



Memorandum

To: Middle Santa Ana River Bacteria TMDL Task Force

From: CDM

Date: May 27, 2010

Subject: Final Technical Memorandum – Source Evaluation Activities in Carbon Canyon Creek and Cypress Channel

The *Middle Santa Ana River Bacterial Indicator TMDL Data Analysis Report* (Santa Ana Watershed Project Authority [SAWPA] 2009) relied on 2007-2008 Urban Source Evaluation Plan (USEP) Monitoring Program data to prioritize steps for mitigating controllable urban fecal indicator bacteria (FIB) sources in the Middle Santa Ana River (MSAR) watershed (SAWPA 2008a, b¹). Locations with a combination of the largest number of FIB exceedances of water quality objectives, highest magnitude FIB concentrations, and most frequent indications of contamination by human sources were given the highest priority for additional source evaluation activities. Tables 1 through 4 summarize the findings observed at these sites during the 2007-2008 sampling program (see SAWPA 2009 for a complete discussion of sample results).

The Cypress Channel subwatershed was ranked high due to a combination of high frequency and high magnitude of exceedances of FIB water quality objectives (SAWPA 2009). Bovine sources of bacteria were also frequently detected at this site. In contrast, the Carbon Canyon Creek subwatershed was ranked very low (SAWPA 2009) as both the frequency of FIB water quality objective exceedances and the magnitude of FIB concentrations was relatively low. Human and bovine sources of bacteria were not detected at this site; however, domestic canine sources were regularly detected.

Both subwatersheds were recommended for source evaluation studies. Evaluation of the Carbon Canyon Creek subwatershed was included to determine if any site-specific characteristics could be identified that provide insight into how to reduce bacterial loads elsewhere. Source evaluation activities involved a desktop level characterization as well as field reconnaissance to identify subwatershed or in-stream characteristics which may contribute to high or low levels of FIB at either site. This technical memorandum summarizes the findings for each waterbody.

¹ The MSAR Monitoring Plan, which includes sample site descriptions, and Quality Assurance Project Plan are also available at www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/msar_tmdl.shtml

Table 1. Fecal coliform and *E. coli* results from Carbon Canyon Creek and Cypress Channel during 2007-2008 monitoring program

| Sample Week | Carbon Canyon Creek | | Cypress Channel | |
|-------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Fecal coliform (cfu/100 mL) | <i>E. coli</i> (cfu/100 mL) | Fecal coliform (cfu/100 mL) | <i>E. coli</i> (cfu/100 mL) |
| 7/8/07 | 100 | 9 | > 24,000 | > 2,900 |
| 7/15/07 | 290 | 150 | 2,000 | 2,500 |
| 7/22/07 | 100 | > 280 | 125,000 | 67,000 |
| 7/29/07 | 90 | 50 | 3,400 | 1,100 |
| 8/5/07 | 120 | 9 | 9,300 | 4,500 |
| 8/26/07 | 140 | 9 | > 2,800 | > 910 |
| 9/2/07 | > 400 | 170 | 7,000 | 1,600 |
| 9/9/07 | > 160 | > 90 | > 7,100 | > 3,400 |
| 9/16/07 | 90 | > 110 | 2,700 | > 1,580 |
| 9/23/07 | 1,400 | > 280 | 7,900 | 3,900 |
| 1/13/08 | 120 | 110 | NS ¹ | NS ¹ |
| 1/20/08 | 930 | 860 | 1,000 | 2,000 |
| 1/27/08 | 520 | 560 | 1,000 | 1,000 |
| 2/3/08 | 210 | 150 | NS ¹ | NS ¹ |
| 2/10/08 | 30 | 40 | NS ¹ | NS ¹ |
| 2/17/08 | < 9 | 60 | NS ¹ | NS ¹ |
| 12/7/07 | 11,000 | 6,900 | 20,000 | 8,300 |
| 12/9/07 | 370 | 340 | 4,900 | 5,200 |
| 12/10/07 | 110 | 150 | NS ¹ | NS ¹ |
| 12/11/07 | 150 | 110 | NS ¹ | NS ¹ |

¹ – No sample, site dry

Table 2. Summary of FIB sample results from Carbon Canyon Creek and Cypress Channel during dry weather (2007-2008)

| Site | Warm Season | | | | Cool Season | | | |
|-----------------------|-------------|-------|---------|--------|----------------|-------|-------|--------|
| | N | Min | Max | Median | N | Min | Max | Median |
| Fecal coliform | | | | | | | | |
| Carbon Canyon Cr. | 10 | 90 | 1,400 | 130 | 9 | 9 | 930 | 150 |
| Cypress Channel | 10 | 2,000 | 125,000 | 7,050 | 2 ¹ | 1,000 | 1,000 | 1,000 |
| <i>E. coli</i> | | | | | | | | |
| Carbon Canyon Cr. | 10 | 9 | 280 | 100 | 9 | 40 | 860 | 150 |
| Cypress Channel | 10 | 910 | 67,000 | 2,700 | 2 ¹ | 1,000 | 2,000 | 1,500 |

¹ -Site often dry during cool season.

Table 3. Frequency of exceedance of FIB water quality objectives in Carbon Canyon Creek and Cypress Channel, 2007-2008

| Site | Single Sample Criterion Exceedance Frequency (%) | | Geometric Mean (cfu/100 mL) | | | | Geometric Mean Exceedance Frequency (%) |
|-----------------------|--|-----|-----------------------------|------------------------|-------------------------|-------------------------|---|
| | Dry | Wet | Warm 2007 (7/14 – 8/11) | Warm 2007 (9/1 – 9/29) | Cool 2008 (1/19 – 2/16) | Cool 2008 (1/26 – 2/23) | |
| Fecal coliform | | | | | | | |
| Carbon Canyon Cr. | 32 | 100 | 126 | 257 | 205 | 122 | 50 |
| Cypress Channel | 100 | 100 | 11,366 | 4,949 | n/a ¹ | n/a ¹ | 100 |
| <i>E. coli</i> | | | | | | | |
| Carbon Canyon Cr. | 26 | 100 | 44 | 84 | 200 | 177 | 50 |
| Cypress Channel | 100 | 100 | 4,745 | 1,981 | n/a ¹ | n/a ¹ | 100 |

¹ – Insufficient data to calculate geometric mean

Table 4. Summary of number of *Bacteroidales* host-specific marker detections at Carbon Canyon Creek and Cypress Channel during 2007-2008

| Site | N | Human | Domestic Canine | Bovine |
|-------------------|----|-------|-----------------|--------|
| Carbon Canyon Cr. | 20 | 0 | 8 | 0 |
| Cypress Channel | 14 | 1 | 2 | 10 |

Source Evaluation Methods

Source evaluation activities involved two primary activities: Desktop level characterization of the subwatershed and a field reconnaissance to survey the stream channel. The following sections describe the activities carried out for each.

Desktop Level Characterization

CDM conducted a desktop level analysis to identify, to the extent possible, the following subwatershed characteristics for Cypress Channel and Carbon Canyon Creek. This analysis examined the following areas:

- *Land use* – Compile the most recent land use information for each watershed.
- *Storm drain network* - Locate storm drain discharge locations, and where available, obtain GIS-based storm drain data from local jurisdictions.
- *Sanitary sewer survey* – To the extent possible, locate wastewater collection system pipes in relation to each channel.
- *Channel characteristics* – Characterize the channels to identify reaches with natural or engineered sections with use of aerial photographs and as-built data, where available from local jurisdictions.
- *Hydrologic characteristics* – Characterize the flow characteristics in each channel.
- *BMP implementation activities* – Identify the types and extent of BMPs implemented to manage urban runoff within the Carbon Canyon and Cypress Creek subwatersheds by consulting with local jurisdictions and review of available aerial imagery.

Field Reconnaissance

CDM obtained from San Bernardino County Flood Control District (SBCFCD) permit approval and temporary right-of-way access to Carbon Canyon Creek and Cypress Channel. Carbon Canyon Creek field reconnaissance was performed on December 4, 2009. Cypress Channel field reconnaissance was conducted on December 22, 2009.

For both channel facilities, CDM entered the SBCFCD gates at a major overcrossing, and where possible, drove the entire length of each channel along maintenance access roads. Observations were made to verify channel characteristics, obtain photographs, document any dry weather flows and trace sources for these flows (where applicable). For Cypress Channel, a portion of the channel (approximately 3,000 feet north of Kimball Avenue) is located within the California Institution for Men (CIM) prison and required separate access approval from CIM. A number of MSAR Task Force members accompanied CDM on the Cypress Channel field reconnaissance at CIM.

Carbon Canyon Creek Source Evaluation

The Carbon Canyon Creek subwatershed is approximately 6.2 square miles (Figure 1). Carbon Canyon Creek begins as a natural watercourse within a residential area of Chino Hills and has two tributaries (English Canyon Channel and Little Chino Creek). Carbon Canyon Creek is tributary to Chino Creek.

CDM conducted a field reconnaissance survey on December 4, 2009, to verify the storm drain discharge locations to Carbon Canyon Creek, and where visually possible, observe conditions of any sanitary sewer lines which cross the channel. The weather was dry on the day of the field survey. The most recent rainfall (0.70 inches) occurred October 13-14, 2009 (SBCFCD Chino Hills Reservoir Gage #2880); therefore, observed channel flows were strictly dry weather flows and not influenced by wet weather events.

Land Use

Land uses in the Carbon Canyon Creek subwatershed are predominantly residential and natural/vacant (Figure 2, see also SAWPA 2009). Also present are pockets of open space and parks (Crossroads Park and Chino Hills Community Park) located in the vicinity of Carbon Canyon Creek. The upper reach of Carbon Canyon Creek flows parallel to Carbon Canyon Road (State Route 142) along its western side. A wide stretch of undeveloped natural land lies along the eastern side of Carbon Canyon Road, south of Chino Hills Parkway.

Storm Drain Network

The City of Chino Hills provided GIS data for the storm drain system within the Carbon Canyon Creek subwatershed. The provided storm drain network data are very high level, showing only major drainage inputs into the channel, not the smaller lateral drains entering the channel (Figure 3 - blue lines). The provided information did not include detailed data such as the number and size of lateral drains. During the field reconnaissance, there were no observed illicit connections to the channel.

Sanitary Sewer Survey

Based on available GIS data, Figure 3 illustrates the location of sanitary sewer lines in the Carbon Canyon Creek subwatershed. Sanitary sewer lines are located belowground and typically cross channels at street/bridge overcrossings. Figure 3 highlights key areas where sanitary sewer lines intersect or are adjacent to the creek channel. Field reconnaissance was performed from outside the channel along the flood control right-of-way and not from within the channel, which limited the ability to view sanitary sewer line crossings, e.g., under bridges. Based on observations, no obvious signs of sanitary sewer line leaks were observed.

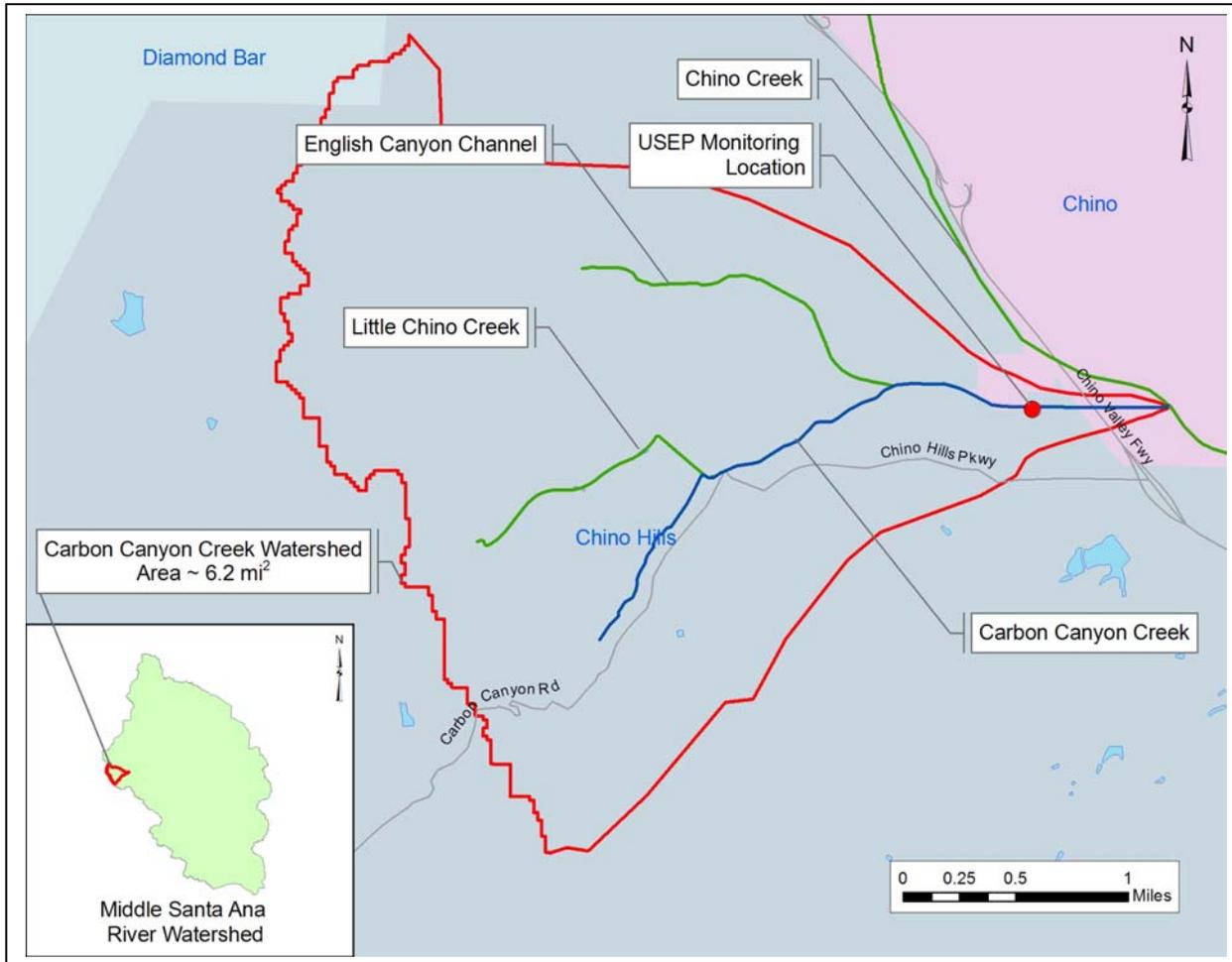


Figure 1. Carbon Creek Canyon subwatershed

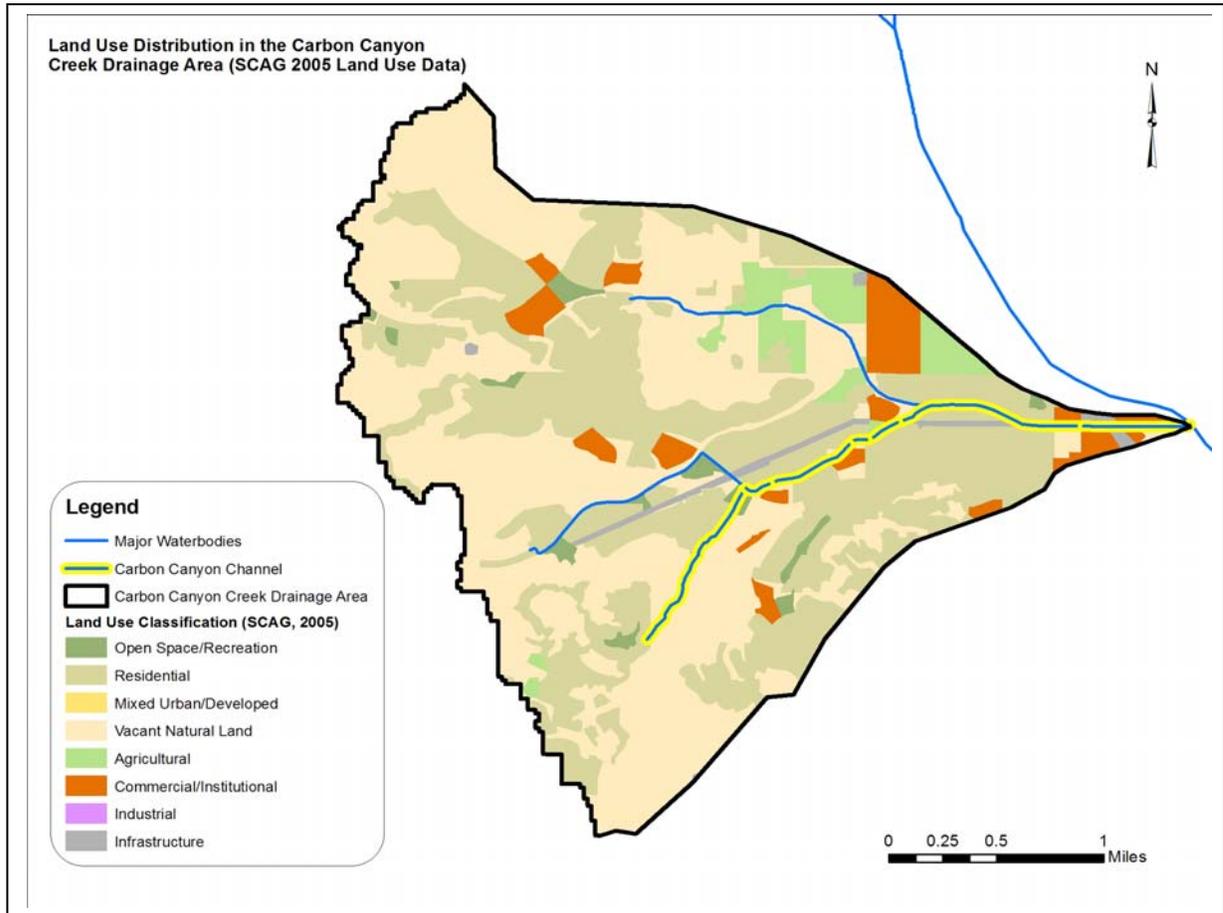


Figure 2. Land use characteristics of the Carbon Canyon Creek subwatershed

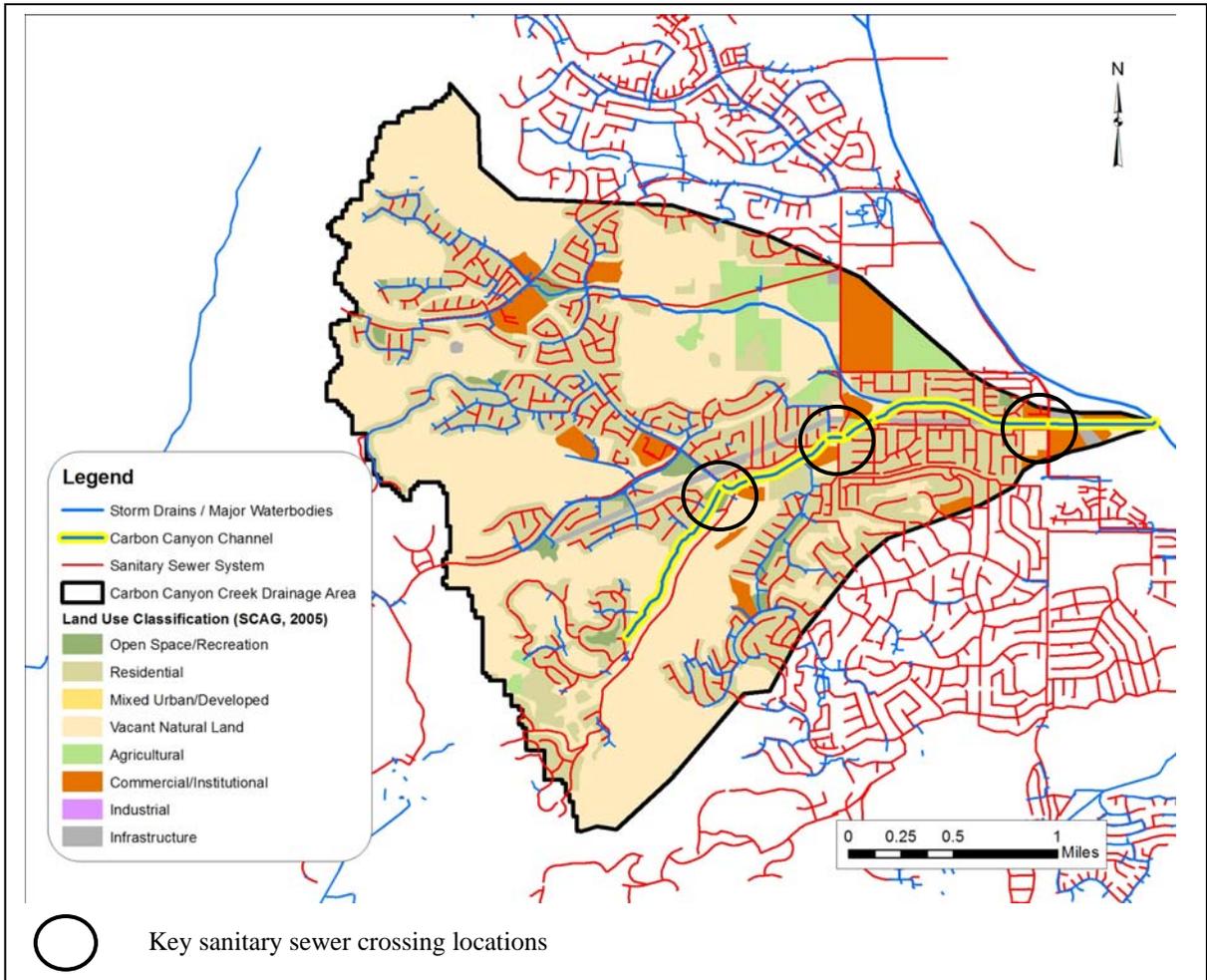


Figure 3. Sanitary sewer and storm sewers in the Carbon Canyon Creek subwatershed

Channel Characteristics

Table 5 summarizes the channel characteristics of Carbon Canyon Creek (Figure 4).

Table 5. Channel characteristics of the Carbon Canyon Creek Channel

| Segment | Description |
|---|---|
| From natural watercourse in Chino Hills downstream to Chino Hills Parkway | Natural channel with heavy vegetation |
| Chino Hills Parkway downstream to approximately 400 ft west of Peyton Drive | Vertical, fully concrete-lined |
| 400 ft west of Peyton Drive to Peyton Drive | Closed culvert section |
| Peyton Drive downstream to approximately 750 ft east of Peyton Drive | Vertical, fully concrete-lined |
| Approximately 750 ft east of Peyton Drive to confluence with English Canyon Channel | Trapezoidal concreted-rock side slope and bottom |
| Confluence with English Canyon Channel to Pipeline Avenue | Trapezoidal concreted-rock side slope and bottom; with concreted-rock bottom control structures spaced from 150 to 200 ft apart |
| Pipeline Avenue downstream to confluence with Chino Creek | Vertical, fully concrete-lined |

Figure 5 provides an aerial view of Carbon Canyon Creek from the confluence with English Canyon Channel downstream to Pipeline Avenue. This segment of the channel is believed to have a somewhat unique bottom structure. The channel has a concreted-rock side slope and bottom - a common type of construction. However, the channel bottom has a series of concreted-rock bottom control structures spaced approximately 150 to 200 feet apart (see close-up in Figure 6). Record drawings provided by SBCFCD indicate these structures are designed for flow dissipation. At the time of the field survey, the bottom control structures appeared to not be optimally maintained, resulting in pools of water behind each control structure along the length of this channel segment (Figure 7).

Vegetated growth was observed throughout the entire length of the trapezoidal concreted-rock segment of the channel (from approximately 750 feet east of Peyton Drive downstream to Pipeline Avenue). Vegetation was prevalent along the base of the side slopes. Additionally, more significant vegetation was observed from the English Canyon Channel confluence to Pipeline Avenue. The flow dissipation bottom control structures appear to facilitate sediment accumulation within the ponded areas which has led to increased vegetation growth.

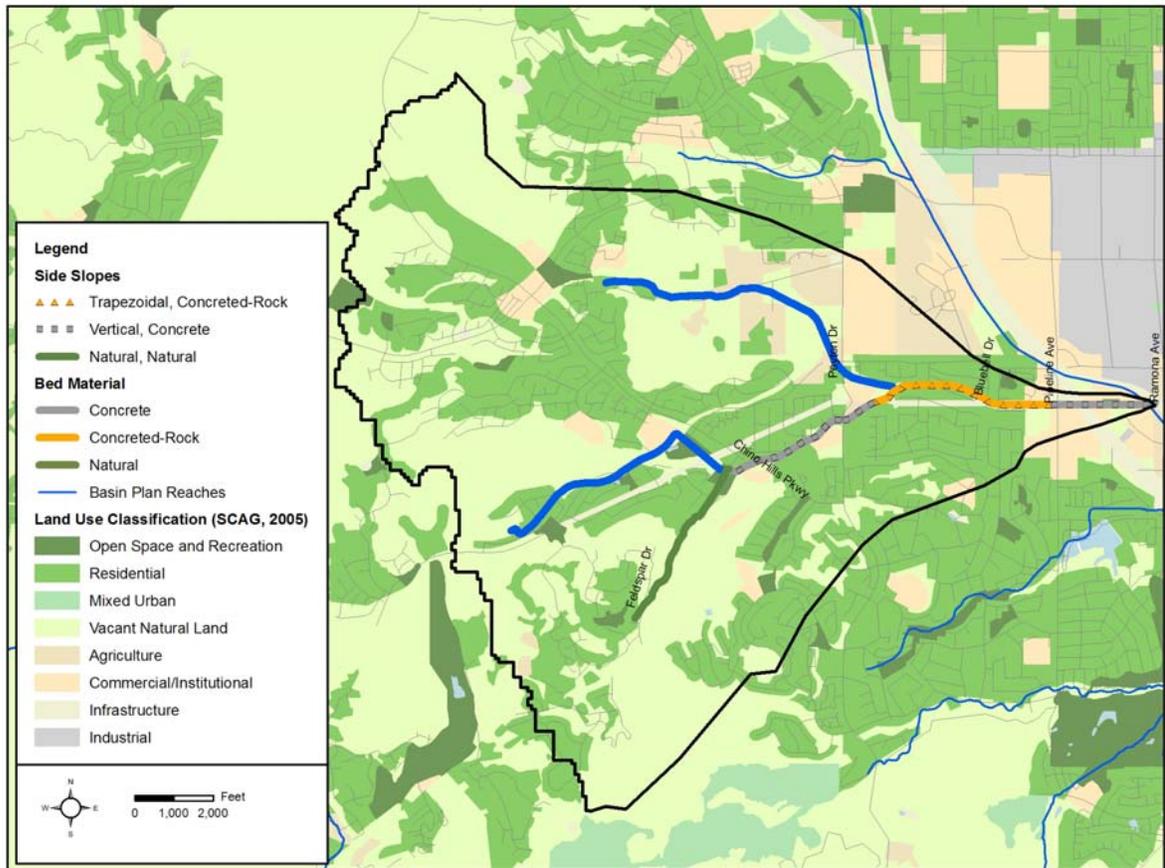


Figure 4. Carbon Canyon Creek channel characteristics



Figure 5. Aerial view of lower portion of Carbon Canyon Creek (blue line) segment showing location of concreted-rock bottom control structures

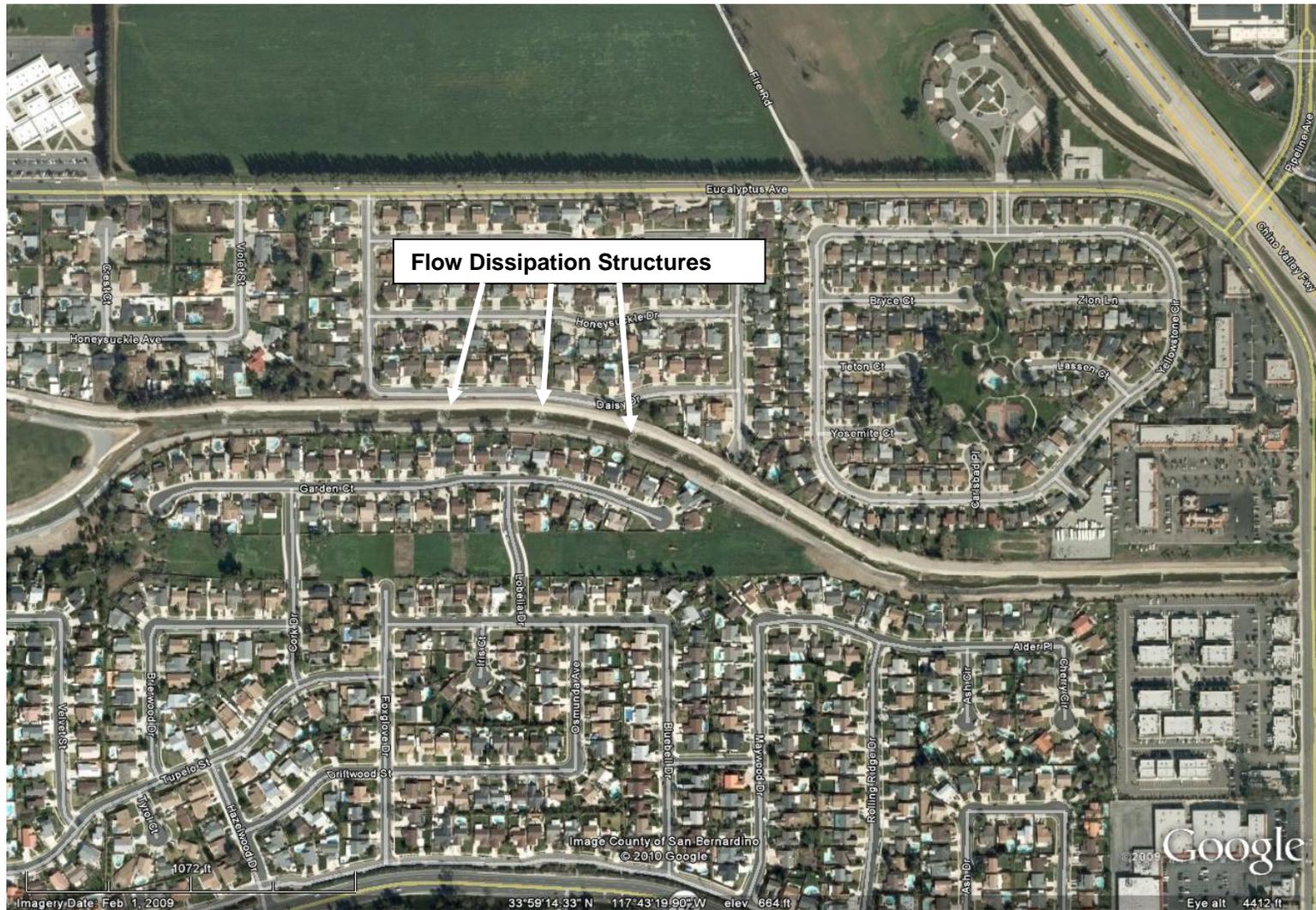


Figure 6. Flow dissipation structures in Carbon Canyon Creek (see Figure 5 for relative location within subwatershed)



Figure 7. Ground view of concreted-rock bottom control structures. Note vegetative growth and ponded water associated with structures.

Hydrologic Characteristics

No continuous flow gauge data is available for Carbon Canyon Creek. Flow data were obtained from the USEP Monitoring Program (2007-2008), where discrete flow measurements were collected at Carbon Canyon Creek at Pipeline Avenue. Table 6 summarizes mean values and ranges for observed flows. Ten flow measurements were collected during the 2007 dry season, six measurements during the wet season, and three additional flow recordings were conducted during a wet weather event in December 2007. Sources of dry weather flow to Carbon Canyon Creek are assumed to be a combination of dry weather discharge from MS4 outfalls and groundwater. No treated effluent is discharged into this watershed.

Table 6. Carbon Canyon Creek recorded flows during USEP 2007-2008 sampling events

| Condition | Mean (cfs) | Range (cfs) |
|----------------------------------|------------|--------------|
| Dry season | 6.86 | 3.20 - 15.31 |
| Wet season | 10.03 | 2.49 - 27.60 |
| Wet weather event, December 2007 | 27.87 | 3.30 - 55.20 |

During the time of the field survey, CDM observed continual baseflow within the entire length of the channel. Lateral drains, where observed, showed little evidence of dry weather flow input during the survey. Within the vertical concrete-lined reaches of the channel (between Chino Hills Parkway and 750 feet east of Peyton Drive), a single lateral drain was observed to be flowing. The source of flow was identified to be irrigation runoff from an adjacent residential neighborhood located north of the channel at Morningfield Drive and Sleepyglen Circle.

Within the trapezoidal concreted-rock side slope and bottom segments, lateral drains had no observable dry weather flows. In a few cases, lateral drains within the segment between the confluence of English Canyon Channel and Pipeline Avenue had wetted surfaces within the drainage pipes and surrounding outfall area but no measureable flow.

Photographs - Carbon Canyon Creek

Figures 8 through 13 provide representative photographs of the Carbon Canyon Creek channel.



Figure 8. View of storm drain lateral to channel (no flow observed)



Figure 9. Downstream view of vegetation and ponded water within channel



Figure 10. Typical downstream view of Carbon Canyon Creek upstream of confluence with English Canyon Channel



Figure 11. Upstream view of vertical concrete-lined channel near Morningfield Drive, upstream of English Canyon Channel confluence



Figure 12. Upstream view of vertical concrete-lined channel north of Chino Hills Parkway, upstream of English Canyon Channel confluence



Figure 13. Downstream view of natural channel (within heavy vegetated area) in upper portion of the subwatershed, south of Chino Hills Parkway

BMP Implementation Activities within Carbon Canyon Creek

The City of Chino Hills implements source control BMPs as part of the City's stormwater management program (e.g., street sweeping, enforcement of waste disposal, littering ordinances, public education). Based on observations (field survey activities and review of aerial photographs) and communications with the City of Chino (Tad Garrety, City of Chino Hills, September 29, 2009), it appears that no structural treatment BMPs have been implemented in this subwatershed.

Observations and Recommendations for Carbon Canyon Creek

As previously noted, the Carbon Canyon Creek survey was implemented to determine if any site-specific characteristics could be identified that provide insight into why FIB concentrations were significantly lower at this USEP monitoring location than what was observed at other USEP monitoring locations. The survey identified the presence of flow dissipation structures in the lower portion of Carbon Canyon Creek. It is not known to what extent this type of channel construction has been used in other waterbodies in the area; its use in Carbon Canyon Creek may be somewhat unique.

The channel segment with the flow dissipation structures is located immediately upstream of the location where the USEP monitoring program collected samples. As noted above, the flow

dissipation structures facilitate sediment deposition resulting in pooled water and vegetation development. While certainly not designed to be a dry weather treatment BMP, these flow dissipation control structures may be providing unintended water quality benefits by (1) reducing flow rates, which increases opportunity for ultraviolet sunlight to kill bacteria; (2) providing a filtering effect as water slowly moves through each flow dissipation structure, and (3) increasing opportunity for vegetation pollutant uptake. It is possible that during dry weather this portion of the channel may be functioning like an extended detention basin or vegetated swale.

Given these observations, it is recommended that at some point the Task Force consider additional studies in this subwatershed to determine if the flow dissipation control structures are truly providing water quality benefits. Implementation of this recommendation would require a short-term intensive monitoring survey to evaluate FIB concentrations above, below and within the segment where the control structures are located. If these structures are providing water quality benefits, then this type of channel structure could be considered for other waterbodies as a potential BMP.

This survey also identified reaches of Carbon Canyon Creek where Use Attainability Analyses (UAAs) could be developed. Specifically, these UAAs would be developed in the engineered portions of the channel (see Figure 4). At this time, the priority for these UAAs is low given the USEP monitoring program observation of low FIB concentrations during dry weather is low.

Cypress Channel Source Evaluation

Cypress Channel, tributary to the lower portion of Chino Creek in Prado Basin, drains an approximately 8.8 square mile area (Figure 14). Cypress Channel begins in the City of Ontario, traverses the City of Chino and continues through El Prado Golf Course before reaching Chino Creek.

CDM conducted a field reconnaissance survey on December 22, 2009, to verify the storm drain discharge locations to Cypress Channel, and where visually possible, observe conditions of any sanitary sewer lines which cross the channel. The weather condition was dry during the field survey, but rain occurred the night before. Observation of dry weather flow discharges to the channel was not feasible since flows into the channel could have been influenced by the wet weather. Although these conditions were not ideal for this survey, it was determined that the survey should occur as planned because of the lengthy period of time that it had taken to obtain permission to visit the portion of the channel in the area of the CIM.

Land Use

The subwatershed is predominantly a combination of residential, agricultural, and commercial land uses. In the upper portion of the subwatershed, residential land use predominates. South of Edison Avenue the lower part of the subwatershed is dominated by agricultural fields and dairy operations (Figure 15). Also in the lower portion of the subwatershed, Cypress Channel crosses the agricultural field located within the CIM facility (Figure 16). Figure 17 depicts the land uses within the Cypress Channel subwatershed area.

Storm Drain Network

The City of Ontario provided GIS data for the storm drain system located in the vicinity of Cypress Channel and within its jurisdiction. The storm drain map shows the drainage system as line segments with catch basins. CDM was not able to field verify the channel segment located at Sultana Avenue and Walnut Avenue downstream to Euclid Avenue. This segment of the channel was under re-construction at the time of the field survey.

The City of Chino provided storm drain maps (hard copy) for the locations near Cypress Channel within its jurisdiction. These maps were land parcel maps with storm drains and catch basins indicated on the maps. The maps provide information such as the number and size of lateral drains. During the field reconnaissance, no illicit connections to the channel were observed. However, lateral drains were observed which are not depicted on the drainage maps. For example, two 18-inch lateral drains are located on both sides of Cypress Channel just south of Kimball Avenue. The storm drain maps are outdated and do not include any information depicting the channel or storm drain system at the following locations:

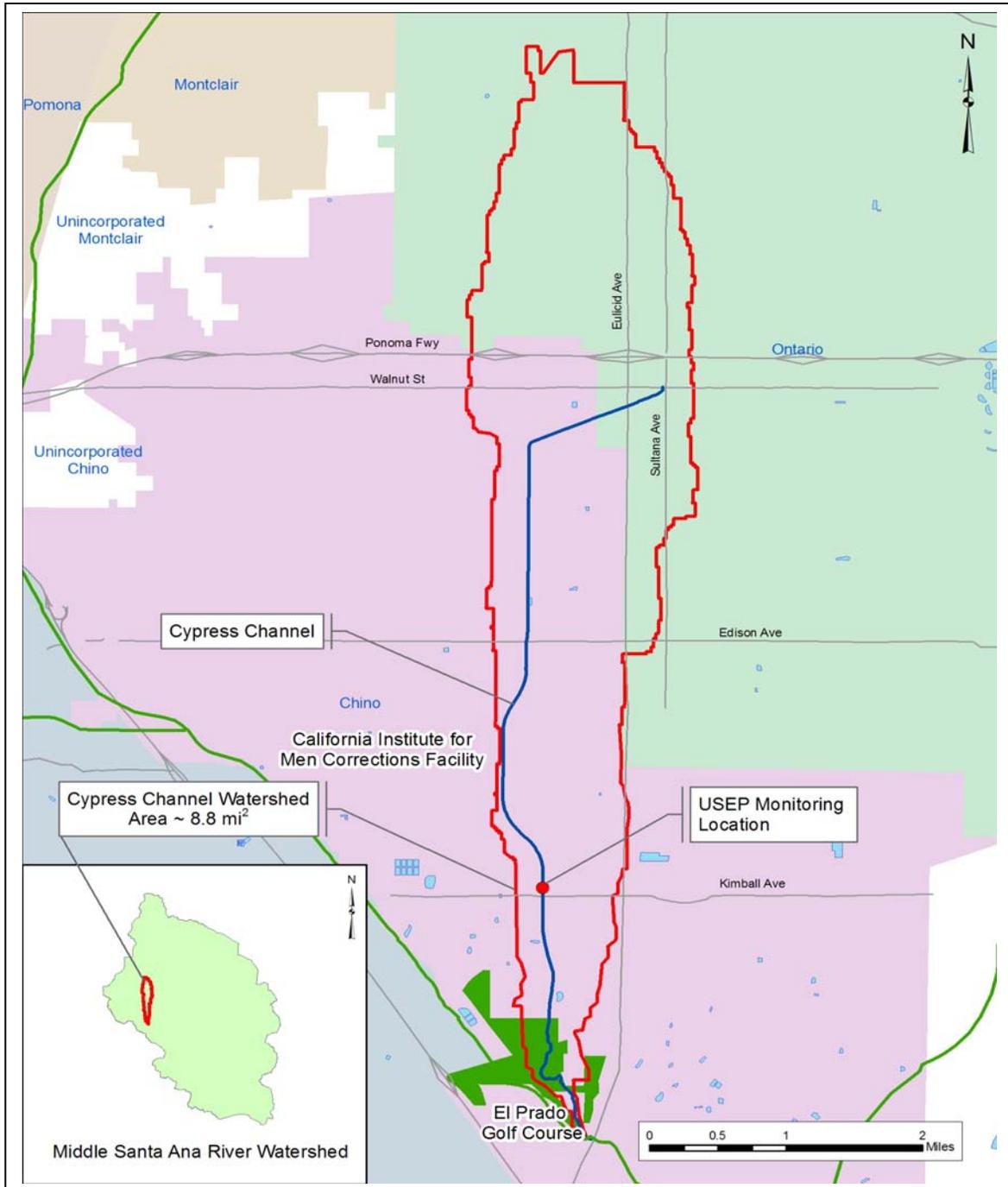


Figure 14. Overview of Cypress Channel subwatershed

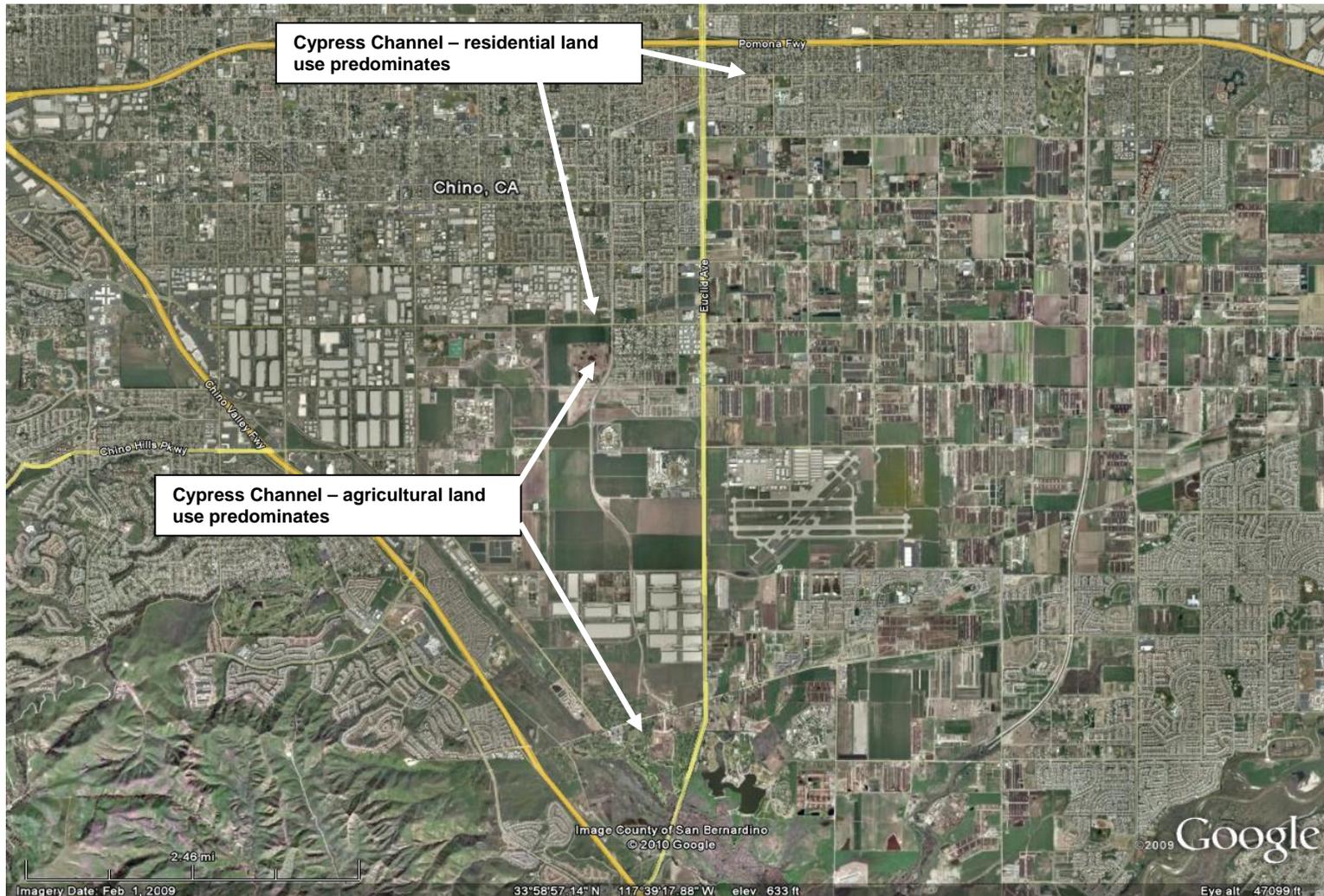


Figure 15. Aerial view of Cypress Channel subwatershed illustrating changing land use from north to south



Figure 16. Aerial view of the lower part of the Cypress Channel subwatershed showing location of various facilities

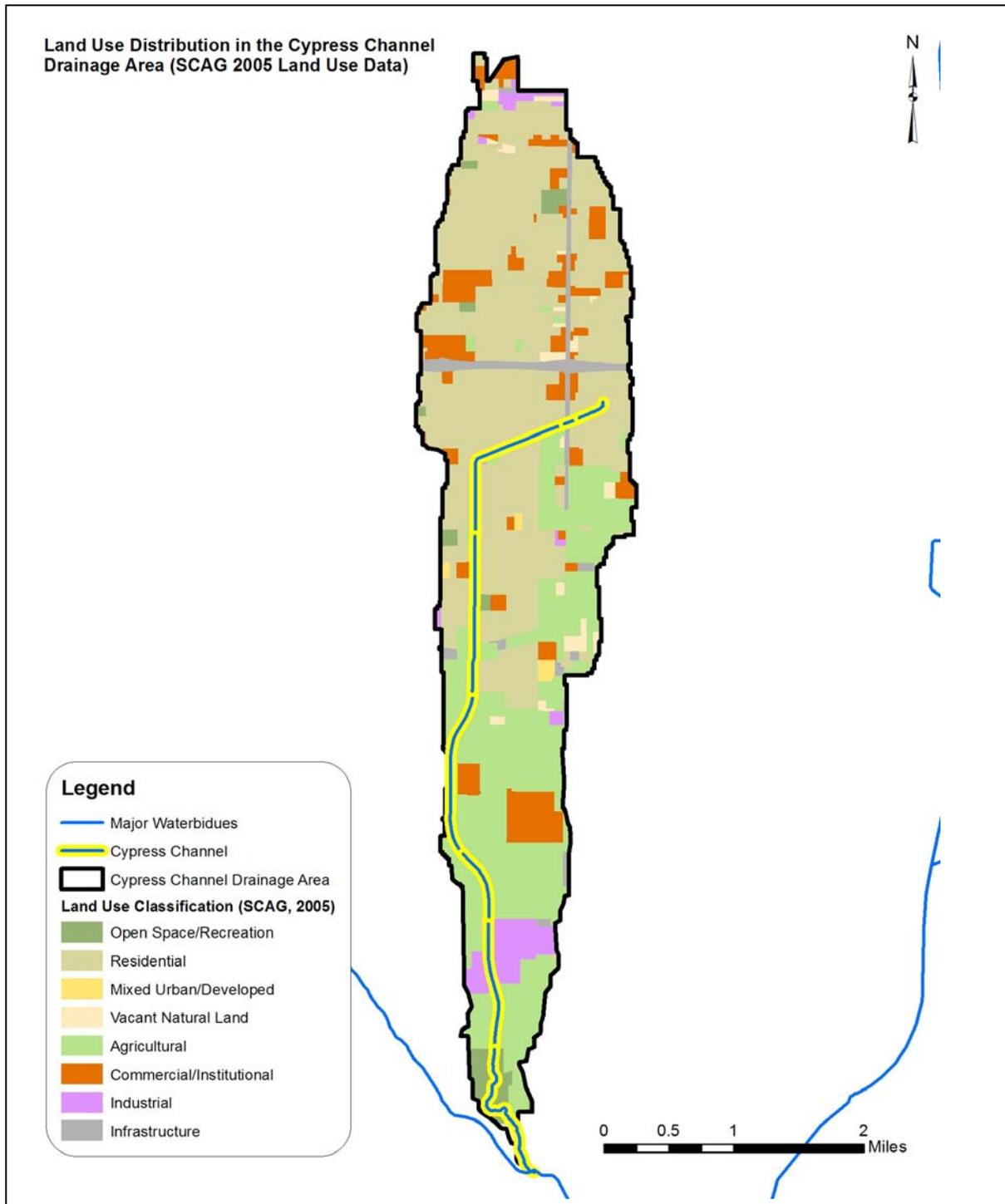


Figure 17. Land use within the Cypress Channel subwatershed

- CIM state prison jurisdiction – City of Chino has no jurisdiction over this State of California facility.
- College Park residential development adjacent to Cypress Channel - This newer housing development is located north and south of Eucalyptus Avenue and is not included on the drainage maps.
- Parcels south of Kimball Avenue and Cypress Channel – Commercial/industrial developments including large distribution centers with large trucking container parking areas are located on the east and west sides of Cypress Channel.
- Parcels south of Bickmore Avenue and Cypress Channel are not shown on the drainage maps. Within this parcel, a retention basin is located on the southeast corner of Bickmore Avenue and Cypress Channel.

Sanitary Sewer Survey

City of Ontario provided a GIS data layer for the sanitary sewer system within the vicinity of Cypress Channel. CDM was not able to verify the channel segment located at Sultana Avenue and Walnut Avenue downstream to Euclid Avenue. This segment of the channel was under re-construction at the time of the field reconnaissance. City of Chino provided a street/sewer map with sewer lines shown on parcel maps. Sanitary sewer lines are located below ground and predominantly cross channels at street overcrossings. Field reconnaissance was performed from outside the channel along the SBCFCD right-of-way and not from within the channel. This limited the opportunity to identify or confirm the condition of sanitary sewer lines running under street overcrossings. However, no obvious concerns were apparent during the field reconnaissance.

Channel Characteristics

Table 7 describes the sidewall and bottom construction of the Cypress Channel. These channel attributes are mapped in Figure 18. Cypress Channel is predominantly a trapezoidal concrete-lined channel. Within the CIM right-of-way, the channel transitions to a natural unlined channel at approximately 3,000 feet north of Kimball Avenue; it then reverts to a trapezoidal concrete-lined channel downstream of Kimball Avenue. SBCFCD does not maintain nor have jurisdictional authority over any portion of the channel within CIM. This segment of the channel does not appear to be maintained. Agricultural fields are on both sides of the channel with no defined buffer to separate agricultural field operations from the unlined channel (see general location of CIM facilities in Figure 17; see photographs of channel in CIM area in Figures 19 and 20).

Table 7. Channel characteristics of Cypress Channel

| Segment | Description |
|--|--|
| West of Sultana Avenue/Walnut Avenue downstream to approximately 3,000 ft. north of Kimball Avenue | Trapezoidal, fully concrete-lined; (<i>Note:</i> At time of field survey, channel was under re-construction). |
| Approximately 3,000 ft north of Kimball Avenue downstream to Kimball Avenue overcrossing | Natural unlined channel, within CIM (not maintained) |
| Kimball Avenue downstream to approximately 2,750 ft south of Bickmore Avenue | Trapezoidal, fully concrete-lined |
| Approximately 2,750 ft south of Bickmore Avenue to confluence with Chino Creek | Natural unlined segment; this segment is not well-defined as it traverses through El Prado Golf Course |

Hydrologic Characteristics

No continuous flow gauge data is available for Cypress Channel. Flow data were obtained from the USEP Monitoring Program (2007-08), where discrete flow measurements were collected at Cypress Channel at Kimball Avenue. Table 8 shows mean values and ranges for these discrete flow records. Ten flow measurements were collected during the 2007 dry season, three measurements during the wet season, and two additional flow recordings were conducted during a wet weather event in December 2007. No treated effluent is discharged into this watershed. Sources of dry weather flow in the winter months when this survey was done are assumed to be primarily a combination of flows from MS4 outfalls and possibly groundwater. During summer months it likely that at least some agricultural irrigation water enters the channel in areas where agricultural activity occurs adjacent to the channel.

During the course of the field survey, continual flow was observed within the entire length of the channel. Lateral drains connected to the channel were not all flowing, even though a rain event occurred the night before the survey.

Table 8. Cypress Channel at Kimball Avenue recorded flows during USEP 2007-2008 sampling events

| Condition | Mean (cfs) | Range (cfs) |
|-------------------|------------|--------------|
| Dry season | 0.76 | 0.17 - 1.72 |
| Wet season | 0.67 | 0.15 - 1.18 |
| Wet Weather event | 10.80 | 4.00 - 17.60 |

Photographs - Cypress Channel

Figures 21 through 26 provide representative photographs of Cypress Channel.

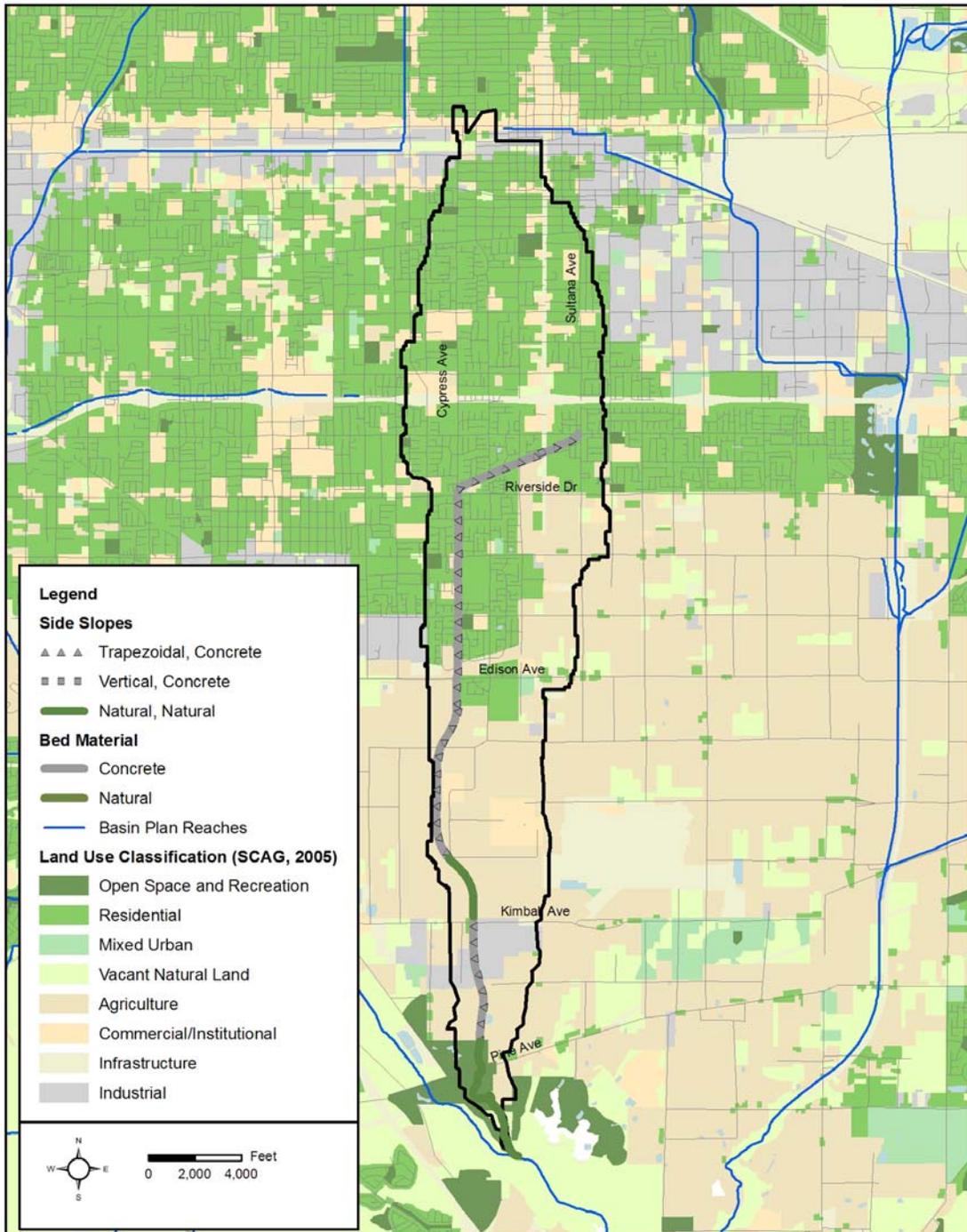


Figure 18. Cypress Channel characteristics



Figure 19. Upstream view of Cypress Channel (transition from trapezoidal concrete to natural) at CIM



Figure 20. Unlined section of Cypress Channel within CIM; agricultural field in background with no buffer between field and channel



Figure 21. Upstream view of Cypress Channel at Euclid Avenue



Figure 22. Downstream view of Cypress Channel north of Eucalyptus Avenue, adjacent to College Park housing development



Figure 23. Downstream view of Cypress Channel within CIM property



Figure 24. Upstream view of Cypress Channel at Kimball Avenue (transition from earthen to trapezoidal concrete channel)



Figure 25. Downstream view of Cypress Channel below Kimball Avenue



Figure 26. Downstream view of Cypress Channel as it enters the El Prado Golf Course

Additional Observations from Field Reconnaissance

A fertilizer facility is located southeast of Kimball Avenue and Cypress Channel, downstream of the USEP monitoring location (see Figure 16). During the field reconnaissance, CDM observed a stormwater storage basin within the property of the fertilizer plant (see Figures 27 through 31). A pipe and pumping system was set up adjacent to the basin. Water was being pumped from the storage basin to a smaller bermed holding pond that was located within the plant's property line but close to the SBCFCD right-of-way. No direct connections were made to the channel and no discharges were observed leaving the fertilizer plant property. A lateral pipe in the channel is connected to a flared end section located within SBCFCD right-of-way but adjacent to the pumping system (see Figure 29). The purpose of this pipe is unclear.

CDM discussed with the City of Chino the observed conditions and the potential for overflow discharges to Cypress Channel if the pumping operations are not well-maintained. Subsequently, City staff inspected the facility and reported that collected stormwater runoff in the stormwater storage basin is pumped to the smaller holding pond temporarily before the water is pumped to a watering truck and used for on-site dust mitigation. City of Chino will continue to inspect this fertilizer facility. The City also reported that the facility had filed a Notice of Non-Applicability in 2008, indicating no stormwater discharges off-site of its facility. The Santa Ana Regional Water Quality Control Board (RWQCB) is in the process of making a determination on the filing (communications with Don Allinder, City of Chino, December 30, 2009 and February 4, 2010).

A detention basin designed to drain runoff from a commercial development is located downstream of Bickmore Avenue and Cypress Channel (also downstream of the USEP monitoring location, see Figure 16). This retention basin collects runoff from commercial properties located to the northwest of Bickmore Avenue and Cypress Channel. The detention basin, which was constructed as part of an approved Water Quality Management Plan, is believed to have been constructed in 2005 as part of the commercial/industrial development. The basin is designed to empty within 72 hours for vector control purposes (communication with Don Allinder, City of Chino, January 13, 2010). During the field survey, the basin was filled with water and actively discharging to Cypress Channel (Figures 32 and 33). Given the rain event the prior evening, this basin was operating as intended.

BMP Implementation Activities

In discussions with City of Chino staff, CDM did not identify any specific treatment BMPs implemented to target bacteria apart from standard source control measures. Consistent with typical municipal stormwater programs, the City has a stormwater pollution prevention program to educate the public on reducing pollutants such as fertilizer, pet waste, and trash from entering the MS4 system. The City's public works department also conducts regular street sweeping and debris removal. Inspection and enforcement actions are implemented year-round to enforce the City's stormwater ordinances.



Figure 27. Stormwater storage basin at fertilizer plant with pumping and piping equipment



Figure 28. Broad view of piping and pump setup at fertilizer plant west of Cypress Channel



Figure 29. Culvert flared end section with 24-inch pipe located within SBCFCD right-of-way; pipe daylights to channel



Figure 30. Lateral pipe (24") daylights to channel



Figure 31. View of holding pond at fertilizer plant, adjacent to SBCFCD right-of-way (barbed wire fence)



Figure 32. View of detention basin located to the southwest of Bickmore Avenue and Cypress Channel



Figure 33. View of discharge entering channel from detention basin located to the southwest of Bickmore Avenue and Cypress Channel

Within the City there are dairy and agricultural operations as well as fertilizer plants. These activities result in the transport of manure from dairies to the fertilizer plant for composting and packaging. This delivery and movement of manure provides opportunity for accidental spills. Accordingly, the City enforces its City ordinances and seeks cost recovery from truck haulers for cleanup when necessary.

The City of Chino also has a water conservation program which includes a web-based form for the residents to report over-watering and irrigation leaks. This program not only supports water conservation but prevents dry weather runoff from entering and carrying pollutants to the storm drain system. A dedicated telephone hotline and web-based reporting link is maintained to receive reports of illegal dumping and discharges to the storm drain system or to report obstructed storm drains.

Observations and Recommendations for Cypress Channel

Based on the desktop characterization and observations from the field reconnaissance, the following observations and recommendations are made for Cypress Channel:

- CIM is not under the jurisdiction of the City of Chino, nor does SBCFCD have jurisdiction over Cypress Channel within CIM property. CDM recommends that the RWQCB follow-up with the CIM to evaluate BMPs implemented in agricultural fields adjacent to Cypress

Channel. For example, a wider buffer with accompanying BMPs (such as silt fencing, fiber rolls) could be implemented to prevent runoff from the agricultural fields from entering Cypress Channel. Limited BMPs (silt fencing) were visible along the natural earthen segment but these BMPs did not prevent sediment from sloughing into the channel. Without more BMPs in place, it appears that any runoff generated from agricultural fields likely will discharge directly into the channel.

In a letter commenting on an earlier draft of this technical memorandum, the RWQCB made the following comments regarding this recommendation (letter from RWQCB Executive Officer to SAWPA, dated April 27, 2010): (1) RWQCB staff realize that wastes may be discharged to waters of the state from lands used for agricultural operations, whether those lands are state owned or privately-owned; (2) RWQCB staff have initiated a process to develop a conditional waiver program that will address agricultural discharges in the San Jacinto watershed. As a result of recent in-house discussions, the conditional waiver program may be expanded to the MSAR watershed; (3) Agricultural operators are members of the MSAR TMDL Task Force and their representatives have been regular participants in the Task Force's process; and (4) RWQCB is funding a project that will specifically identify all agricultural operations within the MSAR watershed. The landowners for these operations will be required to comply with TMDL requirements and to prevent discharge of wastes to waters of the state.

- RWQCB should also evaluate CIM's onsite wastewater operations. According to Waste Discharge Requirements for CIM (Order No. 95-24), treated effluent from CIM's on-site treatment plant is discharged to percolation ponds located near El Prado Road and Kimball Avenue. Treated water from the percolation ponds is then reclaimed to irrigate crops grown within CIM. It is not known the location where this effluent is applied for irrigation or whether there is any potential for over-applied irrigation water to enter Cypress Channel.
- As a concrete-lined engineered waterbody, Cypress Channel is a candidate for a UAA. Re-classification of this channel would support efforts to focus water quality control activities on the lower portion of the channel where it discharges to Chino Creek.
- Additional intensive monitoring surveys may be warranted to determine if there are hot spots for input of FIB to Cypress Channel. For example sampling above and below major features such as the CIM facility may provide additional information regarding whether FIB sources are isolated or ubiquitous.
- City of Chino should continue to observe operations of the fertilizer plant to insure operations do not impact Cypress Channel. An evaluation of potential to discharge stormwater from this facility to Chino Creek should be conducted by the RWQCB (Note: Kathleen Fong, RWQCB, indicated to the City of Chino that the RWQCB will do an inspection of the facility as a follow-up to the Notice of Non-Applicability filing from

2008, email from Fong to Don Allinder, City of Chino, January 5, 2010; the RWQCB in its comments on an earlier draft of this technical memorandum indicated that an inspection occurred on March 2, 2010 and that RWQCB staff continue to work with the facility operator and City of Chino staff to determine future regulatory management of the facility [letter from RWQCB Executive Officer to SAWPA, dated April 27, 2010]).

- SBCFCD should evaluate the purpose of the flared end section and corrugated metal pipe (CMP) within its right-of-way adjacent to the fertilizer plant (see Figure 29) to determine if its presence provides any opportunity to influence water quality.
- In order to identify any potential cross connections or leaking sanitary sewer lines, further field investigation should be carried out to inspect sanitary sewer lines that cross the channel. No concerns were obvious during the field reconnaissance, but a more careful inspection by City engineers is warranted.
- No homeless encampments were observed during the field reconnaissance; however, the focus of this survey was primarily upstream of the USEP monitoring location. Areas below the El Prado Golf Course were not surveyed. It may be appropriate to investigate this potential FIB source as part of a larger evaluation of impacts from these encampments on water quality in the Prado Basin.
- During the field survey, substantial numbers of birds were observed in the channel. It may be appropriate to implement a study to evaluate the contribution that birds have on to FIB concentrations in this waterbody.

References

SAWPA. 2008a. *Middle Santa Ana River Water Quality Monitoring Plan*. Prepared by CDM on behalf of SAWPA and the MSAR Watershed TMDL Task Force. April, 2008.

SAWPA. 2008b. *Quality Assurance Project Plan for the Middle Santa Ana River Pathogen TMDL – BMP Implementation Project*. Prepared by CDM on behalf of SAWPA and the MSAR Watershed TMDL Task Force. April, 2008.

SAWPA. 2009. *Middle Santa Ana River Bacterial Indicator TMDL Data Analysis Report*. Prepared by CDM on behalf of SAWPA and the MSAR Watershed TMDL Task Force. March, 2009.