Supplemental Biological Assessment
Maintenance Cleaning of 47 Culverts/Drainages
West Marin County, California
Marin County Department of Public Works
(summarizes and updates Sycamore BA 2004)

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***Project Description*:**
The Marin County Department of Public Works (DPW) is proposing to clean out numerous drainage culverts and portions of associated drainages along a linear corridor in western Marin County, California. The study corridor includes a total of 47 culvert crossings and associated linear work areas along four Marin County roads. The roads include Sir Francis Drake Boulevard (SFD), Bear Valley Road (BVR), Fairfax-Bolinas Road (FBR), and Olema-Bolinas Road (OBR).

The culvert maintenance project study corridor extends north to south from the 33.58 mileage marker on Sir Francis Drake Blvd. (SFD 33.58), near the head of Schooner Bay to mileage marker 1.61 on Olema-Bolinas Road (OBR 1.61), a distance of approximately 20 miles (Figure 1, Location Map).

The proposed project is required as part of on-going maintenance of drainage culverts by DPW's road maintenance staff in order to remove accumulated sediments and silt along drainage ditches, channels, streams and culverted road crossings. The primary cause of clogged drainages is deposition of decomposed granite emanating from steep slopes on surrounding hillsides. The proximity of Sir Francis Drake Blvd. to these hillsides also contributes to the deposition of decomposed granite to channels and drainages within this area. The soil composition in the stream channels is decomposed granite at the sub-surface level and mud and vegetation at the top layer.

***Project Area*:**
The proposed project corridor is adjacent to Schooner Bay, Drakes Bay, Tomales Bay, Schooner Creek, Third Valley Creek, Second Valley Creek, First Valley Creek, Dream Farm Creek, Redwood Creek, Old Bear Valley Creek, Bear Valley Creek, Silver Hills Creek, Lagunitas Creek, Bolinas Lagoon, Wilkins Gulch, Lewis Gulch and unnamed tributaries.

Vegetative communities present within and adjacent to the study area include coastal freshwater marsh, northern coastal salt marsh, northern coastal scrub, North Coast riparian scrub/forest, mixed evergreen forest, and ruderal roadside vegetation.

Land uses surrounding the study corridor include grazing for dairy cattle in the northern portion and rural residences in the vicinities of Inverness, Olema, and Bolinas. Much of the land in the vicinity is largely undeveloped open space. In the northern and central

portions, the study corridor traverses lands that are part of the Point Reyes National Seashore.

In April 2004, Sycamore Associates LLC prepared the Biological Assessment and Wetland Delineation for Forty-Nine Road Culvert Locations, West Marin County, California (Sycamore Associates 2004). That document provides maps of culvert and project work area locations and photographs of the work areas. Since that document was prepared, four sites have been deleted from the project (i.e., SFD Mile Markers 32.93 and 27.23, BVR MM 1.72, and OBR MM 1.30) and two sites were added (MM 33.30 SFD and MM 2.08 OBR). This document summarizes and updates Sycamore Associates 2004.

***Effects of the Proposed Project*:**
The proposed project will result in the removal of wetland and riparian vegetation, and disturbance of stream channel habitat, causing temporary habitat losses to fish and wildlife resources, including listed species. Emphasis will be placed on avoidance of adverse impacts to fish and wildlife resources through the use of specific and general conservation measures and best management practices.

Sycamore Associates (2004) determined that almost all of the project work areas are expected to fall under federal and/or state jurisdictions as wetlands or waters of the U.S. and state, and will thus require permits or approvals from various state and federal agencies including the U.S. Army Corps of Engineers (USACE), California Department of Fish and Game (CDFG), San Francisco Bay Regional Water Quality Control Board (RWQCB), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and California Coastal Commission (CCC).

Sycamore Associates (2004) conducted a preliminary wetland delineation on several work areas and preliminary jurisdictional determination on all work areas to identify the extent of waters of the U.S. expected to fall under the jurisdiction of the USACE. Based on visual inspections of each of the project work areas, potential jurisdictional waters of the U.S. were estimated partly by observations of surface flow, such as sediment deposits, drift debris, shelving, scouring, or watermarks, or obvious indications of surface soil saturation or inundation. All unvegetated waters of the U.S. on site were estimated based on the ordinary high water mark indicated by one or more of these conditions. Wetlands were identified where strongly hydrophytic vegetation was dominant and where wetland hydrology and hydric soils were evident or indicated.

Also identified were potential waters of the State of California, which are anticipated to fall under the jurisdiction of the CDFG and/or the RWQCB. The estimated extent of waters of the State of California subject to the jurisdiction of the CDFG and the RWQCB was determined by the top of bank on opposite sides of natural stream channels, or by the outward extent of riparian vegetation, whichever is broader (Sycamore 2004).

During 2009, DPW coordinated with the USACE to confirm that the following 10 sites were subject to USACE regulation, including SFDB Mile Markers 29.63, 28.86, 28.29,

28.23, 27.51, 26.93, 25.86, 25.27 and 25.00, and OBR Mile Marker .18. These project sites are subject to USACE jurisdiction because they will either require excavation and fill (temporary cofferdam) in tidal waters under Section 10 of the Rivers and Harbors Act, or excavation and fill (temporary cofferdam) below ordinary high water in fresh waters under Section 404 of the Clean Water Act. Removal of sediment from the remaining 37 sites is not regulated by the USACE because it can be accomplished with clean excavation of sediments and removal to an upland disposal site. However, as waters of the State, sediment removal from all 47 sites is regulated by the CDFG, SFBRWQCB and CCC.

As needed, it is anticipated that permits for the proposed work at these sites will be requested from the USACE under Section 10 of the Rivers and Harbors Act and other applicable Nationwide Permits (e.g., Nationwide Permit 33, temporary Construction, Access and Dewatering) under Section 404 of the Clean Water Act.

For the proposed work at MM 25.00 SFD, a separate permit application was submitted to the USACE on May 5, 2008; this application is pending with that agency. During 2008/2009, we received permits from the CDFG, SFBRWQCB and CCC for the proposed work at MM 25.00 SFD. For the remaining 46 sites, permits are also being requested from these agencies.

Because project impacts will be greater at Mile Markers 25.00 SFD and .18 OBR, DPW is requesting an individual Streambed Alteration Agreement (SAA) from the CDFG for proposed work at Mile Marker .18 OBR and has received a SAA for sediment removal at Mile Marker 25.00 SFD. A Routine Maintenance Agreement is being requested from CDFG for the remaining 45 sites (as waters of the State).

The necessary work at MM 25.00 SFD (White House Pool) would include cleaning sediment from the box culvert on Sir Francis Drake Blvd. and excavation of approximately 415 feet of stream channel and riparian vegetation along Old Bear Valley Creek, from the box culvert at Sir Francis Drake Blvd. to Lagunitas Creek. In addition, approximately 435 linear feet of freshwater wetland vegetation would be temporarily lost (working from top of bank) from the drainage ditch along Sir Francis Drake Boulevard, and another 30 linear feet in an area where 3 small (approximately 10 feet long X 6 feet wide X 4 feet deep) sediment retention basins would be created in the drainage ditch near Silver Hills Creek. Anticipated impacts to wetlands/waters are approximately **880 linear feet, 0.16 acre, and 852 cubic yards** of excavated sediment.

The necessary work at MM .18 OBR would include cleaning sediment from the box culvert, approximately 300 linear feet of creek channel (Lewis Gulch) extending from Olema-Bolinas Road to Bolinas Lagoon, and another 700 linear feet of drainage ditch extending north and south of this mile marker. Anticipated impacts to wetlands/waters are approximately **1,000 linear feet, 0.13 acre, and 565 cubic yards** of excavated sediment.

Implementation of the proposed project at the remaining 45 culvert locations (i.e., omitting (1) MM 25.00 SFD at White House Pool and (2) MM .18 OBR plus surrounding drainage ditches) would result in the excavation of approximately **2,032 cubic yards** of sediment, causing temporary loss or disturbance to an estimated **7,183 linear feet (0.66 acre)** of wetlands and/or waters of the U.S. and State of California. Please note that this is an estimate of limits of work but does not constitute a jurisdictional determination of wetlands or waters of the U.S./State under the regulatory jurisdiction of the USACE, CDFG, RWRCB or CCC.

Sediment removal for the entire maintenance program at all 47 sites would result in excavation of approximately 3,449 cubic yards of sediment, impacting approximately 9,063 linear feet (0.95 acre) of wetlands and other waters of the U.S. and State. Proposed future excavation of sediment required for the entire maintenance program is approximately 946 cubic yards annually.

Approximately 96 trees (2-12 inches in diameter) will need to be removed and 79 trees (2-6 inches in diameter) trimmed at 23 sites in order to reduce the risk of flood damage or provide access for maintenance equipment. Riparian trees affected are primarily small arroyo willow and red alder. See Table 1 for list of sites where trees would be removed or trimmed.

Sycamore Associates (2004) addressed the potential for the occurrence of special-status or sensitive plant or animal species within the areas to be affected by the project. The attached Table 2 contains a summary of habitat types, estimated limits of work in wetlands and waters of the U.S. and State, and potential special-status species affected by the proposed project. Of the 22 fish and wildlife species listed in Table 2, seven are either federally-listed or State-listed as endangered or threatened. They are:

Species	**Status**
California black rail (*Laterallus jamaicensis coturniculus*)	CT; FC

Species	**Status**
Callifornia clapper rail (*Rallus longirostris obsoletus*)	FE; CE
California freshwater shrimp (*Syncaris pacifica*)	FE; CE
California red-legged frog (*Rana aurora draytonii*)	FT; CSC
Coho salmon (*Oncorhynchus kisutch*)	FE; CE

Steelhead trout (*Oncorhynchus mykiss*)	FT
Tidewater goby (*Eucyclogobius newberryi*)	FE; CSC

This supplemental biological assessment also addressed the potential for presence of the following listed plant species.

Sonoma alopecurus (*Alopecurus aequalis var. sonomensis*)	FE

Key:
CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CSC = California Species of Special Concern
FE = Listed as Endangered by the Federal Government
FT = Listed as Threatened by the Federal Government
FC = Candidate for listing by the Federal Government

***Frequency, Duration, Intensity, Severity of Effects to Special-status Species, Wetlands, and Waters of U.S./State*:**
With the exception of MM 25.00 SFD (White House Pool) and MM .18 OBR (and surrounding drainage ditches), the limits of proposed work in wetlands and waters of the U.S. and State of California range broadly from very small (approximately 5 linear feet) to 1,590 linear feet of impact collectively at Mile Markers 33.34, 33.30, 33.19, 33.16 and 33.06 (see Table 2). The frequency of culvert maintenance work will be phased over time. The two highest priority clogged areas (i.e., MM 25.00 SFD and MM .18 OBR and surrounding drainage ditches) would be done first, along with other priority areas. Future maintenance of project areas will be done on an as-needed basis, most likely every 2-5 years. It is expected that USACE Nationwide Permit applications will be submitted consistently with this need and as permits expire, or a Regional General Permit will later be requested from that agency. DPW will request a longer-term permit and maintenance agreement from the California Coastal Commission and California Department of Fish and Game, respectively.

The duration of effects to special-status species and affected habitats will vary depending on the size of the project. For the most part, small projects can be done in one day's time. The larger projects will require approximately 5-7 days to complete. The time period for project work activity will occur from approximately 8:00 a.m. to 4:00 p.m. Project work will take place during the summer dry season (June 15 to October 15), but primarily in August/September, unless timing must be revised to protect nesting birds and certain special-status species.

The intensity and severity of impacts to special-status species will also vary from site to site, depending on project size and the type of equipment needed to complete the work. All efforts will be made to operate equipment (i.e., gradall (telescopic excavator) or excavator with bucket) from the road or top of upland bank in order to clean silt and decomposed granite from areas and channels around culverts. However, in some areas, it will be necessary to use a small, 6-foot-wide by 4-foot high dozer within the stream channel (at Mile Markers 28.86, 28.29 and 25.00 SFD, and .18 OBR). Where equipment access is required or downed trees promote flooding, woody riparian vegetation will need to be trimmed or removed (see Table 1). Also, some sites will require temporary water diversion in order to access the stream channel and cofferdams will be placed in the stream to dewater the construction area. These eight sites include SFD Mile Markers 29.63, 28.86, 28.29, 27.51, 26.93, 25.86 and 25.00; and OBR Mile Marker .18.

All excavated material will be hauled to an upland disposal site in Nicasio or another upland disposal site.

Adverse impacts to special-status species, wetlands, riparian, and stream channel habitat will be temporal. All efforts will be made to avoid removal or disturbance of wetland and riparian vegetation at all project locations. In addition, it is expected that vegetation which must be removed as part of sediment removal activities will re-establish naturally. However, to compensate for any permanent impacts to riparian vegetation, DPW will re-vegetate impacted project sites (see Table 1) with native riparian trees (e.g., arroyo willow and red alder) based on the following criteria: DPW will provide in-kind replacement of removed trees over 6 inches in trunk diameter at breast height or multi-trunked species with an aggregate diameter over 10 inches, using native willow cuttings, at a 3:1 replacement ratio. DPW will also monitor re-establishment of wetland vegetation at SFD MMs 25.00 and 28.23, and plant gumplant (*Grindelia stricta*) within the upper tidal marsh zone along the SFD MM 28.23 tidal channel. Further, potential adverse impacts to biological resources will be mitigated and minimized with implementation of the General Measures for Protection of Biological Resources and Best Management Practices included in this supplemental biological assessment. Where needed, additional species-specific mitigation measures will be implemented as described below. **These measures will be used where appropriate at individual sites depending on the potential for presence of specific listed and other species.** Further, the Endangered Species Coordinator (ESC), who will be the DPW biologist or designee, will oversee and monitor all work.

***Effects on Listed Fish and Wildlife Species*:**
Following is a discussion of potential effects on state-listed and federally-listed species.

California Black Rail:
California black rail are potentially present in 16 of the culvert reaches (see Table 2), with a high potential for occurrence on site. These are SFD MMs 33.58, 33.48, 33.43, 33.39, 33.34, 33.30, 33.19, 33.16, 33.06, 28.65, 28.23, 27.00, 25.00 and FBR MMs 14.64, 14.60 and 14.59. In 2003, CDFG reported this species within the vicinity of the

project area and suitable habitat is present within and adjacent to some of the work areas (Sycamore Associates 2004). Nesting habitat is characterized by non-fluctuating water levels with a depth of less than 3 cm and dense vegetative cover. The proposed project activities could adversely affect this species with the temporary removal of brackish and tidal marsh, and habitat disturbance during work activities.

The following specific measure will also be implemented:

> Perform work during low tide. When working within 100 feet of salt or brackish marsh, presume presence for California black rail during the February 1 – August 31 breeding period, schedule work to begin no earlier than September 1, and survey these sites before allowing work to proceed.

California Clapper Rail:
The potential for occurrence of California clapper rail in the project area is low (Sycamore Associates 2004). Suitable habitat occurs in the downstream brackish marsh near Mile Marker 14.59 Fairfax-Bolinas Road and within the tidal marsh at Mile Marker 28.23 Sir Francis Drake Blvd. (see Table 2).

This species predominantly inhabits tidal salt marshes of the greater San Francisco Bay area (primarily cordgrass habitat), although some individuals use brackish marshes during the spring breeding season. In 2003, CDFG reported occurrence of California clapper rail greater than 5 miles south of the MM 14.59 FBR project area, at Bolinas Lagoon (Sycamore Associates 2004). Even though Tomales Bay does not support a breeding population of California clapper rails, sporadic use has occurred has occurred there, with a tendency to occur in fall or winter (pers. comm. 2009).

The following specific measures will also be implemented:

> When working within 100 feet of the brackish marsh at MM 14.59 FBR, presume presence for California clapper rail during the February 1 – August 31 breeding period and schedule work to begin no earlier than September 1. When working within 100 feet of the tidal marsh at MM 28.23 SFDB, survey this site before allowing work to proceed and schedule work during summer months and low tide.

California Freshwater Shrimp:
In the broader project vicinity, Lagunitas Creek contains habitat for the California freshwater shrimp (CFS), federally listed as endangered (USFWS 1998). The current known range of CFS within Lagunitas Creek extends from Shafter Bridge in Samuel P. Taylor State Park to roughly one mile below the confluence with Nicasio Creek (Hedgpeth 1975; Serpa 1991 *in* National Park Service 2007), approximately 3 miles east of the Inverness project area. Lo Bianco and Fong (2003) found CFS in Olema Creek within one-half mile upstream of its confluence with Lagunitas Creek. In 2003, CDFG reported this species in Lagunitas Creek and Olema Creek, in the vicinity of some project sites (Sycamore Associates 2004).

Suitable habitat for CFS includes perennial or intermittent freshwater streams with perennial pools where banks are structurally diverse with undercut banks, exposed roots, or overhanging woody debris or vegetation. This species is not found in brackish or estuarine environments, but has been found to persist in salinities up to 17 parts per thousand (USFWS 1998).

This species is endemic to Marin, Napa and Sonoma Counties. It is found at low elevations in low gradient streams where riparian cover is moderate to dense, and inhabits shallow pools away from mainstream flow. This shrimp winters on undercut banks with exposed roots; in summer, it inhabits ponds with leafy branches touching the water surface. Four general drainage units support shrimp, including streams draining into Tomales Bay (U.S. Fish and Wildlife Service 1998).

The project sites are outside the current known range of CFS within Lagunitas Creek and do not contain suitable habitat for this species. These sites do not contain structurally diverse banks or overhanging woody debris or vegetation. Therefore, we do not anticipate adverse impacts to this species. However, if this species was discovered as part of any fish surveys, all work in the stream shall be stopped immediately if it is determined that the work has the potential to adversely impact the shrimp or its habitat. Work shall not recommence until a U.S. Fish and Wildlife Service-approved biologist is satisfied that there will be no impact on the shrimp.

California Red-legged Frog:
The California red-legged frog (CRF) is potentially present in most (45 out of 47) of the culvert reaches (see Table 2), with a high potential for occurrence on site. There is suitable foraging and dispersal habitat present within many work areas. The California red-legged frog prefers semi-permanent and permanent stream pools, ponds, and creeks with emergent and/or riparian vegetation. This species was observed in the project area and in 2003, CDFG reported this species in Drakes Bay and the greater regional vicinity of the study corridor (Sycamore 2004). On March 30, 2007, DPW biologist observed this species within the upstream drainage ditch at MM 1.56 OBR.

The Recovery Plan for the California red-legged frog (2002) identifies that the proposed project area is within Recovery Unit 3 (North Coast and North San Francisco Bay) and Core Area 13 (Pt. Reyes Peninsula). Parts of the project area have also been designated and proposed as critical habitat for this species (U.S. Fish and Wildlife Service 2006 and 2008*b*). The California red-legged frog breeds from November through April; eggs are attached to bulrushes and cattails. Juveniles are active diurnally and nocturnally, while adults are largely nocturnal. However, coastal populations are rarely inactive due to the temperature-moderating maritime effect (U.S. Fish and Wildlife Service 2002).

The proposed project could adversely affect this species with the temporary loss of freshwater marsh (such as cattails used as refugial habitat) and riparian vegetative cover (used as resting, foraging and dispersal habitat), and the temporary disturbance to wetland/pool/pond habitats. Therefore, DPW will assume their presence at all sites

except the following areas where full tidal exchange likely precludes their presence: SFD MMs 28.86, 28.29 (downstream), 28.23 and 25.27 (downstream).

The following specific measures will also be implemented when working in these habitats. These measures generally follow the Programmatic Biological Opinion for California red-legged frog (USFWS, Programmatic Formal Endangered Species Act Consultation on Issuance of Permits under Section 404 of the Clean Water Act or Authorizations under the Nationwide Permit Program for Projects that May Affect the California Red-legged Frog,1999) (Biological Opinion)).

1. Work will be done during the dry season (June 15 to October 15), outside the November through April breeding season;

2. No more than seven (7) days prior to commencement of work, a qualified biologist shall conduct pre-construction surveys. If no CRF are found, no further studies or CRF protection measures would be required and the maintenance activity would proceed.

3. If CRF adults or tadpoles are found, the ESC shall contact the USFWS to determine if moving any of these life-stages is appropriate. If the USFWS approves the moving of animals, a USFWS-approved biologist shall be allowed sufficient time to move CRF from the work site before work activities begin.

4. If CRF tadpoles are found, the project will be delayed until tadpoles complete their metamorphosis (e.g., approximately by early September).

5. Dewatering with cofferdams or pumps will be done with oversight by the USFWS-approved biologist.

6. DPW shall designate a person, which will be the ESC or designee, to monitor all work and on-site compliance. The monitor shall coordinate with the DPW Road Maintenance Supervisor to halt any action that might result in more than incidental take of CRF. If work is stopped, the USACE and USFWS shall be notified immediately by the monitor/ESC.

7. If CRF are found and the maintenance activity site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh no larger than five millimeters to prevent CRF from entering the pump system.

8. For any work sites containing California red-legged frogs, the ESC shall provide to the DPW Road Maintenance Supervisor a list of the exclusion measures that will be used at their work site to prevent take or injury to any individual frogs that could occur on the site. The DPW Road Maintenance Supervisor shall ensure that the approved exclusion measures are in place prior to construction. Prior to

work activities, any such frogs found within the exclusion zone shall be moved to suitable habitat upstream or downstream of the work site.

9. Before project commencement, the ESC will provide instruction to on-site maintenance personnel covering a description of CRF, habitat requirements, and the importance of avoiding impacts to this species.

Coho Salmon

Coho salmon are potentially present near four of the culvert reaches because they are adjacent to Lagunitas Creek and Tomales Bay (see Table 2, SFD MMs 28.86, 28.23, 25.27 and 25.00). There is marginally suitable habitat present within some work areas and in 2003, CDFG reported that Coho salmon occur within Lagunitas Creek (Sycamore Associates 2004).

Coho salmon spawning and egg/alevin incubation periods within Lagunitas Creek cover the period from approximately November 1 through June 15 (CDFG 2005). The project work would be conducted during the summer dry season (June 15 to October 15, or first rainfall) to avoid the spawning season for this species. Benefits to coho salmon will occur with the removal of silt and creation of improved habitat for migratory fish.

The following specific measure will also be implemented:

Before conducting maintenance activities in actively flowing streams, the ESC will check available data to determine if the stream is known to currently or historically be used by coho salmon. If coho salmon are known to be absent from the project area, then avoidance has been accomplished.

If Coho salmon are determined or presumed present in the maintenance activity area, then the following shall be implemented:

1. Project work within the wetted stream shall be limited to the period between June 15 and October 15, or the first significant fall rainfall. This is to take advantage of low stream flows and to avoid the spawning and egg/alevin incubation period for salmon. Whenever possible, the work period at individual sites shall be further limited to entirely avoid periods when salmonids are present (for example, in a seasonal creek, work will be confined to the period when the stream is dry; in tidal channels adjacent to Tomales Bay and Lagunitas Creek (e.g., at SFD MMs 28.86, 28.23, 25.27 and 25.00), work will be done during low tide.

2. No heavy equipment shall operate in the live stream, except as may be necessary to construct cofferdams to divert stream flow and isolate the work site. An exception is at sites where a small (6-foot wide by 4-foot high) dozer is used for sediment excavation purposes and to facilitate sediment removal or minimize loss of riparian vegetation (e.g., at Mile Markers 28.86 and 25.00 SFD). For example, at MM 25.00 SFD, the dozer will move the material to a central area for removal, rather than impact the linear riparian corridor.

3. Suitable large woody debris that is not within the sediment removal area shall be left within the riparian zone so as to provide a source for future recruitment of wood into the stream.

4. Measures shall be taken to minimize harm and mortality to listed salmonids resulting from fish relocation and dewatering activities:

    a. Fish relocation and dewatering activities shall only occur between June 15 and October 15 of each year.

    b. DPW's road maintenance staff shall minimize the amount of wetted stream channel that is dewatered at each individual project site to the fullest extent possible.

    c. Before project construction, a qualified biologist will conduct fish relocation activities, and immediately release captured fish to a suitable habitat near the project site.

    d. Screens shall be placed on pumps used for dewatering the work area in accordance with NOAA Fisheries' fish screening criteria (National Marine Fisheries Service 1997). Appropriately-sized screens (i.e., 3/32 inch mesh screen) on pumps and water diversion intake structures will be used to prevent fish from entering the diversion structure. The ESC will be on-site during the dewatering phase to ensure that any fish that may have remained within the maintenance area are relocated to suitable habitat near the project site.

    e. All electrofishing shall be performed by a qualified fisheries biologist and conducted according to the National Marine Fisheries Service Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act, June 2000 (National Marine Fisheries Service 2000).

5. If for some reason these mitigation measures cannot be implemented, or the project actions proposed at a specific work site cannot be modified to prevent or avoid potential adverse impacts to anadromous salmonids or their habitat, then activity at that work site will be discontinued.

Steelhead Trout – Central California Coast

Steelhead trout spawning and egg/alevin incubation periods within Lagunitas Creek cover the period from approximately November 1 through June 15 (CDFG 2005). Sycamore 2004 reported there is marginally suitable habitat present within some work areas and in 2003, CDFG reported that steelhead occur within Lagunitas Creek.

Steelhead are potentially present within or near approximately 20 of the culvert reaches (see Table 2, SFD Mile Markers 33.58, 33.48, 33.43, 33.39, 33.34, 33.30, 33.19, 33.16, 33.06, 29.63, 28.86, 28.29, 28.23, 27.51, 27.19, 25.86, 25.27, 25.00, Mile Marker 14.64 FBR and Mile Marker .18 OBR).

Steelhead trout are known to occur at Schooner Creek (adjacent to MMs 33.58 through 33.06 SFD), Second Valley Creek (MM 28.86 SFD), First Valley Creek (MM 28.29 SFD), Dream Farm Creek (MM 27.51 SFD), Redwood Creek (adjacent to MM 27.19 SFD), Fish Hatchery Creek (MM 25.86 SFD), Bear Valley Creek (adjacent to MMs 1.11 and 2.08 BVR) and Wilkins Gulch (MM 14.64 FBR) (County of Marin 2004 and 2006). Steelhead are also known to occur in Third Valley Creek (MM 29.63) (pers. comm. 2008). DPW staff has observed steelhead in the drainage ditch along Silver Hills Creek (MM 25.00 SFD) and at the downstream section of Lewis Gulch (MM .18 OBR).

The project work would be conducted during the summer dry season (June 15 to October 15, or first rainfall) to avoid the spawning season for this species and during low tide in tidal channels adjacent to Tomales Bay and Lagunitas Creek (e.g., at SFD MMs 28.86, 28.29, 28.23, 25.27 and 25.00). Benefits to steelhead will occur with the removal of silt and creation of improved habitat for migratory fish.

The following specific measures will also be implemented:

Before conducting maintenance activities in actively-flowing channels, the ESC will check available data to determine if the channel is a known or an historical steelhead creek. If steelhead trout are known to be absent from the project area, then avoidance has been accomplished.

If steelhead are determined or presumed present in the maintenance activity area, then the following shall be implemented:

1. All in-stream maintenance activities will be restricted to a modified low-flow period of June 15 to October 15. Work above the flow line will not be subject to this modified work period. The June 15 date may be pushed back depending on whether there was a wet spring or late spring rains, to be determined by the ESC.

2. Before project construction, a qualified biologist will conduct fish relocation activities, and immediately release captured fish to a suitable habitat near the project site.

3. Dewatering with cofferdams or pumps will be done with oversight by the qualified biologist.

4. Screens shall be placed on pumps used for dewatering the work area in accordance with NOAA Fisheries' fish screening criteria (National Marine Fisheries Service 1997). Appropriately-sized screens (i.e., 3/32 inch mesh

screen) on pumps and water diversion intake structures will be used to prevent fish from entering the diversion structure. The ESC will be on-site during the dewatering phase to ensure that any fish that may have remained within the maintenance area are relocated to suitable habitat near the project site.

5. All electrofishing shall be performed by a qualified fisheries biologist and conducted according to the National Marine Fisheries Service Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act, June 2000 (National Marine Fisheries Service 2000).

Tidewater Goby:
In the broader project vicinity, Lagunitas Creek contains habitat for the Tidewater goby. As shown in the U.S. Fish and Wildlife Service's 2005 recovery plan for the federally-listed endangered tidewater goby (TG), Lagunitas Creek is located within the Greater Bay Area Recovery Unit, Sub-Unit GB-3 (USFWS 2005) and portions of National Park Service lands within Unit MAR-3 (Lagunitas Creek) are designated as critical habitat for this species (USDOI 2008*a*). The GB-3 Sub-Unit includes TG occurrences within Lagunitas Creek, approximately 3.6 miles south of the Inverness project area. TG were collected at this historical Lagunitas Creek site in 1953, but were not found in 1996 (USFWS 2005). The GB-3 Sub-Unit also includes lower Tomasini Creek, located in the general vicinity of the proposed project area. Within the Giacomini wetlands restoration area, TG have been found in Tomasini Creek; in a diked slough in the West Pasture near Fish Hatchery Creek; and in non-tidal portions of the East Pasture (NPS 2007). In October 2009, the National Park Service, U.S. Fish and Wildlife Service and California Department of Parks and Recreation introduced TG to a shallow lagoon within Tomales Bay State Park north of the project area (GGNRA press release 2009).

TG inhabit brackish shallow lagoons and lower stream reaches where the water is fairly still. TG tends to avoid currents and concentrate in slack-water areas, suggesting they are less likely to occur in areas with a steep gradient or habitats with a substantial current. TG typically occur in areas with salinities less than 12 ppt, but have been documented in waters with salinity levels from 0 to 42 ppt (USFWS 2005).

TG are typically found in loose aggregations of a few to several hundred individuals on the substrate of shallow water less than three feet deep. Reproduction occurs year-round although distinct peaks in spawning, often in April and May, do occur. When breeding, males dig vertical burrows for females to deposit eggs (USFWS 1994).

The closest of the project sites to known TG habitat is at Mile Marker 25.86 SFDB (Fish Hatchery Creek). However, this project site contains unsuitable habitat for TG because it is characterized by fresh water with relatively constant creek flow. This proposed project site extends about 100 feet downstream of SFD and is located at the upper and opposite end of Fish Hatchery Creek from the known TG habitat in the diked West Pasture slough which contains brackish water.

There is no persistent, shallow, still to slow-moving brackish aquatic habitat like that found within Tomasini Creek or the West Pasture slough within the project sites. Also, tidal action at several sites (e.g., SFD Mile Markers 28.86, 28.29, 28.23, 25.27 and 25.00, located adjacent to Tomales Bay and Lagunitas Creek) precludes TG presence because these waters contain strong currents.

Based on this information, we do not anticipate adverse impacts to this species. However, because a principal threat to TG is degraded water quality (USFWS 2005), DPW will implement sediment and erosion controls to keep excess soils from washing or blowing away during removal, transport and storage. Mitigation measures to avoid and minimize impacts to tidewater goby include those contained in the General Measures for Protection of Biological Resources and Best Management Practices listed below. See especially General Measures 11 and 13 and BMPs covering Natural Resource Protection and Restoration, Sediment Control, Soil Stabilization, and Vegetation and Debris Management.

However, if this species was discovered as part of any fish surveys, all work in the stream shall be stopped immediately if it is determined that the work has the potential to adversely impact the goby or its habitat. Work shall not recommence until a U.S. Fish and Wildlife Service-approved biologist is satisfied that there will be no impact on the goby.

Sonoma alopecurus

Sycamore 2004 noted that a known location of this plant was mapped by the California Natural Diversity Database (CNDDB) approximately 120 feet north of the MM 1.72 BVR site (Sycamore Associates 2004), a site that has been deleted from this project. The CNDDB notation was based on a siting by Davey in 1898 (C. Thayer, pers. comm. 2005). Genet 2004 reported that many of the sites catalogued in the CNDDB no longer support this plant. In particular, wild *Sonoma alopecurus* have not been seen near this site since the 1898 collection. Further, in March 1986, *Sonoma alopecurus* plants were introduced at two sites around Bear Valley Marsh. In 1988, no *Sonoma alopecurus* were found at either site, and in 2000, the sites were found to be overgrown and supporting no *Sonoma alopecurus* plants.

Sonoma alopecurus is known from fewer than five native occurrences in Marin and Sonoma Counties (Sycamore Associates 2004). It is a perennial herb, blooming May – July, and is found in freshwater marshes and swamps. Threats to this plant include cattle trampling, wetland habitat loss, and non-native plants (California Native Plant Society 2001).

Genet 2004 found that wild occurrences are found on sandy soils in marshes and shallow basins that seasonally to perennially contain open, slow-moving water. However, at Point Reyes National Seashore (PRNS), habitat for this plant varies, with some plants found in low basins or drainages that contain well-drained sandy soil and other plants found in small gaps within densely vegetated, poorly drained marshes.

However, all *Sonoma alopecurus* occurrences were located on working ranches or grazing leases managed on cattle operations.

On March 24 and 31, 2005, a qualified biologist with the California Native Plant Society conducted surveys of the 49 culvert reaches under consideration at that time and found there is probably no likelihood of presence of *Sonoma alopecurus* at any the proposed project sites (D. Smith, pers. comm.).

Effects on Other Special-Status Fish and Wildlife Species:
Sycamore Associates (Sycamore 2004) found that the following additional Federal candidate species or State species of special concern have either been observed in the proposed project areas, CDFG has reported them within the vicinity of or adjacent to the work area, or Sycamore Associates has identified there is a moderate to high potential for occurrence on site (Sycamore Associates 2004); (See the attached Appendix A for explanation of status/sensitivity codes):

Species	**Status**
Black-shouldered kite (*Elanus leucurus*)	Federal: FC State: CFP

Description: Suitable nesting and foraging habitat present within some work areas (see Table 2).

California yellow warbler (*Dendroica petechia brewsteri*)	Federal: MB State: CSC

Description: Reported at Olema Marsh (CDFG 2003 *in* Sycamore Associates 2004); suitable nesting habitat present within and adjacent to some work areas (see Table 2).

Species	**Status**
Foothill yellow-legged frog (*Rana boylii*)	Federal: FC State: CSC

Description: Reported within Lagunitas Creek and its tributaries, Cataract Creek, Salmon Creek, confluence of Big Rock Creek and Dairy Creek (CDFG 2003 *in* Sycamore Associates 2004). Suitable habitat is present within some work areas (see Table 2). The Marin Co. DPW creek

naturalist has observed the foothill yellow-legged frog in Nicasio Creek (Liz Lewis, personal communication).

Great egret (*Ardea alba*) Federal: MB

Description: Suitable nesting habitat present adjacent to some work areas (see Table 2).

Great blue heron (*Ardea herodias*) Federal: MB

Description: Suitable nesting habitat present adjacent to some work areas (see Table 2).

Northern harrier (*Circus cyaneus*) Federal: MC
State: CSC

Description: Suitable foraging and nesting habitat in some work areas (see Table 2).

Osprey (*Pandion haliaetus*) Federal: MB
State: CSC

Description: Reported at Inverness Ridge (CDFG 2003 *in* Sycamore Associates 2004). Suitable foraging and nesting habitat adjacent to some work areas (see Table 2).

Salt marsh common yellowthroat (*Geothlypis trichas sinuosa*) Federal: FC
State: CSC

Description: Reported throughout project vicinity (CDFG 2003 *in* Sycamore Associates 2004). Suitable nesting habitat present within and adjacent to some work areas (see Table 2).

Species **Status**

Tomales roach (*Lavinia (=Hesperoleucus) symmetricus*) State: CSC

Description: Reported in Lagunitas Creek and Olema Creek (CDFG 2003 *in* Sycamore 2004), within the vicinity of some work areas (see Table 2).

Tricolored blackbird (*Agelaius tricolor*) Federal: FC
State: CSC

Description: Reported in the vicinity of the project (CDFG 2003 *in* Sycamore Associates 2004). Suitable habitat adjacent to some work areas (see Table 2).

Northwestern pond turtle (*Clemmys marmorata)* — Federal: FC; State: CSC

Description: Observed: suitable breeding, aestivation, nesting, and basking habitat present adjacent to some work areas (see Table 2).

Burrowing owl (*Athene cunicularia hypugea)* — Federal: FC; State: CSC

Description: Potentially suitable habitat in adjacent grassland, shrubland and farmland (see Table 2).

In addition, suitable roosting habitat for the following bat species that are either Federal candidates and/or State species of special concern is present within some work areas (Sycamore Associates 2004):

Fringed myotis bat (*Myotis thysanodes*) — Federal: FC

Long-eared myotis bat (*Myotis evotis*) — Federal: FC

Long-legged myotis bat (*Myotis volans*) — Federal: FC

Pallid bat (*Antrozous pallidus*) — State: CSC

Description: Known to occur in project vicinity (Fellers *in* Sycamore 2004).

Species	**Status**
Townsend's western big-eared bat (*Corynorhinus (= Plecotus) townsendii townsendii)*	Federal: FC State: CSC
Yuma myotis bat (*Myotis yumanensis*)	Federal: FC

Fringed, long-eared, and long-legged myotis bats are less likely to be present in marsh/riparian vegetation (such as that which occurs in the proposed project area) and more likely to be found in mixed hardwood conifer/conifer habitat at higher elevations (H. Johnson 2005). There is potential for the pallid bat, Townsend's western big-eared bat, and Yuma myotis bat to roost in culverts; however, the culverts within the proposed project areas are generally too smooth in texture to be suitable habitat for these bat species. The Western red bat (*Lasiurus blossevillii*), proposed species of concern by the California Department

of Fish and Game, roosts in riparian vegetation in Marin County (H. Johnson 2005).

Avoidance and Minimization Measures for Federal Candidate Species and State Species of Special Concern:

Measures to avoid and minimize adverse impacts to Federal candidates and State species of special concern are included in the General Measures for Protection of Biological Resources and Best Management Practices included in this document.

***Effects on Other Special-Status Plant Species*:**
The following additional special-status plant species have been identified by Sycamore Associates (Sycamore Associates 2004) as having a moderate potential for occurrence within the proposed project areas or have known CNDDB occurrences in the general area (See Appendix A for explanation of status/sensitivity codes):

Species	**Status**
California beaked-rush (*Rhynchospora californica*)	Federal: SC State: CEQA CNPS: 1B:3-3-3

Description: Perennial herb; blooms May – July. Known occurrence mapped within one mile west of MM 29.63 SFD.

Species	**Status**
Coastal marsh milk-vetch (*Astragalus pycnostachys var. pycnostachys*)	State: CEQA CNPS: 1B:3-2-3

Description: Perennial herb; blooms April – October. Known occurrences less than one mile southwest of MM 33.58 SFD.

Flaccid sedge (*Carex leptalea*)	State: CEQA CNPS: 2:3-2-1

Description: Perennial herb (rhizomatous); blooms May – July. Known occurrence within one mile west of MM 29.63 SFD.

Humboldt Bay owl's clover (*Castilleja ambigua ssp. humboldtiensis*)	Federal: SC State: CEQA CNPS: 1B:2-2-3

Description: Perennial herb (hemiparasite); blooms May – August. Known occurrence within 500 feet east of MM 27.44 SFD.

Lyngbye's sedge (Carex lyngbyei)	State: CEQA

CNPS: 2:2-2-1

Description: Perennial herb; blooms May – August. Known occurrence east of MM 27.19 SFD.

Marin knotweed (*Polygonum marinense*)
Federal: SC
State: CEQA
CNPS: 3:3-3-3

Description: Annual herb; blooms June – August.

Pt. Reyes bird's-beak (*Cordylanthus maritimus ssp. palustris*)
Federal: SC
State: CEQA
CNPS: 1B:2-2-2

Description: Annual herb (hemiparasite); blooms May – October. Nearby occurrences on soils consistent with those of on-site saltmarsh.

Swamp harebell (*Campanula californica*)
State: CEQA
CNPS: 1B:2-2-3

Description: Perennial herb (rhizomatous); blooms June – September. Known occurrence within 500 feet of MM 33.19 SFD.

Species **Status**

Thurber's reed grass (*Calamagrostis crassiglumis*)
Federal: SC
State: CEQA
CNPS: 2:3-3-1

Description: Perennial herb (rhizomatous); blooms June – July. Known occurrence within 1.5 miles of study area.

Triquetrella (*Triquetrella californica*)
State: CEQA
CNPS: 1B:3-2-2

Description: Moss. Known location approximately one mile southeast of MM 1.11 BVR.

***Specific Measures for Endangered, Threatened, or Rare Plant Species*:**
On March 24 and 31, 2005, a qualified botanist with the California Native Plant Society surveyed all culvert reaches to determine if suitable habitat was present for these rare plants in the 49 work areas proposed at that time and identified by Sycamore 2004. Based on these surveys, only the following three plants were further investigated for the possibility of suitable habitat at the proposed project sites and, upon further research, it was determined that it is unlikely that any of these plants would be adversely impacted at the proposed project sites, based on the following information:

Flaccid sedge (*Carex leptalea*): Suitable habitat is bogs and ferns, meadows, marshes and swamps. This plant species is not known from Pt. Reyes Seashore (PORE) or Tomales Bay area (NDDB 2001) and is apparently extirpated from Marin by wetland loss (CNPS *in* Parsons 2003).

Lyngbye's sedge (*Carex lyngbyei*): It was indicated that this plant species could potentially be adversely affected within those reaches that affect brackish marsh in transitions from freshwater marsh to coastal salt marsh habitat (e.g., MM 28.23 SFD and 28.29 SFD). In May 2005, this plant was found in the undiked marsh north of the Giacomini Ranch's West Pasture levee (L. Parsons 2005). On May 31, 2005, DPW staff biologist surveyed these reaches for *Carex lyngbyei* and no plants were found. Based on this finding, combined with reducing the linear feet of impacted stream or avoiding suitable habitat for this plant at MMs 27.54, 27.44, 27.00 and 26.93 (all SFD), it is unlikely that it would be affected by the proposed project.

Triquetrella *(Triquetrella californica*): This plant is generally found in coastal grassland where rocks protrude and form a thin layer of soil. This moss is not known in the project area along Bear Valley Road and has not been found on roadsides, which are usually too disturbed for this plant (R. Robertson, pers. comm. 2005).

In the future, if information is obtained that warrants further investigation of the potential for rare plants, the following mitigation measures will be implemented to avoid impacts to endangered, threatened or rare plants:

1. A qualified botanist will survey all work sites for rare plants during the blooming period and prior to any ground-disturbing activities. Rare plant surveys will be conducted following the Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities (California Department of Fish and Game 2000) and Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants (U.S. Fish and Wildlife Service 2000).

2. If any special status plant species are identified at a work site, the ESC will require one or more of the following protective measures to be implemented before work can proceed:

    a. Fencing to prevent accidental disturbance of rare plants during project activities;

    b. On-site monitoring by the ESC during project activities to assure that rare plants are not disturbed; and

    c. Redesign of proposed work to avoid disturbance of rare plants.

3. If it becomes impossible to implement the project at a work site without potentially significant impacts to rare plants, the activity at that work site will be discontinued.

4. The ESC shall ensure that the DPW Road Maintenance Supervisor is aware of these site-specific conditions, and will inspect the work site before, during, and after completion of the work activities.

***General Measures for Protection of Biological Resources*:**

1. The ESC shall have an understanding of biological resources, missions of regulatory agencies and regulations as they may affect species within the context of the proposed project and any permits issued. Before commencement of a maintenance activity with minimal threat activities, as described in this supplemental biological assessment, the ESC will review project-specific information on the type, location and extent of the activity and associated areas of disturbance (e.g., proposed staging, stockpile and sediment disposal areas, etc.). Using both the Best Management Practices (BMPs) and the avoidance and minimization measures for Federally-listed or State-listed species, Federal candidate or proposed species, and species that may become listed (described in this document) the ESC will determine the appropriate measures, if any, to implement. The ESC will complete and distribute the Minimal Threat Activity Worksheet (Worksheet – see Table 3) and the Field Guide (EOA, Inc. 2000b) to the DPW Road Maintenance Supervisor before beginning the maintenance activity. The worksheet contains a list of the BMPs contained in the Bay Area Stormwater Management Agencies Association (BASMAA) BMP Manual (EOA, Inc. 2000a)

2. The ESC shall ensure that pre-construction surveys are completed in a timely manner to allow them to be completed before beginning the maintenance activity.

3. The ESC will implement a monitoring and reporting program that shall include, but not be limited to, project activity oversight during construction, photo documentation, and post-construction restoration/revegetation evaluation, if necessary. Reporting regarding project impacts to California red-legged frogs will be performed in accordance with the terms and conditions of the Biological Opinion issued by the USFWS (USFWS 1999).

4. The ESC shall coordinate with the DPW Road Maintenance Supervisor to stop any activity the ESC deems may result in take or destruction beyond what would be considered incidental. Work would not be allowed to resume until appropriate corrective measures have been completed. The ESC shall immediately report any unauthorized impacts to USACE, USFWS, NMFS, and CDFG.

5. All on-site maintenance activity personnel will receive instruction from the ESC regarding the presence and description of listed species and the importance of avoiding impacts to these species and their habitats before the start of work.

6. **Timing:** To avoid impacts to aquatic habitat, the project activities carried out shall typically occur during the summer dry season.

    a. Work around streams is restricted to the period of June 15 to October 15 or the first rainfall. This is to take advantage of low stream flow and avoid the spawning and egg/alevin incubation period for salmon and steelhead trout.

    b. Upslope work generally occurs during the same period as stream work. Sediment reduction activities are dependent on soil moisture content and in some areas, equipment access and effectiveness are constrained by wet conditions. Associated upslope activities generally do not have seasonal restrictions in the Incidental Take Statement issued by the USFWS, but work may be restricted at some sites to allow soils to dry out completely.

    c. The permissible work window for individual work sites will be further constrained as necessary to avoid adverse impacts to special-status species (see mitigation measures for specific timing of work activities, by species) and the nesting or breeding seasons for fish, birds, amphibians and terrestrial animals.

    d. At most sites with potential for raptor and migratory bird nesting, if work is conditioned to start after July 31, potential impacts will be avoided and no surveys will be required. However, if work in the riparian zone will occur between June 15 and September 1, the ESC will conduct a survey for nesting birds within one week prior to the proposed vegetation removal and/or construction activities and ensure no nesting birds will be impacted by the project. Work can proceed if surveys determine that nesting birds will not be impacted. If active nests are found, the ESC shall create a fence barrier around the nest site and assure that no work occurs until young have left the nest and will no longer be impacted by the project.

    e. Because the culverts in the proposed project areas are fairly small, there is minimal likelihood that they would provide suitable habitat for swallows. However, if any culverts show evidence of past or current swallow nesting, the ESC will identify them and construction will occur after August 31 to avoid the swallow nesting period.

    f. Planting of vegetation (e.g., replaced riparian vegetation) shall begin after December 1, or when sufficient rainfall has occurred to ensure the best chance of survival of the plants, but in no case after April 1.

7. During all activities at project work sites, all trash that may attract predators shall be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas and taken to Nicasio Corporation Yard.

8. Staging/storage areas for equipment, materials, fuels, lubricants, and solvents, will be located outside of the stream's high water channel and associated riparian area. Stationary equipment such as motors, pumps, generators, compressors, and welders located within the dry portion of the steam channel or adjacent to the stream, will be positioned over drip-pans. Equipment will be moved out of the normal high water area of the stream prior to refueling and lubricating. The DPW Road Maintenance Supervisor shall ensure that contamination of habitat does not occur during such operations. Best Management Practices covering Chemical Use (Spill Prevention and Control), contained in the BASMAA Flood Control Facility Maintenance Best Management Practices (BMP) Manual (EOA, Inc. 2000a) will be followed. These BMPs are designed to prevent the discharge of chemicals to flood control channels and storm drain systems and allow prompt and effective response to any accidental spills. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.

9. The ESC shall ensure that the spread or introduction of invasive exotic plants shall be avoided to the maximum extent possible. When practicable, invasive exotic plants and animals at the work site shall be removed.

10. The number of access routes, number and size of staging areas, and the total area of the work site activity shall be limited to the minimum necessary to complete the proposed activity.

11. Any work using equipment within the stream channel shall be performed in isolation from the flowing stream. If there is any flow when the work is done, the DPW Road Maintenance Supervisor shall construct cofferdams upstream and downstream of the excavation site and divert all flow from upstream of the upstream dam to downstream of the downstream dam. The cofferdams will be constructed with clean river gravel or sand bags and sealed with sheet plastic. Sand bags and any sheet plastic will be removed from the stream upon project completion. Clean river gravel may be left in the stream, but the cofferdams must be breached to return the stream flow to its natural channel.

12. For minor actions (where the disturbance to construct cofferdams to isolate the work site would be greater than that which would occur in completing the proposed action), measures will be put in place immediately downstream of the work site to capture suspended sediment. This may include installation of silt catchment fences across the drainage or placement of a filter berm of clean river gravel. Silt fences and other non-native materials will be removed from the

stream following completion of the activity. Gravel berms may be left in place after breaching, provided they do not impede the stream flow.

13. Water quality will be protected through the use of sediment/erosion control measures, including sediment traps, turbidity curtains, silt fences, hay bales, hydro-seeding using a native mix, and use of straw mulch, as appropriate. These measures will be appropriately located to prevent transporting and depositing sediment disturbed during maintenance activities outside of the maintenance activity zone.

14. If it is necessary to divert flow around the work site, either by pump or by gravity flow, the suction end of the intake pipe shall be fitted with fish screens meeting CDFG and NOAA Fisheries' criteria to prevent entrainment or impingement of small fish (National Marine Fisheries Service 1997). Any turbid water pumped from the work site itself to maintain it in a dewatered state shall be disposed of in an upland location (e.g., vegetated upland area via flexible pipe) where it will not drain directly into any stream channel.

15. An individual on foot to displace wildlife and prevent them from being crushed shall precede any equipment entering the active stream (for example, in the process of installing a cofferdam, or movement of a dozer into the stream channel).

16. If any general wildlife species are encountered during the course of work activities, said wildlife shall be allowed to leave the construction area unharmed, and shall be flushed or herded in a safe direction away from the project site. For example, if western pond turtles are found, they shall be moved to suitable habitat upstream or downstream of the work site before work proceeds.

17. For any work sites containing western pond turtles, foothill yellow-legged frogs or tailed frogs, the ESC shall provide to the DPW Road Maintenance Supervisor a list of the exclusion measures that will be used at their work site to prevent take or injury to any individual pond turtles or frogs that could occur on the site. The DPW Road Maintenance Supervisor shall ensure that the approved exclusion measures are in place prior to construction. Prior to work activities, any such turtles or frogs found within the exclusion zone shall be moved to suitable habitat upstream or downstream of the work site.

18. All habitat improvements shall be done in accordance with techniques in the California Salmonid Stream Habitat Restoration Manual (Circuit Rider Productions, Inc. 2004).

Best Management Practices (BMPs)

County of Marin-maintained drainage culverts and associated drainages must be periodically cleaned to maintain their function of passing stream flows and to prevent flooding, to prevent damage to the culvert and adjacent road, and to avoid alteration of

the stream channel by erosion or sedimentation. Using best management practices when maintaining these culverts and channels will help to (1) restore the hydraulic capacity, geomorphic conditions and ecological functionality of the channels; (2) protect and improve water quality; (3) improve passage for salmonids that need to swim through them as they migrate upstream to spawn or find colder water in the upper tributaries during hot summer months; (4) assist juvenile salmon that need to leave streams and rivers to migrate out to sea in the spring; and (5) restore migration corridors for California red-legged frogs at some sites (e.g., MM 25.00 SFD).

The Marin County Flood Control District is a member of the Bay Area Stormwater Management Agencies Association's (BASMAA) Operational Permits Committee (OPC). The OPC identified the need for a guidance manual that specifically addressed stream and channel maintenance activities and participated in the preparation of the BASMAA Flood Control Facility Maintenance Best Management Practices (BMP) Manual (EOA, Inc. 2000*a*). The County of Marin also participated in development of the FishNet4C Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance (FishNet4C 2004). Maintenance staff, including project planners and field staff, within the Marin County Department of Public Works will implement the applicable BMPs contained in these manuals to avoid or minimize impacts to natural resources while allowing for stream and channel maintenance activities to proceed. These BMPs cover Chemical Use, Equipment and Vehicles, Natural Resource Protection and Restoration, Sediment Control, Soil Stabilization, Vegetation and Debris Management, Velocity Reduction, and Water Diversion.

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