

# **WATER DIVERSION GUIDE**

**FOR THE**

**VENTURA COUNTY  
MAINTENANCE PROGRAM EIR**

**VENTURA, CALIFORNIA**

*Prepared for:*

**Ventura County Watershed Protection District**

800 South Victoria Avenue

Ventura, California 93009-1600

*Prepared by:*

**URS**

130 Robin Hill Road, 1 Suite 100

Santa Barbara, California 93117

(805) 964-6010 ♦ Fax: (805) 964-0259

December 2007

*Updated by WPD: September 2019*

## TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page</u></b>
<b>1.0 INTRODUCTION</b> .....	1-1
1.1 BACKGROUND.....	1-1
1.2 PURPOSE .....	1-1
1.3 DISTRICT ZONES .....	1-1
<b>2.0 FACILITY TYPES AND DESCRIPTIONS</b> .....	2-1
2.1 OPEN CHANNELS .....	2-1
2.1.1 Channel Types .....	2-1
2.1.2 Maintenance Activities in Channels .....	2-1
2.2 DEBRIS AND DETENTION BASINS .....	2-2
2.2.1 Debris Basins .....	2-2
2.2.2 Detention Basins .....	2-2
2.2.3 Maintenance Operations .....	2-2
<b>3.0 ASSESSING FIELD CONDITIONS</b> .....	3-1
3.1 ASSESSMENT OF FLOW CONDITIONS .....	3-1
3.1.1 Open Channels.....	3-1
3.1.2 Debris and Detention Basins .....	3-1
3.2 ASSESSMENT OF POTENTIAL AQUATIC HABITAT .....	3-2
3.3 GROUNDWATER DEWATERING .....	3-3
<b>4.0 WATER DIVERSION METHODS</b> .....	4-1
4.1 WATER DIVERSION COMPONENTS .....	4-1
4.2 COFFERDAMS .....	4-1
4.2.1 Types of Cofferdams .....	4-1
4.3 BYPASS SYSTEMS.....	4-3
<b>5.0 WATER DIVERSION BEST MANAGEMENT PRACTICES</b> .....	5-1
5.1 GENERAL WATER DIVERSION BMPS.....	5-1
5.1.1 Maintenance and Repair Planning.....	5-1
5.1.2 Operation and Maintenance.....	5-1
5.1.3 Removal Post-Maintenance .....	5-1
5.2 COFFERDAMS .....	5-2
5.2.1 General Design Considerations for Cofferdams.....	5-2
5.2.2 Inspection and Maintenance .....	5-2
5.2.3 Removal.....	5-2
5.3 BYPASS SYSTEMS.....	5-3
5.3.1 General Considerations for Bypass Systems .....	5-3
5.3.2 Open Channel Bypass Systems .....	5-3

**TABLE OF CONTENTS**

5.3.3 Pipeline Bypass Systems ..... 5-3

5.4 SEDIMENT CONTROL ACTIVITIES..... 5-4

5.5 OUTLET PROTECTION ..... 5-4

5.6 AQUATIC LIFE PROTECTION MEASURES ..... 5-5

5.6.1 Prior to Cofferdam Construction ..... 5-5

5.6.2 Protection of Aquatic Life During Bypass Operation ..... 5-5

5.6.3 Dewatering of Work Area ..... 5-5

5.6.4 Maintaining Flow Through Work Site ..... 5-6

5.6.5 Re-establishing Flows Post-construction..... 5-6

5.7 EQUIPMENT AND VEHICLE USE ..... 5-6

5.7.1 Equipment Operation..... 5-6

5.7.2 Equipment Maintenance During Construction ..... 5-6

5.7.3 Spill Prevention, Control, and Containment..... 5-7

**6.0 REGULATORY SUMMARY..... 6-1**

6.1 FEDERAL AGENCIES ..... 6-1

6.1.1 U.S. Army Corps of Engineers ..... 6-1

6.1.2 U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) ..... 6-1

6.2 STATE AGENCIES..... 6-1

6.2.1 Regional Water Quality Control Board ..... 6-1

6.2.2 California Department of Fish and Wildlife..... 6-2

**List of Tables**

**Page**

Table 1-1 Summary of District Zones ..... 1-2

Table 3-1 Watershed Summary of Potential Special Status Species ..... 3-2

**List of Figures**

**Page**

Figure 1 District Management Zone ..... 1-3

Figure 2 Cofferdam and Bypass Systems ..... 4-2

Figure 3 Intake Configurations ..... 4-3

## **1.0 INTRODUCTION**

### **1.1 BACKGROUND**

The Ventura County Watershed Protection District's (District) ongoing maintenance program focuses on the proper operation and function of the District's flood control facilities. Routine maintenance and repair activities preserve the engineered flow conveyance and retention capacities of the District's flood control facilities and prevent/remove the accumulation of obstructing vegetation and sediments that could increase existing flood or erosion hazards.

This Water Diversion Guide was developed in conjunction with the 2008 Maintenance Program Environmental Impact Report (Program EIR) to address potential impacts to water quality and aquatic habitat during routine maintenance and repair activities. This guidance provides detailed Best Management Practices (BMPs) for the District and its contractors to use during water diversion activities to reduce environmental impacts to hydrology, water quality, and aquatic habitat.

### **1.2 PURPOSE**

During routine maintenance and repair operations, flowing or ponded water may be present at a flood control facility. Water flowing through work areas can potentially impact downstream water quality through the discharge of sediment, debris, construction materials and other pollutants. Construction activity may also impact water quality or native aquatic life by altering flow channels and hydrology, mechanically damaging aquatic habitat or contributing to siltation and turbidity.

Temporary water diversion is required during a routine maintenance or repair activity when work in flowing or ponded water has the potential to negatively impact water quality or native aquatic life. A water diversion facility must be constructed, operated, maintained, and removed to minimize impacts. BMPs implemented as part of the water diversion reduces water quality impacts by minimizing the discharge of sediments and other pollutants from the work area. BMPs for the protection, removal, and relocation of native aquatic life during water diversion reduce impacts to aquatic life. Water quality monitoring is usually required during the operation and removal of a water diversion. The results of water quality monitoring can be used to assess the performance of BMPs and address any potential impacts to water quality from the water diversion.

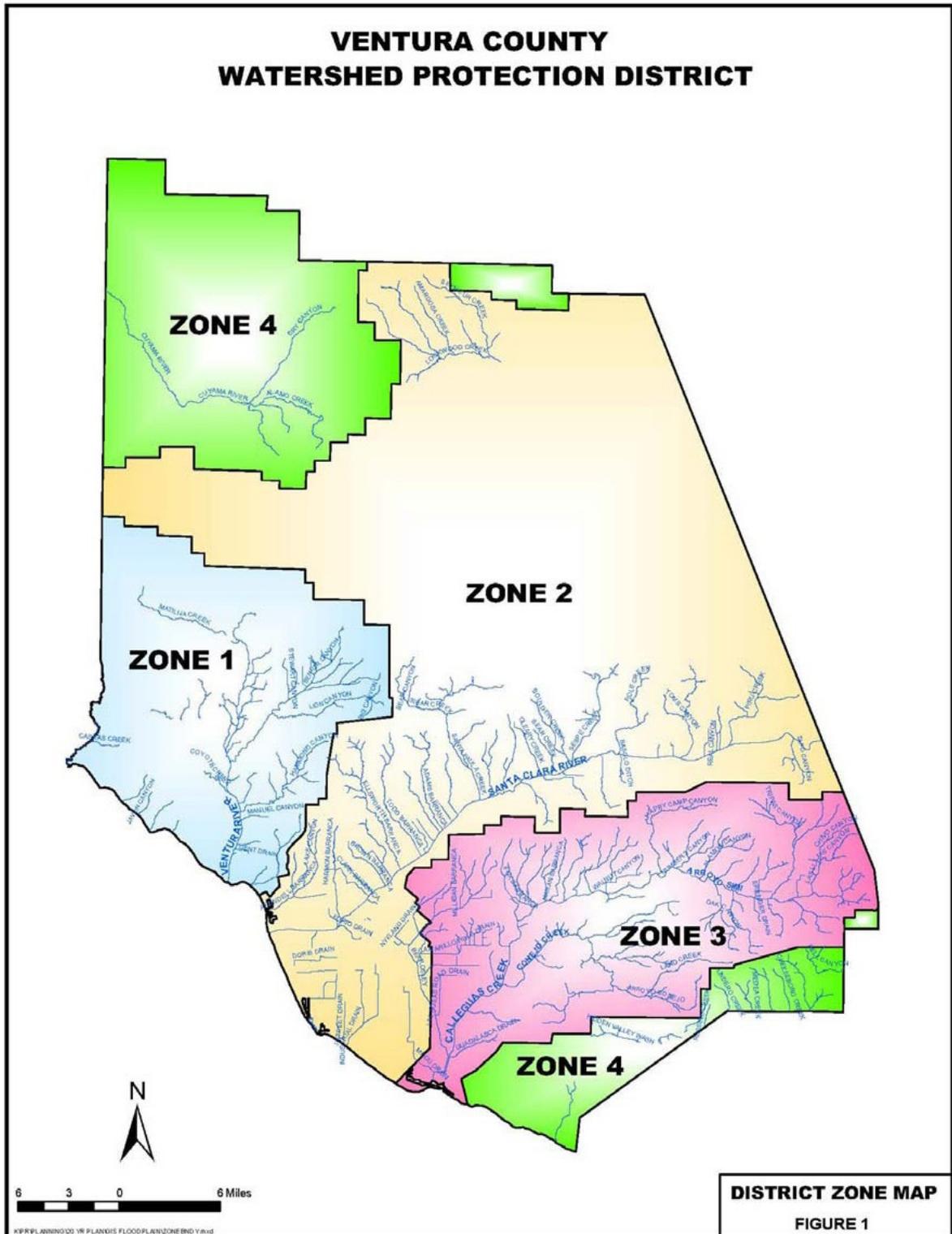
### **1.3 DISTRICT ZONES**

The District operates and maintains projects that have been either constructed by the District or constructed by others and transferred to the District. The District has divided Ventura County into four management zones (Table 1-1 and Figure 1).

**TABLE 1-1  
SUMMARY OF DISTRICT ZONES**

<b>Zone No.</b>	<b>Watershed</b>	<b>Major Drainages</b>	<b>Cities and Communities</b>
1	Ventura River Watershed	Ventura River, San Antonio Creek, tributaries in the Ojai Valley	Ojai, Ventura, Oak View, Casitas Springs, Live Oak Acres, Meiners Oaks
2	Santa Clara River Watershed and Oxnard Plain	Santa Clara River and its tributaries, various Oxnard Plain drains	Piru, Fillmore, Santa Paula, Ventura, El Rio, Saticoy, Oxnard, Port Hueneme, Nyeland Acres
3	Calleguas Creek Watershed	Arroyo Conejo, Arroyo Simi, Arroyo Santa Rosa Creek, Conejo Creek, Arroyo Las Posas Calleguas Creek, Revolon Slough	Simi Valley, Moorpark, Camarillo, Thousand Oaks, Newbury Park, Somis
4	Potrero Creek Watershed, Upper Cuyama River Watershed	Potrero Creek, Medea Creek	Agoura Hills, Westlake Village

FIGURE 1  
DISTRICT MANAGEMENT ZONES



## 2.0 FACILITY TYPES AND DESCRIPTIONS

A variety of basin and linear facilities are maintained by the District. A comprehensive list of the District's facilities and their location, dimensions, capacities, and other pertinent information is included in the District's Catalog of Facilities (2008 Environmental Protection Measures for the ongoing Routine Operations and Maintenance Program EIR, Appendix C, periodically updated) and the Debris and Detention Basin Manual (EIR Appendix D, updated December 2017). The main types of linear facilities are Open Channel; Open Channel Inlets, Outlets, and Transitions; Bank Protection and Related Facilities; and Pipe and Box Culverts (Underground Facilities). There are about 216 miles of maintained linear facilities with open channels accounting for one-half of the total. There are 56 debris and detention basins that are maintained by the District.

### 2.1 OPEN CHANNELS

#### 2.1.1 Channel Types

More than 50 percent of the District's linear facilities are some type of open channel. The most abundant type is the reinforced rectangular or trapezoidal concrete channel. This is a fully lined concrete structure with either a trapezoidal or rectangular (vertical wall) channel geometry. Some of the open channels are graded, earthen channels or unlined channels, while others are grouted (i.e., concreted) riprap channels with earthen bottoms. Channel geometries for earthen channels are usually trapezoidal.

Open channels in the District can be categorized as "improved" or unimproved" channels. Improved channels have been designed for a specific storm flow conveyance capacity, with engineering drawings that specify a certain width and depth. Most "improved" channels are fully or partially lined with concrete. "Improved" earthen channels have design dimensions that must be maintained. "Unimproved" channels are full earthen channels or channels with bank protection (i.e., riprap, gunite) and a soft bottom that do not have engineered design specifications but are maintained to specific configurations as part of the District's ongoing maintenance program.

#### 2.1.2 Maintenance Activities in Channels

Several types of routine maintenance and repair operations are conducted by the District on an annual basis. Any of these activities can occur at a facility with flowing or ponded water that would require a water diversion and appropriate BMPs.

##### 2.1.2.1 Channel Cleanout

The District is the Principal co-permittee of the Ventura Countywide NPDES Permit and responsible for implementation of the Ventura Countywide Stormwater Quality Management Program (VCSQMP)<sup>1</sup>. The VCSQMP requires co-permittees to routinely clean catch basins, drainage facilities, detention/retention basins, and reinforced concrete open channels at least once each year prior to the wet season. At most sites, sediments are removed from the channel bottom using an excavator or a crane working from the top of the banks.

<sup>1</sup> The Ventura Countywide Stormwater Quality Management Program (VCSQMP) complies with the requirements of the Ventura Countywide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit (Order R4-2010-0108; NPDES Permit No. CAS004002) issued by the Los Angeles Regional Water Quality Control Board (RWQCB).

**2.1.2.2 Channel Bed and Bank Repair**

Repair activities include the re-shaping and compaction of earthen channels to repair erosion damage, replacement of damaged concrete in lined channels and other in-kind replacement bank protection. Minor additions of rock riprap and/or concrete may occur in locations with repetitive scour or erosion damage. These types of repairs do not substantially alter the facility footprint or change the type of construction.

**2.2 DEBRIS AND DETENTION BASINS**

The District operates and maintains 56 debris and detention basins. The number, location, and capacity of the District's detention basins are provided in the VCWPD Debris and Detention Basin Manual. They are typically located in headwaters above developed areas. The basins are usually formed by the construction of an earthen dam that may or may not have rock facing. If basin volumes or dam designs exceed certain state criteria, they are regulated by the California State Division of Safety of Dams (DSOD). State-size facilities store more than 50 acre-feet of water or have dams that are more than 25 feet high.

**2.2.1 Debris Basins**

Most of the District basins are "debris basins" which capture large debris (sediment, boulders, trees, etc.) during winter storms. These types of basins function by allowing flood waters to pond in the basin, thereby slowing water velocity so that debris and sediment settle out in the basin.

**2.2.2 Detention Basins**

The District maintains several "detention basins," which detain large volumes of water during the early phases or peak of a storm event, then slowly release the water over time. These basins reduce the peak downstream flows, which reduces flooding.

**2.2.3 Maintenance Operations**

Basins require a certain storage volume to perform in accordance with the design criteria. As sediments accumulate, the design storage volume is decreased, and the basin will not function as designed. Hence, sediments must be removed to maintain the design volume. Basins are cleaned on an as-needed rather than annual basis. A debris basin "cleanout" occurs in advance of each upcoming rainy season and/or immediately following the rainy season if any sediment and debris have accumulated to fill approximately 25% of the design capacity. If the watershed upstream of the basin is burned in the preceding five years, the basins will be cleaned in advance of the rainy season and may be cleaned several times per year until the vegetation in the watershed recovers.

## 3.0 ASSESSING FIELD CONDITIONS

Prior to a maintenance or repair activity in a channel or basin with ponded or flowing water, the District or its contractor will determine the need for a water diversion, the appropriate type of water diversion and appropriate BMPs for the activity. This requires the District or its contractor to perform a pre-construction assessment of field conditions, including the type of facility, flow conditions and the potential for aquatic habitat.

### 3.1 ASSESSMENT OF FLOW CONDITIONS

#### 3.1.1 Open Channels

Some open channels within the District have year-round or perennial flow. Most substantial flows occur in the channels during and immediately following rain events. However, water can be present year-round due to “nuisance” discharges from storm drains, high ground water seeping from “weepholes” in concrete lined channels and agricultural return flows. Some channels have perennial flows due to permitted discharges from water or wastewater treatment plants.

Although the rainy season runs approximately from October to April, intermittent flows can be present any time of the year due to urban or agricultural discharges or monsoonal storms. Provisions for water diversions should always be incorporated into project planning. For coastal facilities, the influence of tidal flows will need to be taken into consideration.

Water diversion and incorporation of appropriate BMPs during a routine maintenance or repair operation in an open channel is indicated under the following flow conditions:

- The maintenance or repair activity is to be conducted in the rainy season between October and April.
- The channel is normally dry, but intermittent urban or agricultural discharge may occur.
- The channel conveys tidal flows or is tidally influenced,
- The channel conveys perennial flows from either man-made or natural upstream sources.
- Flow or ponded water is present in an earthen bottom channel.
- Flows or ponded water within a concrete-lined channel are 2 inches or deeper. Routine cleaning of dry or nearly dry concrete lined channels with less than 2 inches of water is conducted with downstream BMPs (e.g. wattles) to prevent turbidity.

#### 3.1.2 Debris and Detention Basins

A water diversion is needed in a debris or detention basin when water is either flowing into the basin or ponded within it and the maintenance activity will potentially impact downstream water quality or aquatic habitat. Water may be ponded within a basin due to groundwater seepage or retained storm flows. A water diversion with appropriate BMPs is indicated for routine maintenance under the following flow conditions:

- Water is flowing or may flow into the basin from an upstream source.
- Water is ponded within the basin.

### 3.2 ASSESSMENT OF POTENTIAL AQUATIC HABITAT

Most District flood control facilities in the District are managed to minimize riparian, wetland, and aquatic habitat. However, measures must be taken during water diversions to protect aquatic habitat and species if they are present. Facilities that convey flows for sensitive species are identified in the Catalog of Facilities (Table 3-1).

A biological survey must be conducted by a qualified biologist for facilities with potential habitat for native aquatic species prior to initiation of the water diversion and any maintenance or repair activity. Prior to initiating work the District must determine if the following conditions that may require a biological survey are present at the facility:

- The facility may support special status species (Table 3-1).
- The facility supports wetland or riparian vegetation, or aquatic wildlife, or these resources occur downstream.
- The facility is an earthen bottom channel or debris basin with ponded or flowing water.
- The facility conveys perennial or intermittent flows from a man-made or natural upstream source.
- The facility conveys tidal flows or flows that are tidally influenced.
- The facility is a concrete-lined channel conveying flows deeper than two inches.

Prior to initiating work, if the District or its contractor observes the above conditions at a facility with flowing or ponded water, the District will assign a qualified biologist to conduct the biological survey.

**TABLE 3-1  
WATERSHED SUMMARY OF POTENTIAL SPECIAL STATUS SPECIES**

<b>Watershed</b>	<b>Zone</b>	<b>Aquatic Sensitive Species with Potential to Occur</b>
Ventura River	1	California Red-Legged Frog, Southwestern Pond Turtle, Southern Steelhead, Tidewater Goby
Santa Clara River	2	Arroyo Toad, Southwestern Pond Turtle, Southern Steelhead, Tidewater Goby
Calleguas Creek	3	Arroyo Chub, Southwestern Pond Turtle
Malibu Creek	4	Southwestern Pond Turtle

If the pre-construction biological survey indicates that the facility or reach downstream of the facility has the potential for native aquatic habitat, BMPs for the protection of aquatic life must be implemented as part of the water diversion. BMPs for the protection and relocation of aquatic life are included in Section 5.6 of this document and additional recommendations or requirements may be provided by the qualified biologist as part of the survey.

If the biological survey indicates the potential presence of a threatened, endangered, or sensitive aquatic species, District requirements for the protection of listed species must be implemented as

required under the District's biological opinion and take permit for that species or other appropriate documentation.

### **3.3 GROUNDWATER DEWATERING**

A high-water table is usually associated with a basin but may also occur within channels. Maintenance and repair activities requiring excavation below the water table require groundwater dewatering to maintain a dry work area. The RWQCB prohibits activities involving wet excavations (i.e., excavations below the seasonal high-water table) unless authorized by an NPDES or Waste Discharge Requirement.

To comply with the requirements established by the Los Angeles RWQCB for groundwater dewatering, the following applies to maintenance or repair activities requiring excavation.

- In non-coastal areas, groundwater tables fluctuate seasonally, and high groundwater may be avoided by scheduling maintenance and repair activities in the dry season.
- A minimum 5-foot buffer zone must be maintained above the existing activities, unless authorized by RWQCB.
- If groundwater dewatering is proposed or anticipated, the District will file a Report of Waste Discharge to the RWQCB and obtain any necessary NPDES permits/ Waste Discharge Requirements prior to discharging groundwater to a waterway.
- If groundwater is encountered without the benefit of appropriate permits, the District or District contractor will cease all activities in the areas where groundwater is present until the RWQCB is notified and the necessary NPDES permits/Waste Discharge Requirements are obtained.

## 4.0 WATER DIVERSION METHODS

### 4.1 WATER DIVERSION COMPONENTS

The purpose of water diversion is to prevent flowing or tidal waters from entering a work area. In general, the work area may be isolated by the impounding of flows behind a coffer dam or within an in-stream excavated basin. Flows from the coffer dam or excavated basin are routed around or through the work area by a bypass system. The bypass system may consist of a pipeline, excavated channel, lined flume, or a bermed portion of the existing channel. Because of the potential of the water diversion to impact water quality and potential aquatic life, appropriate BMPs must be incorporated into the design and operation of the water diversion. Water diversion design and planning must typically consider the following:

- Design and construction of cofferdam or excavated basin
- Design of bypass system
- Management of sediment
- Bypass outlet
- Water quality monitoring
- Protection of aquatic species and habitat
- Equipment and website use

### 4.2 COFFERDAMS

#### 4.2.1 Types of Cofferdams

Temporary cofferdams are used to keep flowing or ponded water out of facility work areas. Cofferdams are used with bypass systems to divert water either around or through the work area. Cofferdams can be generally categorized as transverse or longitudinal, and with or without tidal conditions (Figure 2). BMPs for the design and construction of cofferdams are provided in Section 5 of this document.

Coffer dams may be constructed of sandbags or native earthen materials wrapped in visqueen, inflatable dams, compacted earth, brick and mortar, or k-rails. In earthen bottom channels, coffer dams may be constructed from materials excavated from the temporary low-flow channel. Inflatable dams (e.g., bladders) should only be used in channels/waterways that have a relatively flat substrate (i.e., concrete lined channels or similar). Pipes (with or without rubber donuts or sandbags) should not be placed beneath the bladder. In addition, sandbag cofferdams are ineffective at preventing water seepage unless plastic (e.g., visqueen) is placed underneath.

As described in Section 5.7.3, no wet concrete product shall encounter any flowing or standing water at any time to avoid pH water quality impacts. Areas where raw cement or grout are applied or where concrete curing or finishing operations are conducted to construct a cofferdam shall be separated from any ponded or diverted water flows until fully dried/cured. All equipment involved with the concrete or grouting operations shall be located within a contained area while using any slurry or concrete product.

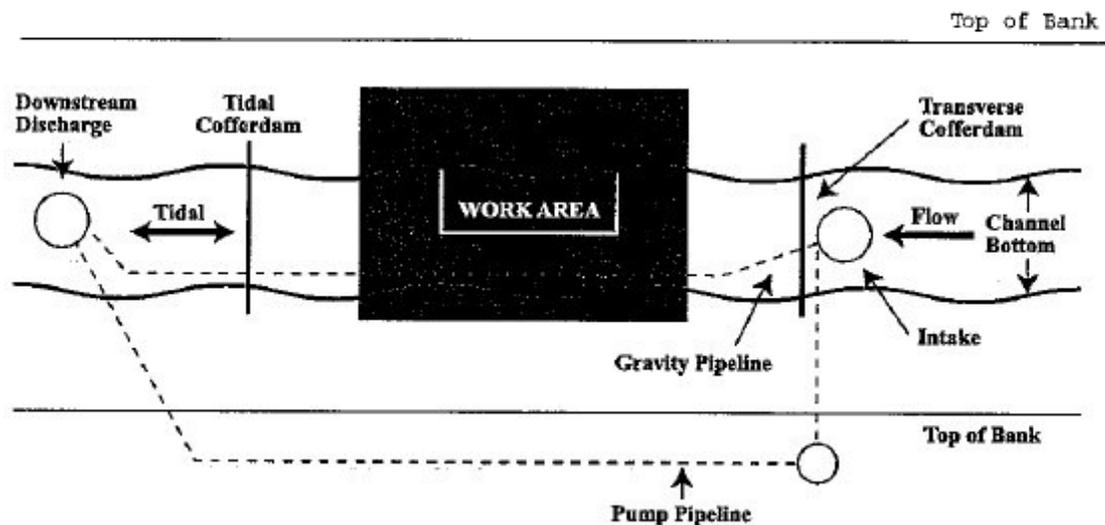
**4.2.1.1 Transverse Cofferdam**

Transverse cofferdams are used in channels or basins to span the entire cross-section of the facility upstream of the maintenance or repair activity. Water is impounded upstream of the cofferdam and a bypass system is used to route flows through or around the work area.

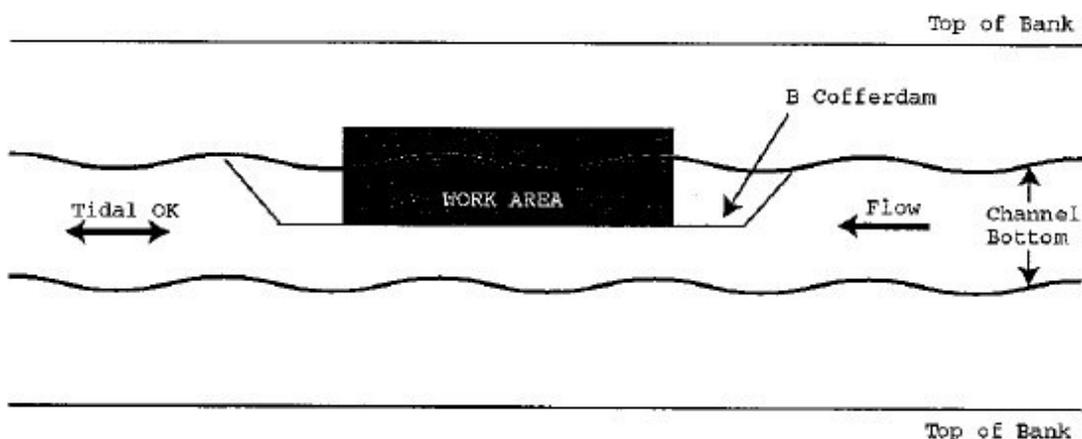
**4.2.1.2 Longitudinal Cofferdam**

A longitudinal cofferdam allows work to proceed in a portion of the channel while allowing natural flow to continue along the remaining part of the channel. Longitudinal cofferdams are typically constructed parallel to the channel or basin banks. Water quality monitoring is not required when the flow is simply moved to one side of the channel using a longitudinal cofferdam and bypass system as shown below.

**FIGURE 2**  
**COFFERDAM AND BYPASS SYSTEMS**  
**Plan View of Transverse Cofferdam and Bypass System**



**Plan View of Longitudinal Cofferdam and Bypass System**



### 4.2.1.3 Tidal Cofferdams

In channels that convey tidal flows or are tidally influenced, transverse or longitudinal cofferdams may be constructed. A transverse coffer dam in a tidally influenced channel may require a cofferdam both upstream and downstream of the work area. The downstream transverse cofferdam must be constructed at a height adequate to retain tidal flows and must be sturdy enough to withstand tidal surge. If a longitudinal cofferdam is constructed, the bypass channel must have adequate flow capacity to accommodate tides. Tidal cofferdams should be installed and removed at low tide.

## 4.3 BYPASS SYSTEMS

Bypass systems are used to divert water impounded by an upstream cofferdam around or through the work area. Bypass systems typically consist of pipelines, excavated low-flow channels or constructed channels or flumes. A berm constructed in the channel bottom may also be used to route low flows around the work area. Selection of a bypass system design depends on the type of facility and activity, cofferdam design, flow conditions, and presence of aquatic habitat.

Transverse and tidal cofferdams diversions typically incorporate a pipeline to convey water through the work area. The pipeline may operate by gravity flow or require water to be pumped. Low flow conditions or channel geometry in an earthen bottom channel may require the excavation of an upstream basin and standpipe to facilitate pumping (Figure 3).

**FIGURE 3  
INTAKE CONFIGURATIONS**



Bypass systems for longitudinal cofferdams may consist of an open channel formed by the cofferdam or berm, an excavated low-flow channel adjacent to the work area, a constructed open flume, or a pipeline.

Outlet protection may be required as part of a bypass system to reduce the velocity and energy of concentrated flows by placing temporary devices or rock at pipe outlets. Outlet protection helps prevent scour in earthen bottom channels and prevents erosion and reduces turbidity.

## 5.0 WATER DIVERSION BEST MANAGEMENT PRACTICES

### 5.1 GENERAL WATER DIVERSION BMPS

#### 5.1.1 Maintenance and Repair Planning

Prior to maintenance and/or repair activities, the District must determine if a water diversion is necessary and incorporate any water diversion into pre-project planning. Planning for water diversions during maintenance and repair activities should incorporate and identify the following:

- A pre-maintenance biological survey must be conducted by a qualified biologist for facilities with potential habitat for native aquatic species prior to initiation of the water diversion and any construction work (Section 3.2).
- Proposed cofferdam construction methods, materials, and installation, maintenance and removal requirements.
- Identification of erosion control BMPs, including methods, materials, and installation, maintenance and removal requirements.
- A map or drawing indicating the location of cofferdams, type and location of bypass system, anticipated water retention depth, cofferdam height, and location of downstream discharge point.
- Location of proposed upstream and downstream water quality monitoring sites.

#### 5.1.2 Operation and Maintenance

- The water diversion and work area dewatering system must be in place and functional before in-channel work can begin.
- While the water diversion is in place, it must be operational 24 hours a day.
- Inspection and maintenance of the water diversion and associated erosion and sediment control BMPs should be conducted daily.
- Maintenance and/or repair activities shall not be conducted during a rainfall event.
- During cofferdam operation, all water from upstream shall always be allowed to pass downstream to maintain aquatic life below the water diversion.

#### 5.1.3 Removal Post-Maintenance

- The cofferdam, bypass system, and erosion control will be removed when the work is completed. Removal normally proceeds downstream in an upstream direction.
- Remove temporary fill as appropriate, such as access ramps diversion structures or earthen cofferdams. Earthen material excavated from the channel bottom for the construction of temporary in-channel berms or channels may be left in place with recontouring to allow proper flows post project.
- Normal flows should be restored to the affected stream immediately upon completion of work.

**5.2 COFFERDAMS****5.2.1 General Design Considerations for Cofferdams**

- Cofferdams will be designed with adequate height to retain dry weather flows and anticipated storm flows or be removed prior to storms.
  - Cofferdam height for non-tidally influenced channels should generally be higher than the normal high-water mark.
  - Cofferdam height is to be established by the District based on facility dimensions and conditions, existing flow conditions, time of year, and other pertinent factors.
- Cofferdam construction will be adequate to prevent seepage into or out of the work area.
- Cofferdams may be constructed from sandbags wrapped in visqueen, inflatable dams, compacted earth, brick and mortar, k-rails, or other appropriate material.
- Seepage shall be prevented to the extent feasible using plastic (e.g., visqueen) or sealants.
- Cofferdams constructed of earth or other erodible materials will be enclosed by erosion control measures, such as filter fabric, silt-fencing, or other appropriate materials.
- Materials used for the construction of earthen cofferdams will not incorporate contaminated sediments; i.e., concrete, pavement, trash, or debris.
- Longitudinal cofferdams in low-flow channels may be constructed from alluvium excavated from the channel and compacted on-site.

**5.2.2 Inspection and Maintenance**

- Inspect all system components twice a day.
- Check for water seepage under the dam and general integrity of the dam, repair as needed.
- Repair all leaks immediately.
- In concrete-lined facilities, the upstream water collection pool shall be cleaned and cleared of sediment and debris regularly to prevent water quality deterioration.
- Clean all debris, dust, loose materials from the work area daily.
- Place wattles, filter fabric, and silt fencing across the flow stream downstream of the work area to catch/filter water in case it is unintentionally discharged the work area:
- Clean water intake to prevent/correct clogging.

**5.2.3 Removal**

- Once project work is complete, reintroduce water into the channel in a manner that avoids turbidity.
- Remove imported construction materials.
- After removal of the cofferdam, dismantle the bypass system and restore disturbed area to pre-construction grades.
- Flows in an earthen bottom channel may be left within the temporary low-flow channel if re-introduction of the flows to the work area would result in excessive discharge of sediment downstream.

**5.3 BYPASS SYSTEMS****5.3.1 General Considerations for Bypass Systems**

- Flows within the bypass will be maintained to the greatest extent feasible in order to maintain adequate water quality and quantity to support fish and other aquatic life.
- During the water diversion, the following upstream and downstream monitoring will be conducted:
  - pH, temperature, dissolved oxygen, turbidity, and total suspended solids (and/or other constituents as required by current permits) monitoring will be implemented.
  - Monitoring will generally be conducted daily during the first week of diversion activities, and then on a weekly basis, thereafter, until the in-stream work is complete.
  - Results of the analyses will be retained by the District and submitted to regulatory agencies as required.

**5.3.2 Open Channel Bypass Systems**

- An open channel bypass will be protected from erosion or spillage of material from channel and basin banks and slopes using readily available BMPs.
  - BMPs include the placement of filter fabric, silt fencing, straw bales, sandbags on cofferdam banks, channel banks, and slopes.
- An upstream silt catchment basin may be constructed so that silt or other deleterious materials are not allowed to pass into the open channel. The silt catchment basin should be monitored and cleaned/repared weekly.
- For facilities that support sensitive species or in perennial streams, an open bypass channel or flume may be required in conjunction with a longitudinal cofferdam.

**5.3.3 Pipeline Bypass Systems**

- Bypass systems with pipelines may be gravity flow or pumped as necessary.
- When using a gravity flow system, the pipeline must slope continuously downgrade and, therefore, may have to pass through or near the work area.
- Intakes and/or excavated basins may be required for gravity flow or pump-fed bypass systems (see Figure 3).
  - Turbulence around the intake and associated turbidity can be reduced by means of ponding water behind the cofferdam or in an excavated sump.
  - In earthen bottom channels or basins, the intake pipe end should be substantially above the bottom of the ponded water or excavated basin as shown in Figure 3 to avoid discharge of sediments.
  - For gravity systems, a standpipe arrangement is very effective (see Figure 3). An intake filter can also be used to screen out sediment but can be easily clogged.
  - All intakes systems with pumps must be fitted with screens.
- Outlet protection should be incorporated at the pipe outlet to prevent generation of turbidity erosion, and scour. Refer to Outlet Protection BMPs in this Section.
- As dry weather flows vary, the contractor may select the proper size pump in the field. A backup pump should be provided.
- Bypass pipes have the potential to heat the water and may require shading to prevent temperature increases in diverted water.

**5.4 SEDIMENT CONTROL ACTIVITIES**

- Work areas, channel banks, or stockpile areas adjacent to the water diversion area that could be subject to erosion during storm events will be stabilized with erosion control measures.
  - Appropriate erosion control materials include silt fencing, sandbags, filter fabric, coir rolls, or wattles.
  - In low flow channels, an upstream silt basin may be constructed so that silt or other deleterious materials settle out before passing through the water diversion area.
  - Erosion control methods used to prevent siltation should be monitored and cleaned/repared weekly.
- Sediment may be discharged downstream as a result of returning flows to the original low-flow channel:
  - When returning flows, minimize the discharge of sediment by installing filter fabric, wattles, or silt fencing downstream of the work area.
  - Bypass flows should be introduced into the dewatered area at the lowest velocity possible to minimize potential erosion and turbidity.
- Water diversions are not typically used by the District during clean-outs of concrete-lined channels devoid of fish or aquatic life where flows are minimal (less than 2 inches deep) and channel widths are narrow (25 feet or less). In low-flow concrete-lined channels, the District uses small bulldozers or “bobcats” working upstream to downstream within the channel bottom to scrape sediment, trash, and debris into piles for collection. In-stream BMPs typically used by the District for this type of channel clean-out include primary and secondary placement of wattles (net-wrapped coir rolls/wattles) downstream of the work area across the channel width. In low-flow conditions, 6-inch diameter wattles are adequate to contain and filter flows within a concrete-lined channel. Proper placement and removal of the wattles prevents the discharge of sediment and debris downstream of the work area.

**5.5 OUTLET PROTECTION**

- Place effectively sized outlet protection underneath pipeline outlet of where diverted water is discharged into stream.
- Rock aprons are the most common type of outlet protection for high flows; however, erosion control fabric, wattles, or silt fencing may be installed at the outlet to provide additional velocity reduction.
- Energy dissipation or other protection may not be necessary if the discharge is to an existing hardened structure (culvert, riprap, or concrete), to deep water or a heavily vegetated area.
- When designing the outlet project, consider flow depth roughness, gradient, side slopes, discharge rate, and velocity.
- If the discharge is to a tidal area, it may be necessary to equip the discharge pipe with a flap gate to prevent tidal flows from backing up into the intake.

**5.6 AQUATIC LIFE PROTECTION MEASURES**

If the results of the pre-construction biological survey indicate that the facility has the potential for native aquatic life, protective measures shall be taken during water diversions to prevent entrapment and mortality of fish and amphibians. If the survey determines that the aquatic life present at the site is and will be only composed of invasive or exotic species, no further action to protect aquatic species during the water diversion is necessary.

The following are minimum measures to be undertaken to protect native aquatic life during the construction, operation, and removal of a water diversion. During construction of the water diversion and during removal, a qualified biologist will be onsite to oversee measures undertaken to prevent entrapment and mortality of native aquatic life. Recovery and replacement of aquatic life may be undertaken by personnel under the supervision of the qualified biologist. For listed and sensitive species, only a qualified biologist with the proper permits may conduct such activities.

**5.6.1 Prior to Cofferdam Construction**

- Prior to construction of cofferdams, the channel section shall be isolated at the upstream and downstream ends and aquatic organisms removed and relocated by a qualified biologist.
  - Block nets shall be secured upstream and downstream of the channel section fully spanning the cross section of flow.
  - Block nets shall be secured into the substrate in soft channel bottoms or weighted across the channel cross section in hard bottom channel.
  - A seine net shall be used within the isolated area to recover fish, macro-invertebrates, and amphibians under the direction of the biologist.
  - Recovered aquatic life may be placed and transported in water-filled buckets to be released downgradient of the work site.
  - A minimum of three full channel sweeps should be conducted to remove aquatic organisms prior to commencement of dewatering.
  - Alternatives to seine netting, such as electro-shock must be approved by CDFW/NMFS first and then implemented by the site biologist.
  - After initial seine netting and removal of aquatic life, cofferdams may be constructed within the area isolated by the block nets.

**5.6.2 Protection of Aquatic Life During Bypass Operation**

- Pump inlets and outlets shall be protected using an appropriate mesh screen:
  - Mesh size will be based on protection of smallest native fish or amphibian species as established by field survey.
  - Default mesh size is 5 mm.
- Bypass pipelines will be adequately sized to pass flows and maintain existing water flows downstream of the work area.

**5.6.3 Dewatering of Work Area**

- Seine nettings of organisms shall continue during dewatering of the dry work space under supervision of the qualified biologist.

- All block nets should be periodically checked for impingement of fish or other wildlife and cleaned of debris to avoid collapse.

#### **5.6.4 Maintaining Flow Through Work Site**

- For water diversions where an open flow channel is maintained or an alternative flow channel is excavated, measures shall be taken to ensure that adequate flows are maintained and that aquatic organisms are not trapped or stranded.
- Flow downstream of the work site shall be maintained during construction and operation of the cofferdams.
- A downstream coffer dam shall be constructed in tidal areas for downstream flow protection (water surges upstream of the work area have occurred unexpectedly at times; water may overtop the upstream coffer dam and enter the work area).

#### **5.6.5 Re-establishing Flows Post-construction**

- During flows into an existing channel from a temporary channel, the qualified biologist shall survey the de-watered temporary channel to ensure that aquatic organisms are not trapped or stranded.
  - Trapped or stranded organisms will be placed in water-filled buckets for transport and release into the existing flow channel.
  - Applicable to diversions in soft bottom channels: if aquatic life has established itself within a temporary channel during the time of construction, flows may be left within the temporary channel.

### **5.7 EQUIPMENT AND VEHICLE USE**

#### **5.7.1 Equipment Operation**

- Stationary equipment such as motors, pumps, generators, and welders located within or adjacent to the channel or basin will be positioned over adequately sized secondary containment.
- Access to the work site via existing roads and access ramps will be shown on the project plans. If no ramps are available in the immediate area, a temporary ramp may be constructed within the flagged work area. Any temporary ramp will be removed upon completion of the project.

#### **5.7.2 Equipment Maintenance During Construction**

- Any equipment or vehicles driven and/or operated within or adjacent to the channel or basin should be checked and maintained daily, to prevent leaks of materials that could be deleterious to aquatic life if introduced to water. All maintenance will occur in a designated offsite area. The designated area will include a drain pan or drop cloth and absorbent material to clean up spills.
- Fueling and equipment maintenance will be done in a designated area removed from the area of the channel or basin such that no petroleum products or other pollutants from the equipment may enter these areas via rainfall or runoff. The designated area will include a drain pan or drop cloth and absorbent materials to clean up spills.

**5.7.3 Spill Prevention, Control, and Containment**

- Prior to maintenance or repair activities, the District or Contractor will identify the methods, materials, and procedures for spill prevention, control, and containment. This information will be incorporated into the contract documents. Spill containment methods should address the types of materials and equipment to be used at the site. Materials for the containment of spills (i.e., absorbent materials, silt fencing, filter fabric, coir rolls) should be identified and be available onsite prior to commencement of maintenance and/or repair activities.
- Any accidental spill of hydrocarbons or coolant that may occur within the work area will be cleaned immediately. Absorbent materials will be maintained within the work area for this purpose.
- No wet concrete product will encounter any flowing or standing water at any time. Areas where raw cement or grout are applied or where concrete curing or finishing operations are conducted will be separated from any ponded or diverted water flows by a cofferdam or silt-free, exclusionary fencing. All equipment involved with the concrete or grouting operations will be located within a contained area while using any slurry or concrete product. The protective berm or other structure will be in place prior to maintenance and/or repair activities.
- Any spill of the grout, concrete curing, or wash water adjacent to or within the work area will be removed immediately.
- During concrete spill clean-up operations and until cessation of maintenance and/or repair activities, pH monitoring will be conducted daily upstream and downstream of the spill site. The results of post-spill pH monitoring will be submitted to the District and kept with the contract documents.
- If vacuum trucks are used to clean up a spill into ponded or diverted water, the vacuum hose should be placed in a 3-to-4 square foot area and protected on all sides by exclusionary fencing to prevent the migration of contaminants. The intake of the vacuum hose should be protected with 5 mm mesh screen to prevent uptake of aquatic life or as determined by regulatory permits.

## 6.0 REGULATORY SUMMARY

Many of the District's facility maintenance activities occur in watercourses or basins where such activities are regulated by state, federal, or local agencies. The District obtains both individual project permits as well as long-term permits to address routine maintenance and repair activities. This section of the Guidance describes the applicable regulatory authorities and permit requirements for the maintenance program.

### 6.1 FEDERAL AGENCIES

#### 6.1.1 U.S. Army Corps of Engineers

Activities that result in the discharge of dredged or fill material in natural watercourses (such as bank stabilization and channel shaping) are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA). Most of the District's maintenance and repair activities are permitted under Nationwide Permits (NWP) No. 3, No. 31, and No. 33. Alternatively, maintenance actions in this program may be authorized under a Regional General Permit or Individual Permits.

#### 6.1.2 U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS)

The requirements of the Endangered Species Act (ESA) apply to any project permitted under a CWA Section 404. An ESA Section 7 Incidental Take Permit is needed if action taken for a project would have the potential to adversely affect listed species or designated critical habitat, either directly or indirectly. Section 7 consultation process takes place concurrent with the Section 404 permit review process. Facilities that convey flows for sensitive species are identified in the Catalog of Facilities.

### 6.2 STATE AGENCIES

#### 6.2.1 Regional Water Quality Control Board

The Regional Water Control Board (RWQCB) Los Angeles Region administers both the Section 401 Water Quality Certification Program and programs under Section 402 of the CWA, including the National Pollutant Discharge Elimination System (NPDES) in Ventura County.

##### **6.2.1.1 Section 401 Water Quality Certification**

The RWQCB requires a Section 401 Water Quality Certification for any activity undertaken under a Section 404 permit. Projects that require water diversions during maintenance and/or repair activities are required by the RWQCB to submit a separate Water Diversion Plan. This Update to the District's 2007 Water Diversion Guide incorporates measures in compliance with the current Section 401 certification requirements for water diversions undertaken by the District. .

##### **6.2.1.2 Section 402**

Section 402 of the Clean Water Act governs the NPDES which regulates point source discharges to waters of the United States. The RWQCB issues both NPDES permits for point source discharges to surface water and groundwater.

A maintenance or repair activity undertaken by the District may require the submittal of a Notice of Intent (NOI) for coverage under the California Construction General Stormwater Permit. This permit requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP). If a water diversion is needed, the appropriate BMPs are incorporated into the SWPPP.

Waste Discharge Requirements (WDRs) can be required for water diversions, dewatering activities or any type of pumping and release of water. Short-term water diversions for District routine maintenance does not normally require WDRs unless there is a need for groundwater dewatering. Groundwater dewatering operations are not covered under this Guidance or the Maintenance Program EIR and will be permitted separately under the following general permit: *Order No.: R4-2018-0125 (Permit No. (CAG 994004), General National Pollutant Discharge Elimination System and Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the State Board on September 13, 2018.*

### **6.2.2 California Department of Fish and Wildlife**

The modification to the bed, bank, and/or vegetation in a natural drainage (and certain man-made drainages) is regulated by the California Department of Fish and Wildlife (CDFW) under Section 1600 of the Fish and Game Code. Such modifications require a Streambed Alteration Agreement. A Section 2081 review process for state listed threatened and endangered species will take place concurrent with the Streambed Alteration Agreement permit review process.