STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

In the Matter of Water Quality Certification for the

PACIFIC GAS AND ELECTRIC COMPANY
RELIEF REACH-KENNEDY MEADOWS RIPARIAN RESTORATION
AND STREAMBANK STABILIZATION PROJECT

SOURCE: Middle Fork Stanislaus River

COUNTY: Tuolumne

WATER QUALITY CERTIFICATION FOR FEDERAL PERMIT OR LICENSE

BY THE EXECUTIVE DIRECTOR:

1. Background and Project Description

On January 4, 2017, Pacific Gas and Electric Company (PG&E or Applicant) filed an application for a permit under Section 404 of the Clean Water Act (CWA) with the United States Army Corps of Engineers for the Relief Reach – Kennedy Meadows Riparian Restoration and Streambank Stabilization Project (Project). The Project is required by Article 401 of the Federal Energy Regulatory Commission's (Commission or FERC) license for the Spring Gap-Stanislaus Hydroelectric Project[1] (Spring Gap Project).

The Spring Gap Project FERC license condition requiring the Project is derived from United States Forest Service (Forest Service) 4(e) condition 39 and condition 9 in the State Water Resources Control Board's (State Water Board) water quality certification (Spring Gap certification). Per those conditions, PG&E is required to evaluate riparian and streambank conditions in upper Kennedy Meadows on the Middle Fork Stanislaus River below Relief Dam (Project Reach) and to develop and to implement vegetation restoration and streambank stabilization measures to improve riparian vegetation and habitat, aquatic habitat, and bank stability. PG&E completed several studies to inform the development of the Project. The main components of the Project include: (1) construction of streambank stabilization bioengineering design elements (including improvements and planting of riparian vegetation) in seven treatment areas within the Project Reach; (2) implementation of best management practices (BMPs) and avoidance, protection, and minimization measures (APMMs) for potential construction impacts; and (3) implementation of a maintenance and monitoring plan (MMP).

The Project is located in Tuolumne County along Highway 108, approximately 57 miles east of Sonora, approximately six miles east of the town of Dardanelle, and 50 miles south of South Lake Tahoe at an elevation of approximately 6,500 feet (mean sea level). The Project Reach is located along the Middle Fork Stanislaus River approximately 2.5 miles downstream of Relief Dam (Figure 1). Streambank stabilization and riparian restoration will occur along a 3,000-linear-foot Project Reach along the Middle Fork Stanislaus River on land that is owned by

[1] Project No. 2130 issued on April 24, 2009.

Tuolumne County. The property is surrounded by public land managed by the Stanislaus National Forest.

Seven locations were selected for bank stabilization and riparian restoration treatments within the Project Reach. The seven locations (treatment areas) have vulnerable or unstable streambanks and lack riparian vegetation cover. These locations are shown on Attachment 2. Attachment 2 shows the type of activities proposed within each treatment area, including the portions of the treatment areas with planting only and where digging and grading will occur. Table 1 identifies issues at the treatment areas, lists proposed restoration and enhancement activities, and includes recent photographs of each treatment area. A description of bank stabilization and riparian restoration treatment activities, equipment to be used, and the source of materials are included in Table 2.

The proposed treatments include a combination of bioengineering techniques, including streambank grading, wood and rock placement, and native vegetation planting. Toe rock additions and root wad series are recommended in areas with more recent and severe active streambank erosion, and where flow velocities and shear forces are greater during high flows compared to the other treatment areas. Areas with lower flow velocities and shear forces will be treated with riparian vegetation plantings. Two of the treatment areas with unstable streambanks and lack of riparian vegetation (Treatment Areas 5 and 6) are located adjacent to a popular recreation trail and river access for cattle and recreationists. To protect the restored vegetation and log structures and promote the successful establishment of riparian vegetation along the streambanks, fencing will be installed in Treatment Areas 5 and 6 at the downstream end of the Project Reach on the east meadow. These fenced areas are separated by an approximate 80-foot bank section without fencing, which is currently used for river access by recreationists and cattle. Fencing will focus access in this section, and reduce pressure on the newly restored areas. To compensate for construction impacts, PG&E will fund fish stocking activities early in the construction schedule.

2. Regulatory Authority

2.1 Water Quality Certification

The Federal Clean Water Act (33 U.S.C. §§ 1251-1387) was enacted “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” (33 U.S.C. § 1251(a).) Section 101 of the Clean Water Act (33 U.S.C. § 1251 (g)) requires federal agencies to “co-operate with the State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.”

Section 401 of the Clean Water Act (33 U.S.C. §1341) requires every applicant for a federal license or permit which may result in a discharge into navigable waters to provide the licensing or permitting federal agency with certification that the project will be in compliance with specified provisions of the Clean Water Act, including water quality standards and implementation plans promulgated pursuant to section 303 of the Clean Water Act. (33 U.S.C. § 1313). Clean Water Act section 401 directs the agency responsible for certification to prescribe effluent limitations and other limitations necessary to ensure compliance with the Clean Water Act and with any other appropriate requirement of state law. Section 401 further provides that state certification conditions shall become conditions of any federal license or permit for the project. The State Water Board is designated as the state water pollution control agency for all purposes stated in the Clean Water Act and any other federal act. (Wat. Code Section 13160.). The State Water

Board's Executive Director has been delegated the authority to issue a decision on a water quality certification (certification) application. (Cal. Code Regs., tit. 23, § 3838, subd. (a).)

On April 8, 2016, the State Water Board received the water quality certification application for the Project. On May 5, 2016, the State Water Board provided notice of receipt of a complete application for the Project to the applicable parties pursuant to California Code of Regulations, title 23, section 3835, subdivision (c). On February 24, 2017, the State Water Board provided public notice of the application pursuant to California Code of Regulations, title 23, section 3858 by posting information describing the Project on the State Water Board's website and by sending out an email notification to the "Water Rights Water Quality Certification" Email Subscription List. On March 9, 2017, one comment letter was received, submitted by Central Sierra Environmental Resource Center (CSERC), which expressed concerns with focusing all river access down to a single point with the installation of split-rail fencing. State Water Board staff considered the comment and determined that limiting access to one area will provide more protection to the newly restored riparian area than allowing multiple access points that would potentially compromise streambank stability. On July 21, 2017, the Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) reviewed a draft certification and provided comments, which have been considered and incorporated as appropriate.

2.2 Water Quality Standards and Water Quality Control Plans

The California Regional Water Quality Control Boards adopt, and the State Water Board and the United States Environmental Protection Agency (USEPA) approve, water quality control plans (basin plans) for each watershed basin in the State. The basin plans designate the beneficial uses of waters within each watershed basin, and water quality objectives designed to protect those uses pursuant to Section 303 of the Clean Water Act. (33 U.S.C. § 1313.) The State Water Board may also adopt water quality control plans. The beneficial uses and water quality objectives that are contained in the water quality control plans, together with state and federal anti-degradation requirements, constitute California's water quality standards.

The Central Valley Regional Water Board adopted, and the State Water Board and the USEPA approved, the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (SR/SJR Basin Plan). The SR/SJR Basin Plan designates the beneficial uses of water to be protected along with the water quality objectives necessary to protect those uses.

The existing beneficial uses for the Stanislaus River above New Melones Reservoir identified in the SR/SJR Basin Plan include: municipal and domestic supply; agricultural; power; contact recreation; noncontact recreation; warm freshwater habitat; cold freshwater habitat; and wildlife habitat.

2.3 Construction General Permit

The State Water Board has adopted a Construction General Permit[2], which is required for activities that disturb one or more acres of soil. Construction activities subject to the Construction General Permit include clearing, grading and disturbances to the ground such as stockpiling or excavation, but do not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility.

[2] Water Quality Order 2009-0009-DWQ and National Pollutant Discharge Elimination System No. CAS000002, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ.

2.4 California Environmental Quality Act

The State Water Board is the lead agency under the California Environmental Quality Act (CEQA) for the Project. (Pub. Resources Code, §§ 21000-21177.) On June 8, 2017, the State Water Board provided, for public comment, an Initial Statement (IS) and Notice of Intent to Adopt a Negative Declaration (ND) (SCH No. 2017062016) for the Project. A total of two comments were received. Included with the comment received from CSERC was a request for a pre-construction site visit. A site visit occurred on July 26, 2017. The ND and IS, together with the CEQA findings and Maintenance and Monitoring Plan in Attachment 1 of this certification, reflect the State Water Board's independent judgment and analysis. The State Water Board filed a Notice of Determination for the Project on September 1, 2017.

3. Conclusion

State Water Board staff have reviewed comments and considered a wide range of information in analyzing the PG&E's certification application, including the plans and submissions of PG&E, the SR/SJR Basin Plan, the existing water quality conditions, Project-related controllable factors, and the Project's CEQA documents. The State Water Board finds that, with the conditions and limitations imposed by this certification, the proposed Project will be protective of state water quality standards and other appropriate requirements of state law.

All documents and other information that constitute the public record for this Project will be maintained by the Division of Water Rights and will be available for public review at the following address: State Water Board, Division of Water Rights, 1001 I Street, Sacramento, CA 95814.

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ACCORDINGLY, BASED ON ITS INDEPENDENT REVIEW OF THE RECORD, THE STATE WATER RESOURCES CONTROL BOARD CERTIFIES THAT THE RELIEF REACH – KENNEDY MEADOWS RIPARIAN RESTORATION AND STREAMBACK STABILIZATION PROJECT will comply with sections 301, 302, 303, 306, and 307 of the Clean Water Act, and with applicable provisions of State law, if Pacific Gas and Electric Company complies with the following terms and conditions during the Project activities certified herein.

CONDITION 1. Waters shall be free of changes in turbidity (due to Project activities) that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to Project controllable water quality factors shall not exceed the following limits as defined in the SR/SJR Basin Plan:

Background Level or Natural Turbidity	**Downstream Turbidity (after starting construction)**
Less than 1 NTU	Total turbidity shall not exceed 2 NTU
Between 1 and 5 NTU	Increases shall not exceed 1 NTU
Between 5 and 50 NTU	Increases shall not exceed 20 percent
Between 50 and 100 NTU	Increases shall not exceed 10 NTUs
Greater than 100 NTU	Increases shall not exceed 10 percent

Standard turbidity limits may be eased during in-water working periods to allow a turbidity increase of up to 15 Nephelometric Turbidity Units (NTU) over the background turbidity as measured in surface waters no greater than 300 feet downstream from the working area. For in-water working periods, turbidity shall not exceed 15 NTU over background turbidity for more than four consecutive hours or 24 hours total for the Project.

The Deputy Director for Water Rights (Deputy Director) and the Central Valley Regional Water Board Executive Officer (Executive Officer) shall be notified promptly and in no case more than 24 hours after monitoring results indicate an averaged turbidity limit exceedance. Activities associated with these exceedances may not resume without approval from the Deputy Director.

Monitoring Equipment
Turbidity shall be measured using nephelometry. All turbidity meters used shall be calibrated and maintained in accordance with the manufacturer's instructions. For each meter used for monitoring, a calibration and maintenance log shall be maintained onsite and provided to State Water Board or Central Valley Regional Water Board staff upon request.

Turbidity Monitoring Procedure
The Applicant shall establish two turbidity-monitoring locations at: (1) a suitable reference location approximately 50 feet upstream of the influence of the Project to establish natural turbidity levels flowing into the Kennedy Meadows Reach; and (2) a location approximately 300 feet downstream of the Project Reach to calculate the increases in turbidity. These locations shall be established by pin flag and used as the monitoring locations throughout the monitoring period. A global positioning system (GPS) point and a photograph of each location shall be taken at the time of initial sampling. Two recorders shall be established at the upstream location and two recorders shall be established at the downstream location. Turbidity data shall be logged at hourly time intervals. Unless approved by the Deputy Director the initial monitoring locations may not be changed.

Visual Monitoring Procedure
Onsite monitors shall be present to visually monitor for turbidity plumes created by Project activities during daylight hours. If a visible plume occurs during daylight hours, the Applicant shall perform hourly grab sample turbidity measurements using a hand-held turbidity meter to supplement the turbidity recorders. The grab sampling shall continue for the remainder of that day.

Unless otherwise approved by the Deputy Director, the grab samples shall be collected as follows. The grab samples shall be collected by immersing the sampling vial into the stream surface water at each monitoring location. Prior to placing the vial into the meter to collect the turbidity measurement, the vial shall be cleaned with the cloth provided with the meter. After each turbidity measurement is collected, the sample shall be discarded and the vial cleaned prior to drawing a new sample for measurement.

Data Recording and Reporting
Data Recording – A visual turbidity monitoring form shall be completed daily when in-water work is in progress; completed forms shall remain on file during the construction period, and thereafter be kept in the long-term Applicant files. Daily observational data shall include the date and time of day, the name of the monitor, weather conditions, visual observations of water quality conditions, and any other remarks or observations made that have the potential to affect water quality conditions. Turbidity data shall be reviewed daily and 24-hour daily averages calculated.

Reporting – The Applicant shall provide the State Water Board reports and tabular turbidity data within two weeks of initiation of monitoring activities and on a bi-weekly basis thereafter until the Project is complete. The reports shall include a summary table of daily water quality monitoring results, a summary of the daily observations, and the turbidity monitoring forms. The reports shall also include a brief description of the Project activities covered during the dates of the report. Abnormal weather or other unusual conditions or occurrences unrelated to Project activities that could cause increases in turbidity shall also be reported.

CONDITION 2. The Applicant shall implement the MMP (dated April 2016) developed for the Project (included in Attachment 1) to address long-term maintenance and monitoring of the Project Reach. The MMP shall be implemented immediately upon completion of the Project's construction.

CONDITION 3. The Applicant shall inspect, photograph, and document the condition of Kennedy Meadows Road prior to and after construction of the Project. Any degradation due to the Project construction shall be restored to pre-construction conditions. The Applicant shall coordinate with the appropriate landowner(s) (Stanislaus National Forest, Tuolumne County) to address potential damage.

CONDITION 4. All dewatering activities within the bed and banks of the Middle Fork Stanislaus River shall be performed in accordance with the Dewatering and Diversion Plan (PG&E, August 2017) and the Applicant shall ensure the following:

- In order to support fish and other aquatic life, flows downstream of the Project Reach shall be in accordance to Conditions 2 and 6 (if necessary) in the State Water Board certification (State Water Board Order WR 2009-0039) for the Spring Gap Project (FERC Project No. 2130).

- During the diversion period, weather conditions and stream flow shall be evaluated daily or more often if conditions warrant. If a precipitation event is forecast (greater than 50 percent chance within a 48-hour period), the Applicant shall consult with the California Department of Fish and Wildlife (CDFW) and the State Water Board to determine if additional site protective actions or an emergency diversion removal is warranted.
- Normal flows shall be restored to the de-watered reach immediately upon completion of work. For the de-watered portion of the channel, the original surface of the streambed shall be restored according to the Project specifications and drawings.
- Equipment, waders, boots, and any other equipment used during fish capture and relocation shall be decontaminated prior to being brought on site. All fish collection equipment shall be cleaned of aquatic invasive species, oil, and grease. All equipment shall be well-maintained. Decontamination protocols developed by the CDFW Declining Amphibian Task Force shall be implemented prior to any instream work.
- Any native fish occurring within the temporary work area shall be recovered and relocated outside the Project Reach prior to diverting water to dewater the Project Reach. Fish shall be excluded from areas near pump intakes.
- All pump intakes shall be screened to avoid potential for entrainment.
- Rescued fish shall be moved to previously identified relocation pools and/or the nearest appropriate aquatic habitat outside of the Project Reach.
- A record shall be maintained of all fish rescued, moved, injured, and dead. For fish rescued and moved, records shall include species, date of capture and relocation, method of capture, location of relocation, and total number of fish captured and relocated. For fish injured or dead, records shall include species, date, and disposal location or action taken. Any dead fish shall be disposed of properly. The fish records shall be provided to CDFW and the State Water Board upon request.
- During dewatering activities, the Applicant shall pump water to a waterproof bag (silt bag) or portable tank located above the ordinary high water mark (OHWM) of the Middle Fork Stanislaus River. The Applicant shall allow sufficient time for sediment to settle out of the water in the silt bag or portable tank. The water shall be used for dust control on the existing access roads via a water truck or shall be hauled off-site and disposed of in compliance with federal, state, and local laws, ordinances, and regulations. Turbid water generated on-site shall not contact or enter surface waters.

CONDITION 5. Construction access and construction site staging for the Project shall be as shown in Attachment 2. Upon completion of construction activities, all access routes and disturbed areas shall be restored to their pre-construction conditions. Restoration of disturbed areas shall include ripping and scarification to remove compaction caused by heavy equipment, seeding with native species, and slope stabilization. All disturbed areas shall be seeded with the appropriate native seed mix (whether meadow or riparian).

CONDITION 6. Signage shall be used during construction to help warn the public of hazards and clearly delineate work areas. Signage shall be used to educate recreationists on the restoration activities and to discourage people from climbing or walking on the treatment measures. Advance notice of the construction schedule shall be provided to the Kennedy Meadows Resort and Pack Station (Pack Station). Signage shall be placed at the campground facilities, the Kennedy Meadows trailheads parking area, the gate across Kennedy Meadows

Road at the Pack Station, the Project site, and on the trail south of the Project site. A public notice shall also be placed in the local newspaper.

CONDITION 7. The Applicant shall take all necessary measures in preconstruction planning to minimize construction impacts on riparian habitat. Prior to construction, the Applicant shall install construction fencing along the outer edges of the construction zone, where necessary, to prevent accidental entry of construction equipment and/or personnel into riparian habitat and limit the disturbance to the minimum necessary to complete the Project. Construction fencing shall be maintained in good condition for the duration of the Project. No grading shall occur within the dripline of trees that will not be removed as part of the Project, unless approved by the Deputy Director. Mats or other means to prevent sinking and rutting shall be used in areas where meadow soils are soft.

CONDITION 8. Disturbance within the bed and bank of the Middle Fork Stanislaus River associated with Project activities shall be limited to August 1 through October 31.

CONDITION 9. Prior to ground-disturbing activities, adequate erosion and sediment control BMPs shall be installed around the periphery of all tributaries, swales, and wetlands within the construction area, and managed at least weekly to avoid sediment or other materials from entering these areas. If soils or other materials build up along the erosion and sediment controls, these materials shall be graded away from the tributaries, swales, and wetlands routinely and prior to a storm event. Removed sediment shall be contained and not allowed to enter any surface waters or sensitive habitats.

CONDITION 10. The Applicant shall fund additional fish stocking, up to a total of 250 catchable rainbow trout, in the late summer/early fall the year(s) of construction. Stocking shall take place downstream of the dewatered areas, in coordination with CDFW.

CONDITION 11. Vehicles, heavy equipment, and all power equipment shall be refueled in designated areas, located away from the riparian area and stream corridor. Drip pans or absorbent pads shall be used during refueling. Absorbent spill clean-up materials and spill kits shall be available at all designated refueling areas. Foreign materials, such as petroleum or other fuels, shall not be released.

CONDITION 12. All material stockpiles shall be protected, covered, and surrounded with coil rolls, straw wattles, or equivalent, to prevent sediment runoff. Stockpiles shall be located outside of riparian habitat and above the OHWM.

CONDITION 13. Appropriate spill containment, absorbent spill clean-up materials, and spill kits shall be available on-site at all times. Any spills shall be cleaned up immediately and shall not be buried or washed with water. Initial containment shall be with absorbent material or, if necessary, the construction of berms. Used clean-up materials, contaminated materials, and recovered spilled materials that are no longer suitable for clean-up shall be stored and disposed of properly. Hazardous and non-hazardous material shall be disposed of in the manner specified by the manufacturer. Contaminated soil shall be excavated, contained, and transported to an approved disposal site.

The Applicant and its contractors shall notify all applicable agencies as soon as feasible, as to the type, date, time, and actions taken in response to all spills within their jurisdiction. In the event of major spill affecting plant, wildlife, or aquatic resources or creating public health concerns, notification shall be according to all applicable requirements.

CONDITION 14. Vehicle use within riparian areas and waterways shall be limited to the designated work areas and access routes as specified in Attachment 2. Vehicles must be inspected and maintained daily for leaks. All equipment temporarily staged within the OHWM shall be placed within secondary containment.

CONDITION 15. The Applicant shall comply with the State Water Board's Construction General Permit and amendments thereto.

CONDITION 16. Prior to a rain event or when there is greater than 50 percent chance of rain forecasted by the National Weather Service during the next 24 hours, erosion control BMPs shall be applied to all exposed areas upon completion of the day's activities.

CONDITION 17. Control measures for erosion, excessive sedimentation and turbidity shall be implemented and in place at the commencement of and throughout any ground clearing activities, excavation, or any other Project activities that could result in erosion or sediment discharges to surface waters. Erosion control blankets, liners with berms, and/or other erosion control measures shall be used for any stockpile of excavated material to control runoff resulting from precipitation, and prevent material from contacting or entering surface waters.

CONDITION 18. All imported riprap, rocks, and gravels used for construction within or adjacent to any watercourses shall be pre-washed. Wash water generated on-site shall not contact or enter surface waters. Wash water shall be contained and disposed of off-site in compliance with federal, state, and local laws, ordinances, and regulations.

CONDITION 19. Construction material, debris, spoils, soil, silt, sand, bark, slash, sawdust, rubbish, steel, or other inorganic, organic, or earthen material, and any other substances from any Project-related activity shall be prevented from entering surface waters. All construction debris and trash shall be contained and regularly removed from the work area to the staging area during construction activities. Upon completion of construction, all Project-generated debris, building materials, excess material, waste, and trash shall be removed from all the Project sites for disposal at an authorized landfill or other disposal site in compliance with state and local laws, ordinances, and regulations.

CONDITION 20. No unset cement, concrete, grout, damaged concrete, concrete spoils, or wash water used to clean concrete surfaces shall contact or enter surface waters. Any area containing wet concrete shall be completely bermed and isolated. The berm shall be constructed of sandbags or soil and shall be lined with plastic to prevent seepage. No leachate from truck or grout mixer cleaning stations shall percolate into Project area soils. Cleaning of concrete trucks or grout mixers shall be performed in such a manner that wash water and associated debris is captured, contained and disposed of in compliance with state and local laws, ordinances and regulations. Washout areas shall be of sufficient size to completely contain all liquid and waste concrete or grout generated during washout procedures. Hardened concrete or grout shall be disposed at an authorized landfill, in compliance with federal, state, and local laws, ordinances and regulations.

CONDITION 21. All equipment shall be washed prior to transport to the Project site and be free of sediment, debris, and foreign matter. Any equipment used in direct contact with surface water shall be cleaned prior to use. All equipment using gas, oil, hydraulic fluid, or other petroleum products shall be inspected for leaks prior to use and shall be monitored for leakage. Stationary equipment (e.g., motors, pumps, generators, etc.) shall be positioned over drip pans

or other types of containment. Spill and containment equipment (e.g., oil spill booms, sorbent pads, etc.) shall be maintained onsite at all locations where such equipment is used or staged.

CONDITION 22. Onsite containment for storage of chemicals classified as hazardous shall be away from watercourses and include secondary containment and appropriate management as specified in California Code of Regulations, title 27, section 20320.

CONDITION 23. Unless otherwise specified in this certification or at the request of the Deputy Director, data and/or reports shall be submitted electronically in a format accepted by the State Water Board to facilitate the incorporation of this information into public reports and the State Water Board's water quality database systems in compliance with Water Code section 13167.

CONDITION 24. The Applicant, including its contractors and subcontractors, shall report any noncompliance to the conditions of this certification to the Deputy Director within 24 hours of the time when the Applicant, or its contractors, or subcontractors become aware of the circumstances of noncompliance.

CONDITION 25. The Applicant shall comply with all applicable requirements of the SR/SJR Basin Plan. If at any time an unauthorized discharge to surface waters (including river or streams) occurs or monitoring indicates that the Project has or could soon be in violation of water quality objectives, the associated Project activities shall cease immediately and the Deputy Director and the Executive Officer shall be notified. Associated activities may not resume without approval from the Deputy Director.

CONDITION 26. Notwithstanding any more specific conditions in this certification, the Project shall be conducted in a manner consistent with all water quality standards and implementation plans adopted or approved pursuant to section 303 of the Clean Water Act. The Applicant must take all reasonable measures to protect the beneficial uses of waters of the Middle Fork Stanislaus River.

CONDITION 27. This certification does not authorize any act which results in the taking of a threatened, endangered or candidate species or any act, which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (ESA) (Fish & Game Code §§ 2050-2097) or the federal ESA (16 U.S.C. §§ 1531 - 1544). If a “take” will result from any act authorized under this certification or water rights held by the Applicant, the Applicant must obtain authorization for the take prior to any construction of the portion of the Project that may result in a take. The Applicant is responsible for meeting all requirements of the applicable ESAs for the Project authorized under this certification.

CONDITION 28. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation is subject to all remedies, penalties, processes, or sanctions as provided for under applicable state or federal law. For the purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to ensure compliance with the water quality standards and other pertinent requirements incorporated into this certification.

CONDITION 29. In response to a suspected violation of any condition of this certification, the Deputy Director or the Executive Officer may require the holder of any federal permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the Deputy Director or the Executive Officer deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. (Wat. Code, §§ 1051, 13165, 13267 & 13383). The State Water Board may add to or modify the monitoring and/or reporting conditions of this certification as appropriate to ensure compliance.

CONDITION 30. The Applicant is responsible for compliance with all applicable federal, state, or local laws or ordinances and shall obtain authorization from applicable regulatory agencies prior to the commencement of construction activities.

CONDITION 31. Upon request, a construction schedule shall be provided to State Water Board staff. The Applicant shall provide State Water Board and Central Valley Regional Water Board staff reasonable access to Project sites to document compliance with this certification.

CONDITION 32. This certification is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to California Water Code section 13330 and California Code of Regulations, title 23, division 3, chapter 28, article 6 (commencing with section 3867).

CONDITION 33. The State Water Board shall provide notice and an opportunity to be heard in exercising its authority to add to or modify the conditions of this certification.

CONDITION 34. Activities associated with construction and maintenance of the Project that threaten or potentially threaten water quality shall be subject to further review by the Deputy Director and Executive Officer.

CONDITION 35. Nothing in this certification shall be construed as State Water Board approval of the validity of any water rights, including pre-1914 claims. The State Water Board has separate authority under the Water Code to investigate and take enforcement action if necessary to prevent any unauthorized or threatened unauthorized diversions of water.

CONDITION 36. This certification is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a FERC license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to California Code of Regulations, title 23, section 3855, subdivision (b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

CONDITION 37. This certification is conditioned upon total payment of any fee required under California Code of Regulations, title 23, division 3, chapter 28.

CONDITION 38. A copy of this certification shall be provided to any contractor and all subcontractors conducting Project-related work, and copies shall remain in their possession at the Project site. The Applicant shall be responsible for work conducted by its contractors, subcontractors, or other persons conducting Project-related work.

Eileen Sobeck
Executive Director

9/5/2017
Date

Enclosures:

Figure 1:	Project Location and Project Vicinity
Table 1:	Treatment Techniques and Vegetation Issues
Table 2:	Description of Activities, Equipment, and Sources of Material
Attachment 1:	Maintenance and Monitoring Plan (dated April 2016)
Attachment 2:	100% Design Plans, Sheet R-1`

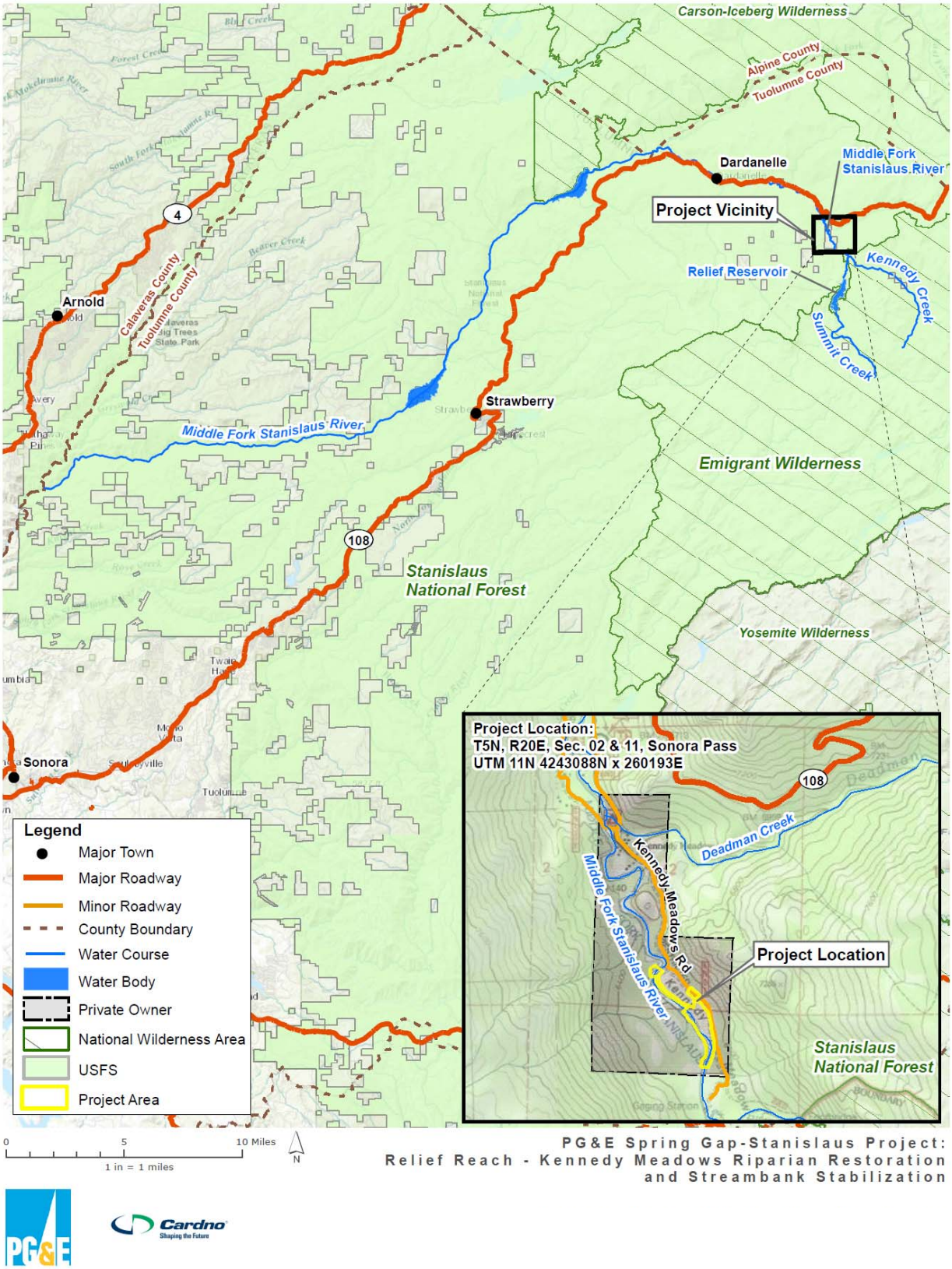


Figure 1 Project Location and Project Vicinity

Table 1 Bank Stabilization Treatment Techniques to Address Erosion and Vegetation Issues within the Project Reach.

Treatment Area	Issue	Bank Grading	Large Wood Placement	Stakes/ Poles/ Bare Root Planting[a]	Root Wad Series	Rock Toe/ Additional Rock	Site Photograph
		Bank Stabilization Treatment Technique					
1	• Lack of riparian cover • Bank erosion – channel widening (wood present) • Bank length: 130 ft. Photograph: facing west bank from east bank, upstream		2 logs	~25 riparian poles/ containers		see Table 2.6-5[b]	
2	• Lack of riparian cover • Bank erosion – channel widening and incision (ongoing) • Bank length: 350 ft. Photograph: east bank, facing upstream	●	9 logs	~80 riparian poles/ containers and 38 upland containers		see Table 2.6-5[b]	

Treatment Area	Issue	Bank Grading	Large Wood Placement	Stakes/ Poles/ Bare Root Planting[a]	Root Wad Series	Rock Toe/ Additional Rock	Site Photograph
		Bank Stabilization Treatment Technique					
3	• Lack of riparian cover • Bank erosion – channel widening and undercut banks • Bank length: 500 ft. Photograph: east bank, facing downstream	●	18 logs	~260 riparian poles/ containers		see Table 2.6-5[b]	
4	• Lack of riparian cover • Bank erosion – channel widening (minimal vegetation present) • Bank length: 130 ft. Photograph: facing west bank from east bank			~25 riparian poles/ containers			
5	• Lack of riparian cover • Bank erosion – channel widening, bank slumping/ block failure • Bank length: 200 ft. Photograph: east bank, facing upstream	●	3 logs	~157 riparian poles/ containers		see Table 2.6-5[b]	

Treatment Area	Issue	Bank Grading	Large Wood Placement	Stakes/ Poles/ Bare Root Planting[a]	Root Wad Series	Rock Toe/ Additional Rock	Site Photograph
		Bank Stabilization Treatment Technique					
6	• Lack of riparian cover • Bank erosion – channel widening, bank slumping/ block failure • Bank length: 400 ft. Photograph: east bank, facing downstream			~295 riparian poles/ containers			
7	• Lack of riparian cover • Bank erosion – channel widening (meander bend) • Bank length: 250 ft. Photograph: facing west bank from east bank, upstream	●		~87 riparian poles/ containers	14 logs	see Table 2.6-5[b]	

[a] Quantities are minimum numbers, and may be modified during the permitting process and site conditions.

[b] Refer to Relief Reach – Kennedy Meadows Riparian Restoration and Streambank Stabilization Project Initial Study/Negative Declaration (PG&E) for table.

Table 2 Description of Streambank Stabilization and Riparian Restoration Activities, Equipment, and Sources of Material.

Activity[a]	Description	Equipment	Source
Bank grading	Prepare streambank slopes by grading them to a more stable angle. Prepare a relatively uniform, smooth surface suitable for vegetation planting.	Excavator	No imported fill
Large wood	Suitable tree (i.e., of adequate size and with root wads and branches or boles) will be delivered to and stockpiled in the temporary staging area. Trees will be delivered by the PG&E contractor. They will be moved to the designated work areas within the Project Reach via the access routes shown on Figure 2.6-1. Trees will be hauled with the excavator, and/or placed on a flatbed truck and transported to the sites from the staging area. Salvaged upland trees (described below under Vegetation Removal) will also be incorporated into the stabilization treatments. An excavator will be used to place the large wood in each treatment area. There will be approximately 25 round trips by trucks to complete this activity.	Excavator, ten-wheel dump truck (or similar), and flatbed truck	Tuolumne County property in the vicinity of the Project, and PG&E vegetation management projects in the vicinity of the Spring Gap-Stanislaus Hydroelectric Project. None will be obtained from floodplain or riparian areas. Trees will be delivered to the Project Reach. Any trees that need to be removed for implementation of the treatments will also be incorporated into the treatments (described below under Vegetation Removal).
Live stake/pole planting	Installation involves the collection and planting of live willow, alder, and/or cottonwood branches. Prior to harvesting, a qualified biologist will identify suitable source areas for collecting the live plant material. Final selection will be coordinated with the appropriate landowner (e.g., Tuolumne County). The branches will be stripped of all side branches, tips, and leaves when salvaged. Stakes are typically three to six feet in length with diameters that vary from ½ inch to four inches. Live stakes may be driven in place or set in holes dug with a digging bar, soil auger, or similar tool. Poles are longer with larger diameters and will be used in areas where depths to groundwater are greater. Live stakes/poles will be inter-planted with bare root plants in the treatment areas where streambank erosion is less severe,	Cuttings will be harvested with hand tools and transported by pickup truck or similar vehicle, as needed. Soil augers or similar tools will be used to dig the holes.	Live plant materials will be cut from existing riparian stands found within the Project Reach or in the vicinity on Tuolumne County property.

Activity[a]	Description	Equipment	Source
	but currently lacks vegetated cover. The roots will provide soil reinforcement and top growth will enhance vegetated cover.		
Bare root planting	Willow/alder/cottonwood/red osier dogwood and upland tree/shrub bare root container stock will be inter-planted with the live stakes/poles.	Shovel, hand trowels. Plantings will be delivered by pickup truck or similar vehicle.	Local nursery.
Toe rock	Toe rock is rock placed at the toe of the bank to provide additional strength to the bank to reduce scouring of the toe and banks during high velocity flows. It is most effective when combined with other bioengineering techniques, and is recommended for several treatment areas to provide additional strength at the toe of the bank. Large rock (approximately 10 inches in diameter) will be incorporated as part of the stabilization treatments. Rock will range in size from 1- to 3-inch river cobble to 1-ton boulders. The smaller rock will also be used to fill voids within the bank treatments. Ten-wheel dump trucks will haul the rock onsite and dump it close to the treatment areas. From that location, an excavator will place the rock. An estimated 25 dump truck trips will be required to haul the material to the site.	Excavator, ten-wheel dump truck.	Expected to be sourced from excess rock material from other PG&E construction projects in the vicinity of the Spring Gap-Stanislaus Hydroelectric Project or from Sonora, California.
Root wad series	Root wad series are a sequence of interlocking uprooted hardwood trees that are typically used in combination with other revegetation methods such as planting, to protect and enhance fish habitat. The bottom segment containing the root mass is placed into an excavated hole into the bank (trunk-first) and the root wad section protrudes perpendicular to the flow. The hole is then backfilled. The root wads deflect the flow away from the streambank so that the bank is less susceptible to erosion. Root wads have the potential to enhance instream habitat by promoting the formation of pool habitat and providing instream habitat.	Same as for large wood.	Same as for large wood.
Vegetation removal (Treatment Area 2 only; see Table 1)	Salvage any existing riparian and upland trees that need to be removed for the construction of the treatments. Riparian trees (approximately 0.014 acre in Treatment Area 2) will be salvaged for use in revegetation as appropriate. Upland trees, including root wads, will be salvaged and used as the large wood. Based on surveys conducted in summer 2015, five (5) Jeffrey pine trees, three (3) white fir trees, and three (3) incense cedar trees	Backhoe or similar equipment, and hand tools.	Not applicable.

Activity[a]	Description	Equipment	Source
	(10-30 inch diameter at breast height)[2] may need to be removed from Treatment Area 2 for construction of the treatment. Salvaged riparian vegetation will be lifted and removed concurrent with construction activities. Based on surveys conducted in summer 2015, six (6) cottonwood trees (15- to 25-inch diameter at breast height)[b] in Treatment Area 2 will need to be transplanted. Soils surrounding the plants will be moistened prior to removal and will be gently removed by excavating around the root zone with hand tools, a backhoe bucket, or other similar equipment. The root wad will be kept as intact as possible and damaged roots shall be pruned as needed. Burlap will be used to wrap and protect the root zone during transport, which will be kept moist/watered to maintain viability. The salvaged plants will be replanted in a suitable location within one of the treatment areas.		
Split rail fence (east meadow near Treatment Areas 5 and 6 only)	A split rail fence (stained pressure treated wood or similar product) (~ 36 inches high, with 3 rungs approximately 8 inches apart) will be installed along the top of the bank to protect the restored banks and revegetated areas approximately two to three feet from the planted vegetation. The fence will be installed in two segments (480 ft. along Treatment Area 5 and 440 ft. along Treatment Area 6), with an open area between these two segments for river access by recreationists and cattle. Large boulders (approximately 4-ft. wide; 2 to 3 ft. in height) will be placed from the end of the fence angling down to the OHWM to discourage access into the treatment areas from the bank slope. Six-foot fence posts will be placed approximately 10 ft. apart and secured with concrete footings. The holes (approximately 95 in total) will be dug approximately 2.5 ft. in depth using a backhoe with an auger attachment. Six inches of clean gravel will be placed at the bottom of the hole to facilitate water infiltration. Concrete will be mixed using a small mixer adjacent to the fence and shoveled into the holes. The top of the concrete will be finished to slope away from the post for drainage. The holes will be filled with concrete to approximately three to four inches below the ground surface, backfilled with existing topsoil, and seeded with the riparian/meadow seed mix. BMPs will be implemented to ensure resource protection.	Cement mixer, backhoe with auger attachment, and hand tools	Expected to be sourced from Sonora, California.

[a] Additional information on treatment activities can be found in the 100% Design Report (PG&E 2016a).

[b] Refer to Table 1; a minimum of 80 riparian species poles/containers and 38 species upland containers will be planted in Treatment Area 2 as part of the treatment.

APPENDIX G

MAINTENANCE AND MONITORING PLAN

This Maintenance and Monitoring Plan (MMP) has been developed for the Relief Reach Riparian Vegetation and Streambank Stabilization Project (Project) in Kennedy Meadows for PG&E. The purpose of the MMP is to help achieve the Project goals and objectives through periodic maintenance and monitoring of specific channel and riparian attributes.

The primary goals of the Project are to:

- Provide streambank stabilization, and
- Enhance the riparian and aquatic habitats within the Project reach of the Middle Fork Stanislaus River.

The objectives of the Project to meet these goals are to:

- Reduce the extent of actively eroding streambanks, and
- Increase riparian cover on the streambanks within the reach.

This MMP, addressing maintenance (including inspections and repair) and monitoring, will be implemented upon completion of the Project's construction (i.e., "post-construction"). Maintenance will be performed to identify problems needing remedial action (e.g., repairing damage from floods, winds, or snow; weeding; irrigation; re-seeding of areas disturbed during construction, etc.) until success criteria are met and through the remainder of the license term (2039; see schedule below). Monitoring will be performed to provide information to assess progress of the Project toward meeting the success criteria; monitoring will conclude when success criteria are met or as agreed upon by the resource agencies (described below). As the Project goals and objectives are focused on improving conditions within the Kennedy Meadows reach, the monitoring will focus on evaluating bank and riparian conditions for the reach as a whole, and will not monitor each treatment area as an individual area.

Maintenance and monitoring will be conducted by qualified personnel[1]. The most intensive maintenance and monitoring period will be take place immediately after the restoration work over a two-year period to quickly identify potential issues with survival and disturbance.

Success Criteria

The following criteria will be used as the basis for determining the success of the Project:

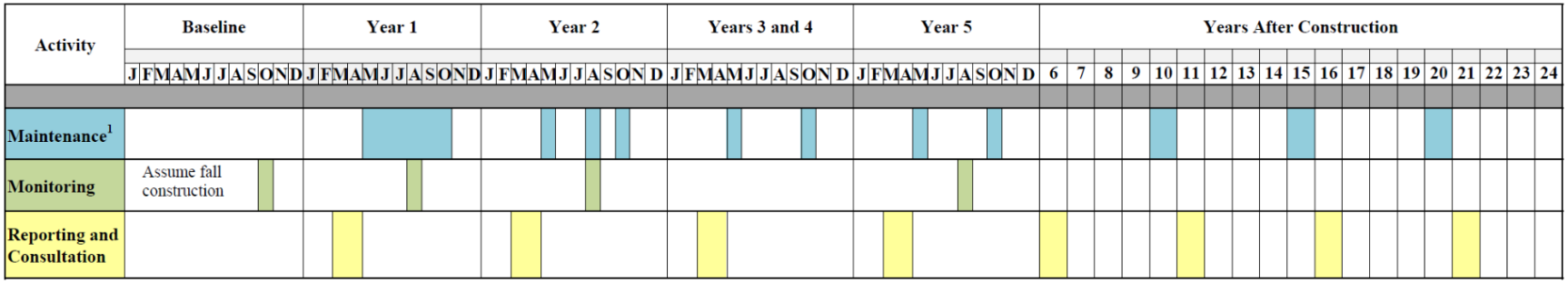
- Establish approximately 1,885 feet (38 percent) of new riparian habitat within the Kennedy Meadows reach by Year 5 after construction (based on cumulative linear distance from the combined restoration treatment areas).
- Improve bank stability along approximately 1,885 feet (38 percent) of streambank within the Kennedy Meadows reach by Year 5 after construction (based on cumulative linear distance from the combined restoration treatment areas).

If success criteria for the increase in riparian cover and/or improved bank stability conditions are not achieved after five years, PG&E will consult with the resource agencies to determine the appropriate next actions. Additional actions (e.g., more planting or more bank treatments) may not be required if it is agreed that the Project objectives have been achieved (reduced extent of eroding streambanks and enhanced cover of riparian vegetation). If it is determined that additional planting or installation of new stabilization treatments is required to meet Project objectives, maintenance and monitoring will be required until success criteria are achieved.

Schedule

The most intensive maintenance period will take place over a two-year period immediately after the restoration work is completed to quickly identify potential areas within the restored reach that may require additional actions due to plant losses or presence of unstable areas of the bank (see Figure G-1 for schedule).

[1] Personnel conducting maintenance activities will review the MMP, previous completed forms, and photo point locations prior to the completing the activities.



[1] Maintenance will also occur the first summer after a winter/summer high flow that exceeds 950 cfs on a daily average basis (measured at the USGS gage no. 11292000). This flow occurs about every 2.5 years on a daily average basis.

Figure G-1. Maintenance and Monitoring Schedule through the Remainder of the License Term (through year 2039).

- Maintenance:
  - Year 1: Once per month between May (or later depending on Highway 108 access) and October.
  - Year 2: Three times in May (or later depending on Highway 108 access); in August and October after the cattle have left Kennedy Meadows.
  - Years 3, 4, and 5: Twice pear year, in May and October, after the cattle have left Kennedy Meadows.
  - Remainder of License Term: Once per year, every five years, and the first summer after a high flow that exceeds 950 cfs on a daily average basis (measured at the USGS gage 11292000)[2] known as gage S-52 in PG&E nomenclature.
- Monitoring:
  - Year 1: Baseline monitoring to establish as-built conditions
  - Years 1, 2, and 5 (or until success criteria are met as described above): conducted in August

Maintenance

The purpose of maintenance is to help ensure the overall quantity and quality of survival of the plantings and structural integrity of the bioengineering treatments to achieve success criteria and maintain conditions through the license term.

Maintenance will be accomplished by periodically inspecting the treatment areas post-construction until success criteria are met, including:

- Bioengineered structures for damage or displacement
- Installed vegetation for insect and/or disease infestations, moisture stress, damage by high flows, herbivory, damage by other uses of the meadow, and other conditions that could impact survival
- Need for irrigation or plant protections (e.g., wire cages)

[2] This flow occurs about every 2.5 years on a daily average flow basis.

- Removal of invasive weeds included on the target list in the approved *Spring Gap-Stanislaus Hydroelectric Project Invasive Weed Management Plan* (PG&E 2011e) or other competing vegetation using manual methods (within a 3-foot radius of the planting)
- Additional fencing and other exclusion features on the meadow and in the riparian area and signage, particularly after winter
- Need for additional permanent exclusion features after removal of the temporary fencing

Maintenance for the remainder of the license term after success criteria are met will involve periodically inspecting:

- Bioengineered structures for damage or displacement
- General condition of riparian vegetation (damage by high flows, other uses of the meadow, or other conditions that could be affecting condition)
- Fencing and other exclusion features on the meadow and in the riparian area and signage

Repairs to the bioengineered structures will not be made if the treatment is still stable and continues to function by stabilizing the streambank. The condition of the features will continue to be monitored during subsequent maintenance. If the features are non-functional due to flows, repairs will be made as soon as practicable (see additional consultation that may be required in Section 5.0). Repairs may require use of large equipment to adjust large wood and/or rock into more stable positions. PG&E will consult with the resource agencies if the damage or displacement is caused by non-Project uses of the meadow/ riparian corridor, high flows, or other potential causes to discuss potential other options.

Vegetation maintenance will be focused on plant survival until the success criteria are met. Vegetation that is not in acceptable growing condition during the first three years after construction will be noted, removed, and replaced with materials of the same species and size as originally specified when conditions are suitable for re-planting (typically late fall). PG&E will hand weed aggressive invasive plants within the treatment areas. PG&E will water/irrigate or install plant protections (e.g., wire cages) if growing conditions are limited by water availability or deer browsing. Watering is only initially proposed to enhance initial survival of the plantings and

should be infrequent to encourage deep rooting of the plantings. If plantings show indications of stress during a maintenance visit (e.g., leaf drop or failure of several pole plantings), the plantings will be watered during that maintenance visit. If herbivory by deer and other animals is resulting in planting mortality such that success criteria may not be achieved, PG&E will install plant protections as soon as practicable.

PG&E will consult with the resource agencies on remedial actions required to address low plant survival beyond typical required maintenance. Once success criteria are met, vegetation maintenance will no longer be conducted.

Damage or displacement of the fencing and other exclusion features on the meadow and in the riparian corridor by flows or winter weather conditions will be repaired by PG&E as soon as practicable. PG&E will consult with the agencies on any excessive or repeated damage to these features to determine if other actions may be required. If observations indicate that non-Project land uses are adversely affecting the condition of the vegetation or treatment features, PG&E will discuss potential actions at the next agency meeting. Specifically, if these uses are resulting in vegetation mortality and/or bank erosion, PG&E will discuss installation of temporary or permanent fencing and signage at these locations. The temporary fencing would likely remain in place in the summer/fall until the damage to the vegetation recovers. Additional permanent fencing would be discussed as an option if the temporary fencing were not successful in addressing use through the riparian corridor.

Maintenance will also include inspection of the disturbed areas that were seeded after construction, and re-seeding if necessary. Seeded areas will be inspected for percent cover once approximately one year after construction in the fall. If percent cover meets or exceeds 70 percent, the seeding will be determined to be successful and no additional maintenance will be required. If percent cover of the seeded areas does not exceed 70 percent, the area will be reseeded, maintenance inspections will continue the following year, and until the 70 percent success criteria are met. The areas will be photographed to document cover.

The maintenance datasheet is provided in Appendix G, Attachment A.

Permanent photo-monitoring stations will be established at each treatment area as part of the Monitoring (see Photo Point section described below under Monitoring). Photographs will also be taken to document any areas that may require repairs or replacement plantings. The photographs will document overall condition of the treatment structures, vegetation condition, condition of exclusion features, and any other notable feature through the license term. Photographs will also be taken to document any damage that occurs within the treatment areas. Photographs of the treatment areas at the photo-point locations will continue as part of the periodic maintenance through the license term.

A brief summary memo, including photographs, will be prepared to document the maintenance that will include general condition of the treatment areas, any damage or plant mortality identified, and remedial actions taken to address deficiencies. The summary memo will also include the photographs and completed datasheets. This memo will be incorporated into a Maintenance and Monitoring Memorandum (Memo), as described below.

Responsibility for Repairs

Table G-1 identifies the repairs that PG&E will be responsible for providing and those that will require consultation with the resource agencies. PG&E will not be financially responsible for repairing damage or displacement that is attributable to non-Project uses of the meadow/ riparian corridor.

Table G-1. Summary of Responsible Parties for Repairs of Stabilization Treatment Areas.

Issue	Cause	Responsible Party
Damage to or Displacement of Bioengineered Structures (see below for vegetation survival)		
	Flows or winter weather conditions	PG&E; discuss with agencies if repeated damage by flows
	Non-Project uses of meadow/ riparian corridor	Discuss with resources agencies
Vegetation Survival until Success Criteria are Met		
	Insect/disease infestations	PG&E
	Moisture stress	PG&E
	High flows or winter weather conditions	PG&E; discuss with agencies if repeated damage by flows
	Aggressive invasive plants	PG&E
	Deer herbivory	PG&E
	Non-Project uses of meadow/ riparian corridor	Discuss with resources agencies
Vegetation Survival (through license term)		
	High flows or winter weather conditions	PG&E; discuss with agencies if repeated damage by flows
	Non-Project uses of meadow/ riparian corridor	Discuss with resources agencies
Exclusion Features (temporary and permanent fencing)		
	Flows or winter weather conditions	PG&E
	Non-Project uses of meadow/ riparian corridor	Discuss with resources agencies

Monitoring

The purpose of the monitoring is to track the progression of the restoration activities toward meeting the Project success criteria described above. If anything that may compromise the success of the restoration is identified, appropriate remedial actions may be implemented and will be documented in the Memo. Baseline monitoring will initially be conducted to document the as-built conditions of the Project and to identify any initial potential threats to Project success. Subsequent monitoring will be conducted as specified in Figure G-1 above. The following methods will be used to determine if the Project success criteria are being met:

- Improved Streambank Stability – Stream Condition Inventory (SCI) surveys (Forest Service 2005) and photo points
- New Riparian Habitat – Longitudinal transects (greenline[3] surveys [Winward 2000]) and photo points

Streambank stability and cover may decrease in other portions of the reach due to circumstances beyond the control of PG&E (e.g., high flows, wind throw, other uses of the meadow). If any of these types of events occur, the circumstances will be documented and PG&E will consult with the agencies.

Improved Streambank Stability

A SCI streambank survey will be conducted to document streambank stability conditions within the reach. The survey will begin at the upstream end of the Treatment Area 1 and extend downstream to the downstream end of Treatment Area 7. Both left and right streambanks will be surveyed in their entirety.

Survey protocols will follow those outlined in the Forest Service Region Stream Condition Inventory Guidebook (Forest Service 2005), and are provided in Appendix G, Attachment B. The entire reach will be surveyed on foot. The streambank condition will be categorized as "Stable," "Vulnerable," or "Unstable," as described in Forest Service (2005). The results will be mapped in

[3] The greenline is defined as: 'The first perennial vegetation that forms a lineal grouping of community types on or near the water's edge. Most often it occurs at or slightly below the bankfull stage' (Winward 2000).

GIS. Photopoints will also be used to document bank conditions over time; those methods are outlined below.

New Riparian Habitat

New riparian habitat within the Kennedy Meadows Reach will be monitored over time using the greenline method (horizontal transect) (Winward 2000). The greenline intercepts the permanent vegetation closest to the channel. This line may be at, below, or above bankfull depending on where vegetation is established. The survey will begin at the upstream end of the Treatment Area 1 and extend downstream to the downstream end of Treatment Area 7. Both left and right streambanks will be surveyed in their entirety. This method is consistent with the vegetation surveys completed for the relicensing (PG&E 2002) and for the 2011 Riparian Progress Report (PG&E 2012a).

Data collected using the longitudinal transect method will be used to characterize the species distributions, and cover of litter, woody debris, woody trees and shrubs[4], and substrate particle size[5] along the streambank (Winward 2000). Composition data (dominant groundcover, shrub, and tree species present) will be obtained by walking along the stream margins, measuring, and recording the length of cover of each dominant or co-dominant species that intersects the greenline. Sub-dominant species found with the dominant species also will be recorded. When a change in the dominant species is observed, a new data entry will be recorded. In addition, the length of areas of bare ground, leaf litter, and large wood will be recorded along each transect. If the lengths of these attributes are different from the vegetation coverage lengths, these attributes will be recorded as separate entries on the datasheet. The lengths of the vegetation and other corridor attributes are then related to the length of the greenline survey to determine the proportion of each along the streambank (Winward 2000). A sample datasheet is provided in Appendix G, Attachment C.

[4] All cover measurements will be made with a densiometer.

[5] See Appendix G, Attachment C for substrate size classes.

Evidence of unusual stress or mortality, and/or evidence of wildlife use, also will be noted. In addition, invasive weed and special-status plant species will be documented if encountered during field surveys. Photopoints will also be used to document bank conditions over time; those methods are outlined below.

Photo Points

Photo documentation provides a visual record of the conditions of the riparian community and streambank and land use (Elzinga et al. 1998; Burton et al. 2007). The photographs will document changes in vegetation cover along the streambank and bank stability for monitoring until success criteria are met, and will continue through the license term as part of the maintenance. The photo point procedures are described in Appendix G, Attachment D.

Permanent photo point locations will be selected to document conditions at each of the stabilization treatment areas. One or two photo point locations will be selected for each treatment area. The location of each photo point will initially be documented in relation to a permanent landmark feature (reference point) and with a Global Positioning System (GPS). If a photo point marker is eroded or removed, an attempt will be made to relocate the marker using the previous photographs, reference points, and GPS coordinates. If the location cannot be identified, a new location in close proximity will be established.

Photographs from the previous year will be taken into the field each year to assist in orienting the camera. The photographs will be taken from the same location. The photographs will be stored electronically in a photo log with pertinent information such as date, time, number, environmental information (such as recent high flows, land uses, etc.).

Reporting and Consultation

Report Consultation

PG&E will prepare a Maintenance and Monitoring Memo to document installation of the stabilization treatments and summarize results of the maintenance and monitoring as specified in Table G-2.

The memos will be provided to the resource agencies at least 30 days prior to the Forest Service Annual Consultation meeting (between March 15 and April 15) and the results and recommendations will be discussed at a time corresponding with the Forest Service Annual Consultation meeting. The memos will be subsequently filed with FERC.

Repair Consultation

If the bioengineered structures are damaged by high flows such that they no longer stabilize the banks, repair work may require construction activities within the channel. PG&E will notify the USACE, State Water Board, and CDFW of the required repair work, and discuss the appropriate next steps to most efficiently and effectively implement the necessary repairs.

Table G-2. Analyses and Reporting to be Included in Each Maintenance and Monitoring Report.

Report	Analyses and Reporting
Baseline Conditions Report	• Summarize baseline conditions immediately after planting • As-built maps (treatment structures and plantings) • Before-and-after photographs
Year 1 Report	• Summary of Year 1 maintenance visits • Results of Year 1 monitoring in comparison to baseline results, including photo point comparisons) and results in PG&E 2002 and 2012 • Recommendations to improve success in the treatment areas • Any circumstances that may adversely impact bank stability or vegetation cover in non-treatment areas within the Project reach
Year 2 Report	• Summary of Year 2 maintenance visits • Results of Year 2 monitoring in comparison to baseline results, including photo point comparisons) and results in PG&E 2002 and 2012 • Recommendations to improve success • Any circumstances that may adversely impact bank stability or vegetation cover in non-treatment areas within the Project reach
Year 5 Report	• Summary of Years 3-5 maintenance visits • Results of Year 5 monitoring in comparison to baseline results, including photo point comparisons), results in PG&E 2002 and 2012, and success criteria • Recommendations to improve success in the treatment areas • Any circumstances that may adversely impact bank stability or vegetation cover in non-treatment areas within the Project reach
Years 10, 15, and 20 Reports	• Summary of all maintenance activities, including photo point comparison • Any circumstances that may adversely impact bank stability or vegetation cover in non-treatment areas within the Project reach

APPENDIX G - ATTACHMENT A

MAINTENANCE DATASHEET

Kennedy Meadows Streambank Stabilization
Maintenance Datasheet – Until Success Criteria are Met
(Page 1; Date:_____)

Name:_____

General Site Conditions & Overall Observations:		
Describe:		
Disturbed Area Re-seeding:		
Reseeded Area	**Photograph ID**	**Percent Cover and Notes**
Photograph Descriptions of Each Treatment Area		
Treatment Area	**Photograph ID**	**Description**
1		
2		
3		
4		
5		
6		
7		

Kennedy Meadows Streambank Stabilization
Maintenance Datasheet – Until Success Criteria are Met
(Page 2; Date:_____)

<table>
<tr><td colspan="3">Natural/Fenced Exclusion Structures & Signage:</td></tr>
<tr><td colspan="3">Any damage? (circle one) Y or N</td></tr>
<tr><td rowspan="5">If yes,</td><td colspan="2">Photograph damage (photograph ID)</td></tr>
<tr><td colspan="2">Describe:</td></tr>
<tr><td colspan="2">Potential cause of damage:</td></tr>
<tr><td colspan="2">Actions/Recommendations (circle all that apply)</td></tr>
<tr><td colspan="2">None required
Return trip required to repair
Other:
Fixed damage on-site
Discuss at next agency consultation meeting</td></tr>
<tr><td colspan="3">Invasive Species</td></tr>
<tr><td>Weeding required in treatment areas?</td><td colspan="2">(circle one) Y or N</td></tr>
<tr><td rowspan="2">If yes,</td><td colspan="2">Identify treatment area(s) where work was performed:</td></tr>
<tr><td colspan="2">Approximate area(s):</td></tr>
</table>

Kennedy Meadows Streambank Stabilization
Maintenance Datasheet – Until Success Criteria are Met
(Page 3; Date:_____)

Vegetation Condition		
Is the vegetation in good condition? (circle one) Y or N		
If no,	Photograph vegetation (photograph IDs)	
	Identify treatment area with issues:	
	Degree of plant mortality or reduced vigor: (select one)	Severe: 50% or greater mortality within treatment area.
		Moderate: Reduced vigor or mortality of up to 50% of cover; potential to reduce project success.
		Minor: A few individuals with reduced vigor or dead; but minimal effect on overall coverage within treatment area.
	Describe potential cause of plant condition:	
	Actions/Recommendations (circle all that apply)	
	• Irrigation	• Plant protection
	• Additional weeding	• Discuss at next agency consultation meeting
	• Replant as soon as practicable	• Other:
Bioengineered Structures		
Any observed damage to or displacement of bioengineered treatment structures? (circle one) Y or N		
If yes,	Photograph (photograph IDs) Identify treatment area(s) with damage or displacement:	
	Degree of damage or displacement (select)	Severe: Loss of function to stabilize banks
		Moderate: Failure of substantial portion of structure, but function of structure is not threatened
		Minor: Some minor scour of small issues observed but are not considered to be a threat to the structure.
	Cause of failure (choose all that apply)	
	• Toe scour	• Scour behind structure
	• Overtopping	• Scour of vegetation
	• Displacement of wood	• High flows
	• Other meadow uses	• Other:
	Recommendations (circle one)	
	• Detailed examination required – possible repair	
	• Continue to watch – immediate action not	
	• Discuss at next agency annual consultation meeting	

Kennedy Meadows Streambank Stabilization
Maintenance Datasheet – After Success Criteria are Met
(Page 1; Date:_____)

Name:_____

General Site Conditions & Overall Observations:		
Describe:		
Photograph Descriptions of Each Treatment Area		
Treatment Area	**Photograph ID**	**Description**
1		
2		
3		
4		
5		
6		
7		
Natural/Fenced Exclusion Structures & Signage:		
Any damage? (circle one) Y or N		
If yes,	Photograph damage (photograph ID)	
	Describe:	
	Potential cause of damage:	
	Actions/Recommendations (circle all that apply)	
	• None required	• Fixed damage on-site
	• Return trip required to repair	• Discuss at next agency consultation meeting
	• Other:	

(Page 2; Date:_____)

Vegetation Condition		
Is the vegetation in good condition? (circle one) Y or N		
If no,	Photograph vegetation (photograph IDs)	
	Identify treatment area with issues:	
	Degree of plant mortality or reduced vigor: (select one)	Severe: 50% or greater mortality within treatment area.
		Moderate: Reduced vigor or mortality of up to 50% of cover; potential to reduce project success.
		Minor: A few individuals with reduced vigor or dead; but minimal effect on overall coverage within treatment area.
	Describe potential cause of plant condition:	
	Actions/Recommendations (circle all that apply)	
	• Discuss at next agency annual consultation meeting	• Other:
	• None required	
Bioengineered Structures		
Any observed damage to or displacement of bioengineered treatment structures? (circle one) Y or N		
If yes,	Photograph (photograph IDs)	
	Identify treatment area(s) with damage or displacement:	
	Degree of damage or displacement (select)	Severe: Loss of function to stabilize banks
		Moderate: Failure of substantial portion of structure, but function of structure is not threatened
		Minor: Some minor scour of small issues observed but are not considered to be a threat to the structure.
	Cause of failure (choose all that apply)	
	• Toe scour	• Scour behind structure
	• Overtopping	• Scour of vegetation
	• Displacement of wood	• High flows
	• Other meadow uses	• Other:
	Recommendations (circle one)	
	• Detailed examination required – possible repair	
	• Continue to watch – immediate action not	
	• Discuss at next agency annual consultation meeting	

APPENDIX G - ATTACHMENT B

FOREST SERVICE REGION STREAM CONDITION INVENTORY (SCI) GUIDEBOOK – STREAMBANK STABILITY SURVEY METHODS (FOREST SERVICE 2005)

Streambank Stability

(Core Attribute)

Importance:

Channel stability is a key indicator of channel condition. Stable streambanks are essential for achieving desired stream channel morphology. Stable banks maintain or help restore low width-depth ratio which in turn helps maintain a high water table, vegetative productivity and favorable habitat for aquatic and riparian dependent wildlife. In many low gradient channels, unstable banks are a major erosion source.

Objectives of This Measurement:

Calculate streambank stability of the sensitive reach.

How Many Observations to Make:

Make 100 observations (50 each bank). Sample points are located at each channel transect.

Where to Take the Measurement:

Streambank stability is a measure of cover that protects streambanks against erosion. Streambanks lie immediately adjacent to the edge of the streambed and are susceptible to the erosive force of water during high flows. Cover consists of perennial vegetation, rock, down wood, or similar erosion resistant material. Cover most commonly occurs above the bankfull stage of stream channels. However, vegetative cover can exist below this level. For example, live plants often grow slightly below bankfull stage along low gradient streams with fine textured streambanks. Where a cover component occurs below bankfull stage record it since it contributes to bank stability.

Streambank stability is measured by observing cover within a plot on the surface of the streambank (Figure 5). The plot is .30 m (12") wide, perpendicular to flow and extends the length of the streambank as defined below.

How to Take the Measurement:

Identify the base of the streambank. It is the point of greatest slope change between the streambed and streambank.

Locate the point on the streambank where vegetative cover is first encountered above the streambed or at bankfull stage, whichever occurs first. Begin the stability plot at that point and extend it upwards as follows:

For channels less than 2% gradient with fine textured streambanks, to the crest of the first convex slope above bankfull stage. This is usually a terrace or an alluvial fan (see Figure 5).

For channels greater than 2% gradient with coarser textured streambanks, to the crest of the first convex slope above bankfull stage or twice maximum bankfull depth, whichever occurs first. Record the following streambank stability class for each plot:

- Stable - Stable streambank plots have 75% or more cover of living plants and/or other stability components that are not easily eroded, and have no indicator of instability.
- Vulnerable - Vulnerable streambank plots have 75% or more cover but have one or more instability indicators.
- Unstable - Unstable streambank plots have less than 75% cover and may have instability indicators. Unstable streambanks are often bare or nearly bare banks composed of particle sizes too small or uncohesive to resist erosion at high flows.

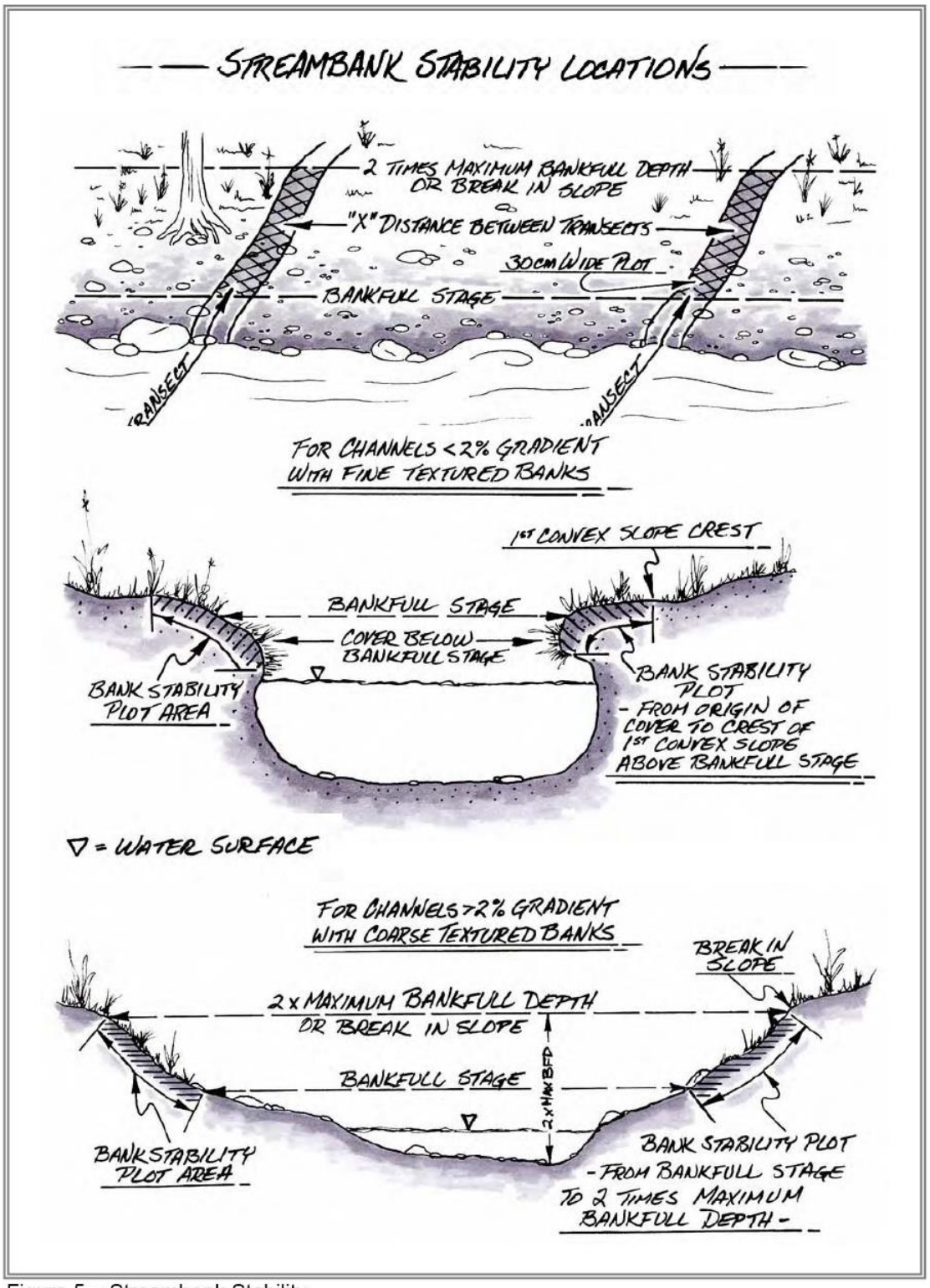


Figure 5 – Streambank Stability

Remember that there are 100 plots that make up the average bank stability for the reach. Do not spend a lot of time determining individual plot condition. Once familiar with this rating system, streambank stability plots can be rated accurately and quickly. Record the numeric value (1 = stable, 2 = vulnerable or 3 = unstable) on Form 9 and move on to the next plot.

Cover Components:

Live Plants - (1) Perennial herbaceous species, such as grass-sedge-rush; (2) woody shrubs (willows, etc.); (3) broadleaf trees (cottonwood, aspen, alder, etc.); (4) conifer trees, and (5) plant roots that are on or near the surface of the streambank and provide substantial binding strength to the substrate beneath.

Rock - Boulders (>256mm), bedrock, and cobble/boulder aggregates when combined as a stabilizing mass.

Down Wood - Logs that are firmly embedded into stream banks.

Erosion Resistant Streambank Soil – In very limited cases, hardened conglomerate or highly cohesive clay/silt stream banks.

Instability Indicators:

Fracturing, blocking, or slumping – This includes cracks near the top of the streambank (often parallel with flow), slumping banks without cracks, and blocks of soil/plant material, which have fallen off or have been pushed down the bank. Usually associated with streams with gradients <2% and fine-textured banks.

Mass Movement - this includes stream bank failure from deep-seated landslides and gravity erosion of oversteepened slopes adjacent to the channel. Mass movement is usually associated with streams with >2% gradient.

Calculating Streambank Stability:

Tally the number of stable plots recorded. Divide the number of stable plots by the number of total plots and multiply by 100 to obtain percent streambank stability. For example, if a 100 plot survey segment has 85 stable plots, dividing by 100 and multiplying by 100 = 85% streambank stability. Vulnerable plots are not classified as stable because they have instability indicators.

References:

Bauer and Burton 1993

Rosgen 1996

Geomorphic Conditions Assessment and Streambank Stability Focused Study Component

DRAFT Streambank Stability Datasheet

Study Site:		Date:		Name:		Survey/ Plot Interval (ft):				
Bank	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**
Survey/ Plot No.	**1**		**2**		**3**		**4**		**5**	
Stability Rating[1]:										
Survey/ Plot No.	**6**		**7**		**8**		**9**		**10**	
Stability Rating:										
Survey/ Plot No.	**11**		**12**		**13**		**14**		**15**	
Stability Rating:										
Survey/ Plot No.	**16**		**17**		**18**		**19**		**20**	
Stability Rating:										
Survey/ Plot No.	**21**		**22**		**23**		**24**		**25**	
Stability Rating:										
Survey/ Plot No.	**26**		**27**		**28**		**29**		**30**	
Stability Rating:										
Survey/ Plot No.	**31**		**32**		**33**		**34**		**35**	
Stability Rating:										

Study Site:		Date:		Name:		Survey/ Plot Interval (ft):				
Bank	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**
Survey/ Plot No.	**36**		**37**		**38**		**39**		**40**	
Stability Rating:										
Survey/ Plot No.	**41**		**42**		**43**		**44**		**45**	
Stability Rating:										
Survey/ Plot No.	**46**		**47**		**48**		**49**		**50**	
Stability Rating:										

[1] Stability Rating-: 1: >75% cover; 2: >75% cover with instability elements (cracking, bank failure, etc.), 3: <75% cover.

APPENDIX G - ATTACHMENT C

LONGITUDINAL TRANSECT (GREENLINE) DATASHEETS

Riparian Vegetation Focused Study Component

Greenline Datasheet

Stream Segment and Site: _____ Date: _____ Name: _____

GPS Waypoint: _____ River Mile: _____

Left Bank Greenline Length (m): _____ Left bank transect crosses greenline at (m):_____ Left bank: zero = US or DS

Right Bank Greenline Length (m): _____ Right bank transect crosses greenline at (m):_____ Right bank: zero = US or DS

L or R Bank	Attribute[1]						Distance on Greenline (m)	Notes[2]
	Dominant Species			Sub-Dominant Species	Other[3]			
	Species	% Cover[4]	Tree Height[5]					
						Start		
						Stop		
						Start		
						Stop		
						Start		
						Stop		
						Start		
						Stop		
						Start		
						Stop		
						Start		
						Stop		

1. Species, community type, or attribute (litter, bare ground, substrate, woody debris, dead vegetation).
2. Fluvial landform, decadence, senescence, grazing, other land use activities.
3. Litter, duff, woody debris, bedrock, boulder, cobble, gravel, sand, fines, dead vegetation.
4. Percent cover for the species.
5. Average tree height of the species.

APPENDIX G - ATTACHMENT D

PHOTO POINT PROCEDURES

Photo Point Procedures

Images taken at the photo points will be landscape photographs that will be taken each monitoring period from the same locations. The views in the photographs will be the same so that differences between monitoring periods can be compared.

Photo point locations will be established at each treatment area. The locations will be established at a location from which multiple view photographs could be taken, if possible. Within each view, an identifiable object, such as a large rock, will be included, if possible, to assist with scale and orientation during the monitoring periods. The photo point markers will be located in places that will likely not be eroded easily by high floods or disturbed by other activities, such as vandalism. Markers will be as inconspicuous as possible to minimize the potential for vandalism.

This appendix describes the procedure for documenting the photo point locations and for retaking the photographs each monitoring period. A field datasheet is provided. One datasheet will be filled out for each photo point location. For those locations where more than one view is taken from the same photo point location, all the views can be recorded on the same datasheet.

Documenting Photo Point Locations

A site marker, such as a stake or a permanent feature each treatment area will be selected at each treatment area. During the first monitoring period, the photo point locations will be established, using the following procedure:

- The photographer will stand immediately over the site marker/permanent feature, if possible. If this is not possible, the location of the photographer relative to the marker will be recorded on the datasheet (distance and angle from the marker).
- The time of the photograph, camera type, focus distance, height of the camera above the ground, compass bearing, and vertical angle of the view will be recorded on the datasheet.
- At least one reference point will be established for each photo point location. The reference point will be within 200 feet of the photo point location. A reference point could be a large tree outside of the flood zone or a large rock. The distance, compass bearing, and vertical

angle will be measured and recorded from the reference point to the photo point location. A marker will be placed on the reference point. The reference point will be described on the datasheet and a site sketch will be drawn showing major landmarks and the locations of the photo points and reference points. The information from the initial sketch with the reference point locations identified, will be transferred to GIS for display over a high-resolution aerial image and stored electronically.

- Additional photographs will be taken of the reference point and the photo point locations. The locations of each will be marked and labeled on the photographs for future use in the field. All information on the location of the photo points and reference points will be stored electronically.
- The locations of the photo and reference points will be recorded with GPS. These locations will be overlain on aerial photographs of each monitoring site to document the approximate locations of the points. The maps will be completed at a scale with sufficient detail to identify obvious landmarks and trees. These maps will be electronically stored for future use.
- Each photo point will be given an identification number, which will be used through the duration of the monitoring.

Repeat Photography

The procedures for the photo points that will be followed during the subsequent monitoring periods are described below:

- For each photo point monitoring period, the field crew will take copies of the original photo point documentation on the locations of the photo and reference point markers, copies of the photographs, and maps. The same camera will be used, if possible. If it is not available, a camera similar to the original one will be used. The new camera type will be noted on the datasheet.
- The photographer will stand at the same place and height as that which the first photographs were taken. The camera will be aligned with the view at the same compass bearing as

recorded during the initial photographs. The view will be compared with the previous photographs to ensure that it is as close as possible to the original.

- The time of the photograph, camera type, focus distance, height of the camera above the ground, compass bearing and vertical angle of the view will be recorded for this monitoring period.
- If the photo point marker cannot be located, an attempt will be made to locate a new photo point as close as possible to the original location using the reference point documentation, maps, and previous photographs. This will be noted in the summary memorandum.
- The new photographs will be catalogued with the previous photographs and stored electronically. The photographs will be compared with the previous photographs in the summary memorandum.

Photo Point Datasheet

Site Name: _____Photo Point Identification Number:_____

Date: _____ Time: _____Weather Conditions: _____

GPS Coordinates: _____Photographer:_____

Camera Type:_____

Subject of Photograph and Purpose of Photographs:

Photo 1	**Photo 2**	**Photo 3**
Camera Height (ft):	Camera Height (ft):	Camera Height (ft):
Camera Angle:	Camera Angle:	Camera Angle:
Azimuth: º	Azimuth: º	Azimuth: º
Focus Distance:	Focus Distance:	Focus Distance:
Photo No.:	Photo No.:	Photo No.:
Camera No.:	Camera No.:	Camera No.:
Photo 4	**Photo 5**	**Photo 6**
Camera Height (ft):	Camera Height (ft):	Camera Height (ft):
Camera Angle:	Camera Angle:	Camera Angle:
Azimuth: º	Azimuth: º	Azimuth: º
Focus Distance:	Focus Distance:	Focus Distance:
Photo No.:	Photo No.:	Photo No.:
Camera No.:	Camera No.:	Camera No.:

Reference Point 1	**Sketch of Photo and Reference Point Locations:**
Description:	
Marking:	
Azimuth: º Angle:	
Distance to photo point marker (ft):	
Reference Point 2	
Description:	
Marking:	
Azimuth: º Angle:	
Distance to photo point marker (ft):	
Reference Point 3	
Description:	
Marking:	
Azimuth: º Angle:	
Distance to photo point marker (ft):	

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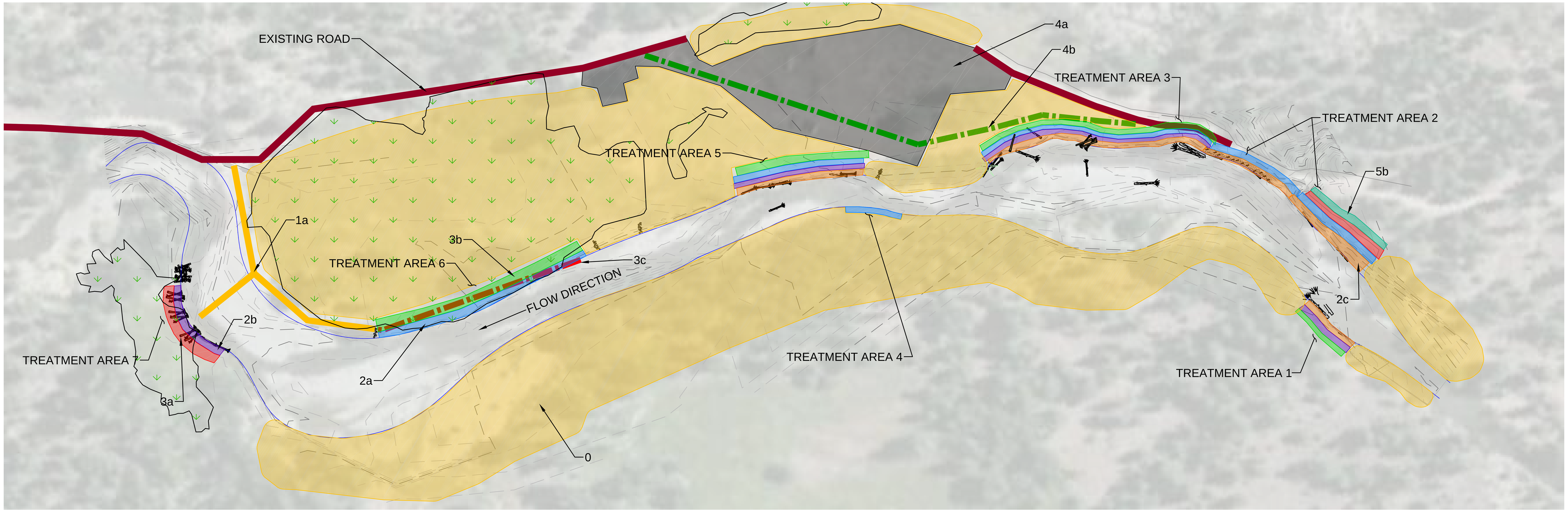

Map ID	Treatment Type	Vegetation Planting Method	Timing of Planting
0	Avoid, protect, minor treatment	Protect and conserve existing vegetation and no change	N/A
1	**Bars (potential, dependent upon dewatering and diversion approach determined by Contractor based on site conditions)**		
1a	Access routes	Restore to natural topography	At end of construction
2	**Streambanks (up to 3 feet above summer water)**		
2a	Planting	Plant willow poles and stakes	At end of construction
		Plant container alder, willow	
		Plant at variable spacing, with 6 x 6 foot spacing on average for willows and alders except in Treatment Areas 5 and 6, plant willows and alders with 4 x 4 foot spacing.	
		Plant clustered and scattered with open areas between clumps.	
2b	Bioengineered structure (wood, rock and wood, or rock only)	Inter-plant willow poles and stakes within the structure	During construction of treatment
		Place salvaged sod at lowest elevations on graded bank behind installed wood or rock	
		Inter-plant container alder and willow	
		Plant at variable spacing, with 6 x 6 foot spacing on average for willows and alders.	
		Plant clustered and scattered with open areas between clumps.	
2c	Bioengineered structure (rock or rock and wood)	Leave Barren	N/A

Map ID	Treatment Type	Vegetation Planting Method	Timing of Planting
3	**Upper Riparian Zone (>3 feet above summer water)**		
3a	Graded banks above wood structure, rock/wood, and rock treatments	Plant container alder, willow, cottonwood	At end of construction
		Plant quaking aspen at Treatment Area 7	
		Plant willow/cottonwood poles and stakes	
		Plant at variable spacing, with 6 x 6 foot spacing on average for willows and alders and 10 x 10 foot spacing for cottonwoods	
		Plant clustered and scattered with open areas between clumps.	
3b	Planting only	Plant willow/cottonwood poles and stakes	At end of construction
		Plant container alder, willow, cottonwood	
		Plant at variable spacing, with 6 x 6 foot spacing on average for willows and alders and 10 x 10 foot spacing for cottonwoods, except in Treatment Areas 5 and 6, plant willows and alders with 4 x 4 foot spacing	
		Plant clustered and scattered with open areas between clumps.	
3c	Access routes	Decompaction (e.g., ripping and scarification to insure compacted surfaces are fractured in areas of intense construction related use)	At end of construction
		Broadcast Seeding (Riparian)	

Map ID	Treatment Type	Vegetation Planting Method	Timing of Planting
4	**Meadow and Floodplain**		
4a	Staging and storage	Decompaction (e.g., ripping and scarification to insure compacted surfaces are fractured in areas of intense construction related use)	At end of construction
		Seeding (meadow seed mix)	
4b	Access routes	Decompaction (e.g., ripping and scarification to insure compacted surfaces are fractured in areas of intense construction related use)	At end of construction
		Seeding (meadow seed mix)	
5	**Upland**		
5b	Seeding and planting	Plant at variable spacing, with 10 x 10 foot spacing for trees and 6 x 6 foot spacing for shrubs; as shown by Owner. Placement dependent upon slope.	At end of construction
		Broadcast Seeding (upland seed mix)	At end of construction
	Existing Road	Regrade road to pre-existing condition	N/A

EXISTING WETLAND

Woody Species Planting Quantities by Treatment Area

Species and Type	Treatment Area 1	2	3	4	5	6	7	Total
Poles / Stakes (minimum quantity)								
Willow	17	58	145	14	105	211	50	*600*
Mountain Alder			20		6	12	5	*43*
Black Cottonwood			30	3	6	12	5	*56*
TOTAL (minimum)	*17*	*58*	*195*	*17*	*117*	*235*	*60*	*699*
Salvaged/transplant								
Black Cottonwood (estimate)		6						*6*
Container Plants								
Willow (mix, Salix jepsonii, S. lemmonii, S. lucida, and S. lutea) (1-5 gal.)		8	30	2	15	30	6	*91*
Mountain Alder, Alnus incana (1-5 gal.)	4	8	10	2	15	15	6	*60*
Black Cottonwood, Populus balsamifera ssp. trichocarpa (5-15 gal)	4		25	4	10	15	7	*65*
Quaking Aspen, Populus tremuloides (5-15 gal.)							8	*8*
Jeffrey Pine, Pinus jeffreyi (5-15 gal.)		6						*6*
Incense Cedar, Calocedrus decurrens (5-15 gal.)		6						*6*
White Fir, Abies concolor (5-15 gal.)		6						*6*
Whitethorn, Ceanothus sp. (1 gal.)		10						*10*
Sierra Gooseberry, Ribes roezlii (1 gal.)		10						*10*
TOTAL	*8*	*54*	*65*	*8*	*40*	*60*	*27*	*262*
GRAND TOTAL (minimum)	***25***	***118***	***260***	***25***	***157***	***295***	***87***	

NOTES:
1. ALL CONTAINER PLANTS TO BE PROVIDED BY PG&E.
2. PLANTING TO BE SUPERVISED BY RESTORATION ECOLOGIST OR RESTORATION ENGINEER.
3. SALVAGE BLACK COTTONWOOD TO BE REPLANTED IN TREATMENT AREA 2.
4. PLANT AT LEAST 1-3 POLES/STAKES PER HOLE.

REVEGETATION OVERVIEW

SCALE 1"=80'

0 100 200
SCALE IN FEET

DATE | REVISIONS | NO.

REGISTERED PROFESSIONAL ENGINEER JESSE CARLSON C 84412 EXP. 9/30/17 CIVIL STATE OF CALIFORNIA 6/14/17

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REVEGETATION SHEET

RELIEF REACH - KENNEDY MEADOWS RIPARIAN RESTORATION AND STREAMBANK STABILIZATION
TUOLUMNE COUNTY, CA

DATE: 6/14/2017
DRAWN BY: JC
CHECKED BY: KRS
SCALE: AS SHOWN
SAP ORDER 2028978
FIGURE NO.
R-1