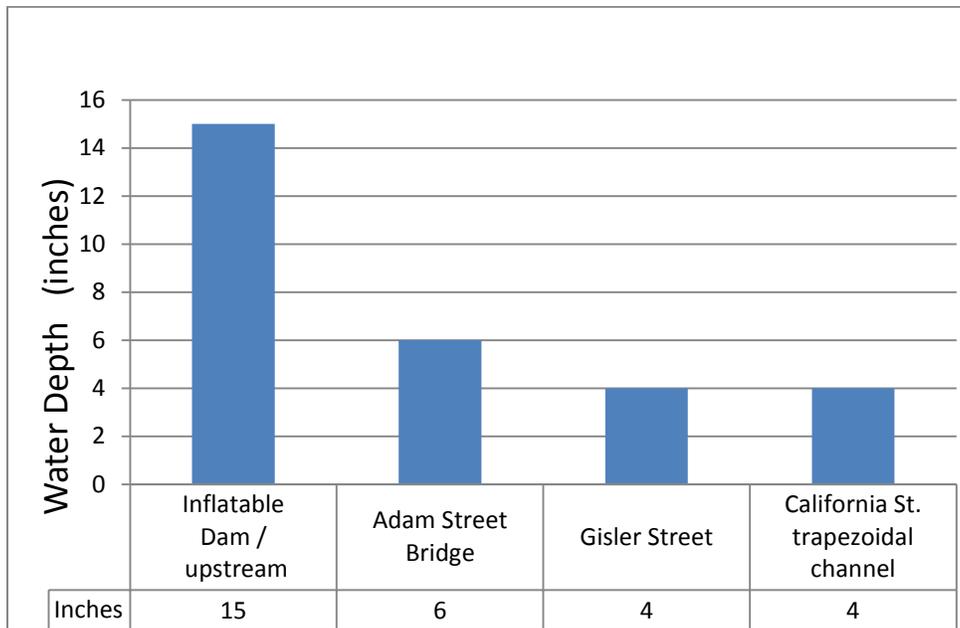


Figure GB-8: Depth of Water in Reach 1 of the Greenville-Banning Channel. The depths are the average of the measurements taken on April 16 and 25th, 2013 from the deepest section of the flow or pooled water.

On average, the City of Costa Mesa receives 10-12" of annual precipitation. However, it typically rains fewer than 30 days each year. During the dry weather conditions common to this area, and with the dam inflated, stream flows in GBC usually range between 4" at the top of Reach 1 to approximately 15-18" near the inflatable dam. The water is too shallow to support swimming or other forms of primary contact recreation in the stream.¹² Further, given the presence of highly attractive ocean beaches less than two miles away, it is extremely unlikely that anyone would choose to recreate in the Greenville-Banning flood control channel where less than a foot of water is available.

It is not feasible to enhance the natural stream flows by discharging a sufficient volume of treated effluent to GBC. At present, no municipal or industrial wastewater is discharged to the channel and there are no plans to do so in the foreseeable future. Nor is there any legal authority to compel a wastewater treatment facility to provide such a discharge. Most important, any effort to augment existing stream flows would undermine the on-going effort to intercept and divert urban runoff in order to protect water quality at the downstream beaches.

Based on the preceding stream depth data, Regional Board staff has concluded that the natural, ephemeral, intermittent and low flow conditions preclude attainment of water contact recreation in Reach 1 of the Greenville-Banning Channel. Therefore, this stream segment should not be designated for REC1 in Table 3-1 of the Santa Ana Basin Plan. See 3.4 for discussion of the REC2 use.

¹² 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.

3.2.2 Dams, Diversions and Hydrologic Modifications Preclude Recreational Uses

3.2.2.1 Methods and Fieldwork

CDM (now CDM-Smith), serving as consultants to the SWQSTF, prepared a UAA Technical Report assessing and summarizing key attributes of the channel morphology in June of 2010¹³. In addition, Regional Board staff made nine field visits (at different times of the year) to the Greenville-Banning Channel between 2009 and 2013. During these reconnaissance surveys, Regional Board staff walked the entire length of the GBC to confirm the depth, dimensions and dominant construction characteristics previously reported by CDM. In addition, the Regional Board staff reviewed the original engineering documents describing the planned improvements when GBC was being converted to a concrete-lined flood control facility.¹⁴ The Orange County Public Works Department (OCPW) provided more recent construction plans of the channel¹⁵.

3.2.2.2 Findings and Conclusions

Over the years, Reach 1 of the Greenville-Banning Channel, which was originally constructed as a simple stormwater ditch, has been significantly modified to provide greater flood control protection. In the 1990's, concrete-lining replaced the existing rip-rap to prevent further erosion, maintain the proper gradient and protect nearby homes (see, for example Figure GB-6).

As described in Section 2.3, Reach 1 is now mostly a vertical walled, concrete-lined box channel. In fact, the vertical-walled section comprises 1.95 miles (91%) of Reach 1's total (2.15 mile) length. The short, trapezoidal section at the top of Reach 1 is also concrete-lined with walls that slope at about a 45-degree angle. These walls make it virtually impossible, and extremely unsafe, to gain access to the water for casual recreation activities.

In addition, chain link fencing and locked gates prevent access throughout the entire length of GBC. One would have to scale the fence and rappel down the 20-foot walls, while avoiding county maintenance workers who would prohibit such activity, to reach the water. An alternative would be to climb down the riprap slope from the bicycle trail into the Santa Ana River Tidal prism and walk up the Tidal Prism Reach of the GBC, a distance of greater than 1.2 miles, to the inflatable dam, the downstream terminus of Reach 1. In addition, someone could enter the Reach 1 channel by climbing down (i.e., over fences and down steep slopes) into the upstream section of the GBC or into the Fairview Channel and walk into the Reach. However, this also would be very cumbersome.

¹³ CDM . Use Attainability Analysis Technical Report for the Greenville-Banning Channel. June, 2011.

¹⁴ County of Orange Environmental Management Agency. Greenville-Banning Channel Facility No. D03. August, 1989.

¹⁵ Orange County Public Works Department. Greenville-Banning Channel (F01) Access Ramps. March 1, 2013.

The diversion works at the bottom of Reach 1 requires special protection. The pump station and inflatable rubber dam would be vulnerable to vandalism were public access to GBC allowed and encouraged. These facilities are an essential element in the effort to protect downstream water quality. Any attempt to provide greater recreational opportunities for the few who may wish to recreate in a concrete-lined flood control channel would compromise those same opportunities for tens of thousands of people at the downstream beaches. In addition, recreating near the pump intakes poses a severe safety hazard especially to small children who may be trapped by the suction.

From its inception, GBC was designed and constructed as a flood control facility. It was never natural stream and it is not feasible to convert GBC to a more natural condition without compromising its primary purpose - flood protection. There is no public benefit provided by transforming GBC to a more natural condition as far superior opportunities for water contact recreation are available just a short distance away at Huntington Beach State Park and Newport Beach along the Pacific Coast. Even closer, are the newly-created wetland and riparian area recently constructed in Fairview Park adjacent to GBC (see Figures GB-9 and GB-16).

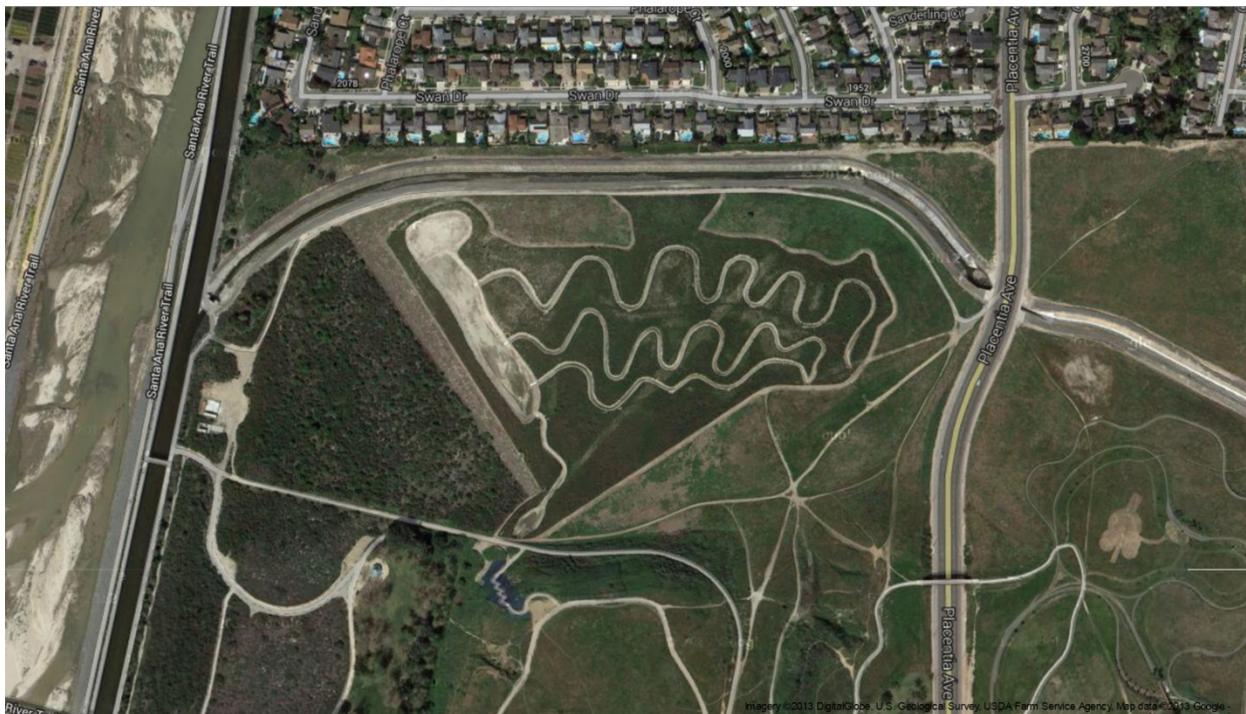


Figure GB-9: Wetlands and Riparian Area Under Construction (now complete) in Fairview Park.

Based on the preceding analysis, the Regional Board staff has concluded that the existing dams, diversions and other hydrological modifications preclude attainment of any meaningful water recreation activities in Reach 1 of the Greenville-Banning 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 GBC. Consequently, Reach 1 should not be designated for REC1 in Table 3-1 of the Santa Ana Basin Plan.

3.3 REC2 Designation

REC2 (non-contact recreation) is not attainable for many 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". The high walls and chain-link fencing preclude all access to the channel. In addition, the low flows and concrete-lining provide poor habitat that severely limits the opportunity for any aesthetic enjoyment. This general lack of wildlife was confirmed during numerous site visits by Regional Board staff and members of the Stormwater Task Force.

There is a bicycle path adjacent to the east side of GBC. At Adams Street, the path jogs across and away from the GBC to the Santa Ana River levee. It is part of a long bike trail that runs along the Santa Ana River from the ocean upstream to Prado Dam. In the Tidal Prism reach of the GBC, there is sufficient flow and habitat to provide opportunities for wildlife viewing by persons walking or riding along the bicycle path. Consequently, the Regional Board staff recommended that the Tidal Prism segment be designated REC2. However, as noted above, that area of Reach 1 adjacent to the path has limited flows and vegetation (apart from aesthetically unpleasing algal mats) that severely restrict wildlife use and the opportunity for aesthetic enjoyment.

In that section of the bike trail that borders Reach 1, opportunities for sightseeing are limited to those who look west toward the Santa Ana River and away from Greenville Banning Channel. No one has been observed bird watching, walking in the channel, or engaging in any other REC2 activity in GBC-Reach 1. Photographic evidence, streamside surveys and interviews of knowledgeable local authorities all confirm that no water recreation of any kind is occurring in or along this portion of the Greenville-Banning Channel. Thus, Board staff recommends that Reach 1 not be designated REC2. However, both the Santa Ana River and the Tidal Prism Reach of GBC should 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.¹⁶ 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

¹⁶ 40 CFR 131.10(h)

Public Works (OCPW) staff, Park Rangers and users of the bicycle trail, and an analysis of all representative and reliable water quality data.

4.1 Evaluation of Actual Recreational Activities

4.1.1 Photo Reconnaissance Survey

Digital cameras were installed at two locations in Reach 1 of Greenville-Banning Channel. 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 first camera was installed on a pedestrian bridge, 1,000 feet upstream from the inflatable dam. This location was selected because it provides an excellent view of the area where recreation would be most likely to occur (see Fig. GB-10). It is adjacent to Fairview Park and water is present year-round. The first camera operated for three weeks in July of 2005 before being destroyed by vandals. A total of 425 images were collected during the peak summer recreation season; but, there were no people present in any of these photos.

A second camera was installed on the Adams Avenue bridge approximately 0.45 of a mile north of, and focused downstream toward, the first camera location (see Fig. GB-11). It operated for six weeks and collected 2,552 images before also being destroyed by vandals. No water contact recreation was observed in any of the photographs. Results from the camera survey are summarized in Table GB-3.

Table GB-3: Summary of Photo Survey in Reach 1 of Greenville-Banning Channel

Location in Reach 1	Survey Dates	# of Images	# of Images w/ Water Contact
1) Pedestrian Bridge	7/7/05 - 7/27/05	425	0 out of 425
2) Adams Ave. Bridge	11/17/05 - 1/3/06	2,552	0 out of 2,552

Results from the cameras installed in GBC 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 (see Fig. GB-12). No water contact recreation was observed in these photographs, nor in the nearly 24,000 photos taken in the Anza Channel adjacent to another public park (see Fig. GB-13). Therefore, the Regional Board staff concluded that the pictures collected in Greenville-Banning Channel, and particularly those taken in mid-summer, accurately characterized the level of recreational activity likely to occur in GBC-Reach 1.



Figure GB-10: Greenville-Banning Channel (looking north toward confluence w/ Fairview Channel) from the Rec-Survey Camera Mounted on the Pedestrian Bridge near Fairview Park.(Source: Recreational Use Survey – Greenville Banning CDM 11/2006)



Figure GB-11: Greenville-Banning Channel (looking South) from the Rec-Survey Camera Mounted on the Adams Ave. Bridge (approximately 0.45 mile North of Camera Location in Figure GB-10). (Source: Recreational Use Survey – Greenville-Banning CDM 11/2006)



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



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

4.1.2 Field Surveys

The Regional Board staff has made numerous field trips to Reach 1 of the Greenville-Banning Channel during the last five years. These visits occurred at different times, on different days, and during different seasons. No individuals have been observed in the channel during any of those visits. In addition, during site visits Regional Board staff regularly asks individuals who are walking on the bicycle trail if they have ever observed any recreational activities in the Channel. No one has reported to staff seeing any individuals in the channel. One couple, who has regularly walked the bike path for the last several years, stated that they only people they had ever seen in or near the water were the Regional Board staff collecting depth data in April of 2013.

Task Force members performed eleven separate field surveys of the Greenville-Banning 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 GBC. Six surveys were completed in July and August of 2006. Five additional surveys were conducted in 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. This includes: 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. Numerous people were observed along the Santa Ana River bicycle trail adjacent to the tidal prism of the Channel, but no persons were observed inside the wetted section of Greenville-Banning Channel, between Adams St. and the inflatable dam, in any of the 11 recreational surveys.

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. The crews were asked to continue keeping the logs even after the cameras were vandalized in order to compensate for the lost cameras.. CDM staff visited the site and filled out the log 28 times between December 3, 2005 and July 1, 2006. Regional Board staff reviewed these reports and confirmed that CDM staff observed no recreational activity or any persons within Reach 1 of the Greenville-Banning Channel.

4.1.3 Other Evidence of Historical Recreational Use

To collect information regarding historical recreational use, Regional Board staff interviewed local agencies with routine responsibilities in or along the Greenville-Banning Channel. CDM made similar inquires and performed additional electronic searches in the course of preparing the UAA Technical Report for GBC.

Orange County Flood Control District (OCFCD) staff visit the area several times a month to operate and maintain the inflatable diversion dam. These maintenance crews state that they have never encountered any unauthorized persons within the confines of the Greenville-Banning Channel (i.e., "inside the chain link fence").

Orange County Harbors, Beaches, and Parks employees working at the Talbert Nature Preserve also report never observing any individuals in any section of the Greenville-Banning channel (including both Reach 1 and the Tidal Prism reach). This is not surprising considering that both the beach and the nature preserve are very close to GBC but provide far superior recreational opportunities.

CDM conducted inquiries to local jurisdictional 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 reference to recreational activities in the 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, documenting any past or present recreational activity in GBC Reach 1.

4.1.4 Probable Future Use

In accordance with the State Water Resources Control Board recommendations, information regarding potential future recreational uses for the Greenville-Banning Channel was obtained by interviewing local parks and planning authorities.¹⁷ The City of Costa Mesa and the Orange County Public Works Department were both contacted in 2009 to identify any planned improvements. Information concerning potential future recreational facilities was reviewed again in 2011 and no substantive changes were identified.

The City of Costa Mesa developed concept plans as part of the Blue Ribbon Committee for the Santa Ana River Trail Vision Study. These plans include improvements to the existing bicycle trail along the channel. Improvements include new access points to the existing bicycle trail, rest areas, improved signage, and pocket parks. However, there are no plans to allow public access or make any recreational improvements inside GBC itself.¹⁸ The project is at a concept plan level and is not currently funded. The SWRCB has previously ruled that unfunded, conceptual improvements are not sufficient evidence that a recreational use is "reasonably possible."¹⁹ However, the Regional Board will continue to monitor these plans and must reconsider the most appropriate use designations if and when the conceptual improvements move toward actual implementation.

OC Public Works was also contacted regarding any potential projects in the Greenville-Banning Channel. No additional projects were identified apart from the concept plans developed by the City of Costa Mesa. There are no plans to provide facilities for any sort of water recreation in or along GBC now or in the future.²⁰ This is consistent with Greenville-Banning's original purpose and on-going mission to serve as a man-made flood control conveyance.

¹⁷ SWRCB Res. No. 2005-0015

¹⁸ Robert Staples, Fairview Park Plan Administrator, City of Costa Mesa, June 25, 2009)

¹⁹ SWRCB Res. No. 2005-0015

²⁰ Jeff Dickman, Regional Recreational Trail Coordinator, OC Public Works (April 22 and July 20, 2009),

4.1.5 Summary – Evidence of Past, Present or Probable Future Recreational Use

In summary, there is no evidence of any actual recreational activity occurring in Reach 1 of the Greenville-Banning Channel. Photographic surveys, field surveys and information provided by public agency staff members who routinely visit the GBC all corroborate this conclusion.

The absence of any water-related recreation in Reach 1 confirms that the low flows and hydrologic modifications are, in fact, precluding attainment of the REC1 or REC2 uses in the Greenville-Banning Channel. No one has been observed paddling, wading, walking, or swimming in any section of the Greenville-Banning Channel. The conditions of Reach 1 make accessing the channel very difficult and unappealing. These same factors also limit the available habitat and the resulting opportunity to engage in wildlife sightseeing.

While it is theoretically possible to enter Reach 1 by hiking in, it is very unlikely that anyone would choose to do considering the long distance and the superior recreational experience available at ocean beaches less than 3 miles away.

Concrete-lined boxed flood control channels are quite common throughout the Santa Ana Region. However, photographic evidence from the Greenville-Banning Channel and several similar locations, including Demens Channel, Anza Park Channel, and Cucamonga Creek (shown below), provide strong evidence that there is no meaningful water recreation occurring in these types of man-made flood control facilities.



Figure GB-14: Cucamonga Creek Channel
(Source: Recreational Use Survey – Cucamonga Creek CDM 7/2009)

4.2 Evaluation of Ambient Water Quality

4.2.1 Assessment Methods

Water quality samples were collected in the Greenville-Banning Channel, on an almost weekly basis, from 2001 to 2004. For a variety of reasons, sampling was not conducted during some weeks of this period and no sampling was conducted between October 2001 and May 2002. Sample analysis included total and fecal coliform.

From May 16, 2001 to October 15, 2004 water quality samples were collected at 200 ft. upstream of the inflatable diversion dam and 200 ft. downstream of the diversion dam. The sampling location 200 ft. upstream of the diversion dam is in Reach 1 and the sampling location 200 ft. downstream of the diversion dam is in the Tidal Prism segment of the Channel.

Table GB-4 shows the Reach 1 results for fecal coliform for 2001-2004. When 5 or more samples were collected in a 30 day period (calendar month, not rolling 30 day periods), a geometric mean (geomean) was calculated and compared to the existing REC1 fecal coliform objective (200 organisms/100mL based on five or more samples/30 day period.) When, as in most cases, insufficient data were available to calculate geometric means, the fecal 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.

Table GB-5 shows running 5-sample geometric mean results for the data collected during 2001-2004. Geometric means were calculated based on the results of discrete groups of 5 consecutive samples, collected over periods of 28-30 days. A total of 82 sets of 5 consecutive samples were evaluated.

In August and September of 2011, Orange County Public Works Department staff collected samples from three locations in Reach 1: California Street (GBC3), Gisler Street (GBC4), and at the inflatable diversion dam (GBC5). The sampling locations are shown in Figure GB-14. The results are presented in Table GB-6.

Geometric means were calculated with and without sample results from September 12, 2011; the results on that day were likely affected by rainfall on September 10, 2011. The geometric means are shown in Table GB-7. On this date, the diversion dam was deflated and flow in the channel was seaward. The results show that, with the exception of the area at the diversion dam, the geometric means for both fecal coliform and *E. coli* exceed the established and proposed objectives.



Figure GB-15: Map of Bacteria Sampling Locations on the Greenville-Banning Channel in August-September 2011

4.2.2 Results and Findings

Tables GB-4, GB-5, GB-6 and GB-7 illustrate that current fecal coliform objective and the proposed *E. coli* objective are frequently exceeded in Reach 1 of the Greenville-Banning Channel. Consequently, neither REC1 nor REC2 can be considered "existing uses" on the basis of having attained the water quality standard (nor would such water quality evidence suffice on its own to make an existing use determination; see the discussion in section 3.1).

**Table GB-4: Monthly Fecal Coliform Data Summary
Greenville-Banning Channel, 2001-2004**

Year & Month	Upstream (200' above diversion dam)				
	Count	Min	Max	% > 400	GeoMean
May-01	1	3000	3000	100%	
Jun-01	4	2	230	0%	
Jul-01	4	2	8	0%	
Aug-01	5	2	8	0%	3
Sep-01	4	2	110	0%	
May-02	4	40	230	0%	
Jun-02	2	80	130	0%	
Jul-02	2	300	800	50%	
Aug-02	4	50	800	25%	
Sep-02	5	9	1100	40%	114
Oct-02	3	2	110	0%	
Nov-02	3	23	220	0%	
Dec-02	4	50	400	0%	
Jan-03	4	90	700	25%	
Feb-03	4	23	3000	25%	
Mar-03	5	4	800	20%	74
Apr-03	3	300	5000	67%	
May-03	5	70	5000	40%	528
Jun-03	5	13	240	0%	43
Jul-03	5	7	50	0%	21
Aug-03	4	20	1600	25%	
Sep-03	4	17	170	0%	
Oct-03	5	23	5000	40%	244
Nov-03	4	50	5000	25%	
Dec-03	4	13	110	0%	
Jan-04	4	17	300	0%	
Feb-04	4	70	24000	25%	
Mar-04	5	20	300	0%	36
Apr-04	4	4	6008	25%	
May-04	3	2	110	0%	
Jun-04	4	2	8	0%	
Jul-04	3	2	300	0%	
Aug-04	4	2	8	0%	
Sep-04	5	2	570	40%	28
Oct-04	2	2100	5400	100%	
Total No. of Months with Violations:				16	2
Total No. of Months:				35	35
Percent:				46%	6%

Notes:

1. Units are colony forming units per 100 milliliters (CFU/100 mL), except for samples collected in 2001, which are reported as most probable number per 100 mL (MPN/100mL)
2. Reporting limit used for results above or below reporting limit when calculating geomean
3. Geometric mean shown only for calendar months with 5 or more samples
4. Basin Plan objectives: logmean<200 organisms/100 mL 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

**Table GB-5: Running 5-Sample Geometric Means - Fecal Coliform
Greenville-Banning Channel, 2001-2004**

Upstream (200' above diversion dam)			
Date1	Date2	No. of Days	GeoMean
7-Aug-02	4-Sep-02	29	327
23-Aug-02	17-Sep-02	26	310
17-Jan-03	10-Feb-03	25	217
21-Mar-03	17-Apr-03	28	771
26-Mar-03	24-Apr-03	30	633
17-Apr-03	15-May-03	29	1239
24-Apr-03	23-May-03	30	706
1-May-03	29-May-03	29	528
8-May-03	4-Jun-03	28	229
9-Oct-03	3-Nov-03	26	428
16-Oct-03	10-Nov-03	26	428
22-Oct-03	20-Nov-03	30	678
31-Oct-03	28-Nov-03	29	458
3-Nov-03	1-Dec-03	29	200
26-Jan-04	23-Feb-04	29	217
2-Feb-04	1-Mar-04	29	386
9-Feb-04	8-Mar-04	29	265
17-Feb-04	15-Mar-04	28	206
17-Sep-04	15-Oct-04	29	481
Total No. of Geomeans > 200			19
Total No. of 5-Sample Data Sets:			82
Percent:			23%

Notes:

1. Units are colony forming units per 100 milliliters (CFU/100 mL), except for samples collected in 2001, which are reported as most probable number per 100 mL (MPN/100mL)
2. Reporting limit used for results above or below reporting limit when calculating geomean
3. Basin Plan water quality objectives: logmean < 200 organisms/100 mL based on 5 or more samples in a 30 day period

Table GB-6: Greenville- Banning Channel Sampling Data, August-September 2011

Site Code	Date	Time	Fecal Coliform (CFU/100 mL)	<i>E. coli</i> (CFU/100 mL)
GB3	8/18/2011	08:44	930	1,130
GB3	8/24/2011	12:10	350	770
GB3	8/24/2011	12:10	300	630
GB3	8/31/2011	11:10	960	1,100
GB3	9/7/2011	10:35	2,600	2,700
GB3	9/7/2011	10:35	2,300	2,400
GB3	9/12/2011	10:20	2,500,000	460,000
GB3	9/14/2011	09:15	18,000	3,700
GB3	9/21/2011	12:00	2,000	1,800
GB3	9/21/2011	12:00	2,100	1,700
GB3	9/22/2011	10:38	10,200	9,300
GB4	8/24/2011	11:45	80	100
GB4	8/31/2011	10:50	410	430
GB4	9/7/2011	10:55	1,700	1,620
GB4	9/12/2011	10:35	1,500,000	170,000
GB4	9/14/2011	09:40	5,700	2,700
GB4	9/21/2011	11:40	1,900	1,600
GB4	9/22/2011	10:50	4,300	4,500
GB5	8/18/2011	07:55	< 9	< 9
GB5	8/31/2011	11:40	< 9	< 9
GB5	8/24/2011	11:00	< 9	< 9
GB5	9/7/2011	10:00	< 9	< 9
GB5	9/12/2011	11:05	>= 7,300,000	>= 3,600,000
GB5	9/21/2011	10:55	20	< 10

Samples at the same date and time are duplicate samples.

Table GB-7 Geomean Summary: Aug. - Sept., 2011

Site Code	Date	# of Samples	Fecal Coliform (CFU/100 mL)	<i>E. coli</i> (CFU/100 mL)
GB3 (w/o 9/12 sample)	8/24–9/22/2011	6	2,728	2,251
GB3 (w/ 9/12 sample)*	8/24–9/22/2011	7	8,503	4,813
GB4 (w/o 9/12 sample)	8/24–9/22/2011	6	1,172	1,034
GB4 (w/ 9/12 sample)*	8/24–9/22/2011	7	3,358	2,142
GB5 (w/o 9/12 sample)	8/18–9/14/2011	4	9	9
GB5 (w/ 9/12 sample)*	8/18–9/14/2011	5	137	119

*Rainfall on September 10 likely influenced the bacteria concentrations on Sept. 12. The diversion dam was deflated on this date, with high tides in the dam area, and remained deflated until Sept. 15.

4.2.3 Probable Future Water Quality

OCPW has conducted an extensive review of Best Management Practices (BMPs) for bacteria control (see Table GB-8). Very few BMPs provide the level of effectiveness required to achieve consistent compliance with 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 Greenville-Banning Channel.

That said, BMPs are being and will be implemented in response to pertinent requirements in the Orange County Areawide Urban Storm Water Runoff Management Program NPDES permit (Order No. R8-2009-0033, NDPEs CA 8618030, as amended). BMPs evaluated and implemented by the Orange County MS4 Stormwater Program include wet ponds, wetlands and source control programs, including septic system inventory and assessment and portable toilet oversight. Again, the existing development in the drainage area limits the effectiveness of many of these BMPs. The area tributary to the Greenville Banning Channel is sewerred 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. In short, absent the dry weather diversion, 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.

The inflatable dam and diversion works were installed in Greenville-Banning Channel because there was no feasible or practicable alternative to achieve water quality standards. Diversion to treatment provides the most effective means to protect downstream uses. During dry weather conditions, the flood control district presently diverts an average of 429,116 gallons per day (0.664 cfs) of urban runoff away from the public beaches (see Fig. GB-16). During wet weather conditions, up to one million gallons per day (1.7 cfs) has been diverted to the sewer system before the rubber dam had to be deflated to prevent flooding.

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 because there are no municipal or industrial wastewater discharges to the Greenville-Banning Channel.

Most important, even if water quality was in compliance with the bacterial objectives, REC1 and REC2 uses would continue to be precluded by the same (or worse) low flows and hydrologic modifications that exist today. To protect public safety, the Orange County Flood Control District prohibits access to GBC. The entire length of channel is fenced and gated to deny entry. The bicycle trail that parallels portions of Reach 1 is separated from the channel by fencing and the 20-ft. vertical walls of the channel. Warning signs are displayed stating that access is prohibited and regular site visits by maintenance crews help ensure compliance. For these reasons, recreational uses cannot be attained by imposing more stringent effluent limitations or requiring additional BMPs to control non-point sources.

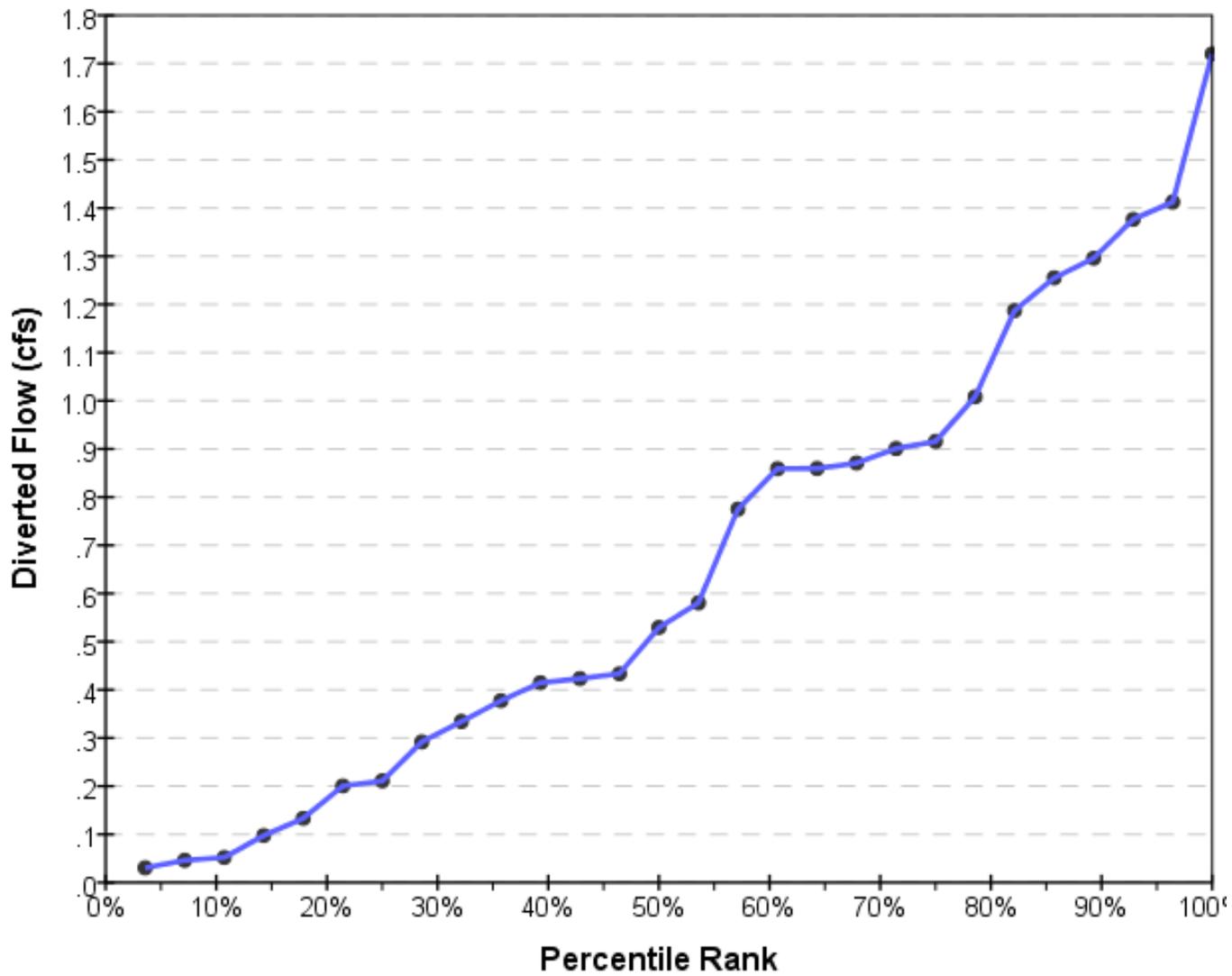


Figure GB-16: Urban Runoff Diversions to OCSD from the Greenville-Banning Channel (2009-2011)

Table GB-8: 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
Water Treatment BMPs						
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 GB-8: 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
Water Treatment BMPs						
	<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)	
Volume Reduction BMPs						
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 GB-8: Evaluation of BMP Alternatives for Effective Control of Bacteria (continued)

Bacteria BMP Type	Parameter	Mean Influent #100 mL	Mean Effluent #100 mL	n	Percent Removal	Source
Infiltration Basins & Trenches	FC	230	ND	5	>99	USEPA (1999); Arvind & Pitt (2006)
					100% for infiltration fraction	
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.²¹ The Greenville-Banning Channel is tributary to Reach 1 of the Santa Ana River which is designated (and will remain designated) for REC1 and REC2. In addition, the Santa Ana River joins the Pacific Ocean just over a mile below the GBC confluence. Shoreline beaches are also designated (and will remain designated) for REC1 and REC2. These downstream waters must continue to meet water quality objectives intended to protect primary contact recreation.

5.2 Compliance Strategies

Currently, BMPs are being employed to reduce fecal indicator bacteria, including fecal coliform, in the Greenville Banning Channel and downstream receiving waters. As discussed above, in response to elevated concentrations of indicator bacteria detected in the late 1990's at Huntington Beach State Park the Orange County Public Works Department implemented the diversion of dry weather flows from the Greenville-Banning Channel. An inflatable dam was installed in the channel about 1.2 miles upstream of the confluence with the Santa Ana River. The dam is the downstream terminus of the proposed Reach 1. The impounded flows are transported via pipeline across the Santa Ana River to the Orange County Sanitation District (OCSD) treatment facility. From January 2006 to December 2009 an average of 302,166 gallons/day (approx.. 0.55 cfs) were diverted to the sanitary sewer.

During repair and maintenance operations and during rain events the dam is lowered and no water is diverted. As a result during rainy years not as much water is diverted as during dry years. The diversions reduce bacteria and nutrient²² loading to downstream receiving waters, which include ocean coastal beaches that are heavily used for water contact recreation, particularly during the drier summer months.

In addition, starting in early 2013, flows impounded from the inflatable dam were diverted to a wetland and riparian habitat area that was constructed in the adjacent Fairview Park (see Fig. GB-17). It is estimated that up to 330 gallons/minute of flows were diverted to fill a series of six ponds in the wetland area. Up to 150 gallons/minute will be used to maintain the ponds and connecting channels. Some of flows will also be used to maintain 17 acres of riparian habitat. All diverted flows to the wetland and riparian area will stay in the area with none returned to the channel. According to the City of Costa Mesa the diverted flows from the GBC will be split evenly between the OCSD and the Wetland and Riparian Habitat area.

²¹ 40 CFR 131.10(b)

²² 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).

Between the two diversion sources virtually all of the dry weather flows will be diverted out of the Greenville-Banning Channel thus providing significant protection to the downstream beaches. Although intended as a permanent BMP at the time of construction, continued operation of these diversion and treatment strategies rests on the assumption that it is not necessary to achieve bacterial objectives in water held behind the inflatable dam. To require otherwise would defeat the intended purpose of this diversion project and discourage similar BMP efforts elsewhere in the region.



Figure GB-17: Fairview Park Wetland and Riparian Habitat Project. In early 2013, flows from the Greenville-Banning Channel have begun to be diverted into the Fairview Park Wetland and Riparian Habitat area. The diverted flows will fill a series of six ponds and sustain 17 acres of riparian habitat. (Regional Board staff photograph, April 2013)

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 Reach 1 of the Greenville-Banning Channel is 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 Reach 1 of the Greenville-Banning Channel to confirm that the existing hydromodifications and access restrictions remain in place and unaltered. In addition, staff will request the Orange County Flood Control District to provide data summarizing the flow diversions from the GBC to the Orange County Sanitation District. Finally, the Regional Board will solicit any new information concerning actual or potential recreational use of the GBC when public notice is given for the Triennial Review.

If new evidence indicates that recreation in or on the water may be attainable because one or both factors previously precluding the use have changed, the Regional Board may elect to: 1) designate GBC for REC1 and/or REC2; or 2) require that a new UAA be conducted in order to determine whether the GBC should continue to be de-designated for REC1 and/or REC2.

The Regional Board retains the authority and discretion to re-examine the issue of appropriate use designations for Greenville-Banning Channel more frequently than once every three years when warranted.

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