Technical Memorandum

Date August 1, 2011

To: Jessica Grant
City of Santa Barbara, Public Works Department

From: Tamara Klug and Rosemary Thompson

RE: **Results of Biological Investigations related to Lower Sycamore Creek Drainage Improvements Project**

Cardno ENTRIX

201 N Calle Cesar Chavez
Suite 203
Santa Barbara, CA 93103
USA

Phone 805-962-7679
Fax 805-963-0412
www.cardno.com

www.cardnoentrix.com

1.0 Introduction

A biological resources assessment (SAIC 2009) was prepared for a larger project in lower Sycamore Creek. That report included an assessment of potential impacts as well as recommended protection measures to avoid or minimize environmental effects during construction. Since that report was prepared, the project scope has been reduced to a shorter segment of Sycamore Creek and an alternative narrower bottom width has been developed. In addition, a number of concerns regarding potential impacts of the project on biological resources have been raised. This memorandum addresses those concerns and the revised project extent. The following issues, as described in our scope of work to the City of Santa Barbara, are described in the following sections:

1. Current conditions of the project site, including tree canopy/shade over the wetted channel.

2. An estimate of post-construction shading of the channel for both the proposed 28-foot channel design and for the alternative 20-foot channel design. This estimate is based on expected canopy size 5 years after planting on the reconstructed creek banks. The analysis also includes an evaluation of shading effects on vegetation under the Punta Gorda Street Bridge.

3. An evaluation of sediment deposition effects on aquatic habitat.

4. An evaluation of altered shading effects on aquatic species.

5. Effects of vegetation and sediment clearing that would be necessary to maintain flood capacity in the widened channel.

6. A quantitative analysis of vegetation and habitat to be removed and restored for project permits.

7. Recommendations to minimize environmental effects of maintenance activities.

Current conditions in lower Sycamore Creek and estimated future conditions are described under different project alternatives for the Lower Sycamore Creek Drainage Improvements Project. Future conditions are estimates based on a review of available information including project plans, aerial images, and other project information supplied by the City as well as a site visit on May 4, 2011 and preparer expertise on expected tree growth and canopy size.

2.0 Project Description

The proposed project consists of widening the existing channel of lower Sycamore Creek from the north side of U.S. Highway 101 to just north of Punta Gorda Street. It includes replacement of the Punta Gorda Street Bridge and planting of riparian vegetation on the reconstructed banks. Phase I of the project encompasses the section from Highway 101 to 100 to 150 feet south of Punta Gorda Street. Phase II extends from the end of Phase I to 55 to 75 feet north of Punta Gorda Street and includes replacement of the existing box culvert under the road with a 54-foot span bridge.

For the purposes of this analysis, we considered two alternatives, the proposed project which consists of a 28-foot-wide channel bottom and an alternative project with a 20-foot-wide channel bottom (hereafter referred to as the 28-foot Alternative and the 20-foot Alternative, respectively). Under both alternatives, the top channel width would be approximately 60 feet. The 28-foot Alternative includes a 20-foot-wide earthen channel bottom plus 4 feet of buried riprap on each side. From the edges of the channel, the buried riprap continues upslope at a slope of 1.5H:1V for a vertical distance of 2 feet. Above the riprap, the banks are earthen with a slope of 2H:1V. The 20-foot alternative is similar, but has a narrower channel bottom and gentler sloping banks.

The City will maintain the new channel and plantings on the banks for 5 years, after which the Santa Barbara County Flood Control District will maintain the channel under their permits for such work.

3.0 Current Conditions

The section of Sycamore Creek between Highway 101 and Punta Gorda Street (Phase I and part of Phase II) is bordered on the north by a trailer park and on the south by undeveloped land. The undeveloped area is heavily impacted by past activities and supports an assemblage of mostly non-native plant species. The south bank of the creek is approximately vertical over most of this reach and is held in place by a retaining wall at the upstream end and by pipe and wire revetment for the remainder of its length. Vegetation on the banks is very limited and consists of a honey locust at Punta Gorda Street and a clump of arroyo willows (*Salix lasiolepis*) about half way along this section. On the north bank, there is a large clump of willows at Punta Gorda Street, a medium-sized Victorian box (*Pittosporum undulatum*) near Highway 101, and a scattering of smaller willows between these locations. Native vegetation on the banks, aside from willows, is relatively uncommon in this area. Many of the smaller willows are sprouts from trees that have been cut at ground level, presumably to reduce flooding.

Shading of the creek (wetted channel) downstream of Punta Gorda Street varies by time of day and time of year due to changes in sun angle. Thus, the nearly vertical south bank can provide shade in the late afternoon while trees and large shrubs of both banks can provide shade for part to all of the day, depending on canopy size and location relative to the wetted channel.

The north bank of Sycamore Creek upstream of Punta Gorda Street supports a dense stand of naturally-occurring arroyo willows in addition to substantial plantings of native shrubs and trees. The first 25 feet of the channel adjacent to the bridge has minimal canopy cover. After that point, willows shade the entire creek corridor throughout the day. The south bank has a variety of landscape plants.

These factors were considered in determining the amount of shading that could be anticipated at the sunniest time of day and time of year (noon at midsummer). The result is shading over 31 percent of the wetted channel for Phase I and 46 percent of the channel for Phase II, with a total of about 40 percent for the two phases combined.

Agency Jurisdiction

Several resource agencies have jurisdiction over the project including the U.S. Army Corps. of Engineers (USACE), the Californian Department of Fish and Game (CDFG), and the Regional Water Quality Control Board (RWQCB). The USACE and RWQCB would both have jurisdiction over wetlands and waters within the ordinary high water mark. If additional state wetlands are present, the RWQCB would have jurisdiction over those as well. As shown on the plans, the existing ordinary high water mark varies in width from about 16 feet to 23 feet. The CDFG has jurisdiction over the entire riparian corridor, which is currently between about 20 and 60 feet wide, depending on location along the channel.

4.0 Post-construction Shading

4.1 Proposed 28-foot Channel

The proposed project would result in a substantial widening of the channel. As part of this widening, almost all of the existing vegetation in and adjacent to the creek would be removed. As a result, no shade would be present at the sunniest time of year and time of day, except for where the bridge is located, immediately after construction. However, after 5 years, plantings installed for the project would provide shade of the channel. In particular, arroyo willows, which grow fast and would be planted near the channel bottom (in the sloping portion of the riprap zone) would provide shade very quickly. Other species planned for restoration of the site would be planted higher on the bank and would have to grow larger before shading the creek bottom. In addition, those species grow more slowly than arroyo willow. For these reasons, only the shade contributed by arroyo willows planted in the riprap zone was considered for this analysis.

For the purposes of this analysis, the following additional assumptions were made:

- Approximately half of the willow cuttings would grow into mature trees. While this may seem low, cuttings are often subject to high mortality rates.

- Spacing of surviving cuttings would be approximately regular.

- Willow cuttings would be planted approximately 14 feet from the center of the channel.
- Each willow would have a 20-foot-diameter canopy at year 5. This is consistent with observations at restoration sites similar to this one.

The resulting estimate is shading over 43 percent of the channel bottom for Phase I and 55 percent for Phase II, with a combined overall shading of 50 percent. Hence total shading for the 28-foot alternative would be substantially more than the 40 percent of the channel that is currently shaded. The amount of shade would continue to increase after 5 years, and the project should provide complete shading between years 20 and 25, if vegetation adjacent to the creek is not removed.

In addition the creek under the new bridge will have a natural bottom, allowing establishment of emergent vegetation, particularly at the edges of the channel. However, vegetation establishment will be somewhat limited due to the degree of shading created by the bridge.

Agency jurisdiction for the 28-foot channel would be as follows:

USACE – 36 feet (ordinary high water mark)

RWQCB – same as for USACE (no other state wetlands)

CDFG – 55 to 60 feet (the entire project width)

4.2 Alternative 20-foot Channel

We conducted a similar analysis for the 20-foot channel. Under this alternative, planting in the riprap zone is assumed to be the same, but plants would shade the channel earlier. Using the same assumptions as for the 28-foot channel, shading for Phase I would be approximately 60 percent and approximately 68 percent for Phase II, which is substantially more than the 40 percent that is currently shaded. The amount of shade would continue to increase after 5 years, and the project should provide complete shading between years 15 and 20.

Agency jurisdiction for the 20-foot channel would be as follows:

USACE – 28 feet (ordinary high water mark)

RWQCB – same as for USACE (no other state wetlands)

CDFG – 55 to 60 feet (the entire project width)

5.0 Effects on Aquatic Habitat

Both project alternatives would result in widening the channel top and bottom. The wider 20-foot or 28-foot channel bottom as designed with a nearly flat bottom would not be suitable habitat for most aquatic species, and particularly fish such as the tidewater goby (*Eucyclogobius newberryi*), because water depth would be uniformly very shallow under low-flow conditions and no cover would be present immediately

after construction is complete. However, a low-flow channel, approximately 2 to 3 feet wide (similar to what is currently present), would be expected to form within the wider channel bottom after the first major runoff event and establish habitat suitable for the tidewater goby. The location and shape of this low-flow channel will likely vary each year and may contain small pools, riffles, and meanders. This narrow low-flow channel would have water depths that could support aquatic species when creek flow is low (i.e., all year except during moderate to large runoff events). Emergent and other vegetation associated with streams is expected to colonize the low-flow channel and adjacent areas of the main channel, enhancing the aquatic habitat. Even a short-term loss of adequate habitat for the tidewater goby between channel construction and the first runoff event would be considered a significant, but mitigable, impact under CEQA.

Sediment deposition rate under low flow conditions would be slightly greater under either alternative than under current conditions because the wider channel would reduce water velocity, for a given volume of water, and thus reduce the sediment carrying capacity of that water resulting in sediment deposition. The wider (28-foot Alternative) would tend to drop more sediment than the 20-foot Alternative for the same reasons (a narrower channel will result in higher velocity flows and more scouring with less sediment deposition). A sediment evaluation study conducted by Penfield & Smith concluded that the conditions following project construction would be adequate to move sediment through the area with little to no accumulation (Penfield and Smith 2010). In addition, the greater amount of shading over the 20-foot Alternative bottom would result in less development of herbaceous wetland vegetation that tends to slow water and trap sediment.

6.0 Effects on Aquatic Species

As described in the previous biological survey report (SAIC 2009), the federally listed as endangered tidewater goby inhabits lower Sycamore Creek from the mouth to at least Punta Gorda Street. The Southern California ESU steelhead (*Oncorhynchus mykiss*), also federally listed as endangered, may use lower Sycamore Creek in the project area for migratory passage with adults moving upstream to spawn during higher flows in winter and both adults and juveniles moving downstream to the ocean in spring. Other special status aquatic to semi-aquatic species (e.g., two-striped garter snake [*Thamnophis hammondi*], southwestern pond turtle [*Emys marmorata pallida*], and California red-legged frog [*Rana draytonii*]) have a low potential to be present (SAIC 2009). However, pond turtles have been observed in the project vicinity and are more likely than the other two species to be present during construction and maintenance.

Removal of vegetation during channel widening would eliminate shading of the water for at least one year with shade gradually increasing over the next few years as described above. Lack of shade, especially during the summer to fall when water flow is low, air temperatures are higher, and day length is long, could result in warmer water temperatures. Until a low-flow channel develops, the large surface area and shallow water depth would also contribute to warmer water temperatures. The very shallow water with no in-channel cover (e.g., vegetation, rocks, shade) would also expose tidewater gobies to predation by birds and raccoons. Since construction is likely to take place in the fall, a low-flow channel is expected to develop within a few months, and as day length and air temperatures decrease, so would water temperatures even without shade. Tidewater gobies often occur in exposed water bodies, such as coastal

lagoons, with little to no shade, so shade is not a necessary habitat component as long as water depth and reduced water clarity can provide cover. This species can live and reproduce at temperatures up to 25°C (77°F) (Moyle 2002). No data are available regarding current water temperatures in Sycamore Creek where tidewater gobies occur; however, it is assumed that water temperatures in the reconstructed channel would be similar to those under current conditions. As long as no barriers are present, the fish would move into areas with suitable temperatures and avoid unsuitable areas. Thus, impacts of the project on water temperature would be less than significant.

Steelhead would only be expected in the project area during winter to spring when flows are higher and water temperatures are lower. Thus, widening the channel bottom in fall is not likely to adversely affect their movement as long as a low-flow channel with deeper water develops before this species arrives in this creek segment.

Current creek conditions provide only marginal habitat for the other special status species, and implementation of either project alternative would not improve aquatic habitat suitability for the California red-legged frog and two-striped garter snake. Restoration of the creek banks with native vegetation could provide cover for California red-legged frogs and two-striped garter snakes, but other necessary habitat components would not be improved by the project. As no individuals of these species are expected to be present after construction is complete, effects are unlikely to occur. Reconstruction of the channel with sloping banks on both sides with vegetation would provide accessible upland habitat for pond turtles but marginal habitat for egg laying. The low-flow channel that develops will not improve habitat for this species as water depths (particularly pools) are expected to be too shallow.

Construction and restoration activities have the potential to introduce non-native plant and animal species into the creek through transport on equipment, including foot gear and hand tools, used in the creek. Of particular concern are species such as the New Zealand mudsnail that can disrupt natural aquatic ecosystems.

Effects of channel maintenance on tidewater gobies, steelhead, other aquatic species, and riparian birds are discussed in the next section.

7.0 Effects of Channel Maintenance

The City will maintain the channel and bank restoration for 5 years to ensure establishment of planted vegetation. Maintenance activities include monitoring, watering, weed control, replacement of plants that fail to establish, erosion repair, and pruning of willows at the edge of the channel to minimize dense growth that can impede high flows and increase the potential for flooding. If willows that occur at the edge of the channel are cut at ground level, a substantial portion of the channel shade could be lost. If the lower branches of channel-side willows are cut, such that upwards growth is encouraged, loss of shade would be reduced and water movement would be maintained.

City maintenance activities, although only occurring during short intervals that are generally spaced several years apart, can still have substantial effects on aquatic and riparian biota, depending on the methods used and time of year the activities occur. Thus, maintenance activities during the bird nesting season could affect reproduction in birds. Nesting birds are protected under the Migratory Bird Treaty Act

and Fish and Game Code Section 3503. Maintenance within the wetted channel at any time of year would affect aquatic species, but conducting the work in the fall just prior to winter rains or early in the spring prior to breeding by the tidewater goby (peak spawning occurs from late April to July [USFWS 2008]) would minimize effects on this species.

After the 5-year maintenance period by the City, Santa Barbara, the County Flood Control District will maintain the channel for flood control purposes. Flood control maintenance will consist of manual cutting and herbicide treatment of vegetation in compliance with their permits for such activities. However, if planted trees and shrubs on the banks are removed by Flood Control, this would remove habitat and shading of the channel, a significant impact. Based on the project sediment analysis, sediment removal is unlikely to be necessary, but if necessary would be incompliance with permits for such work.

8.0 Impacts to Wetland and Riparian Habitat

Quantitative data for permit applications is included as Attachment A. Table 1 details the existing habitat on site and the estimated habitat that would be present at completion of construction, 5 years post construction and at maturity for the proposed 28-foot channel. Table 2 lists those details for the alternative 20-foot channel. The time required for the habitat to reach maturity has not been determined, but it will be several decades.

Table 1. Habitat for the Proposed Project (28-foot Channel)

Habitat Type	Number of Acres			
	Pre-Construction	Post-Construction	5 years Post-Construction	Maturity
Willow Riparian	0.07	0.00	0.16	0.47
Emergent Wetland	0.03	0.00	0.03	0.00
Ruderal/Developed	0.36	0.36	0.32	0.07
Unvegetated Streambed	0.08	0.18	0.03	0.00
Total	0.54	0.54	0.54	0.54

Table 2. Habitat for the 20-foot Channel Alternative

Habitat Type	Number of Acres			
	Pre-Construction	Post Construction	5 years Post-Construction	Maturity
Willow Riparian	0.07	0.00	0.16	0.47
Emergent Wetland	0.03	0.00	0.00	0.00
Ruderal/Developed	0.36	0.43	0.38	0.07
Unvegetated Streambed	0.08	0.11	0.00	0.00
Total	0.54	0.54	0.54	0.54

9.0 Recommendations

Maintenance for the creek bed will consist of vegetation clearing and herbicide treatment, but will need to have an adaptive management component to address changing conditions related to vegetation growth and species use of the habitat. The creek is likely to have water present when vegetation removal activities take place. For that reason, measures to protect sensitive species and vegetation should include the following:

- Timing of clearing activities. Maintenance should be planned for outside the peak breeding season of the tidewater goby (late April through June) and the nesting season for birds (February 15 to September 15). If work needs to be conducted within the bird nesting season, a qualified biologist shall conduct a survey to determine if any birds are breeding, and if so, will establish a protective buffer around the nest.
- The dewatering plan for the project describes how dewatering activities would be conducted to ensure that no water is in the channel during construction of the project and that turbidity downstream of the work area is minimized. However, notification of the U.S. Fish and Wildlife Service needs to be added to that plan for the tidewater goby.
- All vegetation clearing during maintenance activities shall be conducted such that no visible turbidity enters the adjacent undisturbed channel.
- A low-flow channel 2 to 3 feet wide and 6 to 12 inches deep (with more at 12 inches than shallower) shall be installed at the end of project construction activities. This channel shall connect to the existing upstream and downstream low-flow channel. Impacts of construction on tidewater goby habitat would be mitigated to less than significant by this measure.
- A description of vegetation clearing methods, if applicable. Vegetation clearing should be minimized and willows should be trimmed to encourage upward (canopy) growth and discourage low branches that could reduce stream flow. This would apply during the 5-year maintenance of the project as well as future maintenance by County Flood Control.
- If County Flood Control has to remove accumulated sediment from the channel in the future, a low-flow channel shall be installed during the removal in accordance with EIR Mitigation Measure H4.
- Special requirements to prevent spread of non-native invasive species (plant and wildlife), such as making sure that all equipment working in the creek is clean and free of invasive species. This includes boots and hand tools used in the creek. Procedures for preventing introduction of non-native invasive species include:
    - Inspect all equipment, trucks, and engines to ensure they are clean of weed seeds.
    - Ensure that all equipment and personal gear are free of New Zealand mudsnails. Cleaning methods can be found at: http://www.dfg.ca.gov/invasives/mudsnail, http://seagrant.oregonstate.edu/sgpubs/onlinepubs.html, and http://www.anstaskforce.gov/Documents/NZMS_MgmtControl_Final.pdf.

10.0 References

Moyle, P.B. 2002. *Inland Fishes of California*. University of California Press, Berkeley and Los Angeles.

Penfield & Smith. 2010. Sediment Evaluation for the Lower Sycamore Creek Drainage Improvement Project. Prepared for the City of Santa Barbara

SAIC. 2009. Final Sycamore Creek Drainage Improvements Project Biological Resources Assessment Report, Phases 1 and 2. Prepared for City of Santa Barbara.

U.S. Fish and Wildlife Service (USFWS). 2008. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Tidewater Goby (Eucyclogobius newberryi). Final Rule. *Federal Register* 73(21):5920-6006.

Attachment A. Tables for Permit Applications

Cardno ENTRIX

201 N Calle Cesar Chavez
Suite 203
Santa Barbara, CA 93103
USA

Phone 805-962-7679
Fax 805-963-0412
www.cardno.com

www.cardnoentrix.com

The following tables list area and linear feet of habitat and regulatory features for permit applications, as requested by the City.

For USACE Application:

0.04 acre of wetlands

For CDFG Agreement Application:

Vegetation Type	Temporary Impact	Permanent Impact
Willow Scrub	Linear feet: 0 Total area: 0	Linear feet: 117 Total area: 3,026 sq ft
Emergent wetland	Linear feet: 127 Total area: 1,566 sq ft	Linear feet: 0 Total area: 0
Ruderal (non-native species, mostly)	Linear feet: 0 Total area: 0	Linear feet: 245 Total area: 5,790 sq ft

For RWQCB 401 Certification Application

b) Indicate in ACRES and LINEAR FEET (where appropriate) the proposed waters to be impacted and identify the impacts(s) as permanent and/or temporary for each water body type listed below:

Streambed:	0.04 permanent,	0.05 temporary ACRES
	200 permanent,	321 temporary LINEAR FEET
Riparian:	0 permanent,	0.07 temporary ACRES
	0 permanent,	117 temporary LINEAR FEET
Lake/Reservoir:	0 permanent,	0 temporary ACRES
	0 permanent,	0 temporary LINEAR FEET
Ocean/Estuary/Bay:	0 permanent,	0 temporary ACRES
	0 permanent,	0 temporary LINEAR FEET

Acres of wetlands determined by the U.S. Army Corps of Engineers to be jurisdictional.

Jurisdictional Wetland:	0 permanent,	0.04 temporary ACRES
	0 permanent,	127 temporary LINEAR FEET

In addition to wetlands described above, include acres of additional wetlands beyond those determined by the U.S. Army Corps of Engineers to be jurisdictional. **

Wetland:	0 permanent,	0.05 temporary ACRES
	0 permanent,	248 temporary LINEAR FEET

a) Indicate in ACRES and LINEAR FEET (where appropriate) the total quantity of waters proposed to be Created, Restored and/or Enhanced for purposes of providing Compensatory Mitigation:

Water Body Type	Preserved	Created	Restored	Enhanced
Jurisdictional Wetlands	0	0	0	0
All additional Wetlands	0	0.05 acre	0.05 acre	0
Streambed	0	0.08 acre	0.08 acre	0
Riparian	0	0.15 acre	0.07 acre	0
Lake/Reservoir	0	0	0	0
Ocean/Estuary/Bay	0	0	0	0