Appendix F

Additional Resource Information for the Biological Study Area

Part F.1 U.S. Fish and Wildlife Service Biological Opinion

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Part F.9 USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

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Part F.1

U.S. Fish and Wildlife Service Biological Opinion

Note: The EIS analysis assumes project completion in 2015. The ESA consultation documents assume a longer duration to 2017 to characterize a maximum habitat disturbance scenario and to provide implementation flexibility within the ESA authorization.

Note: Total aquatic temporary acreages for giant garter snake in Table 3.9-10 have been updated to reflect the project description change to remove the Nevis borrow site from the biological study area. This change reduced the acreages stated in the BO from 42.52 to 6.81 of temporary aquatic habitat that SBFCA will need to restore to pre-project conditions.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
08ESMF00-2013-F-0342-1

MAY 02 2013

Ms. Alicia Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Formal Consultation on the Feather River West Levee Project, Sutter County, California

Dear Ms. Kirchner:

This is in response to your March 22, 2013, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Feather River West Levee Project (FRWLP) (proposed project) in Sutter County, California. Your request was received on March 28, 2013. You requested our concurrence that the proposed project may affect, and is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)(beetle) and the giant garter snake (*Thamnophis gigas*)(snake). The Service concurs with your determination and this biological opinion addresses the effects of the proposed project on these two species. Critical habitat has been designated for the beetle; however, the proposed project is not located within any designated or proposed critical habitat. Critical habitat has not been designated for the snake; therefore, none will be affected. This response is in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This biological opinion is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

CONSULTATION HISTORY

July 13, 2012. The Service, ICF International, HDR Inc., consultants to Sutter Butte Flood Control Agency (SBFCA), SBFCA, California Department of Fish and Wildlife (CDFW), California Department of Water Resources, and the Corps participated in a site visit to the proposed project. Potential effects to giant garter snake were discussed on the trip.

September 27, 2012. The Service, Corps, HDR, and ICF met to discuss the biological opinion and the level of detail that will be available in order to initiate consultation. The applicant determined that they will have sufficient information to initiate consultation at the project level.

December 18, 2012. The Service, Corps, SBFCA, ICF, and HDR met to discuss effects to giant garter snake. Permanent and temporary effects were discussed as well as the Service providing suggestions on conservation measures that could be incorporated.

February 12, 2013. The Service, Corps, ICF, CDFW, and HDR met to discuss long-term operations and maintenance (O&M). The outcome of this meeting was that the SBFCA FRWLP will not include operations and maintenance in their project description because their project will not be changing O&M. However, the Corps will be initiating consultation on the Sutter Feasibility Study in the next 6 months and this project description will include O&M activities.

March 22, 2013. The Corps initiated section 7 consultation with the Sacramento Fish and Wildlife Office.

BIOLOGICAL OPINION

DESCRIPTION OF ACTION AREA

North to south, the Action Area consists of the 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay to a point about 4 miles north of the Sutter Bypass. The Action Area includes the project construction area and a 100-foot buffer around this area which includes staging and spoils areas. The project construction area was defined as the area in which levee improvements—such as seepage berms, stability berms, relief wells, sheet-pile walls, and slurry cutoff walls—are likely to be constructed. All direct and indirect effects will occur within this area and the 100-foot buffer around this area.

The corridor is divided into 41 relatively homogeneous reaches for ease of describing existing conditions, project components, land cover-types, and potential effects (note that this number is coincidental and one reach does not correspond to a length of 1 mile; additionally, Reach 1 is not part of the FRWLP) (Figure 1).

The Action Area also includes six potential borrow sites that could supply the borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites. It is not anticipated that all six sites will be used over the multi-year phased construction period, but until additional geotechnical and soil samplings are completed, all sites will be available for use and are included in the Action Area.

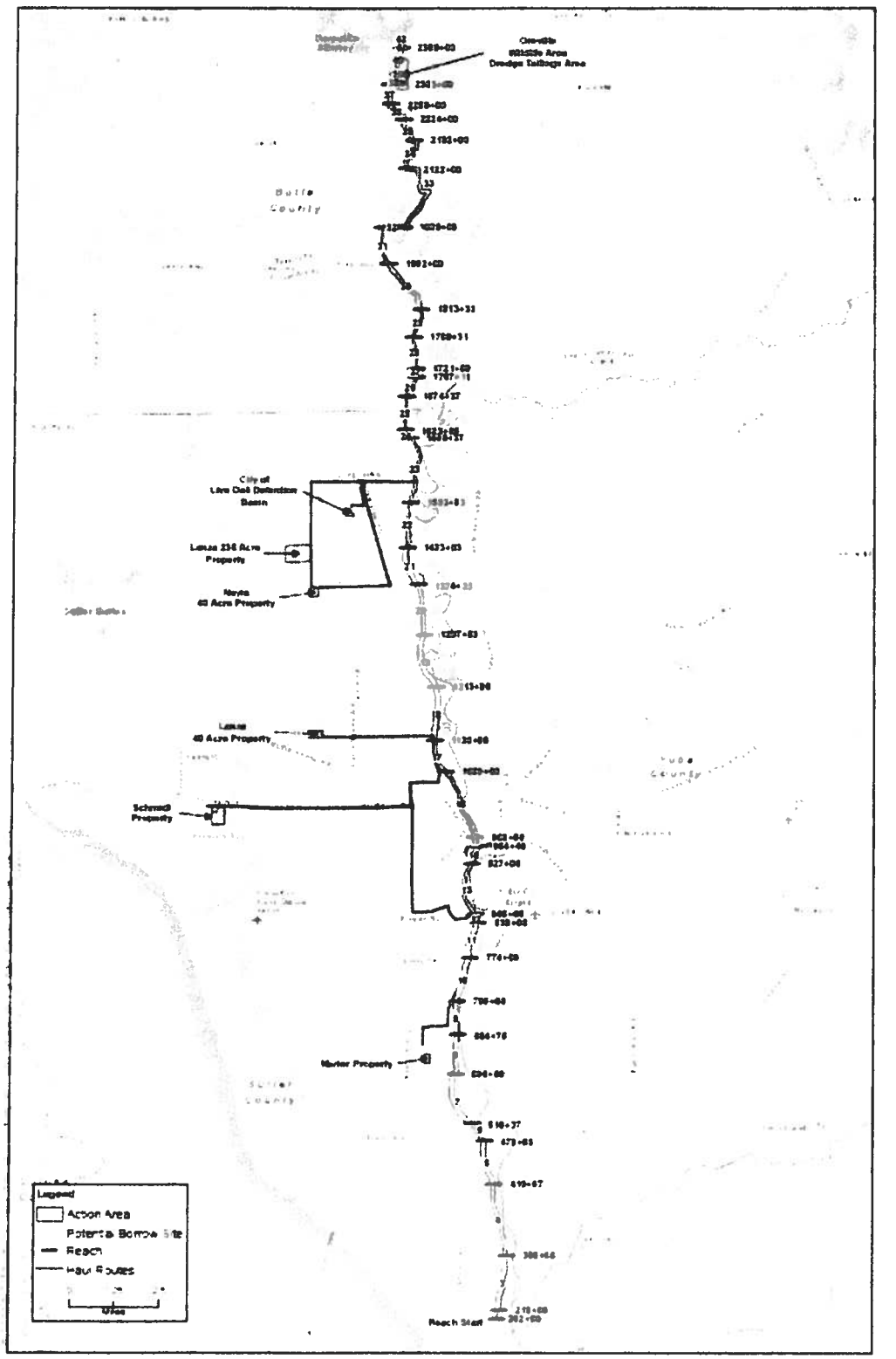

Figure 1. Proposed Project

Finally, the Action Area includes the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. Compensation for the Proposed Action's effects on the beetle is proposed to occur in a portion of this conservation area, which is discussed below under Conservation Measure 5.

Description of Proposed Action

The primary purpose of the FRWLP is to reduce flood risk in the Sutter Basin by addressing known levee deficiencies along the Feather River West Levee from Thermalito Afterbay downstream to a point about 4 miles upstream of the Feather River's confluence with the Sutter Bypass. While the FRWLP will not by itself reduce all flood risks affecting the Sutter Basin, it will address the most immediate risks based on the following.

- The proximity of the Feather River to population centers and key infrastructure.
- The nature of the Feather River West Levee being the longest and most contiguous portion of the planning area perimeter.
- The location of known levee deficiencies and the clarity and feasibility of available measures to address them.

The construction of the FRWLP will be divided into four separate construction contracts. Contract A begins near the intersection of the Feather River West Levee and Laurel Road. It continues north to the beginning of the improvements constructed as part of the Star Bend Setback Levee Project. The total length of the levee in this portion of the FRWLP is 27,618 linear feet. Contract B begins at the end of the improvements constructed as part of the Star Bend Setback Levee Project, and continues north for 31,963 linear feet. Contract C begins near the north end of the Shanghai Bend Setback Levee, and continues north for a total of 77,886 linear feet. Contract D then begins and continues north for 69,363 linear feet.

For Contract A, a cutoff wall ranging between 10 and 35 feet deep will be constructed along the centerline of the levee for the entire length of levee. The overall height of the levee will be degraded by about 50%. In addition to the cutoff wall, a portion of the levee will have a 9,816-foot-long; 100-foot-wide seepage berm installed.

For Contract B, a cutoff wall ranging between 5 and 25 feet deep will be constructed along the centerline of the levee for 31,600 linear feet. The overall height of the levee will be degraded by about 50%. Relief wells 60 feet apart and 50 feet deep will be installed along a 2,500 linear foot section. Finally, two small sections will involve pipe crossing work.

For Contract C, a cutoff wall ranging between 5 and 65 feet deep will be constructed along the centerline of the levee for 62,117 linear feet. The overall height of the levee will be degraded by about 50%, with about 5,900 linear feet of the levee needing to be fully degraded. A 7-foot tall

and 50-foot-wide seepage berm will be placed near the 10th Street bridge and extend through the existing abandoned railroad tunnel. Finally, there will be a few storm drain pipes replaced within the levee.

For Contract D, a cutoff wall ranging between 10 and 90 feet deep will be constructed along the centerline of the levee for 57,361 linear feet. For all but 317 linear feet of levee, the levee will be degraded by about 50%. The remaining 317 linear feet will have a full levee degrade and reconstruction. A canal runs adjacent to the landside of the levee for 4,723 feet. The landside levee will require reconstruction to the bottom of the canal. Six storm drain and irrigation pipes will need to be replaced along a section of the levee. About 4,800 linear feet of seepage berm will be constructed at the northern end of the proposed project. The berm will very in width between 100 and 170 feet. Additionally, a waterside pit located in this area will be filled.

Materials imported to the construction site will include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,500,000 cubic yards of embankment fill material for the new levee surfaces from offsite commercial borrow sites or local landowners willing to sell borrow material. For backfill of new pipelines crossing the levee, controlled low strength material (CLSM) (otherwise known as lightweight concrete) will be placed to the pipeline's spring line.

Construction methods for the flood management measures are described in detail below.

Slurry Cutoff Wall

A slurry cutoff wall consists of impermeable material that is placed parallel to the levee, typically through the center of the levee crown. There are three methods for constructing a slurry cutoff wall: (1) conventional slot trench, (2) deep soil mixing (DSM), and (3) jet grouting. The first two are the primary methods for application over longer areas, while jet grouting is a spot application based on limiting conditions. A slurry cutoff wall addresses the deficiency of seepage (through- and under-seepage).

Conventional Slot Trench Method - To begin construction, the construction site and any necessary construction staging or slurry mixing areas are cleared, grubbed, and stripped. In the conventional slot trench method, a trench is excavated at the top center of the levee and into subsurface materials. The size of the trench is based on the severity of the seepage but can be typically 3 feet wide and up to 80–90 feet deep. As the trench is excavated, it is filled temporarily with bentonite water slurry to prevent cave-in. The soil from the excavated trench is hauled to a nearby location where it is mixed with hydrated bentonite to reduce permeability and cement in some applications where increased strength is desired. The soil-bentonite mixture then is returned to the levee and backfilled into the trench. This mixture hardens and creates the impermeable barrier wall in the levee.

In most cases, degradation of the levee crown is necessary to create a large enough working platform to reduce the risk of hydraulic fracturing from the insertion of slurry fluids, and allowing greater depths to be reached. Dependent on the conditions of the particular levee, it may be necessary to degrade the levee by one- to two-thirds its existing height. The material

from degrading the levee is hauled to a nearby stockpile area. Following completion of the slurry cutoff wall, the material is hauled back to the levee to restore the levee to its original dimensions. The material may need to be hauled offsite to a local landfill, and borrow material may need to be imported if the in-situ levee material is found to be unsuitable for current levee standards.

One construction crew typically is able to construct 75–100 linear feet of slurry wall (about 70–80 feet deep) in an 8-hour shift. Equipment needed for the crew includes a long-reach track hoe, three or four dump trucks (15 cubic yard capacity each), two loaders at the mixing location, bulldozers, excavators, loaders, a rough terrain forklift, compactors, maintainers, and a water truck. Vertical clearance of about 40 feet is needed for the excavator boom. Horizontal clearance of about 30 feet beyond the levee crest may be required for excavator swing when loading dump trucks.

A mixing area is located at the construction staging area. The mixing area is to prepare the soil-bentonite mixture and supply bentonite-water slurry. The mixing area is contained to avoid inadvertent dispersal of the mixing materials. Dump trucks haul material between the excavator and the mixing area along the levee.

An access road made of aggregate base rock is constructed on the levee crown to enable regular levee inspections. Post-construction, areas used for construction staging, mixing, the levee crown, slopes, and any other disturbed areas are hydroseeded.

Deep Soil Mixing Method - The DSM method of constructing a slurry cutoff wall uses a crane-supported set of two to four mixing augers (typically 36 inches in diameter) set side by side. These augers are drilled through the levee crown and foundation to the required depth (capable of a maximum depth of about 200 feet). As the augers are inserted and withdrawn, a soil-bentonite grout is injected through the augers and mixed with the native soil. An overlapping series of mixed columns is drilled to create a continuous seepage cutoff barrier.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee requires excavation with a paddle wheel scraper. Material is scraped and stockpiled at a nearby stockpile area. Dependent on the depth of the wall required, vertical clearance for the crane also may be needed. An excavator manipulates injector return spoils near the DSM rig, and transport trucks are used to haul spoils offsite. A crane is used for in-place sampling of DSM material and also for loading bentonite into the batch plant hopper. A mobile batch plant (diesel-powered) is required near each DSM rig at the work area to prepare the cement-bentonite grout. The grout is transported to the DSM rig through flexible hoses. Each batch plant requires a pad of 50 by 100 feet. Hauling at the work area involves scraper runs along the levee to the staging area and cement and bentonite deliveries to the batch plant.

During DSM slurry wall construction, one DSM rig typically can construct 50 linear feet of DSM wall per 8-hour shift (for wall depths up to 135 feet). Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Jet Grouting Method - Jet grouting involves injecting fluids or binders into the soil at very high pressure. The injected fluid can be grout; grout and air; or grout, air, and water. Jet grouting breaks up soil and, with the aid of a binder, forms a homogenous mass that solidifies over time to create a mass of low permeability. Jet grouting typically is used in constructing a slurry cutoff wall to access areas other methods cannot. In this regard, it is typically a spot application rather than a treatment to be applied on a large scale along an entire reach.

Equipment required for jet grouting consists of a drill rig fitted with a special drill string; a high pressure, high flow pump; and an efficient batching plant with sufficient capacity for the required amount of grout and water. The high-pressure pump conveys the grout, air, and/or water through the drill string to a set of nozzles located just above the drill bit. The diameter of the jet grout column is dependent on site-specific variables such as soil conditions, grout mix, nozzle diameter, rotation speed, withdrawal rate, and grout pressure. Jet grouted columns range from 1 to 16 feet in diameter and are typically interconnected to form cutoff barriers or structural sections. Under ideal conditions, one construction crew—consisting of a site supervisor, pump operator, batch plant operator, chuck tender, and driller—can construct two 6-foot diameter, 50-foot columns per day consisting of about 100 cubic yards of grout injected per 8-hour shift. Ideal conditions will be characterized by no technical issues occurring at either the batch plant or the drilling site, such as loss of fluid pressure, breakdown of equipment, or subsurface obstructions to drilling operations.

To initiate jet grouting, a borehole is drilled through the levee crown and foundation to the required depth (to a maximum depth of about 130 feet) by rotary or rotary-percussive methods using water, compressed air, bentonite, or a binder as the flushing medium. When the required depth is reached, the grout is injected at a very high pressure as the drill string is rotated and slowly withdrawn. Use of the double, triple, and superjet systems create eroded spoil materials that are expelled out of the top of the borehole, this material is frequently used as a construction fill.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee may require degradation with a paddle wheel scrapper. Material is scraped and stockpiled at a nearby stockpile area. Hauling at the work area involves scraper runs along the levee to the staging area and grout, bentonite, and water deliveries to the batch plant.

Batch plants are typically centrally located to the injection site, with pipelines for mixed grout that run the length of the work. Grout mixing and injection equipment consists of grout mixers, high powered grout pumps and supporting generators and air compressors, holding tanks, and water tanks, with bulk silos of grout typically used to feed large mixers. Smaller equipment can be used in combination with the single phase-fluid system and can be permanently trailer-mounted to permit efficient mobilization and easy movement at the job site.

Prior to commencing production jet grouting, a field test program is typically completed to evaluate injection parameters and to assess jet grout column geometries, and mechanical and permeability properties. Where possible, jet grout test elements are exposed by excavation and properties are obtained by direct measurement. Where excavation is not possible, core drilling is employed to obtain samples from the jet grout test columns for strength testing.

Areas used for construction staging, the levee slope, and any other disturbed areas are restored and hydroseeded following construction.

Slope Flattening

Slope flattening is a mechanical method to repair or reshape slopes that do not meet standards for geometry and stability. Levee slopes are typically subject to a standard of 3:1 (horizontal to vertical), but this may vary based on site-specific conditions and supporting engineering analysis. Slope flattening addresses the deficiency of slope stability and geometry. To begin slope flattening activities, the area is cleared, grubbed, and stripped to provide space for construction and reshaping of slopes. Additional embankment fill material may be necessary to achieve slope flattening—if so, bulldozers excavate and stockpile borrow material from a nearby permitted borrow site. Front-end loaders load haul trucks with the borrow material. The haul trucks transport the material to slope flattening site. Motor graders spread material evenly according to levee design plans, and sheepsfoot rollers compact the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

To reshape a waterside slope, the existing crown of the levee is shifted farther landward and the waterside slope is trimmed and reshaped to a 3:1 slope. The shifted levee crown will be a minimum of 20 feet wide, with a 3:1 slope on the landward side. An access road made of aggregate base rock is constructed on the levee crown. Post-construction, the construction staging areas, levee slopes, and any other disturbed areas will be hydroseeded.

Stability Berm

A stability berm will be constructed against the landside slope of the existing levee with the purpose of supplying support as a buttress. The height of the stability berm is generally two-thirds the height of the levee; the structural needs of the levee determine the distance it extends along that reach. A stability berm addresses the deficiency of stability. To begin the construction of a stability berm, the site is cleared, grubbed, and stripped to provide space for construction and shaping of the berm. Embankment fill material necessary to construct the berm is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material, and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

Stability berms may be drained or undrained. An undrained berm consists of embankment fill only. A drained berm includes a layer of drain rock placed along the ground surface underneath the fill material, separated by a casing of filter fabric. Drainage water seeping from the berm will sheetflow on the adjacent landside surface.

Levee Reconstruction

Levee reconstruction will be necessary where a levee has been degraded to facilitate implementation of another measure (such as a slurry cutoff wall), where a substantial

encroachment has been removed from within the levee prism, or otherwise where the levee is found to be deficient and needs to be replaced with materials and methods that meet current engineering standards. The existing levee is first cleared, grubbed, and stripped to the desired surface to allow a working platform for other measures (such as a slurry cutoff wall), to remove an encroachment, or to remove substandard material. Embankment fill material necessary to construct the new levee is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction. The new levee will be built in cross section to meet current engineering standards.

Sheet-Pile Wall

A sheet-pile wall is a series of vertical panels of interlocking steel that is placed parallel to the levee, typically through the center of the levee crown to provide an impermeable barrier. A sheet-pile wall addresses the deficiencies of seepage and will be used only as a site-specific treatment (rather than applied on a reach-wide basis) such as at roadway or railroad crossings. The site where sheet piles are to be installed is cleared, grubbed, and stripped to allow for construction activities, including removal of the roadway or railroad. A hydraulic- or pneumatically-operated pile-driving head attached to a crane drives the sheet pile into the levee crown to the desired depth (up to 135 feet). If the levee material is particularly solid, pre-drilling may be necessary. The conditions of the site and the desired life of the project determine the thickness and configuration of the sheet piles.

Post-construction, construction staging areas, the levee crown, slopes, and any other disturbed areas are hydroseeded and the roadway or railroad will be replaced in-kind to the pre-project condition.

Seepage Berm

Seepage berms are wide embankment structures made up of low-permeability materials that resist accumulated water pressure and safely release seeping water. A seepage berm is typically one-third the height of the levee, extending outward from the landside levee toe for 300–400 feet, and laterally along the levee as needed relative to the seepage conditions. A seepage berm addresses the deficiency of under-seepage. A seepage berm can vary in width, from a minimum of four times the levee height to a maximum of 300 feet. Berm heights can also vary but are typically a minimum of 5 feet tall at the landside toe of the levee and generally taper down to 3 feet at the end of the berm.

Construction consists of clearing, grubbing, and stripping the ground surface. Bulldozers then excavate and stockpile borrow material from a nearby borrow site. Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the berm site. The haul trucks dump the material and motor graders spread it evenly, placing 3–5 feet of embankment fill material. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Seepage berms may have an optional feature of a drainage relief trench under the toe of the berm. Drained seepage berms include the installation of a drainage layer (gravel or clean sand) beneath the seepage berm backfill and above the native material at the levee landside toe. A drained seepage berm does not increase the overall footprint of the berm. Post-construction, areas used for construction staging, the levee, the berm, and any other disturbed areas are hydroseeded.

Relief Wells

Relief wells are passive systems that are constructed near the levee landside toe to provide a low-resistance pathway for under-seepage to exit to the ground surface in a controlled and observable manner. A low-resistance pathway allows under-seepage to exit without creating sand boils or piping levee foundation materials. Relief wells are an option only in reaches where geotechnical analyses have identified continuous sand and gravel layers. Relief wells are constructed using soil-boring equipment to drill a hole vertically through the fine-grained blanket layer (sand) into the coarse-grained aquifer layer (gravel) beneath. Pipe casings and gravel/sand filters are installed to allow water to flow freely to the ground surface, relieving the pressure beneath the clay blanket without transporting fine materials to the surface, which can undermine the levee foundation. Relief wells will be designed to discharge onto a cobble splash, and the water will then sheet flow into adjacent agricultural fields. In areas where sheet flow is not feasible, a swale will be excavated and connected to a drainage canal.

Relief wells generally are spaced at 50- to 100-foot intervals, dependent upon the amount of under-seepage, and extend to depths of 150 feet. Areas for relief well construction are cleared, grubbed, and stripped. During relief well construction, a typical well-drilling rig is used to drill to the required depth and construct the well (including well casing, gravel pack material, and well seal) beneath the ground surface. The drill rig likely will be an all-terrain, track-mounted rig that could access the well locations from the levee toe.

Piezometers, also called monitoring wells, could be installed between relief wells to allow monitoring of groundwater levels to ensure the wells are relieving the pressure within the aquifer.

Areas along the levee toe may be used to store equipment and supplies during construction of each well. Construction of each well and the lateral drainage system typically takes 10–20 days. Additional time may be required for site restoration. Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Depression/Ditch Infilling

Landside depressions and ditches can contribute to risk of levee failure if a seepage pathway forms under the levee and the water then surfaces through the depression or ditch, exploiting its less resistive nature compared to surrounding soil mass. This measure involves placing fill soil in such depressions and ditches to remove localized susceptibility to seepage. Construction consists of clearing, grubbing, and stripping the ditch or depression surface to remove vegetative material. Bulldozers then excavate and stockpile borrow material from a nearby borrow site.

Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the fill site. The depression or ditch may be further excavated to provide a surface that the fill soil may be keyed into. The haul trucks dump the material and motor graders or bulldozers smooth the material level with the surrounding land surface. An excavator may also be used for placement. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Removal and Relocation of Pacific Gas & Electric Facilities

Prior to and/or concurrent with levee rehabilitation construction, Pacific Gas and Electric Company (PG&E) will need to remove and relocate facilities located within the footprint of the FRWLP. PG&E's utility relocations will need to occur in advance of SBFCA's construction activities at any given location. Construction sequencing for SBFCA's work will be dynamic throughout SBFCA's project planning and design. PG&E's construction schedule will be determined by further engineering to clarify and determine efficacy of site-specific measures; the availability of funding for FRWLP; easement and right-of-way acquisition; availability of borrow material for the levee improvement activities; and/or environmental clearances based on wildlife presence, lifecycle activity, and location of habitats. PG&E's construction schedule will be further influenced by utility operation and maintenance constraints, particularly for relocation activities that require taking existing facilities temporarily out of service. As necessary, geotechnical mitigation measures will be incorporated into construction design to ensure that utility facilities effectively co-exist with the FRWLP, relocation will be done where this is not feasible.

For PG&E's electrical transmission and distribution activities, PG&E will install and remove new electrical transmission and distribution poles. Electrical transmission and distribution pole removal is conducted by a line crew, who typically access each pole site with a line truck and trailer or a boom truck, except in those instances when the pole is located on the levee crown (a crane may be used in those instances). On average, removal of vegetation up to 50 feet from the toe of the levee will need to occur to accommodate pole installation activities; this distance may be greater in instances where the installation activity is located further than 30 feet from the levee toe. After vegetation is cleared, PG&E will remove and replace the existing wood distribution and power poles and related equipment.

For PG&E's natural gas transmission and distribution activities, PG&E will install gas transmission and distribution steel pipe. This also typically includes the removal and disposal of existing pipe. Other typical types of gas transmission and distribution equipment that may be installed include Electric Test System/ Gas Cathodic Test System meter stations for future pipe monitoring purposes, and pipeline markers at angle points and at levee crossing locations. Clearing and grading operations in support of installation of natural gas facilities typically involve preparation of the right-of-way, including vegetation removal, debris disposal, and land leveling. Installation sites are backfilled using sand to create a 6-inch insulation zone around the pipe and then covered by native soil from the project area. In some instances, a crane may be required to place pipe at crossing sites located at the crowns of the levees. Dump trucks will be used to transport sand and soil materials. Spoil piles may be temporarily placed onsite while the installation activities are occurring.

Hydrostatic testing associated with installation of natural gas facilities will be performed to test the strength of the new pipeline. Test water intake and discharge will be performed in accordance with all regulations and permit requirements.

Typical electrical and natural gas transmission and distribution project work schedules are comprised of an average 9-hour day, at an average of 6 days per week per crew. Typical crews consist of 3 to 5 members.

PG&E work areas will be about 125 feet by 125 feet in diameter and located in close proximity to installation activity locations. On average, PG&E will require up to 10 work areas per contract phase. PG&E will utilize the work areas identified by SBFCA whenever possible. Typically, PG&E project access is achieved through existing public and private roads. Removal of vegetation to utilize access roads by PG&E equipment and transport of facilities may be required. PG&E currently owns easements along the entire project corridor. However, temporary and/or permanent easements as required for construction and maintenance of these facilities are being acquired by SBFCA.

Encroachment and Vegetation Removal

Encroachments - Existing facilities found within the footprint of an alternative may require removal and replacement nearby, abandonment, or relocation. Encroachments are numerous (over 400 identified) along the Feather River West Levee and may need to be addressed if they present a threat to the stability of the levee, do not currently comply with the levee encroachment criteria, or will be disrupted or otherwise impacted by construction activities. Typical encroachments include pressure pipelines (water supply pipelines from waterside pump stations and drainage pipelines from landside drainage pump stations), gravity drainage pipes, gas lines, telephone utilities, overhead utilities, structural encroachments, and other types and variations. Debris from structure and embankment fill material of poor quality will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Vegetation Removal - Vegetation removal will involve stripping of herbaceous (non-woody) vegetation by bulldozer. Vegetation will be removed only from within the direct construction footprint and the minimum areas necessary for staging and access. Consistent with the Central Valley Flood Protection Plan guidance for levee repair or improvement, vegetation will be removed to meet specific project objectives. Any vegetation removed as part of direct construction activities will not be replaced at that location, but will involve offsite, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

In accordance with the State of California's Urban Levee Design Criteria, at a minimum, all roots larger than 1.5 inches in diameter that are within 3 feet of the perimeter of the tree trunk will be removed. Immature trees less than 4 inches in diameter at breast height that will be removed may be cut off at or below ground level, generally without root removal. Any excavation will be

backfilled with engineered fill using appropriate placement, moisture conditioning, and compaction methods. Additional measures for removing non-compliant vegetation are listed below.

- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Debris from vegetation removal will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Construction Staging, Access, and Temporary Facilities

Staging areas will only be provided within the Action Area. Staging areas will be used for staging construction activities and to provide space to house construction equipment and materials, offices, employee parking, and other uses needed for construction of the proposed project.

To facilitate construction, temporary earthen ramps will be constructed for equipment access between the levee crown and the staging area(s). The earthen ramps will be removed when construction is complete.

Cutoff wall construction requires temporary establishment of an onsite slurry batch plant that will occupy about 1–2 acres. Batch plants will be located at about 1-mile intervals along the levee. The batch plant site will likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. Slurry ingredients will be mixed with water and the mixture will be pumped from tanks through pipes to the construction work sites. The batch plant will produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethelene pipes, will be laid on the ground and will extend to all work sites. An additional pipe may be used to supply water to the work sites.

Staging, access, and other temporary construction areas will be located away from wetlands, woody vegetated areas, wildlife species habitat, known cultural resources, or other sensitive areas and will be limited to disturbed or ruderal grasslands subject to review by Corps and resource agencies.

Material Importation, Reuse, and Borrow

Materials imported to the FRWLP construction area will include water, bentonite, cement, incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, and embankment fill soil. Large quantities of fill soil, or borrow will be required. To meet borrow demands, embankment fill material excavated as part of construction will be evaluated for reuse. Embankment fill material deemed suitable will be used as part of levee reconstruction and berms. The total volume of material required is 1,500,000 cubic yards.

SBFCA has explored the option of purchasing fill or borrow material from a local commercial quarry or other permitted source; however, there are not currently any sites near the Action Area that could supply the volume and type of material required. Consequently, SFBCA plans to purchase fill from local landowners willing to sell borrow material.

Six borrow sites have been identified in the Action Area. Each site was investigated to determine the quantity of available material, hauling distance, material composition, groundwater elevation, and prospects for acquisition. Sufficient fill volume is estimated to be present within an approximate 10-mile, one-way haul distance from the area of construction.

SBFCA will maximize the potential borrow sites' use through gradation, placement, and treatment so that they could continue to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 4–6 inches of topsoil will be set aside and replaced after construction in each construction season. After the FRWLP is completed, the borrow site will be re-contoured and reclaimed.

Through outreach efforts, SBFCA identified a number of sites owned by individuals or government agencies willing to sell their property or provide material on a cubic yard basis. Each borrow site is described below.

North Valley Property - The North Valley property is owned by North Valley Properties, LLC and is located south of Ella Road between Feather River Boulevard and Arboga Road. The Wheeler Ranch housing development is proposed at the site. Borrow for the FRWLP will be taken from the northeast corner of the property to create a 24.5 acre detention pond (referred to as the Drainage Basin C Regional Detention Pond, but commonly referred to as the South Ella Detention Pond). The Ella Basin is being constructed as part of Reclamation District No. 784's Master Drainage Plan. Historically, the site was cultivated for agricultural purposes. Currently, the site is disked ruderal grassland with some roads cut in the southern portion of the property for the Wheeler Ranch development. The depth of excavation is anticipated to be 15–20 feet and the yield of material from this site could be 400,000–500,000 cubic yards. Borrow material from this site will be used for work in Contracts B and C. If borrow material is remaining, it may also be used for Contract D. The haul route to Contract C will use existing roads. The post-project land use of the site will be a regional detention pond for Reclamation District No. 784.

Marler Property - The Marler property is a 10-acre property at Johnson Road near Messick Road, north of Star Bend and south of Shanghai Bend. The site is currently an orchard. The depth of

excavation could be upwards of 6 feet. The yield of material from this site could be 75,000 cubic yards. The haul route will use existing roads. The post-project land use for the property will be agricultural production, likely row crops or orchard.

Lanza Property - The Lanza property is 40 acres in size and is currently farmed in field/row crops. It is located at North Township Road and Pease Road south of Live Oak and north of Yuba City. The site has not yet been investigated to determine the types of materials present. Excavation of the site to a depth of 6 feet may occur. The yield of material from this site could be 200,000 cubic yards. The likely haul route will be along Pease Road directly east to the levee. The post-project land use for the property will be rice production.

City of Live Oak Detention Basin - Live Oak owns the property formerly known as the Caltrans Detention Basin Site located west of SR 99 and south of Paseo Avenue. The site is currently fallow. Live Oak intends to construct soccer fields and a stormwater detention basin at the site in 2013 or later. Although the site will require hauling for a short distance through a residential neighborhood, it is anticipated the residents will be amenable to the hauling as it will be a part of the public amenity constructed by Live Oak. This site is about 25 acres, and the depth of excavation is anticipated to be 3–6 feet. The yield of material from this site could be 125,000 cubic yards, and will likely be used for Contract C. Haul routes will use existing roads.

Live Oak (2012) reports that land at this location has historically been cultivated for agricultural purposes and reported that there was no evidence of any wetland or other sensitive plant or wildlife areas remaining onsite. No wetland features were identified during a preliminary wetland delineation of the area in December 2012. The previous agricultural use has displaced native species of plants and animals except those varieties capable of co-existing with humans in urban settings. The post-project use of the site will be a community park and stormwater detention basin facility.

Oroville Wildlife Area Dredge Tailings Area - This site is within the Oroville Wildlife Area and consists of several mounds of dredge tailings waterside of the existing levee. The material is suitable for use in seepage berms in Contract D. The availability of tailings in the area should be sufficient to meet the total deficit for berm material in these reaches. The excavation of the material will be coordinated to maximize hydraulic benefits from the reshaping of the overbank area. The site also represents an opportunity to provide waterside habitat enhancements. The useful area of this site could be about 75 acres and the depth of excavation could be upwards of 10 feet. The yield of material from this site could be 375,000 cubic yards. Hauling from this site will not take place on public roads. It is anticipated the contractor will use an existing waterside levee ramp (or create one), directly accessing the levee patrol road. The future land use for this site will be similar to its present day use (managed habitat area).

Construction Timing

Specific sequencing of construction will be dynamic throughout planning and design of the FRWLP, subject to change based on factors including the following.

- Further engineering in determining the clarity and efficacy of site-specific measures.

- Easement and right-of-way acquisition (where necessary).
- Availability of proximate, suitable, and cost-effective borrow material.
- Environmental clearances based on wildlife presence, lifecycle activity, and location of habitats.

Based on current planning analysis for the FRWLP, construction will occur in more than one annual construction season (typically April 15 to November 30, subject to conditions). Although subject to change, the four contracts and their respective areas for construction of the FRWLP are identified below.

- Contract A, 2016 – 2017
- Contract B, 2014 – 2015
- Contract C, 2013 – 2014
- Contract D, 2014 – 2015

Construction is anticipated to occur in single 10-hour shifts, 6 days per week. An exception to this schedule is slurry cutoff wall construction, which is anticipated to occur in two 10-hour shifts (essentially 24-hour construction), 6 days per week. While actual construction will not occur between the two 10-hour shifts, equipment maintenance and preparations for the upcoming work shift will occur.

Conservation Measures

SBFCA will implement the following conservation measures to avoid and minimize effects on federally listed species. To ensure their implementation, the measures listed below will be included in the project specifications.

General

Conservation Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the Action Area, a Service-approved biologist will conduct a mandatory biological resources awareness training for all construction personnel about federally-listed species that could potentially occur onsite (beetle and snake). The training will include the natural history, representative photographs, and legal status of each federally-listed species and avoidance and minimization measures to be implemented. Proof of personnel attendance will be provided to the Service within 1 week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- Where suitable habitat is present for listed species, SBFCA will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project construction area. Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- All food-related trash will be disposed of in closed containers and removed from the project construction area at least once per week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project construction area.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.
- Any worker who inadvertently injures or kills a federally-listed species or finds one dead, injured, or entrapped will immediately report the incident to the biological monitor and construction foreman. The construction foreman will immediately notify SBFCA, who will provide verbal notification to the Sacramento Fish and Wildlife Office and the local CDFW warden or biologist within 1 working day. SBFCA will follow up with written notification to Service and CDFW within 5 working days. The biological monitor will follow up with SBFCA to ensure that the wildlife agencies were notified.
- The biological monitor will record all observations of federally-listed species on California Natural Diversity Database (CNDDB) field sheets and submit to CDFW.

Valley Elderberry Longhorn Beetle

Conservation measures for the beetle are based on Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (U.S. Fish and Wildlife Service 1999a).

Conservation Measure 2: Fence Elderberry Shrubs to be Protected and Monitor Fencing during Construction

Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/beetle experience), under contract to SBFCA, will mark the elderberry shrubs and clusters that will be protected during construction. Orange construction barrier fencing will be placed at the edge of the respective buffer areas. The buffer area distances will be proposed by the biologist and approved by the Service. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information:

This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

In some cases, where the elderberry shrub dripline is within 10 feet of the work area, k-rails will be placed at the shrub's dripline to provide additional protection to the shrub from construction equipment and activities. Temporary fences around the elderberry shrubs and k-rails at shrub driplines will be installed as the first order of work. Temporary fences will be furnished, constructed, maintained, and later removed, as shown on the plans, as specified in the special provisions, and as directed by the project engineer. Temporary fencing will be 4 feet (1.2 meters) high, commercial-quality woven polypropylene, orange in color.

Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 3: Conduct Beetle Surveys Prior to Elderberry Shrub Transplantation

Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). The biologist will survey the area surrounding the shrub to be transplanted to ensure that there are not additional elderberry shrubs that need to be removed. Surveys will consist of counting and measuring the diameter of each stem, and examining elderberry shrubs for the presence of beetle exit holes. Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to the Service. SBFCA plans to plant elderberry seedlings/cuttings and associated native plants prior to transplantation of elderberry shrubs. The data collected during the surveys prior to transplantation will be used to determine if SFBCA is exceeding their compensation needs or if additional plantings are necessary. Because the Proposed Action will be constructed in four separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract and to ensure that SBFCA has minimized effects to the beetle.

Conservation Measure 4: Water Down Construction Area to Control Dust

SFBCA or the contractor will ensure that the project construction area will be watered down as necessary to prevent dirt from becoming airborne and accumulating on elderberry shrubs within the 100–foot buffer.

Conservation Measure 5: Compensate for Direct and Indirect Effects on Valley Elderberry Longhorn Beetle Habitat

Before construction begins, SBFCA will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to a Service-approved conservation area (described below). Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) will be replaced, in the conservation

area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies in a riparian or non-riparian area. Stock of either seedlings or cuttings will be obtained from local sources (including the Action Area if acceptable to the Service).

At the discretion of the Service, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that will be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, compensation ratios will be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to Service-approved procedures outlined in the Conservation Guidelines (U. S. Fish and Wildlife Service 1999a). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Property inaccessibility and the high density of vegetation along portions of the Feather River riparian corridor limited the number of elderberry shrubs that could be surveyed (73 shrubs were surveyed). For this reason, compensation for the removal of 91 shrubs was estimated based on the average number of stems in each stem diameter range for the 73 shrubs that could be surveyed. Those average shrub stem counts are as follows.

- Number of stems $\geq$1 inch and $\leq$3 inches = 4.
- Number of stems >3 inches and <5 inches = 1.
- Number of stems $\geq$5 inches = 1.

Table 1 shows the estimated compensation. Because the shrubs are located in riparian habitat and did not have exit holes, the compensation ratios for these conditions were used. As noted in Table 1, one elderberry shrub will need to be transplanted prior to the start of work in 2013 (in Reach 13) and outside of the elderberry dormancy period.

Based on the information in Table 1, the conservation area will be at least 12.15 acres in size to accommodate about 91 elderberry shrubs, 1,470 elderberry cuttings or seedlings, and 1,470 native plants. The conservation area in which the transplanted elderberry shrubs and seedlings are planted will be protected in perpetuity as habitat for the beetle.

Evidence of beetle occurrence in the conservation area, the condition of the elderberry shrubs in the conservation area, and the general condition of the conservation area itself will be monitored over a period of 10 consecutive years or for 7 years over a 15-year period from the date of transplanting. SBFCA will be responsible for funding and providing monitoring reports to the Service in each of the years in which a monitoring report is required. As specified in the Conservation Guidelines, the report will include information on timing and rate of irrigation, growth rates, and survival rates and mortality.

Table 1. Elderberry Stem Sizes and Compensation

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Multiplier for transplanting between June 15 – August 15	Number of Stems	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	No	360	720	720
Riparian	stems > 3" & <5"	No	3:1	1:1	No	90	270	270
Riparian	stems > 5"	No	4:1	1:1	No	90	360	360
2013 Construction - Reach 13								
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	2.5	1	5	5
Riparian	stems > 3" & <5"	No	3:1	1:1	2.5	2	15	15
Riparian	stems > 5"	No	4:1	1:1	2.5	10	100	100
Total replacement plantings							1,470	1,470
Total elderberry shrubs to be transplanted								91
2940 /10 = 294 valley elderberry longhorn beetle credits or 12.15 acres								

To meet the success criteria specified in the Conservation Guidelines, a minimum survival rate of 60% of the original number of elderberry replacement plantings and associated native plants must be maintained throughout the monitoring period.

Proposed Conservation Area

SBFCA proposes to transplant elderberry shrubs to the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. In 2009, Levee District 1 of Sutter County proposed to construct the Feather River Setback Levee and Habitat Enhancement Project at Star Bend to replace a portion of existing levee that poses a high risk of failure in order to decrease the flood stage, velocity, and scour potential; increase and improve floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of CDFW's Feather River Wildlife Area. The Star Bend project created 48.5 acres of floodplain habitat, which included habitat enhancement and onsite compensation for impacted elderberry shrubs.

In 2009, River Partners and Stillwater Sciences prepared a *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend* to be implemented by Levee District 1. It provides further information on the conditions at the time the site was proposed. About 20 acres have been used for elderberry transplants and associated native plants. In early 2012, a fire at the Star Bend site damaged portions of the site; however, elderberry shrub

planting losses were minimal. The remaining 28.5 acres are available at the conservation area for compensating for impacts on elderberry shrubs from construction of the FRWLP. The long-term goal of the conservation area is to merge this area with CDFW's adjoining O'Conner Lakes and Abbott Lakes Wildlife Units. SBFCA will prepare a mitigation and monitoring plan for the 28.5 acres that are available and will be used as a conservation area for effects to the beetle, as well as riparian impacts. This plan is currently being coordinated with the Service, Corps, and CDFW. Additionally, SBFCA will obtain a conservation easement for the 28.5 acre conservation area.

Giant Garter Snake

Conservation Measure 6: Conduct Construction Activities during the Active Period for Giant Garter Snake

Construction activity within giant garter snake aquatic and upland habitat (200 feet of aquatic habitat) will be conducted during the snake's active period (May 1–October 1). During this timeframe, potential for injury and mortality are lessened because snakes are actively moving and avoiding danger. The only work that will be conducted outside of the active season is levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction at two sites in the same reaches because these activities must be conducted when the canal is dry (February–March). Additional protective measures will be implemented at these locations (see Conservation Measure 14 below).

Conservation Measure 7: Install and Maintain Exclusion and Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, SBFCA will install exclusion fencing and orange construction barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The exclusion and construction barrier fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that SBFCA or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The exclusion fencing will consist of 3-foot-tall silt fencing buried 6 inches below ground level. The exclusion fencing will ensure that giant garter snakes are excluded from the construction area and that suitable upland and aquatic habitat is protected throughout construction. The construction barrier fencing will be commercial-quality, woven polypropylene, orange in color,

and 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Barrier and exclusion fences will be inspected daily by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 8: Minimize Potential Impacts on Giant Garter Snake Habitat

SBFCA will implement the following measures to minimize potential impacts on giant garter snake habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the Action Area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

Conservation Measure 9: Prepare and Implement a Stormwater Pollution Prevention Plan

SBFCA will prepare a stormwater pollution prevention plan (SWPPP) that describes the BMPs that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP will be prepared prior to commencing earth-moving construction activities. This will also comply with the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit.

The specific BMPs that will be incorporated into the erosion and sediment control plan and SWPPP will be site-specific and will be prepared by the construction contractor in accordance with the California Regional Water Quality Control Board Field Manual. However, the plan likely will include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction.** The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials.** To the extent possible, equipment and materials will be staged in areas that have already been disturbed.

- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in part through the establishment of designated equipment staging areas, ingress and egress corridors, and equipment exclusion zones prior to the commencement of any grading operations.
- **Stabilize grading spoils.** Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers.** The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area. Natural/biodegradable erosion control measures (i.e., coir rolls, straw wattles or hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because animals can become caught in this type of erosion control material.
- **Stormwater drain inlet protection.** The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization.** The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

Conservation Measure 10: Prepare and Implement a Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, SBFCA will ensure the contractor will prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). The plan will be subject to approval by the Corps, Service, and SBFCA before excavation can begin. The BSSCP will include measures intended to minimize the potential for a frac-out (short for "fracture-out event") associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-effect" response in the event of a frac-out and release of excavation fluid (i.e., bentonite). The BSSCP will require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, the Service, CDFW, and the RWQCB will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be onsite and used if a frac-out occurs. Containment materials, such as straw bales, also will be onsite prior to and during all operations, and a vacuum truck will be on

retainer and available to be operational onsite within notice of 2 hours. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.

- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1-foot, contained, and properly disposed of, as required by law. The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.
- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that will potentially suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material, and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (onsite) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of excavation operations.

Conservation Measure 11: Prepare and Implement a Spill Prevention, Control, and Counter-Measure Plan

A spill prevention, control, and counter-measure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. SBFCA or its contractor will develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP will be completed before any construction activities begin. Implementation of this measure will comply with State and Federal water quality regulations. The SPCCP will describe spill sources and spill pathways in addition to the actions that will be taken in the event of a spill (e.g., an oil spill from engine refueling will be immediately cleaned up with oil absorbents). The SPCCP will outline descriptions of containments facilities and practices such as doubled-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. It will also describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

SBFCA will review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. SBFCA will notify its contractors immediately if there is a non-compliance issue and will require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that results in one or more of the following.

- Violates applicable water quality standards.
- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent will notify SBFCA, and SBFCA will take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Central Valley RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

Conservation Measure 12: Conduct Preconstruction Surveys and Monitoring for Giant Garter Snake

Prior to ground-disturbing activities within 200 feet of suitable habitat, a Service-approved biological monitor will conduct a preconstruction survey of suitable aquatic and upland habitat and inspect exclusion and orange barrier fencing to ensure they are both in good working order each morning. If any snakes are observed within the construction area at any other time during construction the Service-approved biological monitor will be contacted to survey the site for giant garter snakes. The biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities will be allowed to move away from construction activities on their own. If unable to move away on their own, trapped or injured giant garter snakes will be only be removed by a biologist with a federal 10(a)1(a) permit which allows them to handle the snake and will be placed in a location determined through discussions with the Service. The biological monitor will immediately report the finding of a snake to Service by phone and will provide a written account of the details of the incident within 24 hours.

Once all initial ground-disturbing activities are completed, the biological monitor will perform weekly checks of the site for the duration of construction in order to ensure that construction barrier fences and exclusion fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to the Service within 1 week of each monitoring visit.

Conservation Measure 13: Provide Escape Ramps or Cover Open Trenches at the End of Each Day

To avoid entrapment of giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. Capture and relocation of trapped or injured individuals can only be attempted by personnel or individuals with current Service recovery permits pursuant to section 10(a)1(A) of the Act.

Conservation Measure 14: Implement Additional Protective Measures during Work in Suitable Habitat during the Giant Garter Snake Dormant Period

SBFCA will implement additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2–April 30), when snakes are more vulnerable to injury and mortality. It is expected that these additional measures will be implemented during levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction adjoining the canal at two sites in the same reaches during February–March, and if construction activities extend to the period between October 2 and November 1. SBFCA will implement additional protective measures when conducting work in suitable giant garter snake habitat between October 2 and April 30.

- A full-time Service-approved biological monitor will be onsite for the duration of construction activities.
- All emergent vegetation within the Sutter-Butte Canal on the levee side, and vegetation within 200 feet of the canal will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1 for following winter work).
- Exclusion fencing will be installed around the perimeter of the work area and across the Sutter-Butte Canal where construction activities associated with levee slope flattening and pipe reconstruction activities will occur. The fencing should enclose the work area to the maximum extent possible to prevent giant garter snakes from entering the work area. Fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during fence installation. The Service-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation. The exclusion fencing will consist of 3-foot-tall erosion fencing buried 4– 6 inches below ground level. The exclusion fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area (between canal and existing levee).
- Portions of the Sutter-Butte Canal that are temporarily disturbed during construction will be revegetated with emergent vegetation and adjacent disturbed upland habitat will be revegetated with native grasses and forbs after construction is complete.

Conservation Measure 15: Restore Temporarily Disturbed Aquatic and Upland Habitat to Pre-Action Conditions

Upon completion of the proposed project, SBFCA will restore 42.52 acres of suitable aquatic habitat and 118.80 acres of suitable upland habitat for the giant garter snake to pre-project conditions. Restoration of aquatic vegetation and annual grassland will be detailed in a mitigation and monitoring plan that will be reviewed and approved by the Corps and Service prior to the start of construction. Habitat will be restored within one season (defined as May 1–October 1) and providing vegetative cover within 1 year of construction beginning in that area.

Conservation Measure 16: Compensate for Permanent Loss of Aquatic Habitat for Giant Garter Snake

SBFCA will compensate for the permanent loss of 0.004 acre of suitable aquatic habitat for giant garter snake by purchasing preservation credits equal to 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. This bank has available giant garter snake credits and is approved by both the Service and CDFW.

The 0.012 acre of habitat at the conservation bank will be protected in perpetuity for giant garter snake. Prior to the start of construction (excluding Reach 13, as there is no giant garter snake habitat in this reach), SBFCA will provide funding to Westervelt Ecological Services for preservation credits equivalent to 0.012 acre of giant garter snake habitat at the Sutter Basin Conservation Bank. The transaction will take place through a purchase and sale agreement, and funds must be transferred within 30 days, and before any construction activities are initiated. SBFCA will provide the Service and CDFW with copies of the credit sale agreement and fund transfer.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle's and snake's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle and the snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle and snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the beetle and snake; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the beetle and snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the beetle's and snake's current status, taking into account any cumulative effects, to determine if implementation of the proposed

action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the beetle and snake.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the beetle and snake and the role of the action area in the survival and recovery of the beetle and snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Valley Elderberry Longhorn Beetle

Please refer to the *Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) 5-year Review: Summary and Evaluation* (Service 2006) for the current status of the species.

Giant Garter Snake

Please refer to the *Giant Garter Snake (Thamnophis gigas) 5-year Review: Summary and Evaluation* (Service 2012) for the current status of the species.

Environmental Baseline

Valley Elderberry Longhorn Beetle

The closest beetle occurrence in the CNDDB (2013) is about 0.5 mile from the proposed project. Suitable habitat for the beetle (in the form of elderberry shrubs) exists in numerous places along the 41 miles of proposed levee repair. A total of 267 elderberry shrubs were mapped within the action area. Many others exist at various locations between the levee and the river. Of these SBFCA is proposing to avoid 175 elderberry shrubs and transplant 91 elderberry shrubs. Because the action area is within the range of the species, there are known occurrences from the vicinity of the action area, and suitable habitat is present, the Service concludes that it is reasonably likely for the beetle to occupy the action area.

Giant Garter Snake

The *Draft Recovery Plan for the Giant Garter Snake* subdivides the range of the species into four recovery units (Service 1999b). The action area for the proposed project is located within the Sacramento Valley Recovery Unit. There are 20 records of the snake within 5 miles of the action area. The closest occurrence documented in the CNDDB is 2 miles from the action area. Snakes have the potential to occur within the action area because suitable aquatic and upland habitat is present as it is hydrologically connected to areas that support rice agriculture and areas where the snake has previously been detected. The action area is a long corridor that occasionally has irrigation ditches, which run parallel to the levee for limited stretches. The main threat to the snake in the action area is loss of habitat or connectivity due to channel and levee maintenance.

Effects of the Proposed Action

Valley Elderberry Longhorn Beetle

Ninety-one elderberry shrubs will be removed and transplanted. The 91 affected shrubs have 361 stems between 1 and 3 inches, 92 stems between 3 and 5 inches and 100 stems greater than 5 inches at ground level.

Loss of an elderberry shrub or even a stem can affect the beetle breeding and feeding because adult beetles rely solely on elderberry foliage and flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae will be killed or the beetle's life cycle will be interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the valley elderberry longhorn beetle, or impair their production of habitat-quality stems in the future.

2. Elderberry shrubs may die as a result of transplantation.

3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

SBFCA has proposed to transplant one shrub outside of the elderberry shrub's dormant season (November 1 to February 15). To offset the increased risk of the transplantation not being successful SBFCA has proposed to plant 2.5 times the number of elderberry seedlings at the Star Bend Conservation Area.

Temporal loss of habitat will occur. Although conservation measures for effects on the beetle will involve creation or restoration of habitat, it generally takes 5 or more years for elderberry plants to become large enough to support beetles, and it may take 25 years or longer for riparian habitats to reach their full value. Temporal loss of habitat may cause fragmentation of habitat and isolation of subpopulations.

Permanent and temporary habitat loss adversely affects the beetles breeding and foraging requirements. Habitat creation and transplantation of the shrubs will minimize these effects. Success of a restoration site has been linked to presence of transplanted elderberry shrubs that have served to colonize a newly created riparian habitat. Transplants that survive also provide diversity within the conservation area as they are older, larger shrubs within the plantings of young small elderberry seedlings. The Star Bend Conservation Area will be protected with a conservation easement and managed in perpetuity for riparian habitat including valley elderberry longhorn beetle habitat, through development of the *Feather River West Levee Project Mitigation and Monitoring Plan.*

Giant garter snake

Aquatic habitat for the snake near the levee construction varies along the 41 miles of the proposed project. Small areas of aquatic habitat are present in Contract A and C and they are hydrologically connected to areas that support habitat for the snake (rice). Contract D has the largest amount of snake aquatic habitat as the Sutter Butte Canal parallels the levee for longer lengths. Canal filling due to cutoff wall construction will permanently fill 0.004 acre of snake aquatic habitat. Upland habitat around this aquatic habitat will be temporarily disturbed but returned to pre-project condition within one year. Temporary effects will result from temporary fill of aquatic habitat for construction access, reshaping the slope of the Sutter Butte Canal and adjacent levee, and degradation and reconstruction of the levee. These activities will temporarily affect 6.81 acres of aquatic habitat. Levee degradation and reconstruction will temporarily affect 112.47 acres of upland habitat. All temporarily affected areas will be restored to pre-project conditions within the same year the disturbance will occur. This will minimize effects to giant garter snakes because the amount of time the habitat will be unavailable to the snake will be minimized. Permanently affected habitat, such as the canals that will be made smaller will be offset by purchasing 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. None of the borrow sites in the project description have upland or aquatic giant garter snake habitat.

The majority of the construction work will occur during the giant garter snake active season (May 1 to October 1). Increased construction activity in areas where snakes are known to occur could expose snakes to increased risks of injury and mortality from predation, exposure, vehicular traffic, and construction equipment. Because snakes are more mobile during the active season, these effects should be lessened. There are a few activities which SBFCA could not construct during the active season. Because of cooler temperatures in the inactive season (October 1 to May 1), the snake is not as mobile and is most frequently found within burrows. Ground disturbing activities during this timeframe will increase the likelihood of snake mortality when the burrows are disturbed with heavy equipment. SBFCA has proposed to disturb (clear and grub) the out of season work area and place exclusion fencing around the work area during the active season which will create an area that will not support overwintering snakes (lack of burrows). This will minimize the chance of injuring or killing an overwintering snake during out of season construction. This will only occur on one side of the canal, leaving the other side of the canal available as overwintering habitat for the snake.

Temporary effects within the action area will affect both aquatic and upland snake habitat. In some locations degradation of the levee could cause soil to fall into the aquatic habitat or fuel or oil leaks could also adversely affect the habitat and the snake. Placement of sediment fencing and implementing sediment and contaminant BMPs will lessen this effect. Levee degradation will temporarily make upland habitat unavailable to the snake during the active season. Snakes use upland habitat for thermoregulation both as a place to bask and as a place to escape extreme heat (burrows) and cover for shedding and giving birth to young. While snakes are more active during the summer months and more likely to move away from construction, some snakes may choose to remain where they are and therefore will be subject to mortality when construction activities are occurring. In addition to direct mortality, the upland habitat will be temporarily unavailable to the snake during construction. Even once construction is completed it will take a

year or two for the upland habitat to become completely functional for the snake, with burrows or crevices available for them to use. This is likely to result in disturbance, displacement, injury, and/or mortality of snakes. To lessen these effects SBFCA is implementing the conservation measures described above as well as affecting only one side of the canal. This will leave the other side of the canal intact and available to the snake for use, minimizing displacement of snakes. Additionally, because of the staging of construction not all of the upland habitat will be unavailable for use at one time. It will be staged as construction progresses through the various contracts.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. Any future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or result in take of listed valley elderberry longhorn beetle or giant garter snake and are, therefore, cumulative to the proposed project.

Conclusion

After reviewing the current status of the valley elderberry longhorn beetle and giant garter snake, the environmental baselines for these species, the effects of the proposed project, and the cumulative effects on this species, it is the Service's biological opinion that the proposed FRWLP, as described herein, is not likely to jeopardize the continued existence of these species. Although critical habitat has been designated for the beetle, the proposed action will not affect critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary for listed species of this biological opinion and must be implemented by the Corps and SBFCA in order for the exemption in section 7(o)(2)

to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Valley Elderberry Longhorn Beetle

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of this species and their relatively small body size make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of levee construction. Therefore, the Service estimates that all beetles inhabiting 91 elderberry plants containing stems 1 inch or greater at ground level (361 stems between 1-3 inches, 92 stems between 3 and 5 inches and 100 stems $\geq$5 inches; see Table 1 in the text) will be taken as a result of the proposed action.

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: the snake is cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during construction activities (staging areas, work on canal banks, levee degradation and reconstruction, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is difficult to detect, the Service may use the quantification of acreage as a surrogate for the individuals that will be taken. Therefore, the Service anticipates take incidental to this project as the 0.004 acre of suitable habitat that will be permanently lost and the 119.28 acres (6.81 acres aquatic and 112.47 acres upland) of suitable snake habitat that will be temporarily lost. Upon implementation of the Reasonable and Prudent Measure, Terms and Conditions, and the Proposed Conservation Measures considered herein, incidental take within this acreage for the proposed project, will be exempt from the prohibitions described under Section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the beetle or snake.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the adverse effects of the Feather River West Levee Project to the beetle and snake and their habitat in the action area.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and SBFCA must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions implement the Reasonable and Prudent Measure:

1. All the conservation measures as described in the project description, and as restated here in this biological opinion, must be fully implemented and adhered to.

2. The Corps, SBFCA, and PG&E shall include full implementation and adherence to the conservation measures as outlined in the biological opinion as a condition of any permit or contract issued for the project.

3. In order to monitor whether the amount or extent of take anticipated from implementation of the proposed project is approached or exceeded, the Corps and SBFCA shall adhere to the following reporting requirement. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

    a. For those components of the proposed project that will result in habitat degradation or modification whereby incidental take in the form of harm or mortality is anticipated, the Corps and SBFCA will provide weekly updates to the Service with a precise accounting of the total acreage of habitat effected or number of elderberry shrubs and size of stems at ground level transplanted. Updates shall also include any information about changes in the Project Description and not analyzed in this biological opinion.

4. SBFCA shall provide a photo documentation report showing pre- and post-project area conditions for giant garter snake.

Salvage and Disposition of Individuals

The Sacramento Fish and Wildlife Office will be notified within 1 day of the finding of any dead or injured snake or beetle to determine the appropriate measures for salvage and disposition. The Service contact person is the Habitat Conservation Division Chief. In addition, the Recovery Division Chief shall also be notified within 1 day of the procedures implemented for salvage and disposition of the snake or beetle. The applicant must report to the Service immediately any information about take or suspected take of listed species not authorized in this biological

opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured listed species. The Habitat Conservation and Recovery Divisions Chiefs can be contacted at (916) 414-6600. The California Department of Fish and Wildlife should also be contacted at (916)358-2900.

CONSERVATION RECOMMENDATIONS

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of new information. These measures may serve to further minimize or avoid the adverse effects of a proposed action on listed, proposed, or candidate species, or on designated critical habitat. They may also serve as suggestions on how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing you with the following conservation recommendations:

1. The Corps and SBFCA should assist in the implementation of the draft, and when published, the final Recovery Plan for the snake.

2. The Corps and SBFCA should provide funding to researchers studying topics identified by the Service in the draft, and when published, the final Recovery Plan for the snake.

3. The Corps should use environmental restoration authorities to acquire and restore beetle and snake habitat.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Feather River West Levee Project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the proposed action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this Feather River West Levee Project biological opinion, please contact Jennifer Hobbs, at (916) 414-6541 or Doug Weinrich, Deputy Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Roberta Gerson

for Jan C. Knight
Acting Field Supervisor

cc:
Jeff Koschak, Corps, Sacramento, CA
Jenny Marr, CDFW, Chico, CA
Jennifer Haire, ICF, Sacramento, CA

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Part F.2

National Marine Fisheries Service Concurrence Letter

Note: The EIS analysis assumes project completion in 2015. The ESA consultation documents assume a longer duration to 2017 to characterize a maximum habitat disturbance scenario and to provide implementation flexibility within the ESA authorization.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

APR 10 2013

In response refer to:
2013/9542

Alicia E. Kirchner
Chief, Planning Division
Department of Army
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2833

Dear Ms. Kirchner:

This letter is in response to your March 22, 2013, request for initiation of section 7 consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*), concerning the Feather River West Levee Project (FRWLP). The proposed project includes modifying approximately 41 miles of a U.S. Army Corps of Engineers (Corps) levee to reduce the potential for flooding, flood damage, and public risk in the Yuba City area. The proposed project is currently scheduled to be constructed by the Sutter Butte Flood Control Agency (SBFCA), in five construction seasons from 2013 to 2017. To construct the FRWLP, SBFCA is requesting permission from the Corps pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the U.S. Government Code [USC], Section 408, [33 USC 408]), for the alteration of a levee as part of the Sacramento River Flood Control Project.

The Corps has determined that the proposed project may affect, but is not likely to adversely affect federally listed as threatened Central Valley (CV) spring-run Chinook salmon (*Oncorhynchus tshawytscha)* evolutionarily significant unit (ESU), endangered Sacramento River winter-run Chinook salmon (*O. tshawytscha)* ESU, threatened California CV (CCV) steelhead (*O. mykiss*) distinct population segment (DPS), threatened Southern DPS of North American green sturgeon (*Acipenser medirostris*), and their designated critical habitats. In addition, the Corps has determined that the proposed project will not adversely affect essential fish habitat (EFH) of Pacific salmon and thus fulfills section 305 (b)(2) of the Magnuson – Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). This letter also serves as consultation under the authority of, and in accordance with, the provisions of the Fish and Wildlife Coordination Act of 1934 (FWCA), as amended.

Consultation to Date

The following is a summary of the NMFS consultation activities on the proposed project:

(1) On December 28, 2012, SBFCA submitted a letter to NMFS via email to request technical assistance regarding potential effects of the proposed project on listed fish species and their designated critical habitat, identify additional data needs, and determine needs for consultation. The letter included a summary of waterside riparian impacts and a map of the project footprint in relation to the ordinary high water mark (OHWM).

(2) On February 5, 2013, the Corps and SBFCA held a meeting with Michael Hendrick of NMFS to provide an overview of the proposed project and discuss proposed project effects on ESA-listed fish species, proposed conservation measures, consultation requirements, and schedule.

(3) In response to the SBFCA's December 28, 2012, letter, NMFS provided a list of federally listed fish species that could occur in the proposed project area and designated critical habitat occurring in the proposed project area (letter to SBFCA dated March 4, 2013).

Project Description

SBFCA is proposing the FRWLP to reduce flood risk in the Sutter Basin, which includes portions of Sutter and Butte counties in California's Sacramento Valley. Communities in the basin include Yuba City, Biggs, Gridley, Live Oak, and Sutter. Floodwaters that potentially threaten the basin originate from the Feather River watershed or the upper Sacramento River watershed.

The FRWLP will reduce flood risk in the Sutter Basin by addressing known levee deficiencies along the Feather River West Levee from Thermalito Afterbay downstream to a point approximately 4 miles upstream of the Feather River's confluence with the Sutter Bypass. The proposed project includes modifying approximately 41 miles of a Corps levee to reduce the potential for flooding, flood damage, and public risk in the Yuba City area. The levee modification will involve: (1) installing approximately 34 miles of soil and bentonite cutoff walls into the levee core, (2) constructing 0.72 miles of seepage berms on the landside of the levee, (3) placing 0.42 miles of ditch fill, (4) dredging 1.8 miles of canal, and (5) relocating or removing encroachments along approximately 3.44 miles of the Feather River west levee. When completed, the work will reduce levee deficiencies, including through- and under-seepage, slope stability, erosion, and encroachments, within the construction footprint. Materials imported to the construction site will include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,500,000 cubic yards of embankment fill material. While the specific sequencing of construction will be dynamic throughout the planning and design of the FRWLP, the construction will occur from 2013 to 2017.

Action Area

The regulations governing consultations under the ESA define *action area* as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (51 FR 19957). The action area should be determined based on all direct and indirect effects of the proposed action (50 CFR 402.02 and 402.14(b)(2)).

The proposed action area consists of the 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay to approximately 4 miles north of the Sutter Bypass. The proposed action area includes the project construction area and a 100-foot buffer around this area. The proposed construction area is defined as the area in which levee improvements (seepage berms, stability berms, relief wells, and slurry cutoff walls) are likely to be constructed. All of the potential direct and indirect effects will occur within this area and the 100-foot buffer around this area.

The proposed action area also includes six potential borrow sites that could supply the borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites. The proposed action area also includes the existing 48.5-acre Star Bend Conservation Area, located within the setback area adjacent to the west levee of the Feather River, approximately 6 miles south of Yuba City.

Effects of Proposed Action

All federally listed fish species potentially found in the area of the proposed project, the CV spring-run Chinook salmon ESU, CCV steelhead DPS, and Southern DPS of North American green sturgeon, have life histories, biological and habitat requirements that may be impacted by the proposed project. The Sacramento River winter-run Chinook salmon ESU is not found within the proposed project's action area; therefore there will be no impacts.

The proposed action area of the FRWLP provides migratory habitat for adult CV spring-run Chinook salmon, and migratory and rearing habitat for juveniles. Based on observations in the Feather River, adults are likely to be present in the proposed action area between February and July as they migrate to summer holding habitat. The proposed action area of the FRWLP borders the designated critical habitat of CV spring-run Chinook salmon in the Feather River. Primary constituent elements (PCEs) of critical habitat in the adjacent reaches of the Feather River include: (1) freshwater rearing sites that have adequate water quality and quantity, floodplain connectivity, and natural cover that supports juvenile growth and mobility, and (2) freshwater migration corridors that support adequate water quantity and quality as well as natural cover to provide food and migration pathways for juveniles as well as adults. Critical habitat includes the river channel and lateral extent as defined by the ordinary high water line. In areas where the ordinary high water line has not been defined, the lateral extent is defined by the bankfull elevation or the elevation at which water begins to leave the channel and move on to the floodplain (this generally corresponds to a discharge that generally has a recurrence interval of one to two years on the annual flood series) (70 FR 52488).

The proposed action area of the FRWLP provides migratory habitat for adult steelhead, and migratory and rearing habitat for juveniles. Adult steelhead immigration in the Feather River occurs from September through March (SWRI 2003). The proposed action area of the FRWLP borders the designated critical habitat of CV steelhead in the Feather River, which includes the river channel and lateral extent as defined by the ordinary high water line. The PCEs of critical habitat are as described for spring-run Chinook salmon.

The proposed action area provides migratory and foraging habitat and likely spawning habitat for green sturgeon (Beamesderfer et al. 2004; Seesholtz pers. comm.). Historical sightings of adult green sturgeon in the Feather River have been in the spring during the general period of upstream migration in the Sacramento River. The proposed action area of the FRWLP borders designated critical habitat of the Southern DPS of North American green sturgeon, which includes the Feather River upstream to Oroville Dam.

Freshwater PCEs for the Southern DPS of North American green sturgeon include sufficient food resources for juvenile foraging, growth, and development; suitable substrates for egg incubation and development; suitable water quantity and quality for normal behavior, growth, and survival of all life stages; suitable passage conditions for adults, larvae, and juveniles; suitable holding pools and water depths for adults; and sediments free of elevated levels of contaminants capable of adversely affecting green sturgeon (74 FR 52300).

The Corps has determined that there will be no direct effect on the designated critical habitat for federally listed fish species, because all work on the waterside slope will stay above the OHWM and at least 50 feet from the top of the bank of the Feather River. All vegetation loss will be confined to the construction footprint, and there will be no additional removal of vegetation to comply with the Corps vegetation policies. As a result, there will be no modification of riparian vegetation or shaded riverine aquatic cover within designated critical habitat of federally listed fish species.

Direct effect to riparian vegetation will be limited to approximately 27 acres of riparian forest and scrub-shrub above the OHWM. Approximately 135 trees (mixed native and non-native riparian and orchard tress) will be removed from the waterside levee slope and toe. In addition, approximately 27 acres of orchard trees (344 trees) will be removed from the permanent and temporary footprints adjacent to the waterside levee slope. These areas are set well back from the river, ranging from approximately 50 to 5,600 feet from the Feather River during typical summer base flows. To compensate for permanent and temporary loss of woody riparian vegetation, SBFCA developed a mitigation and monitoring plan (MMP) to ensure no net loss of habitat functions and values.

Proposed construction and levee repair activities are not likely to result in adverse turbidity- or sedimentation-related effects on winter-run Chinook salmon, spring-run Chinook salmon, steelhead, and green sturgeon or their critical habitat. For the FRWLP, no in-river construction activities are proposed and all activities that will result in physical disturbance or removal of soil or vegetation on the waterside slope of the levee will be limited to areas above the OHWM. With implementation of the stormwater pollution prevention plan (SWPPP) and the associated erosion and sediment control best management practices (BMPs), exposed or imported soil will be largely contained within the immediate project footprint and stabilized using structural or vegetative methods. Any increases in turbidity and sedimentation attributable to the proposed project are expected to be well below levels associated with injury or reduced growth of juvenile salmonids, and will not likely result in significant disruption of normal feeding, sheltering, and migratory behavior of Chinook salmon, steelhead, or green sturgeon.

Contaminants used at construction sites, including gasoline, diesel fuel, lubricants, and hydraulic fluid, could enter the Feather River as result of spills or leakage from machinery or storage containers and injure or kill listed salmon, steelhead, and sturgeon. These substances can kill aquatic organisms through exposure to lethal concentrations or exposure to non-lethal levels that cause physiological stress and increased susceptibility to other sources of mortality such as predation. There is also a slight risk of the release of bentonite into the Feather River during jet grouting or deep soil mixing used to construct slurry cut off walls. Implementation of a spill prevention, control, and countermeasure plan (SPCCP) and bentonite slurry spill contingency plan as part of the environmental commitments of the project is anticipated to minimize the potential for toxic or hazardous spills or discharges into the Feather River. Adherence to all preventative, contingency, and reporting measures in the approved plans will reduce the risk of injury or mortality of listed fish species to negligible levels.

For the FRWLP, sheet piles will be used only as a site-specific treatment at roadway or railroad crossings, and will be restricted to the levee crown above the OHWM where sound waves will be expected to attenuate quickly before reaching the Feather River. Consequently, pile driving activities will have negligible noise and vibration effects on fish in the Feather River.

Potential utilization of the Oroville Wildlife Area dredge tailing site for borrow material could increase the potential for stranding of listed fish species. Based on current estimates, the area identified as a potential source of borrow material is approximately 75 acres and could be lowered up to 10 feet. The proposed elevation of the tailings will remain above the OHWM but will increase the frequency of overbank flows from the Feather River. Following periods of inundation, the tailings could retain surface water or direct surface water to isolated depressions, resulting in fish stranding and high mortality rates due to lethal water temperatures, low dissolved oxygen, predation, and desiccation. If this site is selected as a source of borrow material, SBFCA proposes to re-contour the area to completely drain to the river and reduce the risk of stranding from current levels. The design will be developed in consultation with NMFS, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and the Corps, and submitted to the agencies for approval prior to the start of excavation. A monitoring plan will be developed and implemented to evaluate the effectiveness of the design in minimizing fish stranding and will include provisions for remediation should the design fail to meet established performance or success criteria. The net effect may be beneficial in terms of alleviating current stranding risk while also making more floodplain surface available to fish at lower water surface elevations.

ESA Section 7 Consultation

Based on our review of the material provided with your request and the best scientific and commercial information currently available, NMFS concurs that the Corps determination that the proposed project as described is not likely to adversely affect federally listed CV spring-run Chinook salmon ESU (*O. tshawytscha*), Sacramento River winter-run Chinook salmon ESU (*O. tshawytscha),* CCV steelhead DPS (*O. mykiss*), Southern DPS of North American green sturgeon (*Acipenser medirostris*), or their designated critical habitats. No construction activities are proposed in-river or below the OHWM; all activities that will result in physical disturbance and removal of vegetation on the waterside slope of the levee will be limited to areas above OHWM.

The proposed project is not likely to result in adverse water quality or noise effects on listed fish species or their critical habitat. The proposed project is not likely adversely affect PCEs of critical habitat of winter-run Chinook salmon, spring-run Chinook salmon, steelhead, and green sturgeon. There will be no direct physical impacts to riparian vegetation or SRA cover within the designated critical habitat of these species. Therefore, no physical modification of critical habitat for ESA-listed fish species will be expected because all proposed construction activities will occur above the OHWM of the Feather River.

In addition to the above, NMFS reached this determination based on the incorporation of the following measures into the project description:

(1) Construction personnel will receive worker environmental awareness training. This training will instruct workers to recognized sensitive species and their habitats.
(2) Erosion control BMPs and a SWPPP will be implemented to address and minimize water quality issues.
(3) Where suitable habitat is present for listed species, SBFCA will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
(4) If a sensitive species is encountered by a biological monitor during construction, activities will cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.
(5) Implementation of a spill prevention, control, and countermeasure plan and bentonite slurry spill contingency plan is anticipated to minimize the potential for toxic or hazardous spills or discharges into the Feather River.
(6) To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas unless it is done offsite.
(7) The biological monitor will record all observations of federally listed species on California Natural Diversity Database field sheets and submit to the Corps, NMFS, USFWS, and CDFW.
(8) Because ground disturbance for the proposed project will be greater than one acre, SBFCA will obtain coverage under the U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System general construction activity stormwater permit.
(9) The specific BMPs that will be incorporated into the erosion and sediment control plan and SWPPP will be site-specific and will be prepared by the construction contractor in accordance with the California Regional Water Quality Control Board Field Manual.
(10) Compensation for permanent and temporary losses of woody riparian vegetation will be achieved through a combination of onsite and offsite compensation. To the extent feasible, SBFCA proposes to conduct onsite compensation in floodplain areas within the proposed project footprint or in the proposed project vicinity. SBFCA proposes to conduct offsite compensation for riparian impacts in the existing 48.5-acre Star Bend Conservation Area, located within the setback area adjacent to the west levee of the Feather River, approximately 6 miles south of Yuba City.
(11) SBFCA prepared an MMP for compensation of riparian impacts with the goal of ensuring no net loss of habitat functions and values. The MMP has been submitted to the

agencies for review and approval. The MMP identifies the compensation ratios and describes how riparian habitat will be restored, monitored, and reported upon over a specified period of time.

(12) To help ensure that there is limited temporal habitat damage to riparian habitat, the mitigation project will be implemented during the fall of 2013.

This concludes ESA section 7 consultation for the proposed project. This concurrence does not provide incidental take authorization pursuant to section 7(b)(4) and section 7(o)(2) of the ESA. Re-initiation of the consultation is required where discretionary Federal agency involvement or control over the proposed project has been retained (or is authorized by law), and if: (1) new information reveals effects of any of the proposed projects that may affect listed species or critical habitat in a manner or to an extent not considered; (2) any of the proposed projects are subsequently modified in a manner that causes adverse effects to listed species or critical habitat; or (3) a new species is listed or critical habitat designated that may be affected by any of the proposed projects.

EFH Consultation

With regards to EFH consultation, the proposed action area has been identified as EFH for Pacific salmon in Amendment 14 of the Pacific Salmon Fishery Management Plan pursuant to the MSA. Federal action agencies are mandated by the MSA (section 305(b)(2)) to consult with NMFS on all actions that may adversely affect EFH, and NMFS must provide EFH conservation recommendations to those agencies (section 305(b)(4)(A)). Based on our review of the material provided, and the best scientific and commercial information currently available, NMFS has determined that the proposed action will adversely affect EFH for Pacific salmon. However, the proposed action includes adequate measures (described in the ESA section 7 Consultation above) to avoid, minimize, or otherwise offset the adverse effects to EFH. Therefore, additional EFH Conservation Recommendations are not being provided at this time and written response as required under section 305(b)(4)(B) of the MSA and Federal regulations (50 CFR 600.920(k)) will not be required. However, if there are substantial revisions to the project description that could result in adverse effects to EFH, the lead Federal agency will need to re-initiate EFH consultation

FWCA Consultation

The purpose of the FWCA is to ensure that wildlife conservation receives equal consideration and is coordinated with other aspects of water resources development (16 U.S.C. 661). The FWCA establishes a consultation requirement for Federal departments and agencies that undertake any action that proposes to modify any stream or other body of water for any purpose, including navigation and drainage (16 U.S.C. 662(a)). Consistent with this consultation requirement, NMFS provides recommendations and comments to Federal action agencies for the purpose of conserving fish and wildlife resources. The FWCA provides the opportunity to offer recommendations for the conservation of species and habitats beyond those currently managed under the ESA and MSA. Because the proposed project is designed to avoid environmental impacts to aquatic habitat within the action area, NMFS has no additional FWCA comments to provide.

Please contact Michael Hendrick at (916) 930-3605, or via e-mail at Michael.Hendrick@noaa.gov, if you have any questions or require additional information concerning this project.

Sincerely,

for Rodney R. McInnis
Regional Administrator

cc: Copy to File ARN 151422SWR2013SA00015
NMFS-PRD, Long Beach, CA

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Part F.3

Feather River West Levee Project Final 408 Permission Mitigation and Monitoring Plan

Note: The EIS analysis assumes project completion in 2015. The ESA consultation documents assume a longer duration to 2017 to characterize a maximum habitat disturbance scenario and to provide implementation flexibility within the ESA authorization.

FEATHER RIVER WEST LEVEE PROJECT
FINAL 408 PERMISSION
MITIGATION AND MONITORING PLAN

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List of Abbreviated Terms

AEP	annual exceedance probability
BA	Biological Assessment
BSSCP	bentonite slurry spill contingency plan
CAPP	Conceptual Area Protection Plans
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CH	fat clay
CL	lean clay
CLSM	controlled low strength material
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWA	Clean Water Act
DBH	diameter at breast height
DSM	deep soil mixing
DWR	California Department of Water Resources
EIP	Early Implementation Program
EIR	environmental impact report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESAs	Environmentally Sensitive Areas
FEMA	Federal Emergency Management Agency
FR	Federal Register
FRFCRP	Feather River Floodway Cooridor Restoration Project
FRWLP	Feather River West Levee Project
GGS	giant garter snake
GPS	global positioning system
ICF	ICF International
LAE	Land Acquisition Evaluations
LD	Levee District
LL	Liquid Limit
ML	silt
MMP	mitigation and monitoring plan
MOU	Memorandum of Understanding

NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OHWM	ordinary high water mark
PG&E	Pacific Gas & Electric Company
PI	Plasticity Index
project	Feather River West Levee Project
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SBCA	Star Bend Conservation Area
SBFCA	Sutter Butte Flood Control Agency
SC	clayey sand
SM	silty sand
SPCCP	spill prevention, control, and counter-measure plan
SR	State Route
SRFCP	Sacramento River Flood Control Project
SWPPP	stormwater pollution prevention plan
TRLIA	Three Rivers Levee Improvement Authority
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USC	U.S. Government Code
USFWS	U.S. Fish and Wildlife Service
VELB	valley elderberry longhorn beetle

Chapter 1
Responsible Parties

This document describes the mitigation and monitoring plan (MMP) for effects associated with implementation of the Feather River West Levee Project (project). Project implementation will create permanent and unavoidable impacts to habitats and species that require mitigation. This document identifies responsible parties for the mitigation project, describes the location and nature of the project, and discusses the types, functions, and values of U.S. Army Corps of Engineers (USACE) jurisdictional wetlands and other waters of the United States.

In addition to the mitigation plan for impacted Section 404 jurisdictional features, this MMP also includes impacts and mitigation for riparian and non-riparian native trees, and special status species habitat for valley elderberry longhorn beetle (VELB) and permanent impacts to giant garter snake (GGS), for which compensatory mitigation is required.

Compensatory mitigation for riparian forest, non-riparian native trees and VELB will occur at the Star Bend site on the Feather River. Mitigation for GGS and Section 404 jurisdictional features will occur at off-site private banking lands.

1.1 California Department of Fish and Wildlife Compliance

This document follows the format and contains the elements described in the USACE report *Mitigation and Monitoring Proposal Guidelines, December 30, 2004* (USACE 2004). Because this report also includes mitigation for non-Section 404 jurisdictional features and will utilize land at the Star Bend Conservation Area (SBCA), the document also complies with the California Department of Fish and Wildlife's (CDFW) own guidelines outlined in *Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands* (CDFW 2012). The policy statement contained within the CDFW's report states:

> *Mitigation for impacts to fish and wildlife resources may occur on publicly owned, Department owned, and conserved lands if it has been determined by the Department that: 1) the mitigation is consistent with requirements of the law under which the mitigation is being sought; 2) its relative value as mitigation is equal to or greater than it would be if the same mitigation were situated on non-public or non-conserved lands; 3) it results in a clear and quantifiable improvement or positive change above that currently present or reasonably expected to exist under current conditions on the site; 4) the future uses of the land, including encumbrances or easements, will not preclude or diminish the mitigation; 5) the mitigation will not preclude, diminish or interfere with the funding or purpose of acquisition, encumbrances, or management plan for the property; and 6) it will not result in a net loss of existing conservation values.*

1.1.1 CDFW Guidelines for Implementing Mitigation on Department Owned or Conserved Lands

The following guidelines are addressed throughout the MMP below. Items 1 through 4 have been fully addressed in this MMP. Item 5 is addressed in the project's incremental cost analysis. The Memorandum of Understanding described in item 6 below is still a work in progress and will be finalized before the MMP is complete.

1. Mitigation is consistent with the current and future uses of the land including any encumbrances, easements or public use values.
    a. To find information on encumbrances, easements or public use values the following documents should be checked:
        i. Management plan for the property
        ii. Any Conceptual Area Protection Plans (CAPP) or Land Acquisition Evaluations (LAE) written for the property
        iii. Easements can be found on the California Natural Resources Agency website and at the County Recorders office. The Lands Program should also be checked.
        iv. Title search – this should be performed by the entity proposing the mitigation
        v. Site visits should be performed
2. Mitigation is consistent with the purpose for which the land was acquired and the funding source used for acquisition.
3. Mitigation will not preclude, diminish or interfere with encumbrances, or the management plan for the property.
4. Mitigation maintains and or enhances the current ecological and public use values of the land.
    a. Entity proposing the mitigation needs to provide documentation of how placing the mitigation on the land is going to maintain or enhance the ecological and public use values of the land.
5. The full cost of the mitigation is accounted for (this includes but is not limited to all capital improvements, restoration, enhancement, monitoring, long term management and maintenance and reimbursement for any Department staff time including enforcement, on all lands).
6. A Memorandum of Understanding (MOU) is in place prior to the project sponsors undertaking the project. The MOU will be developed in cooperation with the land manager, reviewed for statewide consistency by the Department's Lands Program in the Wildlife Branch and signed by the District Assistant Chief and the Department Regional Manager, the land management agency or non-profit (if other than the Department), and the project sponsor. The MOU will define the mitigation purpose, permit requirements, agreement term, scope of work, schedule, management and/or maintenance requirements, monitoring, and responsibilities of the parties to the agreement.

1.2 Lead Agency

The Sutter Butte Flood Control Agency (SBFCA) is the lead agency and implementing agency and will construct the project. The USACE is preparing the Environmental Impact Statement (EIS) for the purposes of compliance with the National Environmental Policy Act (NEPA) due to its authority over alteration of Federal project levees. The USACE is also completing Section 7 Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) for the project. SBFCA is the applicant and party with financial responsibility for implementing the MMP and satisfying the success criteria.

The project proponent is:

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Chapter 2
Project Requiring Mitigation

2.1 Project Location

North to south, the project area is located in the 41-mile corridor along the west levee of the Feather River that begins at the Thermalito Afterbay and ends approximately 4 miles north of the Sutter Bypass (Figure 1). The project area consists of the project construction area plus a 100-foot-wide buffer zone. The project construction area was defined as the area in which levee improvements—such as seepage berms, stability berms, relief wells, and slurry cutoff walls—are likely to be constructed. All direct and indirect effects would occur within the project area.

The project area corridor is divided into 41 relatively homogeneous reaches for ease of describing existing conditions, project components, land cover types, and potential effects (note that this number is coincidental and one reach does not correspond to a length of 1 mile; additionally, Reach 1 is not part of the Feather River West Levee Project [FRWLP]) (Figures 2-1 to 2-28). The levee stations, lengths, landmarks, and dominant land uses for the reaches are listed in Table 2-1.

The project area also includes five potential borrow sites that could supply the borrow material necessary for levee construction and upgrades, and access routes from the project construction area to the borrow sites. It is not anticipated that all five sites would be used over the phased, multi-year construction period, but until additional geotechnical and soil samplings are completed, all sites would be available for use and are included in the project area (Figure 1).

Table 2-1. Summary of Reaches in the Project Area

Reach	Beginning Station	Ending Station	Length (feet)	Landmark(s)	Dominant Land Uses
1	0+00	202+50	Not part of the project at this time.		
2	202+50	218+66	1,616		Ruderal grassland; open space
3	218+66	300+66	8,200	Cypress Avenue	Ruderal grassland; open space
4	300+66	410+67	11,001	Central Street; Wilkie Avenue	Orchard; ruderal grassland; riparian forest
5	410+67	478+68	6,801	Wilkie Avenue	Orchard
6	478+68	510+37	3,169	Star Bend	Orchard
7	510+37	596+00	8,563	Abbott Lake	Ruderal grassland; open space
8	596+00	654+75	5,875		Ruderal grassland; open space
9	654+75	706+50	5,175	Boyd's Boat Launch; Nursery	Ruderal grassland; open space
10	706+50	774+00	6,750	Barry Road	Ruderal grassland; open space
11	774+00	830+00	5,600		Ruderal grassland; open space
12	830+00	845+00	1,500	Shanghai Bend	Ruderal grassland; open space
13	845+00	927+00	8,200		Ruderal grassland; open space
14	927+00	954+40	2,740	Airport	Ruderal grassland; open space
15	954+40	968+50	1,410	Airport	Developed; ruderal grassland
16	968+50	1080+00	11,150	Garden Highway, 2nd Street; Twin Cities Memorial Bridge; Colusa Avenue	Developed; ruderal grassland
17	1080+00	1130+86	5,086	Live Oak Boulevard; Union Pacific Railroad	Developed; ruderal grassland
18	1130+86	1213+85	8,299	Live Oak Boulevard; Union Pacific Railroad; Rednall Road	Orchard
19	1213+85	1297+83	8,398		Orchard
20	1297+83	1374+33	7,650		Orchard; ruderal grassland
21	1374+33	1433+83	5,950		Ruderal grassland
22	1433+83	1503+83	7,000		Riparian forest; ruderal grassland
23	1503+83	1609+37	10,554		Orchard
24	1609+37	1623+86	1,449		Riparian forest; ruderal grassland
25	1623+86	1674+37	5,051		Orchard; ruderal grassland
26	1674+37	1707+11	3,274		Orchard
27	1707+11	1721+60	1,449		Ruderal grassland
28	1721+60	1769+31	4,771		Orchard
29	1769+31	1813+33	4,402		Orchard; riparian forest
30	1813+33	1902+00	8,867		Orchard
31	1902+00	1958+00	5,600		Orchard; ruderal grassland
32	1958+00	1989+00	3,100		Orchard
33	1989+00	2122+00	13,300		Orchard
34	2122+00	2182+00	6,000		Orchard
35	2182+00	2224+00	4,200		Orchard; ruderal grassland
36	2224+00	2259+00	3,500		Orchard; ruderal grassland
37	2259+00	2290+00	3,100		Orchard; ruderal grassland
38	2290+00	2303+00	1,300		Ruderal grassland
39	2303+00	2319+00	1,600		Ruderal grassland
40	2319+00	2359+00	4,000		Ruderal grassland
41	2359+00	2368+00	900	Thermalito Afterbay	Ruderal grassland

Note: Certain planning and engineering studies for the project make reference to segments within the planning area under which the reaches above are grouped. These segment designations do not have substantial bearing on the alternatives descriptions, environmental setting, or determination of effects and thus for simplicity are not used in this document.

2.2 Summary of Overall Project

SBFCA proposed the project to reduce flood risk in the Sutter Basin, which includes portions of Sutter and Butte Counties in the Sacramento Valley of California. SBFCA was formed as a joint powers authority in 2007 through a joint exercise of powers agreement by the Counties of Sutter and Butte; the Cities of Yuba City, Gridley, Live Oak, and Biggs; and Levee Districts 1 and 9 (LD 1, LD 9).

In partnership with the State of California (through the California Department of Water Resources [DWR] and Central Valley Flood Protection Board [CVFPB]), SBFCA embarked on a comprehensive evaluation of the condition of the levees protecting the area in 2007, the results of which are also being used by the USACE. The evaluation was necessary to identify the magnitude and severity of deficiencies and determine measures to address the deficiencies. The results of the comprehensive evaluation revealed that substantial construction is necessary to meet current flood protection standards.

The USACE is conducting a feasibility study (the Sutter Basin Pilot Feasibility Study or Sutter Basin Feasibility Study). The FRWLP is being advanced by SBFCA to expeditiously reduce flood risk before the feasibility study is completed. USACE plans to release for public review a draft integrated study report and supplemental environmental impact statement (EIS)/environmental impact report (EIR) in April 2013. Because the FRWLP and the USACE study may affect the same general area, have similar purposes, and share potential measures and effects, the EIS/EIR prepared for the feasibility study is expected to incorporate by reference much of the information, analyses, and conclusions contained within this document. The EIS/EIR would supplement this EIS/EIR focusing on additional alternatives, their effects, or new information not addressed in this document.

To construct the FRWLP, SBFCA is requesting permission from USACE pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the U.S. Government Code [USC], Section 408, [33 USC 408]), hereinafter referred to as *Section 408*, for the alteration of a levee as part of the Sacramento River Flood Control Project (SRFCP), a Federal work.

2.2.1 Project Purpose

SBFCA's goal is to achieve a minimum of 200-year flood protection for the more urbanized areas with population centers (as mandated by SB 5) and 100-year for the remaining more rural, agricultural parts of the planning area. A 200-year flood is a flood that has a 0.5% chance of occurring in any given year, also referred to as a 0.5% annual exceedance probability (AEP). A 100-year flood has a 1% AEP. The target of 100-year protection for the more rural, agriculture parts of the planning area, specifically the southern portion of the basin downstream of Yuba City, is driven by the goal to maintain viability and sustainability of agriculture by avoiding Federal Emergency Management Agency (FEMA) restrictions that would hinder construction or upgrade of agricultural infrastructure (such as farm residences, barns, silos, dryers, seasonal worker housing) and supporting business.

The primary purpose of the FRWLP is to reduce flood risk for the entire planning area by addressing known levee deficiencies along the Feather River West Levee from Thermalito Afterbay downstream to approximately 4 miles upstream of the confluence with the Sutter Bypass. While the FRWLP would not by itself reduce all flood risks affecting the planning area, it would address the most immediate risk based on the following.

- The proximity of the Feather River to population centers and key infrastructure.
- The nature of Feather River West Levee being the longest and most contiguous portion of the planning area perimeter.
- The location of known levee deficiencies and the clarity and feasibility of available measures to address them.

Future phases may be implemented by SBFCA in coordination with the State of California and USACE based on available funding, the outcome of the Sutter Basin Feasibility Study, and implementation of the Central Valley Flood Protection Plan (CVFPP) and other flood management programs (or multi-objective programs that include flood management).

2.2.2 Project Objectives

The following objectives provide additional detail in support of the project purpose above.

- Protect existing populations and minimize exposure to flooding for agricultural commodities, infrastructure use, and other property.
- Reduce flood risk from Feather River toward a target of 200-year protection for Yuba City and to the north of the planning area and 100-year protection south of Yuba City, in compliance with Senate Bill (SB) 5 mandates for 200-year protection for urbanized areas.
- Address known deficiencies and observed performance issues.
- Construct a project as soon as possible to reduce flood risk as quickly as possible.
- Construct a project that is economically, environmentally, politically, and socially acceptable.
- Facilitate compatibility with the CVFPP and Sutter Basin Feasibility Study such that proposed activities would be “no regrets” and not inconsistent with any future plans.
- Facilitate compatibility with recreation and restoration goals in the planning area.

This MMP is being prepared because the project will have unavoidable effects on Section 404 jurisdictional features and special-status species habitat for which compensatory mitigation is required.

- Project implementation would result in permanent loss of vegetation and wetlands. Compensation for vegetation and wetlands losses with a no-net-loss goal will mitigate those effects.
- Construction of the project would result in the injury, mortality, or disturbance of special-status and common species during construction, which could affect local populations. Implementation of mitigation measures would minimize or avoid these effects and reduce them to a less-than-significant level.
- The project would have no effect on SRA cover and critical habitat; however, there may be effects on Federal Endangered Species Act (ESA)-listed fish species due to loss of floodplain riparian vegetation. Vegetation loss would be minimized and all activities would occur above the ordinary high water mark on the waterside levee slopes and toe. Thus, the project is not expected to contribute to significant effects on fish and aquatic resources.

2.2.3 Project Schedule

Specific sequencing of construction would be dynamic throughout planning and design of the FRWLP, subject to change based on factors including the following.

- Further engineering in determining the clarity and efficacy of site-specific measures.
- Easement and right-of-way acquisition (where necessary).
- Availability of proximate, suitable, and cost-effective borrow material.
- Environmental clearances based on wildlife presence, lifecycle activity, and location of habitats.

Based on current planning analysis for the FRWLP, construction would occur over the course of multiple construction seasons (typically April 15 to November 30, subject to conditions) and would proceed as noted below.

As discussed above, it is anticipated the construction of the FRWLP would be divided into four separate construction contracts (i.e., A, B, C, and D). Although subject to change, the most current information for the four contracts and their respective areas is provided in Table 2-2.

Table 2-2. Construction Contracts, FRWLP Reaches, and Years for Construction

Construction Contract	FRWLP Reaches	Years
A	2–5	2016–2017
B	6–12	2014–2015
C	13–25	2013–2014
D	26–41	2014–2015

It should be noted that 2015 is the presently anticipated year for completion and is consistently used throughout the analysis as presenting the conditions that would result in the greatest severity effect magnitude and disclosure of maximum effects (e.g., for air quality, 2015 represents the most conservative basis for analysis because it is the most aggressive feasible schedule in determining daily and annual emissions). The one exception is that 2017 is used for the consultations with USFWS and NMFS because the longer construction duration represents maximum effects based on habitat disturbance.

Construction is anticipated to occur in single 10-hour shifts, 6 days per week. An exception to this schedule is slurry cutoff wall construction, which is anticipated to occur in two 10-hour shifts (essentially 24-hour construction), 6 days per week. While actual construction would not occur between the two 10-hour shifts, equipment maintenance and preparations for the upcoming work shift would occur. Maintenance work is also anticipated on Sundays.

Contract A begins at Levee Station 202+50 near the intersection of the Feather River West Levee and Laurel Road. It continues north to the beginning of the improvements constructed as part of the Star Bend Setback Levee Project, Levee Station 478+68. The total length of the levee in this portion of the FRWLP is 27,618 linear feet. Contract B begins at Levee Station 478+66, the end of the improvements constructed as part of the Star Bend Setback Levee Project, and continues north to Levee Station 832+30. The total length of the levee in this portion of the FRWLP is 31,963 linear feet. Contract C begins at Levee Station 845+00, near the north end of the Shanghai Bend Setback Levee, and continues north to Levee Station 1674+37. The total length of the levee in this portion of the

FRWLP is 77,886 linear feet. Contract D begins at Levee Station 1674+37 and continues north to Levee Station 2368+00. The total length of the levee in this portion of the FRWLP is 69,363 linear feet.

Reach 1 is not currently part of the FRWLP.

2.2.4 Project Description

Table 2-3 identifies the construction activities that would occur with each reach. For Reaches 2–11, a cutoff wall ranging between 10–25 feet deep would be constructed along the centerline of the levee. The overall height of the levee would be degraded by approximately 50%. In addition to the cutoff wall, two seepage berms would be constructed. One seepage berm would be 100 feet wide and 1,616 feet long, and the other would be 200 feet wide and 2,268 feet long.

Fifty-foot-deep relief wells would be installed 60 feet apart in Reach 7.

For Reaches 13–24, a cutoff wall ranging between 21 and 105 feet in depth would be constructed along the centerline of the levee. The overall height of the levee would be degraded by approximately 50%, with approximately 2,600 feet of the levee being fully degraded.

At Reach 17, a seepage berm beneath the State Route (SR) 20 crossing would be constructed in addition to the description of the flood management measures for the remainder of the reach. The seepage berm would be 7 feet tall and approximately 50 feet wide. It would extend through the existing abandoned railroad tunnel at the levee landside toe.

For Reaches 26–38, a cutoff wall ranging between 10 and 90 feet in depth would be constructed along the centerline of the levee. The overall height of the levee would be degraded approximately 50%. In Reach 38, an 11-foot-high seepage berm would be constructed. The new levee would be constructed using the tailings materials located along the landside of the existing levee.

In Reach 41, a 100-foot-wide drained seepage berm would be constructed. The seepage berm would include a 1-foot thick filter drain along the bottom. The filter drain would provide drainage for seepage through the levee. The existing concrete outfall structure located at the south end of this reach would remain in place and would be backfilled with earth materials. A 30-foot-wide construction access area would be provided at the toe of the seepage berm.

As a special site-specific treatment for the project, a through-seepage barrier would be constructed at four locations where the levee is crossed by a roadway or railroad: the 5th Street Bridge at Station 1007+00 (Reach 16), SR 20 Bridge at Station 1131+00 (Reach 18), East Gridley Road at Station 1902+00 (transition between Reaches 30 and 31), and the Union Pacific Railroad (UPRR) crossing at station 1131+00 (Reach 18). The barrier would be constructed as a cutoff wall through deep soil mixing (DSM), jet grouting, a sheet-pile wall, or a combination thereof.

Materials imported to the construction site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,500,000 cubic yards of embankment fill material for the new levee surfaces from offsite commercial borrow sites or local landowners willing to sell borrow material. For backfill of new pipelines crossing the levee, controlled low strength material (CLSM) (otherwise known as lightweight concrete) would be placed to the pipeline's spring line.

Major activities associated with the project are described below.

Encroachments

Existing facilities found within the footprint of an alternative may require removal and replacement nearby, abandonment, or relocation. Encroachments are numerous (over 400 identified) along the Feather River West Levee and may need to be addressed if they present a threat to the stability of the levee, do not currently comply with the levee encroachment criteria, or would be disrupted or otherwise impacted by construction activities. Typical encroachments include pressure pipelines (water supply pipelines from waterside pump stations and drainage pipelines from landside drainage pump stations), gravity drainage pipes, gas lines, telephone utilities, overhead utilities, structural encroachments, and other types and variations. Debris from structure and embankment fill material of poor quality would be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Vegetation Removal

Bulldozers would be used to remove woody and herbaceous vegetation from the direct construction footprint and the minimum areas needed for project staging and access routes. Vegetation removal to meet project objectives would be consistent with the CVFPP guidance for levee repair or improvement activities. Any vegetation removed as part of direct construction activities would not be replaced at that location and would require offsite, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

In accordance with the State of California's Urban Levee Design Criteria, at a minimum, all roots larger than 1.5 inches in diameter that are within 3 feet of the perimeter of the tree trunk would be removed. Immature trees less than 4 inches in diameter at breast height (DBH) that would be removed may be cut off at or below ground level, generally without root removal. More extensive root removal may be required, depending upon the location, size, and type of tree; the quantity, orientation, and size of the roots; the dimensions of the levee (or floodwall); the composition of the levee and foundation; and the levee features that address seepage and underseepage. Less extensive root removal may be justified where roots from adjacent trees would be unduly damaged. Any excavation resulting from the above actions would be backfilled with engineered fill using appropriate placement, moisture conditioning, and compaction methods. Additional measures for removing non-compliant vegetation are listed below.

- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Debris from vegetation removal would be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Table 2-3. FRWLP Action Alternatives by Reach

Contract	Reach	Length (feet)	project Flood Management Measure
A	2	1,616	202+50 to 218+66, cutoff wall extending to an elevation of 25' with 100'-wide undrained seepage berm. Seepage berm 5' thick at berm toe.
A	3	8,200	218+66 to 230+00 cutoff wall extending to an elevation of 25' with 100'-wide undrained seepage berm. Seepage berm 5' thick at berm toe. 230+00 to 250+00 cutoff wall tip elevation (-)35'. 250+00 to 289+00 cutoff wall tip elevation (-)20'. 289+00 to 300+66 cutoff wall tip elevation (-)12'.
A	4	11,001	300+66 to 312+00 cutoff wall tip elevation 15'. 312+00 to 349+00 cutoff wall tip elevation 15'. 349+00 to 368+00 cutoff wall tip elevation 10'. 368+00 to 410+67 cutoff wall tip elevation 20'.
A	5	6,801	410+67 to 417+00, cutoff wall tip elevation 20'. 417+00 to 425+00, cutoff wall tip elevation 10'. 425+00 to 456+00, cutoff wall tip elevation 15'. 456+00 to 475+35, cutoff wall tip elevation 15' with 300' wide undrained seepage berm. Seepage berm 5' thick at berm toe. 475+35 to 478+68 no flood management required.
B	6	3,169	510+00 to 510+50, potential pipe crossing work to install positive closure device and correct pipe size.
B	7	8,563	510+37 to 514+37, no flood management required. 514+00 to 526+00, cutoff wall tip elevation 15'. 526+00 to 570+00, cutoff wall tip elevation (-)5'. 545+00 to 570+00, relief wells with 60' spacing and 50' depth over one half of the length, distributed at various locations over this stretch of levee. 570+00 to 575+00, cutoff wall tip elevation 5'. 575+00 to 595+00, cutoff wall tip elevation (-)10'. 595+00 to 596+00, cutoff wall tip elevation 15'.
B	8	5,875	596+00 to 654+75, cutoff wall tip elevation 15'.
B	9	5,175	654+75 to 670+00, cutoff wall tip elevation 15'. 670+00 to 697+00, cutoff wall tip elevation 20'. 697+00 to 706+50: cutoff wall tip elevation 10'.
B	10	6,750	706+50 to 726+00, cutoff wall tip elevation (-)10'. 726+00 to 746+00, cutoff wall tip elevation (-)5'. 746+00 to 754+50, cutoff wall tip elevation 5'. 754+50 to 774+00, cutoff wall tip elevation 25'
B	11	5,600	774+00 to 784+50, cutoff wall tip elevation 25'. 784+50 to 827+50, cutoff wall tip elevation 5'. 827+50 to 830+00, cutoff wall tip elevation 25'
B	12	1,500	832+30, relocate two 24-inch sewer pipes.
C	13	8,200	844+50 to 923+75: cutoff wall tip elevation (-)38'. Full levee degrade from 844+50 to 897+50.
C	14	2,740	952+00 investigation of 12 kV cable to determine if it meets Title 23 requirements.
C	15	1,410	No flood management measures required.
C	16	11,150	Closure of gap in cutoff wall at 5th Street bridge crossing around Station 1007+00, cutoff wall tip elevation 40'. Closure of gap in cutoff wall at 10th Street bridge crossing around Station 1026+00, by using a seepage berm within the abandoned railroad tunnel. 1077+85 to 1080+00, cutoff wall tip elevation 30' and backfill landside toe depression. Miscellaneous landside encroachment relocations/removals.

Contract	Reach	Length (feet)	project Flood Management Measure
C	17	5,086	1080+00 to 1089+00, cutoff wall tip elevation 30' and backfill landside toe depression. 1089+00 to 1125+00, cutoff wall tip elevation 35' and backfill landside toe depression. 1125+00 to 1130+86, cutoff wall tip elevation 0'.
C	18	8,299	1130+86 to 1151+50, cutoff wall tip elevation 0'. 1151+50 to 1159+50: cutoff wall tip elevation 30'. 1159+50 to 1169+50: cutoff wall tip elevation 25'. 1169+50 to 1189+50: cutoff wall tip elevation 30'. 1189+50 to 1209+50: cutoff wall tip elevation 40'. 1209+50 to 1213+85: cutoff wall tip elevation 35'.
C	19	8,398	1213+85 to 1219+75, cutoff wall tip elevation 35'. 1219+75 to 1224+00, cutoff wall tip elevation 5'. 1224+00 to 1238+00, cutoff wall tip elevation (-)28'. 1238+00 to 1248+00, cutoff wall tip elevation (-)42'. 1248+00 to 1268+75, cutoff wall tip elevation 3'. 1268+75 to 1297+83, cutoff wall tip elevation 35'.
C	20	7,650	1297+83 to 1298+75, cutoff wall tip elevation 35'. 1298+75 to 1359+00, cutoff wall tip elevation 50'. 1359+00 to 1369+00: cutoff wall tip elevation 40'. 1369+00 to 1374+33: cutoff wall tip elevation 32'.
C	21	5,950	1374+33 to 1386+00 cutoff wall tip elevation 32'. 1386+00 to 1408+00: cutoff wall tip elevation 55'. 1408+00 to 1433+00: cutoff wall tip elevation 40'.
C	22	7,000	1433+83 to 1448+75, cutoff wall tip elevation 40'. 1448+75 to 1468+83, cutoff wall tip elevation 50'. 1455+00 to 1461+00, full levee degrade and reconstruction. 1468+83 to 1503+83, cutoff wall tip elevation 55'.
C	23	10,554	1503+83 to 1508+50, cutoff wall tip elevation 55'. 1508+50 to 1528+75, cutoff wall tip elevation 60'. 1528+75 to 1566+50, cutoff wall tip elevation 55'. 1566+50 to 1608+75, cutoff wall tip elevation 60'.
C	24	1,449	1608+75 to 1623+86, cutoff wall tip elevation 28'
C	25	5,051	1623+86 to 1625+00, cutoff wall tip elevation 28'.
D	26	3,274	1639+00, replace two 24-inch steel storm drain pipes. 1673+00 to 1674+37, cutoff wall tip elevation 65'. 1674+37 to 1707+11, cutoff wall tip elevation 65'. Reconstruction of landside slope extends down to elevation of bottom of canal.
D	27	1,449	1707+11 to 1721+60: cutoff wall tip elevation +65'; reconstruction of landside slope extends down to elevation of bottom of canal.
D	28	4,771	1721+60 to 1727+75, cutoff wall tip elevation 65'. 1727+75 to 1748+50, cutoff wall tip elevation 70'. 1748+50 to 1769+31, cutoff wall tip elevation 45'. Reconstruction of landside slope extends down to elevation of bottom of canal.
D	29	4,402	1770+00, 1785+24, 1785+55, 1792+96, 1799+44, 1809+65, storm drain and irrigation pipe replacements.

Contract	Reach	Length (feet)	project Flood Management Measure
D	30	8,867	1813+33 to 1816+50, cutoff wall tip elevation 80', with full levee degrade and reconstruction. 1816+50 to 1848+25, cutoff wall tip elevation 30'. 1848+25 to 1866+00, cutoff wall tip elevation 70'. 1866+00 to 1877+75, cutoff wall tip elevation 47'. 1877+75 to 1883+00, cutoff wall tip elevation 40'. 1883+00 to 1902+00, cutoff wall tip elevation 27'.
D	31	5,600	1902+00 to 1907+50, cutoff wall tip elevation 27'. 1907+50 to 1917+50, cutoff wall tip elevation 44'. 1907+92 to 1909+42, waterside slope flattening or other remedial measure. 1917+50 to 1927+50, cutoff wall tip elevation 75'. 1927+50 to 1937+00, cutoff wall tip elevation 50'. 1937+00 to 1958+00, cutoff wall tip elevation 40'.
D	32	3,100	1958+00 to 1971+80, cutoff wall tip elevation 40'. 1971+80 to 1987+25, cutoff wall tip elevation 48'. 1987+25 to 1989+00, cutoff wall tip elevation 10'.
D	33	13,300	1989+00 to 2002+00, cutoff wall tip elevation 10'. 2002+00 to 2016+75, cutoff wall tip elevation 90'. 2016+75 to 2036+75, cutoff wall tip elevation 20'. 2036+75 to 2041+00, cutoff wall tip elevation 53'. 2041+00 to 2067+00, cutoff wall tip elevation 38'. 2067+00 to 2088+00, cutoff wall tip elevation 33'. 2088+00 to 2122+00, cutoff wall tip elevation 90'.
D	34	6,000	2122+00 to 2137+00, cutoff wall tip elevation 90'. 2137+00 to 2148+00, cutoff wall tip elevation 20'. 2148+00 to 2164+00, cutoff wall tip elevation 90'. 2164+00 to 2182+00, cutoff wall tip elevation 50'.
D	35	4,200	2182+00 to 2196+50, cutoff wall tip elevation 40'. 2196+50 to 2212+00, cutoff wall tip elevation 45'. 2212+00 to 2218+25, cutoff wall tip elevation 50'. 2218+25 to 2224+00, cutoff wall tip elevation 55'.
D	36	3,500	2224+00 to 2233+50, cutoff wall tip elevation 55'. 2233+50 to 2245+75, cutoff wall tip elevation 70'. 2245+75 to 2259+00, cutoff wall tip elevation 42'.
D	37	3,100	2259+00 to 2277+00, cutoff wall tip elevation 42'. 2277+00 to 2290+00, cutoff wall tip elevation 45'.
D	38	1,300	2290+00 to 2292+00 cutoff wall to elevation +45'. 2290+00 to 2303+00 construct 11' high seepage berm, 50' wide at the top and 170' wide from levee centerline.
D	39	1,600	2312+10, remove 24" storm drain pipe.
D	40	4,000	2331+00 to 2335+00, construct 120'-wide seepage berm. 2335+00 to 2359+00, 100'-wide seepage berm. Berms are 9' thick at the levee toe and 3' thick at the berm toe.
D	41	900	2359+00 to 2368+00, construct 100'-wide seepage berm with 1'-thick drain layer.

kV=kilovolt.

Construction Staging, Access, and Temporary Facilities

Staging areas would only be provided for the contractor within the project right-of-way and easement limits. The contractor would be responsible for obtaining all required local, state, and Federal permits for any staging areas outside of these limits. Staging areas would be used for equipment staging, storage of equipment and materials, mobile project offices, construction staff parking, etc.

To facilitate project construction, temporary earthen ramps would be constructed for equipment access between the levee crown and the staging area(s). The earthen ramps would be removed when construction is complete.

Cutoff wall construction requires temporary establishment of an onsite slurry batch plant that would occupy approximately 1–2 acres. Batch plants would be located at approximately 1-mile intervals within the project footprint. The batch plant site would likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. The site would also accommodate slurry tanks to store the blended slurries temporarily until they are pumped to the work sites. Slurry ingredients would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work sites. The batch plant would produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethylene pipes, would be laid on the ground and would extend to all work sites. An additional pipe may be used to supply water to the work sites.

Staging areas, access routes, and other temporary construction areas would be located away from wetlands, riparian habitat, oak woodlands, special-status wildlife habitat, known cultural resources, or other sensitive areas and would be limited to disturbed or ruderal grasslands subject to review by USACE and Federal and state resource agencies.

Material Importation, Reuse, and Borrow

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, and embankment fill soil. Each alternative would require the use of large quantities of fill soil, or borrow. To meet borrow demands, embankment fill material excavated as part of construction would be evaluated for reuse. Embankment fill material deemed suitable would be used as part of levee reconstruction and berms.

Borrow Volume

The total volume of material required is 1,500,000 cubic yards. The quantities were calculated assuming a 20% shrinkage factor between excavation at the borrow site and placement at the levee. Only material suitable for placement in levee construction may be borrowed (HDR et al. 2012). These materials are identified as low to medium plasticity soils classified in accordance with American Society for Testing and Materials D 2487 as silty sand (SM) and clayey sand (SC), silt (ML), or clay (lean clay [CL] or fat clay [CH]). The materials should have a Liquid Limit (LL) less than or equal to 45 (may be extended up to 55 with justification and approval from the USACE and the CVFPB), a Plasticity Index (PI) greater than or equal to 12 and less than 40, and a fines content

greater than or equal to 30%. The material should be free from visible organics and be no greater than 2 inches in any dimension.

Borrow Site Selection Factors

SBFCA's first choice for fill or borrow material would be from a local commercial quarry or other permitted source. In the event that material is desired from a source that is not presently permitted, for reasons such as quality, proximity, or volume available, SBFCA would implement soil supply protection measures. One such measure would be maximizing on-site use through gradation, placement, and treatment. Another measure would be the preservation and replacements of topsoil at borrow sites, so that they could be continued to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 12 inches of topsoil would be set aside and replaced after project construction in each construction season. After the project is completed, the borrow site would be re-contoured and reclaimed. An additional measure would be independent environmental documentation and regulatory compliance, as required.

Factors determining borrow sources and sites are (followed by a description of each factor and discussion of potential borrow sources).

- Hauling distance and haul route
- Depth to groundwater
- Royalty fees
- Post-construction land use
- Environmental factors

Hauling Distance and Routes. The cost for borrow site excavation and hauling is directly related to the distance required to haul the material and the route by which the materials must be transported. To the extent possible, sites should be selected that minimize haul route length and the use of public roadways (Wood Rodgers 2011).

Depth to Groundwater. Because the top layer of a borrow site must be removed and stockpiled to exclude organics from the borrow material, it is economical to maximize the depth of the excavation. This maximum depth is typically governed by the normal seasonal depth of groundwater. Once excavation extends to within a few feet of the groundwater table, additional expense is incurred to implement dewatering at the site. Groundwater elevations generally fluctuate throughout the year and can be influenced by standing water or irrigation activities on adjacent lands. Typically, groundwater depths are higher at the beginning of spring, and become deeper toward the end of summer (Wood Rodgers 2011).

Royalty Fees. Royalty fees for material excavated directly affect the cost of the borrow and also typically trigger more substantial permitting requirements. It is desirable to find a property owner who wishes to have excavation carried out for his own purposes, such as creating a detention basin to support future development, so that royalty fees and a SMARA permit are avoided (Wood Rodgers 2011).

Post-Construction Land Use. The post-construction use of the property can also effect the depth of excavation. Borrow sites must be free draining after the material is excavated, and therefore cannot be extended deeper than the offsite drainage facilities can accommodate (Wood Rodgers 2011).

Environmental Factors. Environmental factors, including the need for mitigation for special-status species and wetlands encroachments, are also a factor in selecting borrow sites. Consideration should also be given to haul routes when evaluating environmental effects. Routes which could be unavailable during the early months of the construction season due to the presence of nesting raptors should be avoided (Wood Rodgers 2011). If waterside borrow sites outside the construction footprint are needed, only sites that do not impact woody vegetation associated with fish-inhabited waters should be considered. All sites will be surveyed for potential wildlife habitat, jurisdictional waters, cultural resources, and other environmental regulatory triggers prior to use, and environmental documentation and permits will be secured independently or supplemental to the FRWLP documentation and permits.

Borrow Sources and Proposed Borrow Sites

SBFCA has explored the option of purchasing fill or borrow material from a local commercial quarry or other permitted source; however, there are not currently any sites near the project area that would supply the volume and type of material required. Consequently, SFBCA plans to purchase fill from local landowners willing to sell borrow material.

Five borrow sites have been identified in the project area. Each site was investigated to determine the quantity of available material, hauling distance, material composition, groundwater elevation, and prospects for acquisition. The purpose of the investigation was to identify the sites with the greatest potential to economically provide material for the FRWLP. Economical hauling has been determined to be within a 2-miles radius and marginally economic hauling within a 10-mile radius. As a result of the borrow analysis, sufficient fill volume is present within an approximate 10-mile, one-way haul distance from the area of construction.

SBFCA would maximize the potential borrow sites' use through gradation, placement, and treatment so that they could continue to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 4–6 inches of topsoil would be set aside and replaced after construction in each construction season. After the FRWLP is completed, the borrow site would be re-contoured and reclaimed.

Through outreach efforts, SBFCA identified a number of sites owned by individuals or government agencies willing to sell their property or provide material on a cubic yard basis. Figure 1 shows the locations of the five potential borrow sites identified and the proposed haul routes to the construction area.

North Valley Property

The North Valley property is owned by North Valley Properties, LLC and is located south of Ella Road between Feather River Boulevard and Arboga Road. The Wheeler Ranch housing development is proposed at the site. Borrow for the FRWLP would be taken from the northeast corner of the property to create a 24.5 acre detention pond (referred to as referred to as the Drainage Basin C Regional Detention Pond but commonly referred to as the South Ella Detention Pond). The Ella Basin is being constructed as part of Reclamation District No. 784's Master Drainage Plan. Historically, the site was cultivated for agricultural purposes. Currently, the site is disked ruderal grassland with some roads cut in the southern portion of the property for the Wheeler Ranch development. The material at this site is anticipated to be CL from a depth of 18–22 feet, followed by silt-sand material below a depth of 22–25 feet. The depth of excavation is anticipated to be 15–20 feet and the yield of material from this site could be 400,000–500,000 cubic yards. Borrow

material from this site would be used for work in Reach 13 of Contract C (60–70,000 cubic yards needed), Contract B, and the remainder of Contract C. If borrow material is remaining, it may also be used for Contract D.

The haul route to the northern portion of Contract C from the North Valley Property would be west on Ella Avenue to north on Feather River Boulevard to north on SR70 to west on SR20/Colusa Avenue to north on Live Oak Boulevard to north on SR99 to east on Paseo Avenue. Additional access route to the levee along northbound SR99 would be north on Kent Avenue to east on Koch Lane. Additional access routes to the levee along northbound Live Oak Boulevard would be east on Morse Road, east on Rednall Road and east on Market Street to east on Lynn Way. Additional access routes to the levee along westerly SR20/Colusa Avenue would be North on Sutter Street/Market Street to east on Lynn Way.

The haul route to the southern portion of Contract C (and Reach 13) from the North Valley Property would be west on Ella Avenue to north on Feather River Boulevard to north on SR70 to west on SR20/Colusa Avenue to south on Sutter Street to south on 2nd Street to levee access. Additional access route to the levee along westerly SR20/Colusa Avenue would be south on SR99 to east on Bogue Road to south on Garden Highway to east on Shanghai Bend Road.

The post-project land use of the site would be a regional detention pond for Reclamation District No. 784.

Marler Property

The Marler property is a 10-acre property at Johnson Road near Messick Road north of Star Bend and south of Shanghai Bend. The site is currently an orchard. The depth of excavation could be upwards of 6 feet. The yield of material from this site could be up to 75,000 cubic yards. The likely haul route would be Johnson Road to Messick Road to the Garden Highway, accessing the levee near Oswald Road. The post-project land use for the property would be agricultural production, likely row crops or orchard.

Lanza Property

The Lanza property is 40 acres in size and is currently farmed in field/row crops. It is located at North Township Road and Pease Road south of Live Oak and north of Yuba City. The site has not yet been investigated to determine the types of materials present. Excavation of the site to a depth of 6 feet may occur. The yield of material from this site could be up to 200,000 cubic yards. The likely haul route would be along Pease Road directly east to the levee. The post-project land use for the property would be rice production.

City of Live Oak Detention Basin

The City of Live Oak owns the property formerly known as the Caltrans Detention Basin Site located west of SR 99 and south of Paseo Avenue. The site is currently fallow. The City of Live Oak intends to construct soccer fields and a stormwater detention basin at the site in 2013 or later. Although the site would require hauling for a short distance through a residential neighborhood, it is anticipated the residents would be amenable to the hauling as it would be a part of the public amenity constructed by the City of Live Oak. The material at this site is anticipated to be CL from a depth of 1–2.5 feet, followed by more sandy material to a depth of 6 feet. This site is approximately 25 acres, and the depth of excavation is anticipated to be 3–6 feet. The yield of material from this site could be

up to 125,000 cubic yards, and would likely be used for Contract C. The haul route to the northern portion of Contract C from the City of Live Oak Detention Basin would be west crossing the canal to north to Treatment Plant Access road and west on Treatment Plant Access Road to north on Farm Access Road to north on Richards Avenue to east on Pennington Road. Additional access routes to the levee from eastbound on Pennington Road are south on SR99 to east on Paseo Avenue and north on Metteer Road to east on Riviera Road. Additional routes to the levee along northerly Metteer Road would be east on Campbell Road and east on Cooley Road.

The City of Live Oak (Scmidt, pers. comm.) reports that land at this location has historically been cultivated for agricultural purposes and that there was no evidence of any wetland or other sensitive plant or wildlife areas remaining onsite. A preliminary wetland delineation of the area conducted by HDR Engineering in December 2012 did not identify any wetland features. The previous agricultural use has displaced native species of plants and animals except those varieties capable of co-existing with humans in urban settings. The post-project use of the site would be a community park and stormwater detention basin facility.

Oroville Wildlife Area Dredge Tailings Area

This site is within the Oroville Wildlife Area and consists of several mounds of dredge tailings on the waterside of the existing levee. The material is suitable for use in seepage berms at Reaches 40 and 41 and an adjacent levee at Reach 38. The availability of tailings in the area should be sufficient to meet the total deficit for berm material in these reaches. The excavation of the material would be coordinated to maximize hydraulic benefits from the reshaping of the overbank area. The site also represents an opportunity to provide waterside habitat enhancements. The useful area of this site could be approximately 75 acres and the depth of excavation could be upwards of 10 feet. The yield of material from this site could be up to 375,000 cubic yards. Hauling from this site would not take place on public roads. It is anticipated the contractor would use an existing waterside levee ramp (or create one), directly accessing the levee patrol road. The future land use for this site would be similar to its present day use (managed habitat area).

Post-Construction Operations and Maintenance

After construction completion, the levee and staging areas and levee slopes would be hydroseeded for erosion protection, dust abatement, and to prevent colonization of exotic vegetation.

In accordance with Federal Flood Control Regulations (33 CFR 208.10) and State requirements (California Water Code Section 8370), each year the Federal flood control facilities are inspected four times, at intervals not exceeding 90 days. DWR would inspect the system twice per year, and the local maintaining authorities would inspect it twice per year and immediately following major high water events. The findings of these inspections would be reported to the CVFPB's Chief Engineer through DWR's Flood Project Integrity and Inspection Branch.

Permanent facilities associated with relief wells include the wells themselves and surface drainage trenches to control the discharge. Inspection of the relief wells is required at least annually, and observation of flow from the wells is required during high river stages. The wells are test-pumped periodically. The collection ditch is maintained to allow free flow of water.

Because operations and maintenance activities are conducted by DWR and local flood protection districts, the effects of these activities are not part of the proposed project and are not discussed further in this MMP.

2.2.5 Conservation Measures

SBFCA will implement the following conservation measures to avoid and minimize effects on federally listed species. To ensure their implementation, the measures listed below will be included in the project specifications.

General

Conservation Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the project area, a biologist approved by USFWS, NMFS, and CDFW will conduct a mandatory biological resources awareness training for all construction personnel about federally listed species that could potentially occur onsite (VELB, giant garter snake, and fish species). The training will include the natural history, representative photographs, and legal status of each federally listed species and avoidance and minimization measures to be implemented. Proof of personnel attendance will be provided to USFWS, NMFS, and CDFW within 1 week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- Where suitable habitat is present for listed species, SBFCA will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project construction area.
- Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- All food-related trash will be disposed of in closed containers and removed from the project construction area at least once per week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project construction area.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.
- Any worker who inadvertently injures or kills a federally listed species or finds one dead, injured, or entrapped will immediately report the incident to the biological monitor and construction foreman. The construction foreman will immediately notify SBFCA, who will provide verbal notification to the USFWS Sacramento Endangered Species Office and/or the local CDFW warden or biologist within 1 working day. SBFCA will follow up with written notification to USFWS or CDFW within 5 working days. The biological monitor will follow up with SBFCA to ensure that the wildlife agencies were notified.

- The biological monitor will record all observations of federally listed species on CNDDB field sheets and submit to CDFW.

Valley Elderberry Longhorn Beetle

Conservation measures for VELB are based on USFWS's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (U.S. Fish and Wildlife Service 1999a).

Conservation Measure 2: Fence Elderberry Shrubs to be Protected and Monitor Fencing during Construction

Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/VELB experience), under contract to SBFCA, will mark the elderberry shrubs and clusters that will be protected during construction. Orange construction barrier fencing will be placed at the edge of the respective buffer areas. The buffer area distances will be proposed by the biologist and approved by USFWS. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information:

This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

In some cases, where the elderberry shrub dripline is within 10 feet of the work area, k-rails will be placed at the shrub's dripline to provide additional protection to the shrub from construction equipment and activities. Temporary fences around the elderberry shrubs and k-rails at shrub driplines will be installed as the first order of work. Temporary fences will be furnished, constructed, maintained, and later removed, as shown on the plans, as specified in the special provisions, and as directed by the project engineer. Temporary fencing will be 4 feet (1.2 meters) high, commercial-quality woven polypropylene, orange in color.

Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project lead and USFWS.

Conservation Measure 3: Conduct VELB Surveys Prior to Elderberry Shrub Transplantation

Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the Conservation Guidelines for the VELB (U.S. Fish and Wildlife Service 1999a). The biologist will survey the area surrounding the shrub to be transplanted to ensure that there aren't additional elderberry shrubs that need to be removed. Surveys will consist of counting and measuring the diameter of each stem, and examining elderberry shrubs for the presence of VELB exit holes. Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to USFWS. SBFCA plans to plant elderberry seedlings/cuttings and associated native

plants prior to transplantation of elderberry shrubs. The data collected during the surveys prior to transplantation will be used to determine if SFBCA is exceeding their compensation requirements or if additional plantings are necessary. Because the project would be constructed in four separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract and to ensure that SBFCA has fully mitigated for impacts on VELB.

Conservation Measure 4: Water Down Construction Area to Control Dust

SFBCA or the contractor will ensure that the project construction area will be watered down as necessary to prevent dirt from becoming airborne and accumulating on elderberry shrubs within the 100–foot buffer.

Conservation Measure 5: Compensate for Direct and Indirect Effects on Valley Elderberry Longhorn Beetle Habitat

Project impacts to VELB habitat are discussed in Section 2.3 and compensation ratios are discussed below in Section 3.4.

Giant Garter Snake

Conservation measures for giant garter snake were developed using portions of the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997).

Conservation Measure 6: Conduct Construction Activities during the Active Period for Giant Garter Snake

To the maximum extent possible, all construction activity within giant garter snake aquatic and upland habitat within 200 feet of aquatic habitat will be conducted during the snake's active period (May 1–October 1). During this timeframe, potential for injury and mortality are lessened because snakes are actively moving and avoiding danger. Because levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction at two sites in the same reaches must be conducted when the canal is dry (February–March), additional protective measures will be implemented at these locations (see Conservation Measure 14 below).

Conservation Measure 7: Install and Maintain Exclusion and Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, SBFCA will install exclusion fencing and orange construction barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The exclusion and construction barrier fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that SBFCA or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist

to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The exclusion fencing will consist of 3 foot-tall silt fencing buried at least 4-6 inches below ground level. The exclusion fencing will ensure that giant garter snakes are excluded from the construction area and that suitable upland and aquatic habitat is protected throughout construction. The construction barrier fencing will be commercial-quality, woven polypropylene, orange in color, and 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Barrier and exclusion fences will be inspected daily by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead and USFWS.

Conservation Measure 8: Minimize Potential Impacts on Giant Garter Snake Habitat

SBFCA will implement the following measures to minimize potential impacts on giant garter snake habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the project area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

Conservation Measure 9: Prepare and Implement a Stormwater Pollution Prevention Plan

Because ground disturbance for the project would be greater than 1 acre, SBFCA would obtain coverage under the U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit. The Central Valley Regional Water Quality Control Board (RWQCB) administers the NPDES stormwater permit program in Sutter and Butte Counties. Obtaining coverage under the NPDES general construction activity permit generally requires that the project applicant prepare a stormwater pollution prevention plan (SWPPP) that describes the BMPs that would be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP would be prepared prior to commencing earth-moving construction activities.

The specific BMPs that would be incorporated into the erosion and sediment control plan and SWPPP would be site-specific and would be prepared by the construction contractor in accordance with the California RWQCB Field Manual. However, the plan likely would include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction.** The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials.** To the extent possible, equipment and materials will be staged in areas that have already been disturbed.
- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in part through the establishment of designated equipment staging areas, ingress and egress corridors, and equipment exclusion zones prior to the commencement of any grading operations.
- **Stabilize grading spoils.** Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers.** The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area. Natural/biodegradable erosion control measures (i.e., coir rolls, straw wattles or hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because animals can become caught in this type of erosion control material.
- **Stormwater drain inlet protection**. The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization**. The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

Conservation Measure 10: Prepare and Implement a Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, SBFCA would ensure the contractor would prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). If the contactor prepares the plan, it would be subject to approval by USACE, NMFS, and SBFCA before excavation can begin. The BSSCP would include measures intended to minimize the potential for a frac-out (short for “fracture-out event”) associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and “minimum-effect” response in the event of a frac-out and release of excavation fluid (i.e., bentonite). The BSSCP would require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, CDFW, and the RWQCB will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be onsite and used if a frac-out occurs. Containment materials, such as straw bales, also will be onsite prior to and during all operations, and a vacuum truck will be on retainer and available to be operational onsite within notice of 2 hours. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.
- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1-foot, contained, and properly disposed of, as required by law. The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.
- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that will potentially suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material, and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (onsite) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of excavation operations.

Conservation Measure 11: Prepare and Implement a Spill Prevention, Control, and Counter-Measure Plan

A spill prevention, control, and counter-measure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. SBFCA or its contractor would develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP would be completed before any construction activities begin. Implementation of this measure would comply with State and Federal water quality regulations. The SPCCP would describe spill sources and spill pathways in addition to the actions that would be taken in the event of a spill (e.g., an oil spill from engine refueling would be immediately cleaned up with oil absorbents). The SPCCP would outline descriptions of containments facilities and practices such as doubled-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. It would also

describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

SBFCA would review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. SBFCA would notify its contractors immediately if there is a non-compliance issue and would require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that results in one or more of the following.

- Violates applicable water quality standards.
- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent would notify SBFCA, and SBFCA would take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Central Valley RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases would be documented on a spill report form.

Conservation Measure 12: Conduct Preconstruction Surveys and Monitoring for Giant Garter Snake

Prior to ground-disturbing activities within 200 feet of suitable habitat, a USFWS-approved biological monitor will conduct a preconstruction survey of suitable aquatic and upland habitat and inspect exclusion and orange barrier fencing to ensure they are both in good working order each morning. If any snakes are observed within the construction area at any other time during construction the USFWS-approved biological monitor will be contacted to survey the site for giant garter snakes. The biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities will be allowed to move away from construction activities on their own. If unable to move away on their own, trapped or injured giant garter snakes will be only be removed by the USFWS-approved biological monitor and will be placed in the nearest suitable habitat that is outside of the construction area. The biological monitor will immediately report these activities to USFWS by phone and will provide a written account of the details of the incident within 24 hours.

Once all initial ground-disturbing activities are completed, the biological monitor will perform weekly checks of the site for the duration of construction in order to ensure that construction barrier fences and exclusion fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to USFWS within 1 week of each monitoring visit.

Conservation Measure 13: Provide Escape Ramps or Cover Open Trenches at the End of Each Day

To avoid entrapment of giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. If any individuals have become trapped, the USFWS-approved biological monitor will be contacted to relocate the snake and no work will occur in that area until approved by the biologist.

Conservation Measure 14: Implement Additional Protective Measures during Work in Suitable Habitat during the Giant Garter Snake Dormant Period

SBFCA will implement additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2–April 30), when snakes are more vulnerable to injury and mortality. It is expected that these additional measures will be implemented during levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction adjoining the canal at two sites in the same reaches during February–March, and if construction activities extend to the period between October 2 and November 1. SBFCA will implement additional protective measures when conducting work in suitable giant garter snake habitat between October 2 and April 30.

- A full-time USFWS-approved biological monitor will be onsite for the duration of construction activities.
- All emergent vegetation within the Sutter-Butte Canal on the levee side, and vegetation within 200 feet of the canal will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1 for following winter work).
- Exclusion fencing will be installed around the perimeter of the work area and across the Sutter-Butte Canal where construction activities associated with levee slope flattening and pipe reconstruction activities would occur. The fencing should enclose the work area to the maximum extent possible to prevent giant garter snakes from entering the work area. Fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during fence installation. The USFWS-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation. The exclusion fencing will consist of 3 foot-tall erosion fencing buried 4-6 inches below ground level. The exclusion fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area (between canal and existing levee).

  Portions of the Sutter-Butte Canal that are temporarily disturbed during construction will be revegetated with emergent vegetation and adjacent disturbed upland habitat will be revegetated with native grasses and forbs after construction is complete.

Conservation Measure 16: Restore Temporarily Disturbed Aquatic and Upland Habitat to Pre-Project Conditions

Upon completion of the proposed project, SBFCA will restore 6.81 acres of suitable aquatic habitat and 118.80 acres of suitable upland habitat for giant garter snake to pre-project conditions.

Conservation Measure 17: Compensate for Permanent Loss of Aquatic Habitat for Giant Garter Snake

Project impacts to GGS are discussed in Section 2.3 and compensation ratios are discussed below in Section 3.4.

2.3 Site Characteristics

2.3.1 Biological Resources in the Project Area

This section identifies the field surveys conducted to identify biological resources known to occur or having the potential to occur in the project area, special-status wildlife and fish species with potential to occur in the project area, and the effects of the project on sensitive biological resources.

Field Surveys

The field surveys conducted to identify biological resources in the project area consisted of habitat mapping, a delineation of wetlands and other waters of the U.S., special-status wildlife surveys, and a tree survey.

Land Cover Mapping

The information pertaining to land cover types in the project area was derived primarily from the collaborative mapping done in November 2010 by ICF International GIS staff and Galloway Consulting and updated as needed based on the results of the 2011 reconnaissance-level biological assessment conducted by ICF International biologists. These 2010 and 2011 field surveys were conducted by combination of aerial photograph interpretation and walking and driving through the project area.

Land cover types in the project area fall into four broad categories: wildlands, potential wetlands and other waters of the U.S., agricultural lands, and developed/disturbed areas.

Delineation of Wetlands and Other Waters of the U.S.

In June, July, and August 2012, HDR conducted a formal delineation of wetlands and other waters for all areas that may potentially be directly affected by construction of the project. Potential borrow site locations were surveyed for wetlands in winter 2012. An approved Preliminary Jurisdictional Delineation for the Feather River West Levee Project was received on May 1, 2013.

Special-Status Wildlife Surveys

Field surveys to identify habitats for special-status wildlife and elderberry shrub (*Sambucus* spp.) habitat for VELB in the project area were conducted by ICF biologists on July 20–22, July 27, and August 31, 2011. Additional mapping of the elderberry shrubs was conducted by ICF concurrently with arborist surveys in summer 2012. During the 2011 surveys, biologists located elderberry shrubs by driving and walking along the levee in the project area and mapped elderberry shrubs (and shrub clusters) with a sub-meter accuracy global positioning system (GPS). When the bases of shrubs were accessible, stem counts, heights, and widths of shrubs were recorded, and shrubs were

surveyed for VELB exit holes. Where dense poison oak (*Toxicodendron diversilobum*), Himalayan blackberry (*Rubus armeniacus*), and/or other vegetation surrounds elderberry shrubs, stem counts and exit hole surveys could not be conducted. Final stem counts will be conducted on all elderberry shrubs prior to removal for transplanting.

An assessment of habitat for giant garter snake was conducted by ICF and HDR biologists on July 12, 2012, and October 25, 2012. During the assessment, biologists evaluated aquatic and upland habitat for giant garter snake, took representative photographs of habitat present, and recorded all wildlife species observed.

Borrow sites recently have been identified and have not been surveyed yet. Surveys of these sites are planned to occur prior to construction. Any borrow site that contains habitat for listed species will not be utilized.

Tree Survey

ICF arborists assessed trees within the project footprint from July 17 to October 11, 2012. The arborist survey methods followed standard professional practices. Tree location data were collected with a GPS unit. Trees within the defined project footprint, overhanging the project footprint, and greater than 4 inches in DBH were surveyed. Trees were labeled with an aluminum tree tag with unique numbers inscribed on the tags.

The assessment criteria and recorded data from the arborist survey included:

- Identification of the species
- Status of the species
- Number of trunks
- Diameter of trunk 4.5 feet above the ground surface (DBH)
- Tree height
- Canopy dripline radius
- Health, vigor, and structure
- Remarks

For trees with relatively symmetrical canopies, the measurement from the trunk to the end of the longest lateral limb was measured and doubled to determine the diameter of the canopy. For trees with asymmetrical canopies, the diameter of the canopy was determined by adding the distance as measured from the longest lateral limb to the trunk to the distance measured from the trunk to the longest lateral limb on the opposite side of the tree (greater than 90 degrees either side from the first measurement).

Tree health and structure were rated as *good*, *fair*, or *poor*. Table 2-4 provides a general definition of these ratings. Where conditions were between ratings of good and fair or fair and poor, intermediate ratings of fair-good and fair-poor were given.

Table 2-4. Criteria Used to Rate the Health, Vigor, Structure and Form of Surveyed Trees

Rating	Tree Health and Vigor
Good	Overall appearance of the tree is exemplary of the species. No visible wounds or defects, or completely healed. Crown root area displays no signs of wood deterioration. Bark missing from less than 10% of trunk circumference. Trunk does not show any signs of wood decay, cracking, or deterioration. Foliage is exemplary of the species, no sprout growth observed, evenly distributed, and free of pests. No signs of disease symptoms or pests observed. Current annual twig growth is greater than expected for the species. Buds are normal size, viable, abundant, and uniform throughout canopy. Little to no evidence of stress or nutrient deficiency.
Fair	Overall appearance of the tree is representative of the species. Wounds actively healing, but not completely healed. Crown root area displays minor signs of wood deterioration. Bark missing from more than 10% but less than 30% of trunk circumference. Trunk does not show any signs of wood decay, cracking, or deterioration. Foliage is representative of the species, some sprout growth observed, foliage is unevenly distributed yet balanced across whole tree, or only a minor pest problem observed. Disease symptoms or pests observed create an intermittent or temporary nuisance. Current annual twig growth is as expected for the species. Buds are of normal size and viable, but are somewhat sparse or irregular throughout the canopy. Some evidence of minor stress or nutrient deficiency observed.
Poor	Overall appearance of the tree deviates from species representative. Wounds not healing vigorously or are showing signs of decay. Crown root area decayed over more than 30% of tree's cross section. Bark missing from more than 30% of trunk circumference. Trunk shows signs of wood decay, cracking, or deterioration. Foliage deviates from species representative, sprout growth observed, foliage is unevenly distributed, or pest infestation observed. Disease symptoms or pests observed threaten the health and well-being of host and/or adjacent trees. Current annual twig growth is less than expected for the species. Buds are few, or not viable, or sparse, or irregular throughout the canopy. Evidence of stress or nutrient deficiency observed.

Rating	Tree Structure and Form
Good	Tree structure has a low potential for failure. Ample space for tree to grow to mature size characteristic of the species. No visible root defects or damage from roots to infrastructure observed. No anchor roots exposed. Trunk appears solid and free of cavities, decay, or hollowness. No bark inclusion observed. Canopy is full and balanced. Single leader, branch attachment solid, and angle of branch attachment exemplary. No dead limbs observed, all limbs free of defects, and limbs are not overburdened.
Fair	Tree structure has a moderate potential for failure. Adequate space available for tree to grow to a size representative of the species. Roots abutting infrastructure, displacing built objects from normal alignment. Some anchor root exposure. Trunk displays some signs of minor deterioration, but structurally still solid and in process of healing. Bark inclusion observed only on minor branches and away from posing threats to health, safety, and welfare of the public. Canopy is slightly lacking or unbalanced. Leader not clearly defined, but not missing; branch attachment characteristic of species. One minor dead limb observed, but solidly attached, other limbs free of defects, limbs only slightly overburdened.
Poor	Tree structure has a high potential for failure. Inadequate space available for tree to grow to a size representative of the species. Roots lifting sidewalks or built objects from normal grade, extensive portions of root system cut, decay of root crown in excess of 30%, or root zone subject to overwatering. Anchor roots exposed. Trunk decay is affecting 30% or more of the trunk cross section, healing process slow or not evident, or crack observed. Unequal weight distribution within tree structure due to trunk lean. Bark inclusion at branches, involving main trunk, or posing a threat to health, safety, or welfare of the public. Canopy is lacking or unbalanced, or concentrated in the upper 1/3 of tree. Double leader or no leader observed, a branch observed nearly as large as trunk, narrow angles of branch attachment, multiple limb attachments or attachments of limbs not characteristic of species, or decay observed at branch attachment. More than one dead limb observed, a wound in limb observed greater than 30% of cross section, limbs overburdened, or multiple branches sprouting from cuts.

2.3.2 Special-Status Plants

Special-status plant species are plants that are legally protected under California Endangered Species Act (CESA), ESA, or other regulations, and species considered sufficiently rare by the scientific community to qualify for such listing.

Nine special-status plant species have been reported in the seven USGS quadrangles that overlap the project area (California Department of Fish and Game 2010; California Native Plant Society 2012; California Department of Fish and Game 2012; U.S. Fish and Wildlife Service 2012). Two species, slender Orcutt grass (*Orcuttia tenuis*) and Greene's tuctoria (*Tuctoria greenei*) are vernal pool species that lack potential habitat in the project area. No vernal pools were observed in the area during the 2010 and 2011 field surveys. Six species were determined to have low potential for occurrence because the potential habitat (i.e., oak woodland, ruderal areas outside the toe of the levee) constitutes a relatively small portion of the biological study area and has been lowered in quality by past and ongoing disturbance (agricultural activities, dredging). Additionally, suitable microhabitat requirements (subalkaline flats, heavy clay soils, acidic clay soils) for these species may not be met.

Sanford's arrowhead is the only special status species that could occur in jurisdictional habitat, including freshwater marshes, sloughs, canals, and other slow moving habitats. It is neither federally or state listed, but is classified as fairly endangered in California according to the California Rare Plant Rank. For the project area, it was determined to have low potential to occur along the edges of irrigation canals, inundated areas of the river's floodplain within riparian forest, and ponds on the land side of the levee that support a fringe of riparian forest.

2.3.3 Special-Status Wildlife Species

Special-status wildlife species are defined as animals that are legally protected under the ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status wildlife species are defined as follows.

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.11 for listed animals and various notices in the Federal Register (FR) for proposed species).
- Species that are candidates for possible future listing as threatened or endangered under the ESA (77 FR 69993, November 21, 2012).
- Species listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Animals listed as California species of special concern on CDFW's Special Animals List (California Department of Fish and Game 2011).
- Animals that are fully protected in California under the California Fish and Game Code (Sections 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]).

Based on the USFWS (2012) species list and CNDDB (California Department of Fish and Game 2012) records search for the quadrangles overlapping the affected area, 23 special-status wildlife species

were identified as having potential to occur in the affected area. Of these 23 species, four are known to occur in the affected area (western pond turtle, Swainson's hawk, western yellow-billed cuckoo, and bank swallow). Swainson's hawk was observed in the affected area during 2011 field surveys. Though not reported to occur in the affected area, 10 other special-status wildlife species have a moderate or high potential to occur in the affected area given their known range, reports of occurrence, and/or the presence of suitable habitat. These species include Antioch Dunes anthicid beetle (*Anthicus antiochensis*), Sacramento anthicid beetle (*A. sacramento*), Sacramento Valley tiger beetle (*Cicindela hirticollis abrupta*), VELB, giant garter snake, northern harrier, bald eagle, western burrowing owl, tricolored blackbird, and silver-haired bat. The remaining nine species have low or no potential to occur. Seven additional species were added as having at least a moderate potential to occur in the affected area based on species habitat requirements and professional judgment (white-tailed kite, loggerhead shrike, purple martin, yellow warbler, pallid bat, hoary bat, and western red bat).

ESA Consultation to Date

Of the 10 federally listed species considered for inclusion, only VELB and the giant garter snake have the potential to be affected by the project.

The USACE and SBFCA, pursuant to ESA, must consult with USFWS with regard to any proposed actions that may affect the continued existence of a federally listed species.

The Corps has determined that the proposed project may affect, and is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)(beetle) and the giant garter snake (*Thamnophis gigas*)snake. A Biological Opinion (08ESMF00-2013-F-0342-1) was received from USFWS on May 2, 2013 concurring with the Corps determination and that critical habitat will not be affected concluding ESA section 7 consultation for the proposed project.

Project impacts to VELB and GGS habitat are discussed below.

Valley Elderberry Longhorn Beetle

Status and Distribution

VELB was listed by USFWS as a threatened species on August 8, 1980 (45 FR 52803–52807), due to loss of habitat and inadequate regulatory protection. The current known range of VELB extends from southern Shasta County, south to Fresno County, and from the east side of the Coast Range to the Sierra Nevada foothills (Barr 1991; U.S. Fish and Wildlife Service 2006). The USFWS promulgated the final ruling designating critical habitat for VELB on August 8, 1980 (45 FR 52804). Two critical habitat areas were designated along portions of the American River in Sacramento County (the Sacramento Zone and the American River Parkway Zone). The Proposed Action addressed in this Biological Assessment (BA) is not located within designated critical habitat for VELB. Critical habitat has not been designated for giant garter snake. Accordingly, critical habitat is not discussed further in this BA. In 2006, USFWS released a 5-year review for VELB that recommended delisting the species due to reduction of its primary threats (loss of riparian and inadequacy of regulatory mechanisms) and the increased number of occurrences in the Central Valley (U.S. Fish and Wildlife Service 2006). The report recommended a post-delisting monitoring plan that includes monitoring of the 195 known VELB locations. The purpose of the plan would be to ensure that VELB remains stable after ESA protections are removed.

On August 19, 2011, USFWS announced a 90-day finding on a petition to delist VELB (76 FR 51929–51931). USFWS found that the petition presented substantial scientific or commercial information indicating that delisting may be warranted and requested further scientific and commercial data and other information regarding VELB. Following the review of additional information, USFWS will issue a 12-month finding on the petition, which will address whether the petitioned action is warranted.

Habitat and Biology

VELB is dependent on its host plant, elderberry, which is a common component of riparian corridors and adjacent upland areas in the Central Valley. VELB has four stages of life: egg, larva, pupa, and adult. Females deposit eggs on or adjacent to the host elderberry. Egg production varies and females have been observed to lay between 16 and 180 eggs (U.S. Fish and Wildlife Service 2007). Eggs hatch within a few days of being deposited and larvae emerge. The larvae bore into the wood of the host plant and create a long feeding gallery in the pith of the elderberry stem. The larvae feed on the pith of the plant for 1–2 years. When a larva is ready to pupate, it chews an exit hole to the outside of the stem and then plugs it with frass. The larva then retreats into the feeding gallery and constructs a pupal chamber from wood and frass. The larvae metamorphose between December and April; the pupal stage lasts about a month. The adult remains in the chamber for several weeks after metamorphosis and then emerges from the chamber through the exit hole. Most records for adults show occurrence from late-April to mid-May (U.S. Fish and Wildlife Service 2007). Adults feed on elderberry leaves and mate within the elderberry canopy.

Studies conducted in the American River basin demonstrate that VELB occurs most frequently and is most abundant in significant riparian zones that are well developed. Within significant riparian zones, VELB primarily occurs within the riparian corridor but can occur infrequently in non-riparian scrub habitats adjacent to the riparian corridor. Along the American River, the beetle tends to occupy woodlands dominated by exotic trees (black locust [*Robinia psuedoacacia*]) and black walnut [*Juglans californica*]), and in mixed riparian forests. The beetle less commonly occupies annual grasslands and live oak woodlands. One study showed that the beetle preferentially occupies elderberry shrubs in wooded areas with a relatively dense canopy cover over elderberry shrubs located in open and sparsely wooded areas. Of the occupied shrubs found in wooded areas, about 50% were under a canopy cover of 25–50%, while 25% were under canopies with 50–75% cover and 25% were under canopies with 75–100% cover. The study also demonstrated that VELB appears to be capable of limited dispersal and prefers to remain within contiguous patches of high quality riparian habitat. Clusters of local aggregations of VELB along the American River Parkway were approximately 600–800 meters in diameter (Talley 2005 in Talley et al. 2006).

A variety of branch sizes are utilized for larval development and pupation, although most of those measured in Barr's study (1991) were 2–4 inches (5–10 centimeters) in diameter at the exit hole. Infrequently, smaller branches (less than 1.5 inches [3.8 centimeters] in diameter) that contained exit holes were encountered. Lang et al. (1989) found no current-year exit holes on stems smaller than 1 inch (2.5 centimeters) in diameter. Talley et al. (2007) found that exit holes most frequently occurred in stems that were 0.8–2.8 inches (2–7 centimeters) in diameter and below 3.2 feet (1 meter) (79%). Holes were also found in larger diameter stems (2.8–4.7 inches [7–12 centimeters]) (36% of occurrences) and at heights of 3.2–6.4 feet (1–2 meters) above the ground (19%).

Reasons for Decline

The primary threat to VELB has been attributed to habitat loss and degradation of the riparian forest ecosystem as a result of agricultural and urban development (Barr 1991; Barbour et al. 1993; Eng 1984; Katibah 1984). Colonization by the Argentine ant (*Linepithema humile*) may also pose a biological threat to VELB through egg predation (Huxel 2000).

Occurrence in the Project Area

The closest VELB occurrence in the CNDDB (California Department of Fish and Game 2012) is approximately 0.5 mile from the project area. Numerous other occurrences are located within 10 miles of the project area.

Suitable habitat for VELB is located at numerous places in the project area along the levee construction footprint. There were no elderberry shrubs observed at the seven borrow site locations during the wetlands delineation effort at these sites. A total of 267 shrubs/shrub clusters were mapped in the project area. Because of property inaccessibility and the high density of California grape and Himalayan blackberry along portions of the Feather River riparian corridor, stem counts and examination of shrubs for VELB exit holes could only be conducted for 73 shrubs/shrub clusters in the project area.

Effects of the Project on Valley Elderberry Longhorn Beetle

Direct effects are defined as the direct or immediate effects of a proposed action on a species or its habitat. Direct effects may result from the action and may include the effects of interrelated and interdependent actions. An *interrelated action* is an activity that is part of the proposed action and depends on the proposed action for its justification. An *interdependent action* is an activity that has no independent utility apart from the action under consultation (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside the area directly affected by the action (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

Direct Effects

Permanent Loss of Elderberry Shrubs and Potential Loss of Individual VELB from Shrub Removal

Removal of habitat (elderberry) and potential injury or mortality of VELB associated with construction of the project would be considered direct effects on VELB. Trimming of elderberry branches that are 1 inch or greater in diameter could also result in injury or mortality of VELB. Because VELB larvae may feed on the roots of elderberries, disturbance of elderberry roots within the shrub dripline could also result in injury or mortality of individuals. Where root damage is expected to be extensive, elderberry shrubs would be removed. Where damage is limited (few roots affected) and roots are expected to grow back, impacts would be considered temporary. Because incidental take of VELB would be difficult to detect or quantify, effects on elderberry shrubs will be used as a proxy for measuring take.

Elderberry shrubs within the construction area that cannot be protected will be removed in accordance with to USFWS-approved procedures outlined in the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). Shrubs will be transplanted to the Star Bend Conservation Area.

Transplanted shrubs will be moved prior to construction when the plants are dormant, approximately November through the first 2 weeks in February, after they lose their leaves. Transplanting during the dormant period will reduce shock to the plant and increase transplantation success. However, transplanted elderberry shrubs may experience stress, a decline in health, or death due to changes in soil, hydrology, microclimate, or associated vegetation.

Elderberry shrubs that can be avoided at the dripline of the shrub or greater distance will be protected with fencing and/or k-rail as described in Conservation Measure 2. Table 2-5 shows the estimated number of elderberries to be transplanted and to be protected by contract and within Reach 13 (as this is the first portion of the project to be constructed).

Table 2-5. Approximate Number of Elderberry Shrubs/Clusters to be Removed and Protected

Construction Contract	Approximate Number of Elderberries Removed/ Transplanted	Approximate Number of Elderberries Protected/ Fenced
A	3	36
B	10	37
C	43	68
Reach 13	1	16
D	35	34
Oroville Wildlife Area Borrow Site	1	0
Total[a]	91	175

[a] Shrubs in Reach 13 are included in the number of elderberries for Contract C.

As described in Conservation Measure 3, surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. The data collected during the surveys prior to transplantation will be used to determine if SFBCA is exceeding their compensation requirements, or if additional plantings are necessary. Because the project would be constructed in four separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract, and ensure that SBFCA has fully mitigated for impacts on VELB. Compensation ratios for VELB habitat is discussed below in Section 3.4.

Indirect Effects

As discussed above, *indirect effects* are caused by or result from the project, are later in time, and are reasonably certain to occur. Indirect effects may occur outside the area directly affected by the action.

Loss of Connectivity to Adjacent Habitat

Loss of connectivity between elderberry shrubs may result when elderberries or associated vegetation is removed. Removal of such vegetation could result in gaps in vegetation that are too wide for VELB to travel across due to their fairly limited movement distances (Talley et al. 2006a), resulting in separation of individuals or reducing the possibility of colonization of adjacent areas. Removal of associated vegetation may result in an altered habitat structure or microclimate that could affect behaviors of VELB in response to these changes in unforeseen ways (U.S. Fish and Wildlife Service 2003).

Although more research is needed, VELB has been observed to fly a mile or more in contiguous or fairly contiguous habitat, and exit holes have been observed on isolated shrubs that are a minimum of 0.25 mile (0.4 kilometer) from the next nearest elderberry (Arnold pers. comm. 2011). Within the American River Basin, evidence suggests that local beetle movements are farther within the riparian corridor (141±144 feet [43±44 meters]) than in the adjacent non-riparian scrub (82±52 feet [25±16 meters]) (average±1 standard deviation nearest neighbor distances between recent exit holes) illustrating that VELB population extents may also be habitat-specific (Talley et al. 2006a).

Although approximately 91 elderberry shrubs are expected to be removed as part of the project, 175 elderberry shrubs would be protected in the project area and continue to provide habitat for VELB. Given the distance VELB has been observed to fly, and the amount of elderberry shrubs that will remain in the project area, VELB is not expected to be indirectly affected by a loss of connectivity to adjacent habitat.

Soil Disturbance Adjacent to Roots

Ground disturbance within 20 feet (6.1 meters) of an elderberry shrub's dripline could result in disturbance of roots. Root damage could result in stress or reduced vigor of elderberry shrubs. Because construction of the project may result in disturbance within 20 feet (6.1 meters) of the dripline of elderberry shrubs, indirect effects on these shrubs may result. Elderberry shrubs will be fenced and/or protected with k-rail, as described in Conservation Measure 2, to minimize soil disturbance adjacent to roots. With this measure in place, and because elderberry shrubs are hearty and frequently re-sprout after damage, this indirect effect is not expected to substantially affect VELB.

Dust

Vehicle travel on the levee road adjacent to elderberry shrubs during construction of the project could result in dust becoming airborne and settling on elderberries. The levee road is graveled, and existing shrubs are and have been exposed to dust from vehicles associated with farming and levee maintenance. Construction of the project would increase the amount of dust in the project area as a result of ground-disturbing activities and an increase in the frequency of vehicles driving on the levee road. The amount of dust in the project area would be minimized through dust control measures, as described in Conservation Measure 4. Additionally, according to Talley et al. (2006b), in an experiment along the American River Parkway (Sacramento County) conditions of elderberry shrubs related to dust from nearby trails and roads (paved and dirt) did not affect the presence of VELB. Additional work by Talley and Holyoak (2009) found no effect on elderberries from dust accumulations. Because dust has not been found to greatly affect elderberry shrubs and because dust control measures would be implemented during construction, this indirect effect is not expected to substantially affect VELB.

Altered Hydrology

Reduction of water to elderberry shrubs as a result of altered of hydrology from changes in topography or compaction of soil could result in reduced shrub vigor/vitality and an associated decrease in shoot, leaf, and flower production and ultimately reduce the suitability of the shrubs to provide habitat for VELB. In most portions of the project area, the levee will be degraded and re-built within the same footprint, and would not modify the hydrology of the surrounding area where elderberries may be present. There may be a few instances where the slope is modified or there are other changes that may affect the hydrology in the project area. These situations are expected to be rare. Additionally, a substantial portion of the elderberries are located within riparian woodland

along the Feather River and obtain water from within the river channel, which will not be hydrologically changed as a result of the project. Therefore, altered hydrology as a result of the project is not expected to substantially affect VELB.

Existing Elderberry Shrubs in the Conservation Area

As described in Conservation Measure 5, elderberry shrubs to be removed will be transplanted to the Star Bend Conservation Area, which contains existing elderberry shrubs. Although transplantation activities may occur within 100 feet of existing elderberry shrubs, it is unlikely that they would be indirectly affected by transplantation activities, as the transplantations would be conducted by qualified individuals who would be knowledgeable about elderberry shrubs and the existing conditions within the conservation area.

Temporal Loss of Habitat

It generally takes 5 or more years for newly planted elderberry cuttings/seedlings to become large enough to support beetles, and it generally takes 25 years or longer for riparian habitats to reach their full value (U.S. Fish and Wildlife Service 1994). Because elderberry shrubs within the project area will be transplanted to the Star Bend Conservation Area, which is immediately adjacent to the project area, no temporal loss of habitat for VELB is expected. Additional elderberry plantings in the conservation area will provide additional and/or replacement habitat for VELB in future years.

Giant Garter Snake

Status and Distribution

Giant garter snake was listed as a threatened species by USFWS on October 20, 1993 (58 FR 54033). The species is also State-listed as threatened. Giant garter snake is endemic to the Sacramento and San Joaquin Valleys where it is found in lowland areas (U.S. Fish and Wildlife Service 1999b). Historically, this species was found throughout the Central Valley from Butte County in the north to Kern County in the south. Currently, giant garter snake is only known to occur in 13 discrete populations in the Sacramento and San Joaquin Valleys in Butte, Colusa, Fresno, Glenn, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties (U.S. Fish and Wildlife Service 1999b:9, 11–12).

Habitat and Ecology

Giant garter snakes inhabit agricultural wetlands and other waterways including irrigation and drainage canals, ricelands, marshes, sloughs, ponds, small lakes, and low gradient streams, as well as adjacent upland areas in the Central Valley. Because of the direct loss of natural habitat, giant garter snake relies heavily on rice fields in the Sacramento Valley, but it also uses managed marsh areas in national wildlife refuges and State wildlife areas.

Habitat requirements for giant garter snake consist of the following.

- Adequate water during the snake's active season (early spring through mid-fall) to provide food and cover.
- Emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season.
- Grassy banks and openings in waterside vegetation for basking.

- Higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter.

Giant garter snake can persist in waterbodies that contain predatory fish if sufficient cover is present. It is typically absent from larger rivers because of lack of suitable habitat and emergent vegetative cover; it is also typically absent from wetlands with sand, gravel, or rock substrates. Riparian woodlands typically do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations.

Giant garter snake inhabits small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period (November through mid-March), where it typically selects burrows with sunny exposure along south and west facing slopes. The breeding season extends from March through May and resumes briefly in September. Females give birth to live young from late July through early September. Giant garter snake feeds primarily on small fishes, tadpoles, and frogs (U.S. Fish and Wildlife Service 1999b:12, 13, 22, 24).

Reasons for Decline

Giant garter snake has been extirpated from the southern third of its range as a result of agricultural and flood control activities, which have eliminated the snake's freshwater marsh habitat in the historical Buena Vista, Tulare, and Kern lakebeds. Much of the habitat on the floor of the Central Valley has been lost or degraded by upstream watershed modifications, water storage and diversion projects, and urban and agricultural development. Other negative factors that may be contributing to the decline of giant garter snakes include interrupted water supply, poor water quality, and contaminants (U.S. Fish and Wildlife Service 1999b:25.)

Occurrence in the Project Area

There are no CNDDB records of occurrences of giant garter snake in the project area; however, there are 20 records of occurrences within 5 miles of the project area (California Department of Fish and Game 2012). The information for some of these records is suppressed, but the closest available occurrence is approximately 2 miles from the project area (California Department of Fish and Game 2012).

Within the project area, suitable aquatic habitat for giant garter snake is present within rice fields, irrigation canals, drainage canals, and ponds. Some of the drainage canals and ponds in the project area provide suitable aquatic habitat but do not have connectivity to other water features except the Feather River (which is not considered suitable habitat).

Canals

Canals in the project area consist of the Sutter-Butte Canal and other linear, concrete-lined features that convey water across multiple parcels. Many of these features have no vegetation present, while some have herbaceous emergent (rooted) vegetation and shrubs present in the margins. These canals generally convey water only during the active agricultural periods, which take place between April 15 and February 15.

Suitable upland habitat in the project area is limited to the levee banks and adjacent ruderal areas. Giant garter snakes (if present) are expected primarily to be associated with aquatic habitat in the project area. Table 2-6 provides a summary of the suitability of potential aquatic habitat in the levee construction portion of the project area. Table 2-7 provides a summary of the suitability of potential borrow sites to provide habitat for giant garter snake.

Table 2-6. Suitability of Aquatic Habitat for Giant Garter Snake in the Levee Construction Portion of the Project Area

Approximate Stationing	Aquatic Habitat	Suitability for Giant Garter Snake
208	Perennial ponded area, ditch along levee toe	Suitable aquatic—limited upland, no connectivity to other aquatic.
233	Ditch on land side of levee	Suitable aquatic.
254–258	Pond	Suitable aquatic—limited upland, no connectivity to other aquatic.
280	Canal	Suitable aquatic (low quality) —limited upland, has connectivity to other canals/ditches.
292	Concrete lined canal	Suitable—isolated segment but near other canals.
310	Perennial pond	Suitable aquatic—burrows in grassy hillside and levee side, channel from pond continues north along base of levee and also provides habitat.
336	Perennial pond	Dense willow ring, limited basking areas and upland, limited suitability/low potential for species.
373	Open channel on water side of levee	Suitable aquatic.
396	Canal	Suitable aquatic.
409–410	Cement-lined storage pond	Not suitable—concrete-lined and fenced.
409–410	River backwater, freshwater emergent, and seasonal wetland	Marginal aquatic—area connected to river with marsh.
426	Channel with marsh (seasonal wetlands)	Suitable aquatic—open areas for basking, side of levee may provide upland.
434	Perennial pond	Suitable aquatic—open areas for basking, side of levee provides upland habitat.
512	Canal	Not suitable—canal is concrete-lined, used for drainage, and not connected to other canals/ditches and water not maintained.
544–577	Abbott Lake	Suitable aquatic—open areas for basking, limited upland habitat, connected “channel” along base of levee to the north also provides suitable aquatic.
647–649	Cement-lined storage pond	Not suitable.
689	Canal	Assumed suitable—appears to connect to other canals/ditches, limited suitable upland.
872–880	Seasonal wetland	Wetland feature observed dry during October 25, 2012 site visit. Not suitable—likely does not stay inundated through summer, may not have open water.
1043–1052	Detention pond	Not suitable—unvegetated and unlikely to sustain water through summer.
1043	Stream	Not suitable—stream isolated by river and development.
1060	Stream	Not suitable—stream isolated by river and development.
1375	Unlined canal	Suitable habitat—water present throughout the summer.

Approximate Stationing	Aquatic Habitat	Suitability for Giant Garter Snake
1428	Start of Sutter-Butte Canal	Suitable throughout the project area—water year-round, some patches of suitable emergent vegetation, connectivity to other canals/ditches.
1707	Canal	Similar to the Sutter-Butte Canal, suitable aquatic—connectivity to other canals/ditches.
1761–1766	Ditch	Not suitable—ditch is not very defined and is isolated.
1902	Ditch	Suitable aquatic—ditch had water on October 25, 2012 site visit, ditch is small and isolated but is in close proximity to the Sutter-Butte Canal.
1958	Canal/ditch	Assumed suitable—connected to Sutter-Butte Canal.
2076, 2122, 2217, 2262	Ponds in tailings area	Marginal suitability—aquatic areas appear suitable at base, but are often surrounded by steep mounds of tailings; availability of food is questionable; upland areas are rocky and are unlikely to provide burrows.

Table 2-7. Habitat Suitability of Potential Borrow Sites for Giant Garter Snake

Potential Borrow Site	Habitat Present	Habitat Suitability
Oroville Wildlife Area Dredge Tailings Area	Tailings with emergent vegetation	Not considered suitable—aquatic areas appear suitable at base, but are often surrounded by steep mounds of tailings; availability of food is questionable; upland areas are rocky and are unlikely to provide burrows.
City of Live Oak Detention Basin	Irrigation ditch and grassland	Suitable—irrigation ditch along the edge of the property extends beyond the potential borrow site and provides suitable aquatic habitat; adjacent grassland provides suitable upland habitat.
South Ella Detention Pond	Ruderal grassland	Not suitable—no reported aquatic habitat within 200 feet of potential detention pond borrow site.
Lanza 40-acre property	Agricultural/ row crops	Suitable—irrigation ditch along the edge of the property provides suitable aquatic habitat but adjacent area where borrow would be removed is not suitable (i.e., no impacts to irrigation ditch).
Marler property	Agricultural/ row crops	Not suitable—no aquatic or upland habitat present.

Effects of the Project on Giant Garter Snake

Suitable aquatic habitat for giant garter snake in the project area consists of rice fields, irrigation canals, drainage canals, and ponds. Suitable upland habitat consists of ruderal grassland on the levee banks and adjacent to the levee banks. For the effects discussion below, impacts on ruderal grassland areas were calculated if they occur within 200 feet of suitable aquatic habitat.

Permanent and Temporary Disturbance of Suitable Aquatic and Upland Habitat for Giant Garter Snake

Construction of the Proposed Action would result in the permanent loss of 0.004 acre and the temporary loss of 6.81 acres of suitable aquatic habitat for giant garter snake (Figures 3-1 to 3-34).

Permanent effects to aquatic habitat would result from fill of canals for seepage berms (Reaches 3 and 41). Temporary effects to aquatic habitat would result from temporary fill for construction access along the landside levee toe (Reaches 3 and 7) and from work within the Sutter-Butte Canal (Reaches 26–28; 6.81 acres).

Construction of the Proposed Action would also result in the temporary loss or disturbance of 118.80 acres of suitable upland habitat for giant garter snake. Temporary impacts to suitable upland habitat would mostly occur along the levee and at the City of Live Oak Detention Basin borrow site.

Temporarily affected aquatic and upland habitat would be restored to pre-project conditions within a maximum of one season (a season is defined as the calendar year between May 1 and October 1 [U.S. Fish and Wildlife Service 1997]), as described in Conservation Measure 16. Permanently impacted aquatic habitat for giant garter snake would be compensated for through purchasing preservation credits equal to 0.012 acres of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County (Conservation Measure 17). Permanent and temporary losses of suitable aquatic and upland habitat for giant garter snake within the project area are summarized in Table 2-8.

If additional impacts to giant garter snake habitat are expected to occur within or outside of the project area as a result of Pacific Gas & Electric Company (PG&E) facility relocation activities, SBFCA would reinitiate consultation to address these additional effects.

Disturbance or degradation of suitable aquatic habitat for giant garter snake in the project area could occur if soil or other materials are sidecast or fall into the habitat. Fuel or oil leaks or spills adjacent to aquatic habitat could also cause degradation of habitat. These potential effects would be avoided by installing sediment and construction barrier fencing (Conservation Measure 7), locating staging areas away from aquatic habitat (Conservation Measure 8), implementing sediment and contaminant BMPs as required by the NPDES permit (SWPPP) (Conservation Measure 9), and preparing a frac-out plan and SPCCP (Conservation Measures 10 and 11).

Table 2-8. Effects on Giant Garter Snake Habitat in the Project Area

Habitat	Total
Aquatic habitat	
Permanent	0.004
Temporary	6.81
Upland habitat (ruderal within 200 feet of aquatic habitat)	
Permanent	0
Temporary	118.80

Potential Injury or Mortality of Giant Garter Snake

Construction activities in suitable habitat could result in the injury, mortality, or disturbance of giant garter snakes. Giant garter snakes could be injured or crushed by construction equipment working in suitable aquatic and upland habitat, or if soil or other materials are side-cast or fall into suitable aquatic habitat. Snakes could also be killed by construction vehicles traveling though the project area. Fuel or oil spills from construction equipment into aquatic habitat could also cause illness or mortality of giant garter snakes. Trenches left open overnight could trap snakes moving through the

construction area during the early morning hours. Noise and vibrations from construction equipment, and presence of human activity during construction activities may also disturb giant garter snakes within the project area. Most construction activities will be limited to the snake's active period (May 1–October 1) when the potential for direct mortality is reduced because snakes can actively move and avoid danger. However, work within the Sutter-Butte Canal (Reaches 26–28) requires construction during February and March when the irrigation canal is dry. Giant garter snakes, if present, in the upland ruderal grassland adjacent to the canal could be injured or killed during work within the snake's dormant period. Conservation Measure 14 would be implemented to reduce the potential for mortality in Reaches 26–28 during this time period.

Potential effects on giant garter snake would be minimized or avoided by conducting biological resources awareness training (Conservation Measure 1), conducting work during the active period (May 1–October 1) (Conservation Measure 6), installing exclusion fencing around suitable habitat (Conservation Measure 7), conducting preconstruction surveys and monitoring (Conservation Measure 12), and providing escape routes or covering open trenches (Conservation Measure 13). If work continued past October 1, additional preconstruction surveys and monitoring would be required (Conservation Measure 14). All of the conservation measures intended to avoid and minimize impacts to giant garter snake would apply to PG&E facility relocations. If these measures cannot be implemented, or the PG&E facility relocation is outside of the project area but would impact giant garter snake or its habitat, SBFCA would reinitiate consultation to address these additional effects.

Indirect Effects

Construction of the project is not expected to have any indirect effects on giant garter snake. Two potential indirect effects on giant garter snake and its habitat were considered but were determined to have no potential to occur as a result of the project. Specifically, the following determinations were made.

- There would be no increase of trash, hazardous waste, or off-road vehicle use due to increased human presence. The project would not result in development or increased access to giant garter snake habitat.
- The project would not result in indirect effects on habitat suitability through changes in the length of inundation or other habitat modifications that would make the habitat less suitable for giant garter snake.

Cumulative Effects

As described above, cumulative effects are future State, local, and private actions not involving a Federal action that are reasonably certain to occur within the action area under consideration. No other actions within the action area are proposed at this time. Therefore, no cumulative effects would result from the proposed action.

Future Federal actions that are unrelated to the project are not considered in this section because they would be subject to separate consultation pursuant to Section 7 of the ESA.

2.3.4 Special-Status Fish Species

Several special-status fish species occur or have the potential to occur in or near the study area. Critical habitat for spring-run Chinook salmon and Central Valley steelhead falls within the study

area in the Feather River. In addition, the Feather River is designated critical habitat for green sturgeon (74 FR 52345 October 9, 2009). While the Feather River is not designated critical habitat for winter-run Chinook salmon, effects on this species were considered as they have the potential to occur in the study area for at least part of their life-cycle.

No construction activities are proposed in-river or below ordinary high water mark (OHWM); all activities that would result in physical disturbance and removal of vegetation on the waterside slope of the levee would be limited to areas above OHWM. Therefore, no physical modification of critical habitat for ESA-listed fish species would be expected because all proposed construction activities would occur above the OHWM of the Feather River. No mitigation measures are required for special-status fish due to project impacts.

2.3.5 Riparian Trees

Riparian forest occurs along the Feather River and its tributaries and forms a fringe around ponds. Riparian forests support an overstory dominated by mature native and nonnative trees. The dominant overstory species are valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), or Goodding's black willow (*Salix gooddingii*). Other trees commonly observed in the riparian forest are box elder (*Acer negundo* var. *californicum*), arroyo willow (*S. lasiolepis*), Oregon ash (*Fraxinus latifolia*), and western sycamore (*Platanus racemosa*). The shrub layer of most of the riparian forest in the biological study area is extremely dense, and species commonly observed are Himalayan blackberry, poison oak, button bush (*Cephalanthus occidentalis*), wild rose (*Rosa* spp.) and blue elderberry (*Sambucus nigra* ssp*. caerulea*). Blue elderberry is the host plant for the valley elderberry longhorn beetle, federally listed as threatened. Many of the trees and shrubs in the riparian forest are covered in California grape (*Vitis californica*). The herbaceous understory of riparian forest contains a mixture of native and introduced species. Representative species observed were horsetails (*Equisetum* spp.), mugwort (*Artemisia douglasiania*), and curly dock (*Rumex crispus*). Several patches of the invasive giant reed (*Arundo donax*) occur along the edges of riparian areas.

Effects of the Project on Riparian Trees

An arborist survey of the project area was conducted during the summer of 2012 to identify riparian trees that would be affected by the project. The project would remove riparian trees on the levees for construction of the proposed cutoff wall and seepage berms. Loss of riparian habitats on the existing levee would be permanent because riparian restoration would not be permitted on the levees or seepage berms to comply with the USACE levee vegetation policy. The policy requires that the crown, slopes, and areas within 15 feet of the waterside and landside levee toes remain free of all woody vegetation. While not proposed for removal by the FRWLP, vegetation would still be subject to USACE levee vegetation policy and may be removed as described under the No Action Alternative.

Riparian communities, including cottonwood riparian woodland and valley oak riparian woodland, are considered sensitive natural communities by the CNDDB (California Department of Fish and Game 2012). These woodlands would be regulated by CDFW and USFWS (46 FR 7644) under no-net-loss policies for existing riparian habitat values.

Construction of the project would impact 23.48 acres of riparian tree canopy. Impacts to riparian trees were generated from data collected during the arborist survey described above in Section 2.3.1.

2.3.6 Non-Riparian Native Trees

The biological study area contains several small patches of oak woodland. The overstory of oak woodlands is predominantly valley oak but some ornamental tree species are also present. The understory of oak woodland contains annual grasses mixed with native and nonnative forbs. Representative understory species are wild oat (*Avena* spp.), soft chess (*Bromus hordeaceus*), ripgut brome (*B. diandrus*), field hedge parsley (*Torilis arvensis*), and the invasive yellow starthistle (*Centaurea solstitialis*).

Construction of the project would impact 0.22 acre of non-riparian native tree. Impacts to non-riparian native trees were generated from data collected during the arborist survey described above in Section 2.3.1.

2.3.7 USACE Section 404 Jurisdictional Areas

The project area contains numerous features that are potential wetlands and other (i.e., non-wetland) waters of the United States that may be subject to USACE jurisdiction under Section 404 of the Clean Water Act (CWA). An approved Preliminary Jurisdictional Delineation for the Feather River West Levee Project was received on May 1, 2013 from the USACE Sacramento District.

Affected Wetland and Other Water Types

The types and acreages of wetlands and other waters that would be affected by the proposed project are listed below in Table 2-9 and mapped in Figures 2-1 to 2-28. A description of each type of affected wetland and other water is provided below.

Table 2-9. Acreages of Fill of Wetlands and Other Waters

	Acreages of Fill		
Waterbodies	Permanent	Temporary	Total
Wetlands			
Forested/shrub wetland	0.03	0.324	0.354
Seasonal wetland	0.026	0.011	0.037
Tailing wetland	0.131	0.074	0.205
Other Waters			
Open water	0.038	none	0.038
Stream/river	none	none	none
Pond/basin	none	none	none
Ditch/canal	0.207	7.195	7.402
Total	0.432	7.604	8.036

Forested/Shrub Wetlands

Forested/shrub wetlands occur on the waterside of the levee along the margins of the Feather River (but are outside the OHWM of the river) and are concentrated in the southern half of the biological study area. The vegetation in riparian forest wetlands is comparable to that of non-wetland riparian

forest and non-wetland riparian scrub-shrub (described above); however, the forested/shrub wetlands exhibit positive indicators of all three Federal wetland criteria.

Seasonal Wetlands

Areas categorized as seasonal wetlands consist of areas that are predominantly vegetated by either floating vegetation or emergent (rooted) vegetation. Common floating vegetation is filamentous algae, common duckweed (*Lemna minor*), and bladderwort (*Utricularia* sp.). Typical emergent vegetation present is floating primrose willow (*Ludwigia peploides*), tall flatsedge (*Cyperus eragrostis*), lady's thumb (*Persicaria maculosa*), and narrowleaf cattail (*Typha angustifolia*), Seasonal wetlands are scattered throughout the southern half of the biological study area. Based on the absence of a plant community with species that are typically found only in vernal pools (e.g., coyote thistle [*Eryngium* sp.]), the seasonal wetlands in the biological study area were determined to not be vernal pools.

Tailing Wetlands

Tailings wetlands occur at the northern end of the biological study area and contain a mixture of floating and emergent vegetation bounded by shrubs and trees. Common floating and emergent species are common rush(*Juncus effusus*), tall flatsedge, lady's thumb, spikerush (*Eleocharis* spp.) floating primrose willow, and common duckweed. Typical trees and shrubs are Pacific willow (*Salix lasiandra*), Goodding's black willow, and valley oak.

Open Water

Areas categorized as open water following the USACE field review of the delineation consist of features where water is flowing or standing that contain sparse, if any, emergent vegetation. Open water features occur in tailings at the northern end of the biological study area and are interspersed with riparian habitats in the southern end of the biological study area.

Stream/River

The area contains two unnamed streams and the Feather River. The unnamed streams are located in the Feather River floodplain within Reach 16 and convey water at least seasonally (i.e., during the wetter winter months). The streams do not have an apparent link to the Feather River but likely have a hydrologic connection during times of high flow. The Feather River connects to the Sacramento River outside the biological study area.

Pond/Basin

Areas categorized as ponds and basins consist of artificial and excavated depressions, some of which contain water year-round.

Ditch/Canal

The drainage ditches and canals scattered within the biological study area are anthropogenic features that drain water from active agricultural lands during the growing season or following a rain event. They consist of the Sutter-Butte Canal, and other linear, concrete-lined features that convey water across multiple parcels. Many of these features are unvegetated; however, some support emergent vegetation or shrubs along their margins.

Soils and Substrate

The Natural Resources Conservation Service (NRCS) Soil Survey shows the permanent impacts to jurisdictional waters are mapped within 10 different soil types. Descriptions of the soil types are listed in Table 2-10. Most of the soils have loamy alluvium parent materials, except for the 118 Xerorthents, which are dredge spoils. The soils are found on low slope floodplain and terrace landorms and range from somewhat poorly drained to somewhat excessively drained.

Hydric soils are formed under saturated conditions (due to flooding or ponding) for sufficiently long enough duration during the growing season to form anaerobic conditions in the upper soil layer. The soils support growth of hydrophytic vegetation. The 7 soils with a hydric rating and criteria are also indicated in Table 2-10. Five of 7 hydric soils listed are described by the NRCS as only containing minor hydric soil components located in only 3–5% of the soil mapping unit, which means that the soils in the impacted areas themselves may not contain any hydric soil layers.

The predominant soil types of the permanently impacted jurisdictional areas (excluding canals) are 118 Xerorthents, tailings, 0 to 50 percent slopes (45% of area) and 124 Conejo loam, 0 to 2 percent slopes (29% of area). Soil type 118 Xerorthents, tailings is derived from dredged spoil piles from gravelly alluvium derived from igneous, metamorphic and sedimentary rock. The texture of the surface layer is very gravelly sandy loam. It is rated as a hydric soil across 80% of its mapping unit with a hydric rating of 4, which refers to soils that are frequently flooded for long or very long duration during the growing season. Soil type 124 Conejo loam, 0 to 2 percent slopes is derived from loamy alluvium derived from mixed sources. Typically, the surface layer is an approximate 7 inch brown loam and the subsoil is brown loam about 23 inches thick. It is not rated as a hydric soil. The third soil type comprising a substantial portion (17%) of the total impacted area is 121 Boga-Loemstone complex, 0 to 1 percent slopes. It's derived from loamy alluvium over dense silty alluvium derived from igneous and metamorphic rock. The surface layer texture is loam and it is not rated as a hydric soil.

Vegetation

The dominant plant communities in the impacted areas are described above in Section 2.3.3.

Threatened and Endangered Species

Discussion of federally–listed and other special status species is described in detail above in Section 2.3.2 and 2.3.3.

VELB was listed by USFWS as a threatened species on August 8, 1980 (45 FR 52803–52807), due to loss of habitat and inadequate regulatory protection (U.S. Fish and Wildlife Service 2011). The current known range of VELB extends from southern Shasta County, south to Fresno County, and from the east side of the Coast Range to the Sierra Nevada foothills (Barr 1991; U.S. Fish and Wildlife Service 2006). Two critical habitat areas have been designated along portions of the American River in Sacramento County (U.S. Fish and Wildlife Service 1984).

The giant garter snake is the only federally listed species occurring in jurisdictional waters requiring ESA consultation. Critical habitat has not been designated for the giant garter snake.

Table 2-10. Characteristics of Soils in the Impacted Areas

Soil Unit	Parent Material	Slope	Drainage Class	Capacity of Limiting Layer to Transmit Water	Landform	Hydric Rating	Hydric Criteria
Sutter County							
124 Conejo loam, 0 to 2 percent slopes	Loamy alluvium derived from mixed sources	0–2%	Well drained	Moderately high or high (0.57–1.98 in/hr)	Terraces		
126 Conejo-Tisdale complex, 0 to 2 percent slopes	Loamy alluvium derived from mixed sources	0–2%	Well Drained	Moderately High (0.2–0.57 in/hr)	Terraces	Yes [a]	2B3, 4
138 Liveoak sandy clay loam, 0 to 2 percent slopes	Loamy alluvium derived from igneous and metamorphic rock	0–2%	Moderately well drained	Moderately high or high (0.57–1.98 in/hr)	Terraces		
143 Marcum-Gridley clay loams, 0 to 1 percent slopes	Loamy alluvium derived from mixed sources	0–1%	Moderately well drained	Very low (0.00–0.00 in/hr)	Terraces	Yes [b]	2B3, 4
165 Shanghai silt loam, frequently flooded, 0 to 2 percent slopes	Alluvium derived from mixed sources	0–2%	Somewhat poorly drained	Moderately high or high (0.57–1.98 in/hr)	Floodplains	Yes	4
Butte County							
118 Xerorthents, tailings, 0 to 50 percent slopes	Dredged spoil piles from gravelly alluvium derived from igneous, metamorphic and sedimentary rock	0–50%	Somewhat Excessively Drained	High (1.98–4.25 in/hr)	Floodplains	Yes	4
121 Boga-Loemstone complex, 0 to 1 percent slopes	Loamy alluvium over dense silty alluvium derived from igneous and metamorphic rock	0–1%	Moderately well drained	Low to moderately low (0.00–0.06 in/hr)	Terraces		
152 Gianella fine sandy loam, 0 to 1 percent slopes, frequently flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (1.13–5.38 in/hr)	Floodplains	Yes [c]	4
161 Gianella fine sandy loam, 0 to 1 percent slopes, rarely flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (1.13–5.95 in/hr)	Floodplains	Yes [d]	2B2
162 Gianella loam, 0 to 1 percent slopes, rarely flooded	Stratified coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock	0–1%	Moderately well drained	Moderately high or high (0.85–1.98 in/hr)	Floodplains	Yes [e]	2B2

[a] Only for the Oswald component, which comprises 3% of the soil mapping unit.
[b] Only for the Oswald and Capay components, which comprise a combined 4% of the soil mapping unit.
[c] Only for the Columbia, frequently flooded component, which comprises 3% of the soil mapping unit.
[d] Only for the Columbia taxadjunct, very fine sandy loam component, which comprises 3% of the soil mapping unit.
[e] Only for the Columbia taxadjunct, very fine sandy loam component, which comprises 5% of the soil mapping unit.
2B2 - A water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches
2B3 - A water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
4 - Soils that are frequently flooded for long or very long duration during the growing season.

Chapter 3
Mitigation Design

3.1 Basis for Design

On-site replacement habitat involves replacement of affected habitat with new habitat of the same type and at the same location as the loss. Because much of the affected habitat (specifically, woody vegetation) is not compliant in its location with USACE levee vegetation policy, this option is not considered feasible. Further, the highly dispersed nature of the impact locations makes efficient replacement infeasible. Therefore, on-site replacement was not considered further as a viable option for this project and off-site, in-kind habitat replacement was selected as the best option for mitigation. It involves replacement of affected habitat with the same type of habitat at a different location off-site. This often allows for consolidation of mitigation at a single or small number of sites, allowing for economy of scale and higher quality habitat due to large patch size.

The project will utilize two sub-types of off-site, in-kind replacement:

- **Permittee-responsible mitigation.** This option involves replacement of in-kind habitat on habitat lands operated by the permittee. Two separate sites are proposed for this mitigation option. The first site is the Star Bend Conservation Area (SBCA) on the west levee of the Feather River near river mile 18 is an existing floodplain habitat restoration site that was created as part of the Star Bend setback levee project. The second site is the proposed 500-acre TRLIA Feather River Floodway Cooridor Restoration Project (FRFCRP) located on the east bank of the Feather River just upstream of the Star Bend site. Together, both sites contain sufficient area to accommodate all of the project's upland compensatory mitigation and will be used for mitigating impacts to: 1) riparian forest; 2) non-riparian, native trees; and 3) VELB.
- **Purchase of credits at commercial mitigation banks.** This option involves replacement of in-kind habitat through purchase of credits issued for habitat lands operated by a commercial mitigation bank. For the aquatic habitat impacts to GGS, the project proposes to purchase credits at the Sutter Basin Conservation Bank, operated by Westervelt Ecological Services in Sutter County, which is the only bank that presently offers giant garter snake credits approved by both the USFWS and CDFW. The project proposes to purchase jurisdictional water credits at the River Ranch Wetland Mitigation Bank, owned and operated by Wildlands, Inc., and located at the confluence of the Sacramento and Feather Rivers in Yolo County. There are currently no mitigation banks that offer oak woodland (non-riparian native tree) credits.

3.2 Characteristics of Design Reference Site

Previous mitigation work was performed at the 48.5-acre SBCA starting in 2009 for the Feather River Setback Levee and Habitat Enhancement Project (Restoration Resources 2010). The work was done as part of a project to replace a portion of the Feather River west levee with a new setback levee approximately 3,400 feet long that begins near the intersection of Star Bend Road and continues southeasterly to the intersection of Tudor Road. For Phase 1A of the project, 37 existing elderberry shrubs were transplanted. For Phase 1B, 20 acres of elderberry and native associate

plants were installed to enhance VELB habitat. For Phase 1C, approximately 2.46 acres of California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) were planted to protect an area of cultural significance (Restoration Resources 2010). Phase 2 of the SBCA will consistof planting the remaining approximately 24.5 acres. This acreage will be utilized for the mitigation described in this MMP.

The design characteristics used in the initial mitigation work at SBCA will serve as a reference site for the additional VELB mitigation to be performed for this MMP. These characteristics are described in the report *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend*, prepared by River Partners and Stillwater Sciences in 2009 for Levee District 1 and Wood Rodgers.

Design characteristics for riparian forest and oak woodland will incorporate the species composition and plant spacing found in other natural areas in the project site that will not be disturbed. These areas were field mapped, including field inventories of species composition and size. Additional guidance will be provided by the guidelines for Phase 2 riparian habitat planting outlined in River Partners and Stillwater Sciences (2009).

Design of the FRFCRP has not begun, but the site's ecological setting is similar to that found at the SBCA, and it is likely that design principles used at that site could be applied to the FRFCRP.

As described above, mitigation for USACE jurisdictional habitat and GGS will occur off-site at commercial mitigation and conservation banks.

3.2.1 Previous Work Credit

Much of the design information presented below that is specific to the SBCA is taken from the report *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend*, prepared by River Partners and Stillwater Sciences in 2009 for Levee District 1 and Wood Rodgers.

3.3 Proposed Mitigation Site

3.3.1 Location

The SBCA mitigation site is located on the water side (east) of the new setback levee that was constructed in 2009 on the Feather River, approximately six miles south of Yuba City, Sutter County, California (Figures 1 and 4). The 48.5-acre site is just upstream of the Star Bend boat ramp (near River Mile 18) and is bounded on the north and east by a sharp bend in the river. Access by road is from the west via Star Bend Road off of Garden Highway (River Partners and Stillwater Sciences 2009). The property to the east is part of the O'Connor Lakes unit of CDFW's Feather River Wildlife Area. The unit is managed by CDFW and DWR to provide wildlife habitat, restore native plant communities, and convey Feather River flood events. The land to the west of the levee is primarily orchards.

In 2009, LD 1 of Sutter County constructed the Feather River Setback Levee and Habitat Enhancement Project at Star Bend to replace a portion of existing levee that poses a high risk of failure in order to decrease the flood stage, velocity, and scour potential; increase and improve

floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of CDFW's Feather River Wildlife Area. The SBCA project created approximately 48.5 acres of floodplain habitat, which included habitat enhancement and onsite mitigation for impacted elderberry.

Approximately 20 acres have been used for elderberry transplants and associated native plants. In early 2012, a fire at the SBCA damaged portions of the site; however, VELB planting losses were minimal. The remaining approximately 28 acres are available at the conservation area for compensating for impacts on elderberry shrubs, riparian forest, and non-riparian, native trees from construction of the FRWLP.

The FRFCRP site is located on the east side of the Feather River in the levee setback area created by the TRLIA Early Implementation Program (EIP) Feather River Setback Levee project (Figure 1). The FRFCRP is located along a section of the Feather River which currently provides over 3,000 acres of wildlife habitat. Restoration on this site is important because it would add another large block of contiguous habitat (approximately 500 acres) along the lower Feather River; thereby reducing habitat fragmentation.

3.3.2 Ownership Status

The SBCA is under joint control by one of SBFCA's member agencies (Levee District 1) and CDFW. The FRFCRP site is entirely owned by TRLIA.

3.3.3 Jurisdictional Areas

There are no known jurisdictional areas in or near the mitigation activities.

3.3.4 Aquatic Functions

The Feather River Setback Levee and Habitat Enhancement Project at Star Bend constructed in 2009, along with the TRLIA EIP Feather River Setback Levee project, increased the amount of floodplain potentially exposed to inundating flows by approximately 1649 acres. The floodplain restoration allows for higher quality floodplain habitat (better water quality, food inputs, and shelter) for juvenile salmonids and other native species such as Sacramento splittail and steelhead. Organic material produced by native deciduous species restored within the floodplain provides an increased nutrient load for the aquatic environment. This influx of nutrients provides for a greater invertebrate population, thereby creating an abundant food source for fish.

3.3.5 Hydrology and Topography

Both the SBCA and the FRFCRP site were once part of a dynamic system of meandering channels and oxbow lakes that covered an area much wider than the levees of the Feather River Flood Control Project. Levee construction, beginning in the 1860's, confined the channel to its present location, and dams on the Feather and Yuba rivers regulate flows (River Partners and Stillwater Sciences 2009).

To the north of the SBCA, overbank flow from the Feather River periodically (i.e., modeled stage of the 2.5- to 3-year recurrence interval flow [approximately 60,000 cfs]) fills the drainage feature and depressions left by dredger mining (Wood Rodgers, Inc. 2007). In the O'Connor Lakes unit, scour

channels, debris accumulations in trees and shrubs, and deposits of sand are evidence of periodic overbank flow. Periodic maintenance on the O'Connor Lakes Unit is conducted by DWR to increase the conveyance of flood flows and transport sediment (River Partners and Stillwater Sciences 2009).

On the land-side of the existing levee system, rain, flood irrigation and seepage under the levee are the primary sources of surface water. Flooding is used to irrigate the orchard crops, occasionally leaving standing water behind for short periods of time following irrigation. The levee ditch was constructed to contain any water seeping under the toe of the levee, but was only inundated in 1986 and 1997, years in which extremely large flood events occurred (B. Hampton, Manager, LD1, pers. comm., 2007). During those events, water remained for a couple of weeks, generally percolating into soil after flood flows had receded (B. Hampton, Manager, LD1, pers. comm., 2007). In 2006, which had a relatively large flood event, there was no water in the levee ditch (B. Hampton, Manager, LD1, pers. comm., 2007) (River Partners and Stillwater Sciences 2009).

The 2010 initial monitoring report for the Star Bend site (Restoration Resources 2010) stated that surface water was present within the 20 acre habitat area in March 2010 due to low depressions that do not provide sufficient drainage, but began to dry out into April. These areas may have stayed inundated due to the more than average rain received in the regional area during the winter and early spring season.

Elevations of the project area average 45 feet above sea level. Topography is generally flat, with steeper gradients at the river's edge. Several small hills and depressions occur in the O'Connor Lakes Unit as a result of overbank flood scour and deposition, and previous soil excavation and habitat enhancement projects (River Partners and Stillwater Sciences 2009).

Hydrologic function and existing topography of the FRFCRP is likely similar to that found at the SBCA.

3.3.6 Soils and Substrate

The Sutter County Soil Survey (Lytle 1988, NRCS 2008) identifies two soil series within the SBCA. The majority of the site consists of mapping unit 124 Conejo loam, 0 to 2 percent slopes. Conejo soils are very deep, well drained soils formed in alluvium and are observed on alluvial fans and stream terraces. Conejo soils contain about 39.2% sand, 37.3% silt and 23.5% clay. They are classified in hydrologic group B, which have moderately low runoff potential when thoroughly wet and water transmission through the soils is unimpeded.

Mapping unit 134 Holillipah loamy sand, 0 to 2 percent slopes occupies the northern boundary of the site along the Feather River. The Holillipah soils, which contain deep sand to loamy sand derived from mixed alluvium, are frequently flooded, and somewhat excessively well drained (River Partners and Stillwater Sciences 2009).

Detailed soil information for the FRFCRP has not been collected.

3.3.7 Vegetation

Vegetation types at the SBCA were assessed during a September 13, 2006 field survey by EIP Associates (EIP Associates 2007) and were mapped and described during wetland delineation surveys conducted in September 2007 and January 2008 by Stillwater Sciences (Stillwater Sciences 2008b) (River Partners and Stillwater Sciences 2009).

Plant species observed during a September 13, 2006 field survey by EIP Associates included wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), turkey mullein (*Eremocarpus setigerus*), wild mustard (*Brassica* sp.), and prickly lettuce (*Lactuca serriola*) (EIP Associates 2007) (River Partners and Stillwater Sciences 2009).

Riparian forest habitat occurs north of the SBCA, throughout much of the levee ditch, and across much of the O'Connor Lakes unit to the southeast. The area north of the existing levee has a dense canopy of native riparian tree species (approximately one acre), including Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), northern California black walnut (*Juglans californica* var. *hindsii*), Oregon ash (*Fraxinus latifolia*), and valley oak (*Quercus lobata*). There is a sparse to moderately dense shrub layer with arroyo willow (*Salix lasiolepis*), box elder (*Acer negundo*), California button willow (*Cephalanthus occidentalis*), California rose, and narrowleaf willow (*Salix exigua*). The vine layer is thin, containing predominantly California wild grape (*Vitis californica*) and poison oak (*Toxicodendron diversilobum*). The herbaceous layer is generally absent, with small clearings containing black mustard (*Brassica nigra*), oat (*Avena* sp.), perennial pepperweed (*Lepidium latifolium*), seashore vervain (*Verbena littoralis*), and soft brome (River Partners and Stillwater Sciences 2009).

Portions of the Star Bend setback levee ditch (approximately three acres) are predominantly comprised of a mature canopy of valley oak, occasionally shared with blue elderberry (*Sambucus mexicana*). The understory is fairly sparse, with blue wildrye (*Elymus glaucus*), California blackberry, California rose, California wild grape, Goodding's black willow, narrowleaf willow, and poison oak (River Partners and Stillwater Sciences 2009).

The northwest corner of the SBCA includes the recent mitigation work previously described. For Phase 1A of the project, 37 existing elderberry shrubs were transplanted. For Phase 1B, 20 acres of elderberry and native associate plants were installed to enhance VELB habitat. For Phase 1C, approximately 2.46 acres of California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) were planted to protect an area of cultural significance (Restoration Resources 2010).

The majority of the land west of the SBCA is a plum orchard that is flood irrigated. Annual grass and weedy forb species occur between the rows of trees, but the sparse distribution and short stature of the forbs indicate they are sprayed with herbicides or otherwise controlled on a regular basis (River Partners and Stillwater Sciences 2009).

The FRFCRP is vegetated with non-native annual grasses and forbs and is devoid of any woody vegetation. The site is mostly surrounded by orchards or other agriculture, but there an area of existing riparian vegetation adjacent to the southwest corner.

3.3.8 Present and Historical Uses of the Mitigation Areas

Prior to the arrival of Europeans, Native Americans of the Valley Nisenan populations established villages along the Feather River and its tributaries in the vicinity of the site. The northwest corner of the site is a historic low rise along the river and contains an historic record of an indigenous village site (Bayham 2004) (River Partners and Stillwater Sciences 2009).

John Sutter laid claim to the region when he secured the New Helvetia Land Grant in the 1840s. He promptly built Hock Farm, a rancho in the vicinity of the site, which provided cattle stock that ranged freely along Feather River. W. H. Ashford owned and farmed a section of the west bank as early as 1880, which includes most of the site. In 1880, the O'Connor family owned the parcel to the

south of the site where the lakes are located (Sutter County 1880). The 1912 (U.S. Army Corps of Engineers 1912) geologic survey shows dredging activities to the north and south of the site, but not within the site. The 1912 survey also shows that the site had not been cleared for agriculture (River Partners and Stillwater Sciences 2009).

The SBCA is presently being used for the Phase I and Phase II mitigation work previously described. The SBCA converted 55 acres of former orchard and levee into floodplain habitat. Twenty acres of elderberry shrubs and native associate plants for VELB habitat were planted as part of the initial mitigation. The remaining 35 acres were not planted.

The FRFCRP is currently being managed as open floodplain habitat. Prior to inclusion in the setback area created by the TRLIA EIP Feeather River Setback Levee project, the site was largely planted in orchard trees.

3.3.9 Present and Proposed Uses of All Adjacent Areas

The Feather River and three other properties surround the SBCA (i.e., Churkin, Singh, and CDFW properties). The majority of the area west of the site on the land side of the levee is a plum (*Prunus* sp.) orchard that is flood irrigated. The existing levee, operated by LD1, and the Star Bend pumping plant also are located along the site's western boundary. The pumping plant includes pump station discharge lines and irrigation pipelines that bisect the northern portion of the site and continue to adjacent properties. All the property to the east of the SBCA is part of the O'Connor Lakes unit of CDFW's Feather River Wildlife Area. The unit is managed by CDFW and DWR to provide wildlife habitat, restore native plant communities, and convey Feather River flood events.

The FRFCRP is surrounded by orchards or other agricultural land uses to the north, south, and east. To the west is an area of riparian vegetation.

3.4 Created/Restored Habitats

3.4.1 Compensation Ratios

VELB Habitat

Before construction begins, SFBCA will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to the SBCA. Elderberry seedlings or cuttings and associated native species will also be planted at the mitigation site. For mitigation at the site, each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted) would be replaced with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies in a riparian or non-riparian area. Stock of either seedlings or cuttings would be obtained from local sources (including the project area if acceptable to USFWS).

At the discretion of USFWS, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access

problems, may be exempted from transplantation. In cases where transplantation is not possible, minimization ratios would be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to USFWS-approved procedures outlined in the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Property inaccessibility and the high density of vegetation along portions of the Feather River riparian corridor limited the number of elderberry shrubs that could be surveyed (73 shrubs were surveyed). For this reason, compensation for the removal of approximately 91 shrubs was estimated based on the average number of stems in each stem diameter range for the 73 shrubs that could be surveyed (see Table 3-1). Those averages are as follows.

- Number of stems ≥1 inch and ≤3 inches = 4.
- Number of stems >3 inches and <5 inches = 1.
- Number of stems ≥5 inches = 1.

Table 3-1 shows the estimated compensation required for the entire project. Because most of the shrubs are located in riparian habitat and did not have exit holes, the compensation ratios for these conditions were used. As noted in Table 3-1, one elderberry shrub in Reach 13 of Contract C will need to be transplanted prior to the start of work in 2013 and outside of the elderberry dormancy period. Additional compensation will be determined and provided for these shrubs after stem counts are conducted.

Table 3-1. Estimated Compensation for Elderberry Shrubs Removed

Stem Diameter	Number of Stems[1]	Seedling Ratio[2]	Native Plant Ratio[2]	Total Seedlings	Total Native Plants
Stems ≥1" to ≤3"	360	2:1	1:1	720	720
Stems >3" to <5"	90	3:1	1:1	270	270
Stems ≥5"	90	4:1	1:1	360	360
Total	**552**			**1,350**	**1,350**

N/A = not applicable.

[1] The number of stems per shrub was based on the average number of stems in each stem diameter range for the 72 shrubs that could be surveyed. Those averages are as follows: number of stems ≥1" and ≤3" = 4; number of stems >3" and <5" = 1; and number of stems ≥5" = 1.

[2] Ratios are based on shrubs within riparian habitat with no VELB exit holes.

Based on the information in Table 3-1, 270 elderberry units, or 11.16 acres, will be required to fully mitigate for project impacts. All of this mitigation will occur at the SBCA.

Riparian Habitat

The compensation ratios for the project impacts are listed in Table 3-2. The 46.96 acres of compensatory mitigation will be fulfilled at the SBCA and the FRFCRP sites. At the SBCA, the 11.16 acres of elderberry mitigation will be utilized to partially offset the riparian habitat mitigation

obligation, as will 24.5 acres of the riparian mitigation plantings. The remaining 22.46 acres of riparian habitat mitigation will be fulfilled at the FRFCRP site.

Non-Riparian, Native Trees

The compensation ratios for the project impacts are listed in Table 3-2. All 0.44 acre of compensatory mitigation will be fulfilled at the FRFCRP.

Giant Garter Snake

0.012 acre of compensatory giant garter snake mitigation will be purchased from the Sutter Basin Conservation Bank, owned and operated by Westervelt Ecological Services. The bank is located approximately 2.5 miles west of Reach 4.

Jurisdictional Waters

0.87 acre of compensatory wetland mitigation will be purchased from the River Ranch Wetlands Bank, owned and operated by Wildlands Inc. The bank is located approximately 13.5 miles south of Reach 3.

Table 3-2. Anticipated Project Impacts to Sensitive Resources and Proposed Compensatory Mitigation

Impact Type	Impact Unit	Mitigation Ratio	Impact Quantity	Mitigation Need	Mitigation Area
Riparian Tree	acres of canopy	2:1 for canopy	23.48 acres total	46.96 acres	46.96 acres at 10’ o.c. plant spacing
Non-Riparian Native Tree	acres of canopy	2:1 for canopy	0.22 acre total	0.44 acre	0.44 acre at 10’ o.c. plant spacing
Elderberry	individual shrubs and total stem count within each shrub	See Table 3-1	91 shrubs with 540 total stems	91 transplants, 1,350 elderberry seedlings, and 1,350 native associates	11.16 acres (270 elderberry units)
Giant Garter Snake	acres of permanent impact	3:1	0.004 acre aquatic 0.00 acre upland	0.012 acre	0.012 acre
Jurisdictional Waters	acres of permanent impact	2:1	0.432 acre	0.87 acre	0.87 acre

3.4.2 Long-Term Goal(s)

The long-term goal ownership goal for the SBCA is to merge with CDFW’s adjoining O’Conner Lakes and Abbott Lakes Wildlife Units. A similar goal with an appropriate public agency is also envisioned for the FRFCRP.

Given the presence of good soils and potential exposure to frequent flooding, both project areas should sustain rapid growth of restored riparian species throughout the life of the project implementation (approximately 3 years). An “over-planting” approach is used to rapidly establish

native riparian species. Over-planting the project site will eliminate the need for any additional replanting efforts. The ultimate ecological objective for over-planting is that in time the area will thin out and create a complex of open canopy, dense forest, and dead snags, all of which provide benefits to wildlife (River Partners and Stillwater Sciences 2009).

It is anticipated that at the end of the 3-year establishment period, 70% survivorship of woody species will be attained. Over time, mortality based on differences of soil textures and water table depths will create areas of complex, open canopy, dense forest, and dead snags, all of which create habitat for wildlife (River Partners and Stillwater Sciences 2009).

3.4.3 Aquatic Functions

No jurisdictional open water habitat will be created at the either site. The Feather River Setback Levee and Habitat Enhancement Project at Star Bend, together with the TRLIA EIP Feather River Setback Levee project, increased the amount of floodplain potentially exposed to inundating flows by approximately 1649 acres. The floodplain restoration allows for higher quality floodplain habitat (better water quality, food inputs, and shelter) for juvenile salmonids and other native species such as Sacramento splittail and steelhead. Organic material produced by native deciduous species restored within the floodplain provides an increased nutrient load for the aquatic environment. This influx of nutrients also provides for a greater invertebrate population, thereby creating an abundant food source for fish. The additional mitigation plantings for VELB habitat and plantings for riparian forest and non-riparian, native trees proposed for this MMP will further increase the food inputs and shelter for aquatic species by expanding the acreage of floodplain forest and upland habitat at the site (River Partners and Stillwater Sciences 2009).

3.4.4 Hydrology and Topography

The long-term source of water for the new SBCA and FRFCRP mitigation plantings will be groundwater and Feather River flood flows. After the plants have become established enough to discontinue irrigation, groundwater will be the primary source of water. Additional surface water flooding will be provided during when the Feather River flows, most often high during spring and early summer snowmelt. Hydraulic modeling shows that the Feather River overbanks at locations north of the Star Bend site approximately once every 2.5 to 3 years (Wood Rodgers, Inc. 2007, as cited in River Partners and Stillwater Sciences 2009). It is anticipated that flooding will occur at the proposed mitigation site on a similar recurrence interval frequency. The duration of flooding will depend upon water year type. In some years, the river will not overtop its banks and inundate the site. In other years, flooding may occur over a period of several days, while in the wetter years the site could be flooded for several weeks. Flood water that overbanks into the site will generally flow downgradient from the north to south and eventually infiltrate into the ground or recede back into the river when the river's flood stage decreases.

3.4.5 Soils and Substrate

The majority of the SBCA consists of 124 Conejo loam soils, which are very deep, well drained soils formed in alluvium and are observed on alluvial fans and stream terraces. They are classified in hydrologic group B, which have moderately low runoff potential when thoroughly wet and water transmission through the soils is unimpeded. These soils are highly suitable for supporting elderberry shrubs and associated plans for VELB habitat, and for supporting riparian and non-

riparian tree species. The same species that will be planted in the soils at the SBCA are currently growing in the same soils in lands in the site's vicinity.

Detailed soil information has not been collected at the FRFCRP site.

3.4.6 Vegetation

The target plant communities and species at the SBCA will include riparian forest, non-riparian native trees, and elderberry shrubs and associated plans for VELB habitat (Table 3-3).

Table 3-3. Woody Planting Species for the SBCA and FRFCRP site

Common Name	Scientific Name
Coyote brush	*Baccharis pilularis*
Mule fat	*Baccharis salicifolia*
Buttonbush	*Cephalnathus occidentalis*
California Rose	*Rosa californica*
California Blackberry	*Rubus ursinus*
Sandbar willow	*Salix exigua*
Arroyo willow	*Salix lasiolepis*
Blue elderberry	*Sambucus mexicana*
Valley oak	*Quercus lobata*
Interior live oak	*Quercus wislizeni*
Oregon ash	*Fraxinus latifolia*
Fremont cottonwood	*Populus fremontii*
Box elder	*Acer negundo*

The detailed planting plan is described below in Section 5.2.

Chapter 4
Success Criteria and Monitoring

4.1 Success Criteria

For this MMP, a "success criterion" is a measure that indicates whether the mitigation goals have been achieved at the end of the monitoring period. The mitigation will be evaluated annually for the first five years and then every five years until the twentieth year using the annual performance standards. Table 4-1 summarizes the monitoring success criteria for restored and enhanced wetlands, drainages, and upland and riparian areas.

Table 4-1. Monitoring Success Criteria for Planted Areas at the SBCA and FRFCRP site

Monitored Characteristic	Monitoring Year	Success Criteria Standards
Riparian Vegetation		
Plant survival	1–20	Demonstrate at least 60% survival of all riparian vegetation plantings after 20 years.
Non-Riparian Vegetation		
Plant survival	1–20	Demonstrate at least 60% survival of all non-riparian native plant plantings after 20 years.
Valley Elderberry Longhorn Beetle		
Plant survival	1–10 or 1, 2, 3, 5, 7, 10, and 15	Demonstrate at least 60% survival of all elderberry and native associate plantings

A minimum survival rate of at least 60 percent of all of the plantings must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The resource agencies will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

4.2 Monitoring

4.2.1 Methods

Monitoring will be quantitative and qualitative. The monitoring methods that will be used during the annual performance monitoring are described below by habitat and restoration/mitigation category.

Annual Surveys

At the end of the first growing season, the restoration contractor will conduct a complete census of all woody species planted. The data are best analyzed using a database to calculate survivorship, and to determine any changes to or omissions from the original planting design. During years two and

three, woody species plantings will be sampled to determine survivorship, growth, and coverage. Sampling of native grass and herbaceous understory plantings will also be conducted (River Partners and Stillwater Sciences 2009).

Census

At the end of the first growing season, a census noting survivorship for each location (alive, dead, or missing/not planted) will be conducted. The census allows for pattern analysis to examine the effects of soil, hydrology, or other factors affecting survivorship. During implementation, changes in the planting design are possible (or even desirable) and should be noted. Deviations in planting can also be recorded during the census. Results of the census will be used to determine progress towards performance criteria and replanting, if necessary (River Partners and Stillwater Sciences 2009).

Permanent Plot Sampling

After the initial census, subsequent monitoring (years 2 and 3) utilizes permanent plots to collect data on overall survivorship, height, and cover. The sampling procedure is modified for a restoration setting from protocol developed by Dr. Dave Wood (CSU, Chico) to establish permanent plots in riparian forests (personal communication). Some of the methods have been adapted from Elzinga et al. 1998. Comparison of survivorship between the sampling procedure and census indicates that sampling estimates are within 2% and provide additional information on cover and recruitment (results based on data from field 4 of the Ord Bend Unit, Sacramento River National Wildlife Refuge (River Partners 2003)). The sampling procedure may also be used to compare pre- and post-restoration vegetation, if the permanent plots are installed beforehand (River Partners and Stillwater Sciences 2009).

Plot Location and Size

All samples are based on 20 m x 50 m (1,000 m^2) plots (quadrats) placed with the long axis oriented in a north-south direction. Permanent plot locations will be selected by stratifying the field and using the grid cell method (overlaying each field with a 20 m x 50 m grid) to select sampled plots. Plots that extend past the plantable area are generally rejected. In addition, we exclude locations that are not characteristic of that particular area. In general, a plot should be established every 5–20 acres. The plots serve as areas to collect information on woody, shrub, and herbaceous species (if desired) (River Partners and Stillwater Sciences 2009).

Once each specific plot location is randomly selected, its field location will be permanently recorded at the upstream, inland corner of the plot. The position will be recorded with a GPS unit, and, in subsequent monitoring years, will be reestablished in the same position (River Partners and Stillwater Sciences 2009).

Measurements

At each plot, cover and height measurements of all shrubs and trees inside the 20 m x 50 m plot will be recorded. To assess the survivorship of planted species, we will note their status: alive, dead, or missing (not planted). Because restoration activities often create conditions that favor the survivorship and natural recruitment of native plants, newly recruited native riparian woody species will also be recorded. The estimate of aerial cover of both trees and shrubs will be based on the longest diameter through the horizontal plane of the plant's drip line, a thin line at which a drop

of water would fall from the outward most oriented leaf (River Partners and Stillwater Sciences 2009).

4.2.2 Monitoring Schedule

The riparian tree and non-riparian native tree restoration areas will be monitored annually during Years 1 through 5 following completion of mitigation project implementation. First year monitoring will not be completed until after one full growing season for vegetation has passed since completion of construction. SBFCA will submit an annual report at the end of each monitoring year and a final report to USACE and other resource agencies for review and approval. These areas will be monitored annually during May or June. Additional monitoring of the riparian tree and non-riparian native tree restoration areas will be conducted in the 10th, 15th, and 20th years.

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist (USFWS 1999a).

4.2.3 Photo-Documentation

The progress of the restoration areas will be documented photographically. Permanent photo-documentation stations will be established at several points throughout both sites. The locations of photo-documentation stations will be determined during the first year of the monitoring period, and the locations will be identified in the field and mapped, either on a map or by using a GPS receiver.

The number of photographs taken at a given photo-documentation station will vary, depending on the area and habitat. Photos will include panoramic views taken from a high point at the site that will not be obscured in future years by growing vegetation. A sufficient number of stations will be established to ensure that the photographs provide a visual record of the sites. Photographs will be taken during June of each monitoring year. Additional representative photographs may be taken at other times of the year at SBFCA's discretion.

Chapter 5
Implementation Plan

5.1 Site Preparation

5.1.1 Avoidance Measures

Site preparation during the first phase of work will involve implementing the following avoidance measure actions related to preconstruction surveys and construction staking.

- Stake the limits of the work area, including construction, staging, and access areas.
- Perform pre-construction surveys for giant garter snake, western pond turtle, nesting birds/raptors, native bats and valley elderberry longhorn beetle.
- Stake the limits of Environmentally Sensitive Areas (ESAs).
- Place protection fencing around the perimeter of ESAs.
- Place silt fencing, when appropriate, around the perimeter of ESAs.
- Perform preconstruction surveys of affected drainages.

Prior to construction, the construction contractor, under the supervision of SBFCA, will survey and stake the location of the work area and ESAs. These locations will be based on the project construction documents prepared by SBFCA and will be in accordance with this MMP.

The construction contractor will install protective fencing and/or silt fencing according to the specifications in the project construction documents around ESAs to be preserved. Protective fencing will consist of orange plastic-mesh fencing that is secured to metal T-posts. To prevent soil or sediment from entering sensitive areas, silt fencing may be installed around areas to be preserved. Silt fencing may be used in combination with protective fencing and will be installed in accordance with the Stormwater Pollution Prevention Plan that will be prepared by the contractor and the best management practices identified in the project construction documents. This silt fence will also serve as exclusion fencing to aid in preventing wildlife from entering active construction areas.

Prior to initial ground disturbance, preconstruction surveys for giant garter snake, western pond turtle, nesting migratory birds/raptors, and roosting bats will be conducted to ensure that these sensitive species are not directly or indirectly affected by restoration activities. Nesting bird and raptor survey will be conducted no more than 14 days prior to the start of construction to ensure that no active bird nests are present within 50 feet and no raptor nests are present within 300 feet of restoration activities. A bat emergence survey will also be conducted within 14 days prior to construction to ensure that no trees supporting maternal roosts are present within or adjacent to restoration activities.

If a special-status species is identified within or adjacent to restoration activities, appropriate no-disturbance buffers will be established for breeding sites or the individual(s) will be allowed to passively move out of the construction area. Buffers will be determined by a qualified biologist, coordinating with the appropriate regulatory agency, and will depend on the species identified and

one or more of the following factors: season of activity, level of noise or construction activity, level of ambient noise in the vicinity, and line-of-sight.

5.1.2 Pest Plant Removal

Weed control is necessary for the successful establishment of native plants and improvement of habitat. The weeds of greatest concern at the site are black mustard, yellow starthistle and pepperweed (River Partners and Stillwater Sciences 2009).

In areas to be planted with herbaceous species, spraying and mowing for an entire season before planting is recommended. Once the herbaceous species are planted, weed control methods will be mowing, possibly applying 2,4-D to control broad leaf pressure. The restoration contractor will abide by county and state herbicide permitting and reporting requirements. Roundup® (glyphosate) and 2,4-D (for broad-leaf control in native grass planting) are likely to be the most commonly used herbicides on the project. Rodeo® (for areas adjacent to water bodies), Telar® (for pepperweed control), Poast® (for post-emergence control of annual grasses in herbaceous understory planting) and Garlon™ (for woody species control) may also be used (River Partners and Stillwater Sciences 2009). No herbicide will be applied on days when wind speed is high enough to cause drift onto adjacent natural or planting areas.

Planting areas that are within 200 feet of any natural elderberries, elderberry plantings or transplants will not be sprayed with any herbicide during site preparation activities. Only hand or mechanical weed removal methods will be employed in these areas.

5.1.3 Construction Monitor

An individual familiar with this mitigation and monitoring plan will supervise all phases of construction of the project. These phases may include:

- Layout of proposed other waters of the United States boundaries prior to construction.
- Placement and installation of ESA fencing.
- Site preparation/vegetation clearing operations.
- Planting and seeding operations.

The construction monitor will have authority to direct equipment operators and will submit a summary report to the USACE documenting construction observations and any problems that arise.

5.2 Planting/Seeding

5.2.1 Planting Plan

A conceptual planting plan and plant palette for the SBCA is shown in Figures 5 and 6. Planting of the SBCA and FRFCRP site will consist of the following species for Elderberry mitigation (Table 5-1), riparian mitigation (Table 5-2), non-riparian native tree mitigation (Table 5-3) and upland seed mix (Table 5-4):

Table 5-1. Plant Palette for Elderberry Mitigation Areas

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Sambucus mexicana	Blue elderberry	50	10’ O.C.	1-gallon
Baccharis pilularis	Coyote brush	10		1-gallon
Populus fremontii	Fremont cottonwood	10		1-gallon
Rosa californica	California rose	10		1-gallon
Quercus lobata	Valley oak	10		1-gallon
Salix lasiolepis	Arroyo willow	5		1-gallon
Salix exigua	Sandbar willow	5		1-gallon

Table 5-2. Plant Palette for Riparian Mitigation Areas

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Populus fremontii	Fremont cottonwood	25	10’ O.C.	1-gallon
Box elder	Acer negundo	12.5		1-gallon
Oregon ash	Fraxinus latifolia	12.5		1-gallon
Rosa californica	California rose	10		1-gallon
Quercus lobata	Valley oak	10		1-gallon
Salix lasiolepis	Arroyo willow	10		1-gallon
Salix exigua	Sandbar willow	10		1-gallon
Rubus ursinus	California blackberry	5		1-gallon
Cephalanthus occidental	Buttonbush	5		1-gallon

Table 5-3. Plant Palette for Non-Riparian Native Tree Mitigation Areas

Scientific Name	Common Name	Percent of Planting Mix	Plant Spacing (feet on-center)	Container Size
Quercus lobata	Valley oak	75	10’ O.C.	1-gallon
Baccharis pilularis	Coyote brush	15		1-gallon
Quercus wislizeni	Interior live oak	10		1-gallon

Table 5-4. Upland Seed Mix

Botanical Name	Common Name	Pounds Pure Live Seed Per Acre (Slope Measurement)
In-Stream Bench Seeding (Type 1)		
Leymus triticoides	Creeping wild rye	10
Hordeum brachyantherum ssp. *californicum*	Meadow barley	12
Elymus glaucus	Blue wild rye	12
Eschscholizia californica	California poppy	2
Lupinus succulentus	Arroyo lupine	4
Triticum x Elymus	Regreen	25

5.2.2 Nature and Source of Propagules

Container plants will be purchased from a commercial nursery located within two hours of the project site. If possible, container plants will be grown from seeds or cuttings collected at or near the project site in order to populate the site with species ecotypes that are adapted to local ecological conditions.

5.3 Irrigation

Because of the dry summers typical of the climate in the area, irrigation will be required for plant establishment and survival. Irrigation should be applied with the goal that plants will become self-sufficient by the end of the third growing season (River Partners and Stillwater Sciences 2009).

In the first growing season, the rapidly growing seedlings have roots only in the surface (the top 1–2 feet) of the soil profile. The rooting zone must be kept moist through the season to ensure optimum growth and survival. Because of the sandy soils at the site and water table depths of over 20 feet, the soil moisture of the fields planted with woody species will need to be closely monitored. The intervals between irrigations are dependent upon soil texture, depth to water table, the weather conditions, and plant water stress. Because a mixture of species with different water demands is proposed, the plants must be carefully observed to maintain a balance of soil moisture that is acceptable for xeric species like valley oak and elderberry as well as more mesic species like cottonwood and willow (River Partners and Stillwater Sciences 2009).

Prior to project implementation, a more detailed irrigation design will be developed. All irrigation water at the SBCA will be provided by an existing well located in the O'Connor Lakes Unit, near the midpoint of the eastern edge of the project area. The mainline will run west from the well (River Partners and Stillwater Sciences 2009). Irrigation water at the FRFCRP site will be supplied from existing wells on-site.

Based on knowledge of the site and plant design, the following are expected to be the requirements for the system:

- The plant spacing throughout most of the restoration and mitigation areas will be 10-foot-wide rows with a 10-foot distance down the planting rows, and rows planted in an approximate east-west direction.

- Planting rows will curve and run parallel to flood flows. The irrigation system will utilize existing wells as water sources.
- The drip-line emitters will be spaced, with three emitters per plant 12 inches apart. The design flow will be 0.6 gallons per hour per emitter (1.8 gallons per plant per hour).

Within selected areas, soil-moisture sensors will be placed throughout both planting areas. Sensors will be installed at depths of 12 and 36 inches (River Partners and Stillwater Sciences 2009).

In conjunction with these measurements, plant stress observations before and after irrigation periods will be necessary to critically judge the timeliness and effectiveness of irrigation. Measurements provide the most direct assessment of soil moisture. Table 5-5 provides the irrigation goals of the project (River Partners and Stillwater Sciences 2009).

Table 5-5. Irrigation Goals for the SBCA and FRFCRP site

Year	Goal	Frequency
1	Keep the shallow roots (1–2 feet) of young plants moist to ensure optimum growth and survival.	Utilize soil moisture probes to monitor and maintain moisture throughout the soil column.
2	Encourage deep rooting and enhance field access to facilitate weed control.	Deliver less frequent but longer irrigations.
3	Encourage deep rooting and enhance field.	Continue with long irrigations and extend the access to facilitate weed control period between irrigations.

Source: River Partners and Stillwater Sciences 2009.

The strategy for the second and third year is to train the roots to grow deep. Roots at depth (5–15 feet) will need less water and may be able to tap into the water table on the site and outcompete more shallow-rooted weeds. Less frequent, deep watering will encourage roots to grow deeper, well below the roots of the weeds, allowing the tree exclusive use of this deep moisture. As the tree's roots grow deeper, the times between irrigations become longer; this allows the soil surface layers to dry, thereby reducing weed vigor (River Partners and Stillwater Sciences 2009).

We anticipate that the well-drained, sandy soils, and relatively deep groundwater present on the site, will require frequent irrigations and careful observation of water stress. These areas may dictate the frequency of watering on the site. Field managers should use a combination of methods including evapotranspiration estimates, soil probes, gypsum blocks, and plant water stress signs to assess soil moisture and alter the irrigation regime (River Partners and Stillwater Sciences 2009).

5.4 Implementation Schedule

The mitigation project will be implemented during the fall of 2013. Initial elderberry shrub transplant activities will take place during the winter of 2013–2014 and additional transplants will take place in subsequent winters as future phases of the levee project are implemented. Mitigation maintenance will begin immediately following completion of the mitigation activities.

Chapter 6
Maintenance during Monitoring Period

6.1 Maintenance Activities

6.1.1 Overall

Mitigation and riparian vegetation enhancement activities at the SBCA and FRFCRP site will be monitored by LD1 and/or CDFW (or their designee) to determine if mitigation requirements and habitat enhancement goals and performance standards are being met. Annual monitoring of riparian vegetation establishment, including natural native plant recruitment, nonnative plant recruitment, and plant development, will provide guidance to LD1 and/or CDFW (or their designee) to determine if remedial actions are needed. Annual monitoring reports will be submitted by December 31 of each year. If monitoring reveals that performance standards are not being met, remedial activities may be implemented (River Partners and Stillwater Sciences 2009).

6.1.2 Irrigation

All planted areas within the mitigation site will be irrigated during the establishment period. Soil moisture should be checked at least twice weekly and plantings should be qualitatively assessed for signs of drought stress. All planting areas will be irrigated at least twice weekly from May through October. Irrigation event duration should be adjusted depending on soil moisture and prevailing weather conditions but should be of sufficient length to maintain vigorous plant growth and encourage deep root growth.

Between November and April soil moisture at the mitigation site will be checked twice a month, and, if necessary, the irrigation system will be run for approximately ½ hour or long enough to replenish soil moisture around the plantings in the mitigation area.

6.1.3 Invasive Plant Control

Weeding efforts will occur on a monthly basis from April to October of each year for 5 years. Weed control will consist of controlling populations of invasive weeds when they occur in the planting areas. Weed control will consist of mechanical or manual removal only. At no time will herbicides be used in the planted areas. Plant Replacement

Dead of diseased plants will be replaced immediately upon their discovery with new plants of the same size and species. Plant species substitutions will only be permitted with the prior approval of the resource manager.

6.1.4 Irrigation System Maintenance

The resource manager will maintain the irrigation system during the plant establishment maintenance period. Maintenance will include the repair and replacement of parts, ensuring the system is delivering the required amount of water, and ensuring the system is fully operational at all

times. The resource manager will regularly inspect the irrigation system, adjust and replace parts as necessary.

6.1.5 Reporting and Record Keeping

The resource manager will prepare and keep current a record of monthly maintenance performed on the project. The record will identify, at a minimum, project name, mitigation planting zones, current date and establishment period. The record will also identify and discuss weed control performed, irrigation activity and maintenance, plant health, vandalism, site feature conditions, general observations, total precipitation for the month, personnel onsite and any other pertinent information describing site conditions and activities performed during the month.

Chapter 7
Proposed Monitoring Reports

7.1 Due Dates

SBFCA will notify the USACE and other resource agencies of the due date (month and day) for the annual monitoring report.

7.2 As-Builts

As-built planting and irrigation drawings of the mitigation areas will be prepared by SBFCA following completion of the project. The as-built drawings will be prepared on 40-scale or larger-scale maps and will indicate the following features.

- Extent of planting areas (in plan view).
- Location of any permanent markers (e.g., identification stakes, photo documentation stations).
- Seeded areas.
- Other pertinent features.

Any changes from the original mitigation construction plans will be indicated in indelible red ink. The as-built drawings will be submitted to USACE and other resource agencies within 6 weeks of construction completion.

7.3 Annual Reports

7.3.1 File Number

Any appropriate USACE permit/file numbers will be included on correspondence, including the cover and title page of all reports.

7.3.2 Contents

The following text describes the content that will be included in the mitigation monitoring reports.

Years of Full Monitoring

SBFCA will prepare an annual monitoring report in accordance with USACE guidance (U.S. Army Corps of Engineers 2004 and 2006) by December 31 of each monitoring year. Each full-year monitoring report will include the following information.

- Project Information
    - Project name and a summary of the project location and description including date of project commencement and completion.

  - Contact information for the applicant.
  - A list of the names, titles, and companies of the people who prepared the content of the annual report or participated in monitoring activities that year.
  - USACE permit file number.
  - Type and acres of impacted habitat.
  - The monitoring year.
  - Information on any required performance bonds or surety, if applicable.
- Compensatory Mitigation Site Information
  - Location of the mitigation site.
  - Purpose and goals of the mitigation.
  - Dates of mitigation site construction and completion.
  - Dates and summary of maintenance and performance monitoring visits.
  - Contact information for the responsible party for the mitigation site.
  - Summary of remedial actions, if applicable.
- Figures and Graphics
  - Location map.
  - Mitigation site map indicating restored habitats, monitoring locations, photo documentation stations, and any other pertinent site features.
- List of USACE-approved success criteria
- Monitoring Results
  - A summary and analysis of the monitoring results, including an evaluation of site conditions in the context of the performance standards and success criteria, including a comparison with previous monitoring years.
  - Summary of field data taken to determine compliance.
- Problems noted and proposed remedial measures
  - Problems noted during the course of the monitoring surveys or other site visits.
  - Management recommendations, including discussion of areas with inadequate performance and recommendations for remedial action.
- Appendices
  - Original data sheets and technical appendices, as required by the USACE and other resource agencies.
  - Photo-documentation of the planting areas using photographs taken during the monitoring surveys.

Final Monitoring Report

A final monitoring report will be submitted after all performance monitoring at the mitigation sites is complete. The final report will be prepared by a qualified biologist and will evaluate whether the mitigation has achieved the goals and success criteria set forth in the approved MMP. The final report will be submitted within 90 days of the end of the monitoring period to the USACE and other resource agencies for review and approval.

Chapter 8
Potential Contingency Measures

8.1 Initiating Procedures

If the final report indicates that the mitigation project has been unsuccessful, in part or in whole, based on the approved success criteria for physical and ecological functions, the applicant will evaluate the causes for not meeting the criteria and submit a revised or supplemental mitigation plan within 90 days of the end of the monitoring period for the review and approval of USACE to compensate for those portions of the original program that did not meet the approved success criteria. The approved remedial measures will be developed based on the qualitative and quantitative monitoring results to determine the most effective remedy. The revised mitigation plan containing the remedial measures will be processed as an amendment to the original permit unless USACE determines that no permit amendment is required.

If, after all remedial measures have been implemented, it becomes evident that the permit requirements cannot be satisfied according to the proposed mitigation plan, SBFCA will coordinate with the permitting agencies to develop a contingency plan to be approved by all parties.

8.2 Contingency Funding Mechanism

SBFCA will fund any necessary contingency mitigation efforts, including additional planning, implementation, and monitoring. SBFCA will keep funds available for potential contingency measures until final written confirmation from the USACE that all success criteria have been met.

Chapter 9
Completion of Mitigation Responsibilities

9.1 Notification

SBFCA will notify USACE of completion of mitigation responsibilities in conjunction with the final annual report. A minimum of 2 years will be required after the completion of all maintenance activities (e.g., irrigation, replanting, rodent control, fertilization) before final success criteria will be considered met.

9.2 USACE Confirmation

After receiving the final monitoring report, USACE will conduct a site visit and confirm in writing to SBFCA that the mitigation obligations and responsibilities have been met, or if not met, describe additional actions required.

Chapter 10
Long-Term Management

10.1 Property Ownership

The SBCA is owned in part by LD 1 and in part by CDFW. The FRFCRP site is entirely owned by TRLIA.

10.2 Management Plan

10.2.1 Purpose

This section only addresses permittee-responsible mitigation, as compensatory mitigation not addressed below will be deemed satisfied and complete through purchase of credits from a commercial mitigation bank approved by the appropriate resource agencies.

The purpose of this long-term management plan is to ensure the mitigation site is monitored and maintained in perpetuity. This management plan provides management objectives and tasks to monitor, manage, maintain and report on the mitigated natural resources. Routine monitoring and minor maintenance tasks are intended to assure the viability of the mitigation site's functions and values. This long-term management plan will take effect after the completion of the monitoring period, once it has been determined by the appropriate resource agencies that the mitigation project has achieved its project objectives and outlined performance standards for each habitat type have been reached. During the long-term management period the gradual withdrawal of the required support systems (e.g., irrigation and frequency of maintenance) for mitigation resources will begin. The goal for each mitigation site is to become fully self-sustaining. The designated resource manager(s) will oversee all long-term management activities.

10.2.2 Resource Manager

The resources managers are LD1 and CDFW. The resource managers, and subsequent resource managers, upon transfer, shall implement this long-term management plan. Long-term management tasks shall be funded through the mitigation site's endowment fund. The resource manager(s) shall be responsible for providing an annual report, consisting of a description of the management tasks and total funds expended, to the appropriate resource agencies. Any subsequent modification to the mitigation sites by the resource manager(s) or their representatives must be approved by the appropriate resources agencies and the necessary permits obtained.

10.2.3 Management Approach

The general management approach to the long-term maintenance of the mitigation site will be to maintain quality habitat functions and values for each mitigated resource and on-going monitoring and maintenance of the mitigation site. When necessary, adaptive management will be used to adjust management practices, including corrective actions as determined to be appropriate by the

appropriate resources agencies in discussion with the resource manager(s). Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural events, force majeure, etc. Before considering any adaptive management changes to the long-term management plan, the appropriate resource agencies will consider whether such actions will help ensure the continued viability of the mitigation site's biological resources.

10.2.4 Long-Term Management Needs

The expected long-term management needs and activities necessary to maintain the mitigation site will be resource specific long-term maintenance activities as describe d below and other general maintenance activities such as exotic species elimination, clean-up and trash removal, infrastructure management such as gate, fence, road, culvert, signage and drainage-feature repair, and other maintenance activities necessary to maintain the functions and values of the mitigation site.

Biological Monitoring

Annual field surveys will be conducted to qualitatively assess and record the general conditions of the riparian, non-riparian native trees, and elderberry planting areas. General hydrology, general vegetative cover, structure and native plant diversity, invasive species, and erosion sites will be recorded, evaluated and mapped during site examinations in the spring. Notes to be made will include observations of species encountered, general condition of the planting areas, occurrences of erosion, and presence of significant populations of non-native invasive plants.

Diversity of native plant species will be maintained by replanting native species as specified in the original planting plan, or when appropriate, introduction of additional native species. Native species from various plant communities should be selected to complement natural seral processes that may take place as the mitigation site ages and matures.

Other Site Management Activities

Other site management and maintenance activities are those that may be required on an as-needed basis. Items listed below may be observed, implemented, and/or recorded during annual site observation and included in annual report to the appropriate resource agencies. Funding for these management and maintenance activities will be covered by the mitigation site's endowment fund.

General Inspections: The resource manager(s) will conduct two general site inspections each year. These inspections may take place while conducting other routine site maintenance visits. Photo documentation will be collected. Permanent photo points for taking photographs will be established, and a site map showing the photo point will be prepared for the mitigation project file. Representative photographs will be taken once per year during the same season.

Mosquito Abatement: Potential mosquito abatement issues will be addressed through the development of a plan by the resource manager(s) and the mosquito and vector control district in coordination with and approved by the appropriate resource agencies.

Trash and Trespass: At least once yearly trash will be collected and disposed within the mitigation site. Vandalism and trespass impacts will be repaired and rectified. Sources of trash and trespass will be monitored.

Non-native Invasive Species: The resource manager(s) will monitor and maintain control over non-native invasive species, including but not limited to noxious weeds, that diminish site quality for which the mitigation project was established. The mitigation site currently functions with a number of nonnative species, some of which have become naturalized. They are predominantly annual species that occur in grasslands. It is unreasonable to require or expect eradication of established nonnative species at the site. The required management of nonnative plants therefore will be limited to the management of newly introduced invasive species and controlling the spread of existing invasive species. Methods of removing or controlling these species are outlined below.

Hand/mechanical: Hand removal or use of small hand-powered or handheld equipment (such as a Weed Wrench or a chainsaw) always should be the preferred method of removing invasive species from the mitigation properties. If hand-removal methods are found ineffective, or the problem is too widespread for hand removal to be practical, mechanical methods (use of larger equipment with motors such as mowers) or biological controls as described below can be used.

Biological controls: The county agricultural commissioner would be the point of contact for use of biological controls in the mitigation properties.

At no time will herbicides be utilized at the mitigation site.

Weeding will be done on an as-needed basis starting in March and ending in October.

Each year's annual walk-through survey (or a supplemental survey) will include a qualitative assessment (e.g., visual estimate of cover) of potential or observed noxious weeds or other non-native species invasions, primarily in or around the wetlands. Additional actions to control invasive species will be evaluated and prioritized.

Fire Hazard Reduction: Potential wildfire fuels will be reduced as needed by mowing in areas where approved by the resource agencies. The site will be maintained as required for fire control while limiting impacts to biological values. Vegetation will be mowed in areas required by authority agency(ies), and as approved by the appropriate resource agencies, for fire control.

Reporting and Administration

The resource manager(s) will provide an annual report on all management tasks conducted and general site conditions to appropriate resource agencies and any other appropriate parties. The annual report will be completed and circulated to the appropriate resource agencies and other parties by August 15 of each year. The report will make recommendations with regard to any habitat enhancement measures deemed to be necessary, any problems that need near short and long-term attention (e.g., weed removal, erosion control), and any changes in the monitoring or management program that appear to be warranted based on monitoring results to date.

10.2.5 Management Responsibilities and Plan Modification

Transfer of Management Responsibilities

Any subsequent transfer of management responsibilities under this long-term management plan to a different resource manager shall be requested in writing by the existing resource manager(s). The request shall be made to the appropriate resource agencies, which will issue written approval that shall be incorporated as an amendment into this long-term management plan. Any subsequent

property owner assumes resource manager responsibilities described in this long-term management plan and as required in the conservation easement, unless otherwise amended in writing by the appropriate resource agencies.

Amendment to Management Plan

The resource manager(s), property owner, and the resource agencies may meet and confer from time to time, upon the request of any one of them, to revise the long-term management plan to better meet management objectives and preserve the habitat functions and values of the mitigation site. Any proposed changes to the long-term management plan shall be discussed with the appropriate resource agencies and the resource manager(s). Any proposed changes will be designed with input from all parties. Amendments to the long-term management plan shall be approved by the appropriate resource agencies in writing and implemented by the resource manager(s).

10.2.6 Funding

Long-Term Funding Mechanism

An endowment will be provided by SBFCA to CDFW who will hold the principal and interest monies as required by law in a deposit fund, or subsequent state authorized trustee fund which consists of monies that are paid into it in trust pursuant to law, and will be appropriated to fulfill purposes for which payments into it are made. These interest monies will fund the long-term management, enhancement and monitoring activities set forth by the conservation easement and consistent with this long term management plan.

The resource manager(s) shall consult with CDFW as required to determine the amount of funding available for management and monitoring activities.

10.2.7 Long-Term Conservation Mechanism

Conservation Easement

Conservation easements will be created for the portion of the SBCA owned by LD , and the entire FRFCRP site. They will act as a legal binding agreement to restrict the use of the parcel for the purpose of conserving in perpetuity the mitigated natural resources. The conservation easement will be attached to the property's fee title and apply to present and all future owners and resources managers of the mitigation site should LD1 relinquish or transfer land management responsibilities.

Chapter 11
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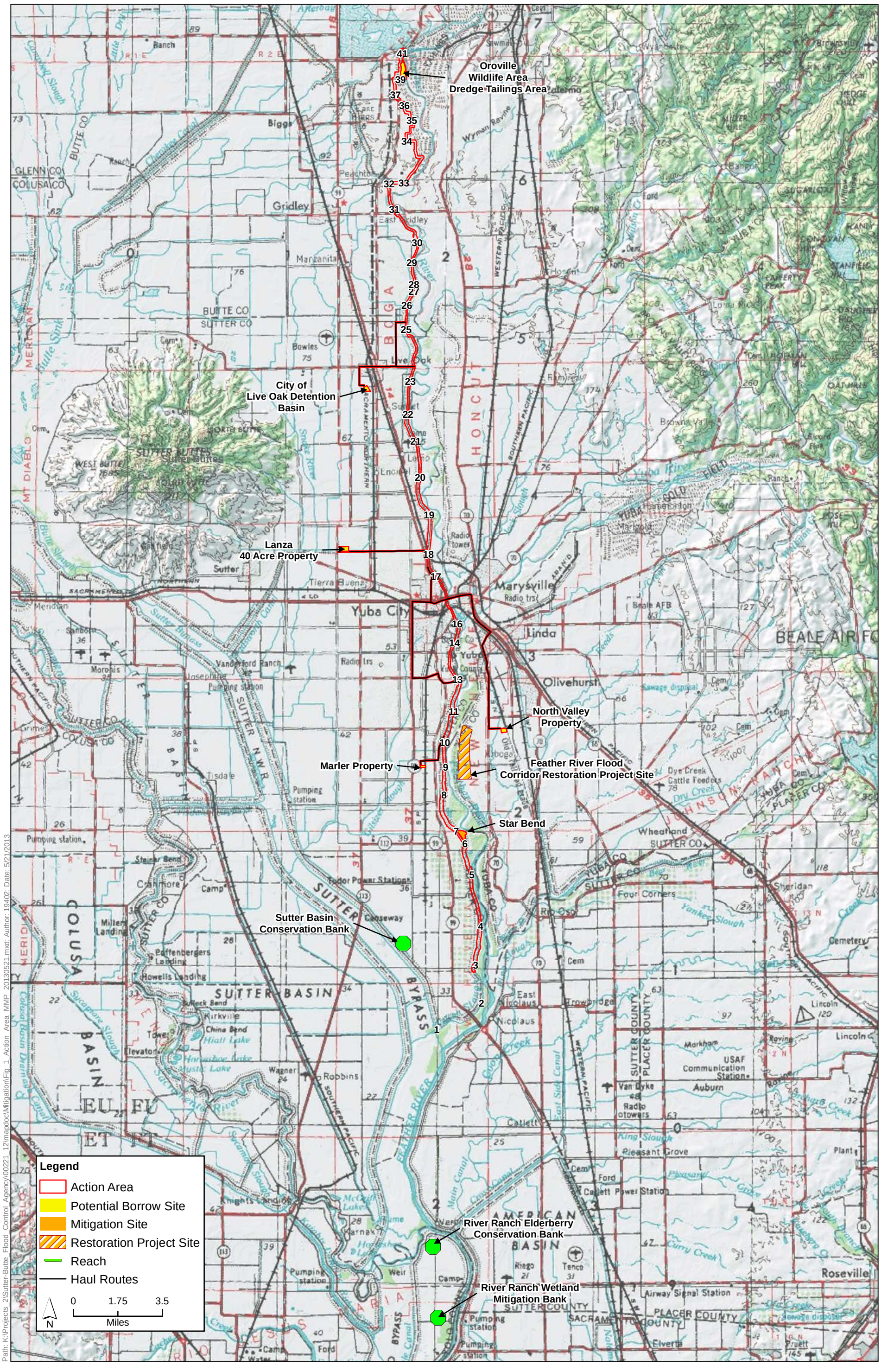

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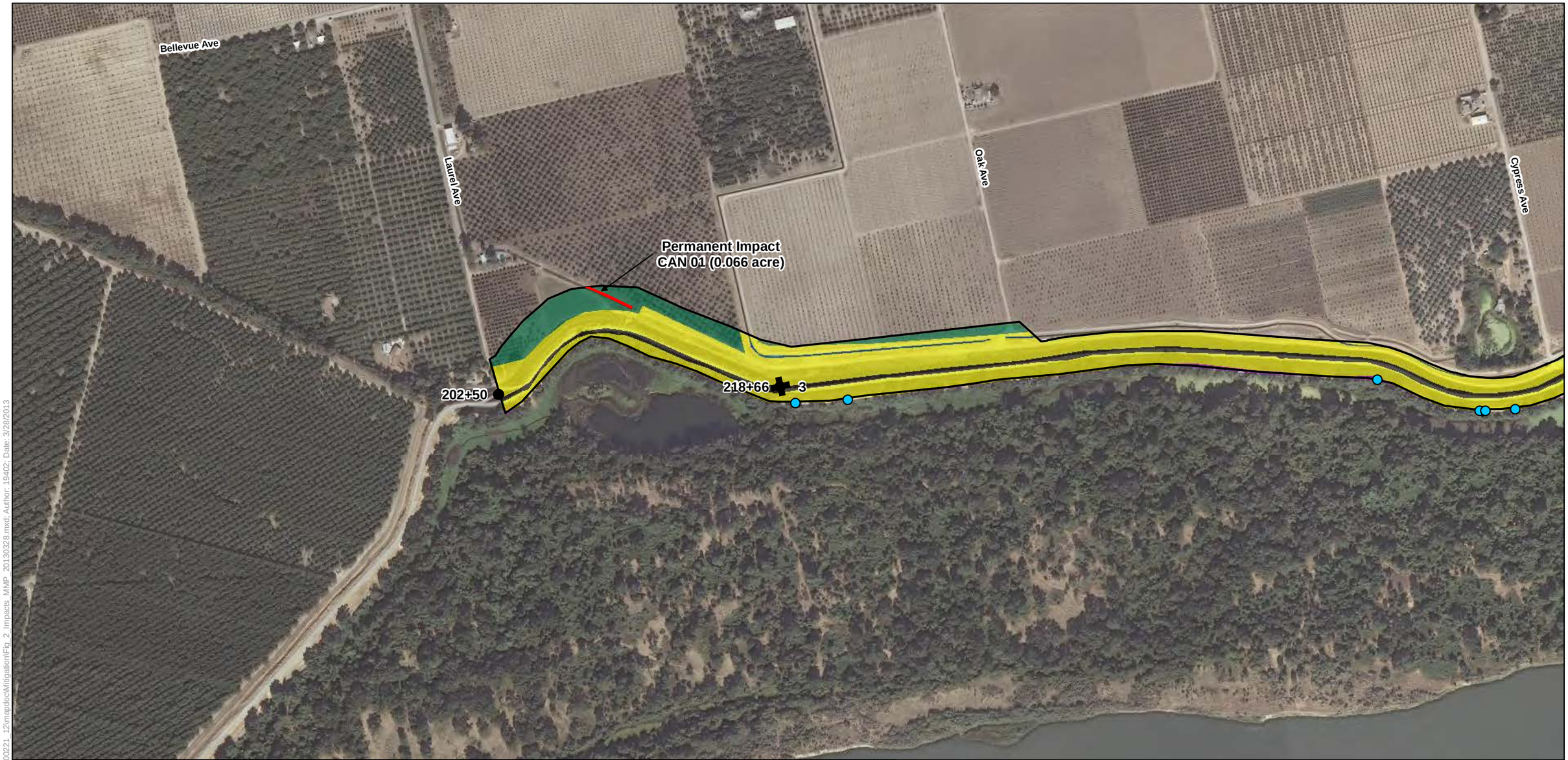
Figure 1
Feather River West Levee Project Action Area



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-1
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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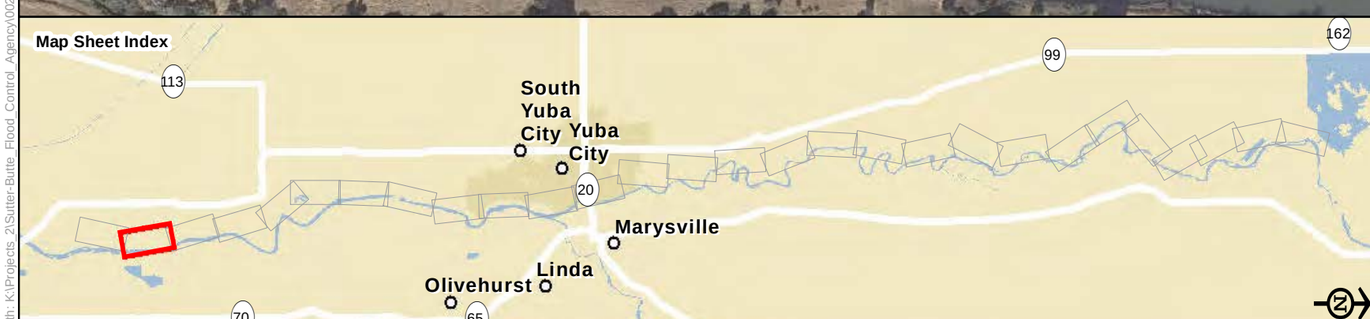

Legend

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- Station 202+50

Elderberry Action

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- Fenced

Land Cover Types

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- Field and Row Crops
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- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-2
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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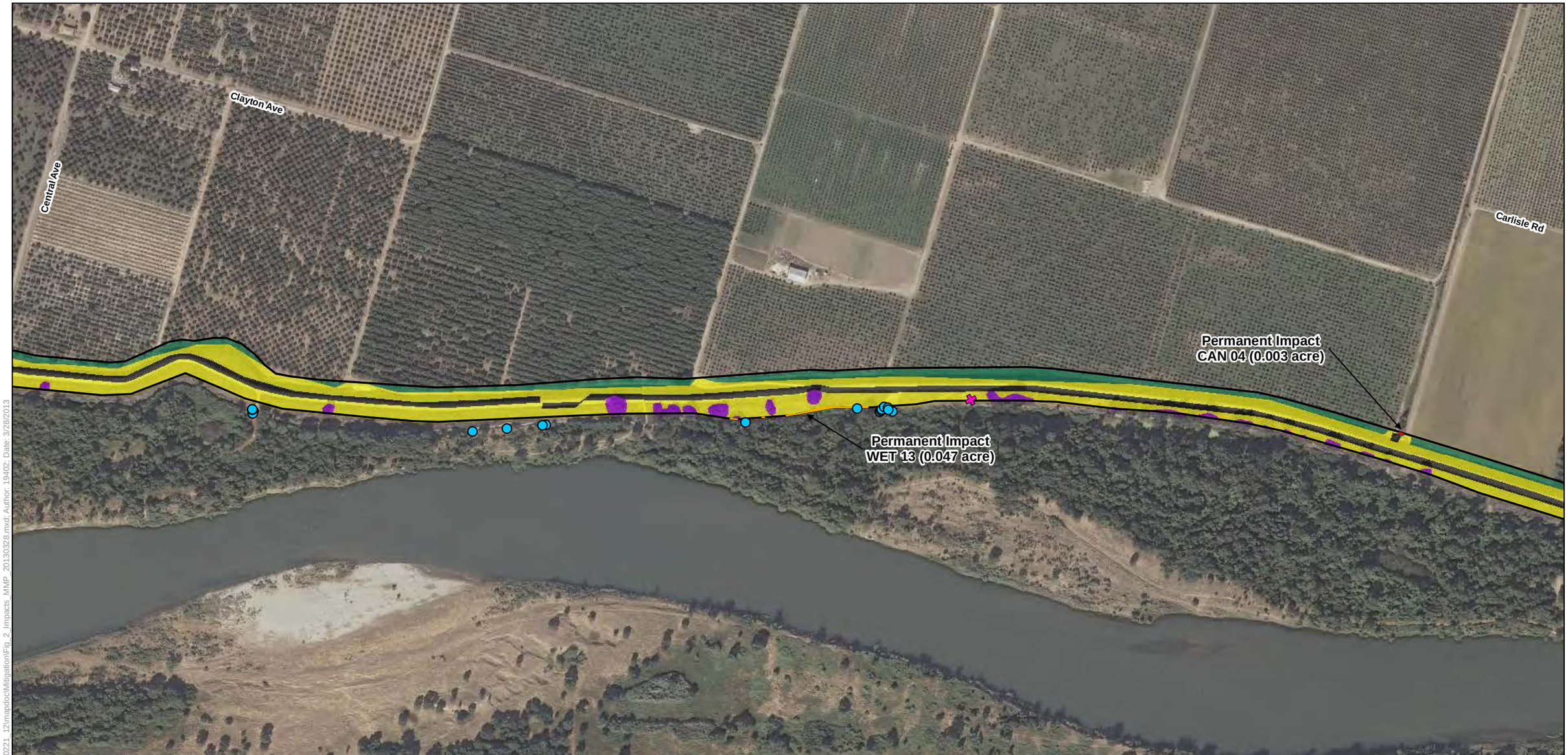

Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

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- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-3
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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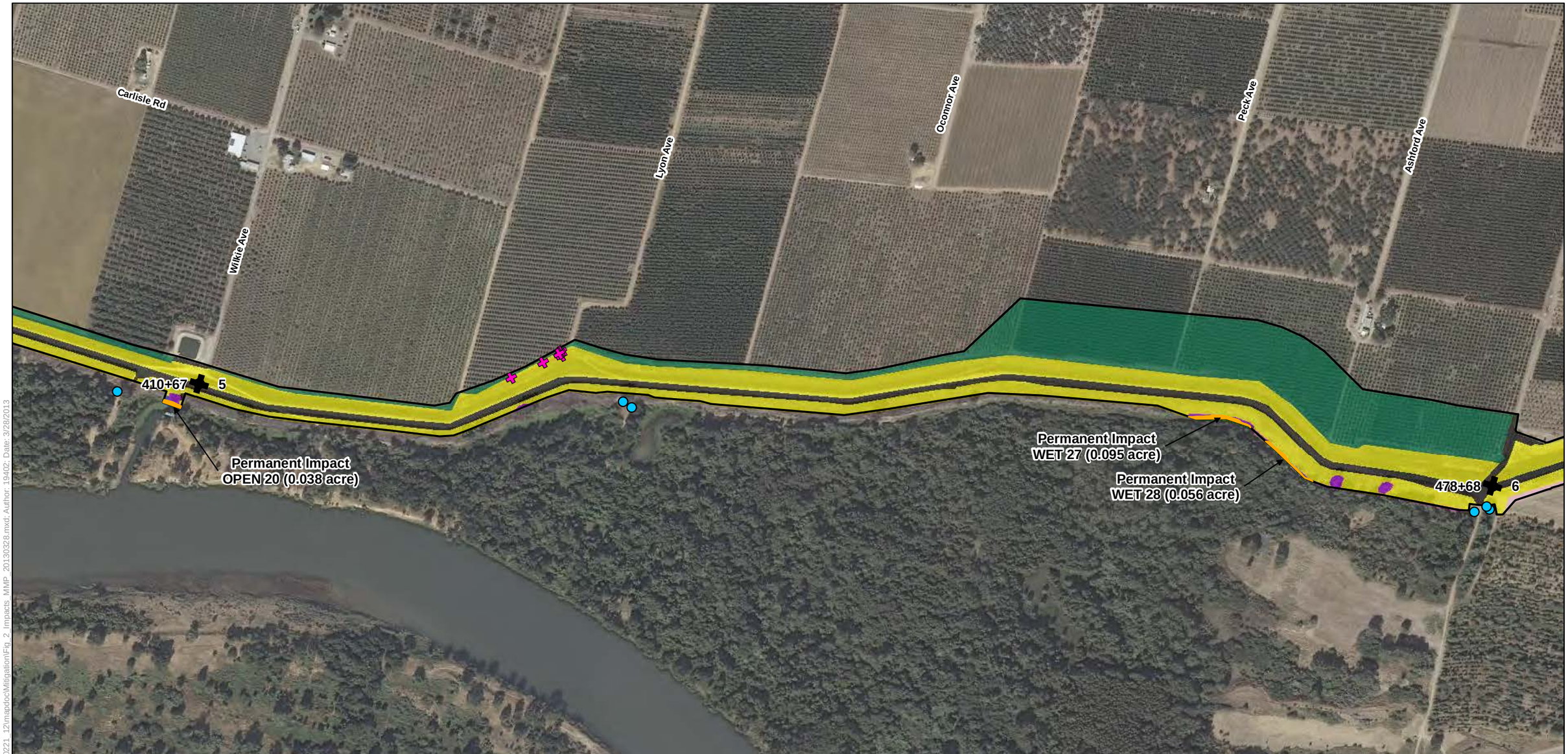

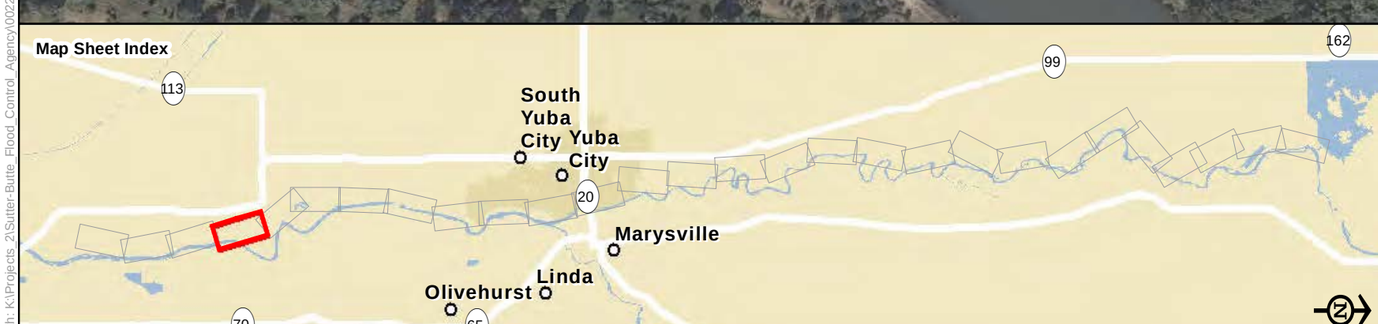

Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-4
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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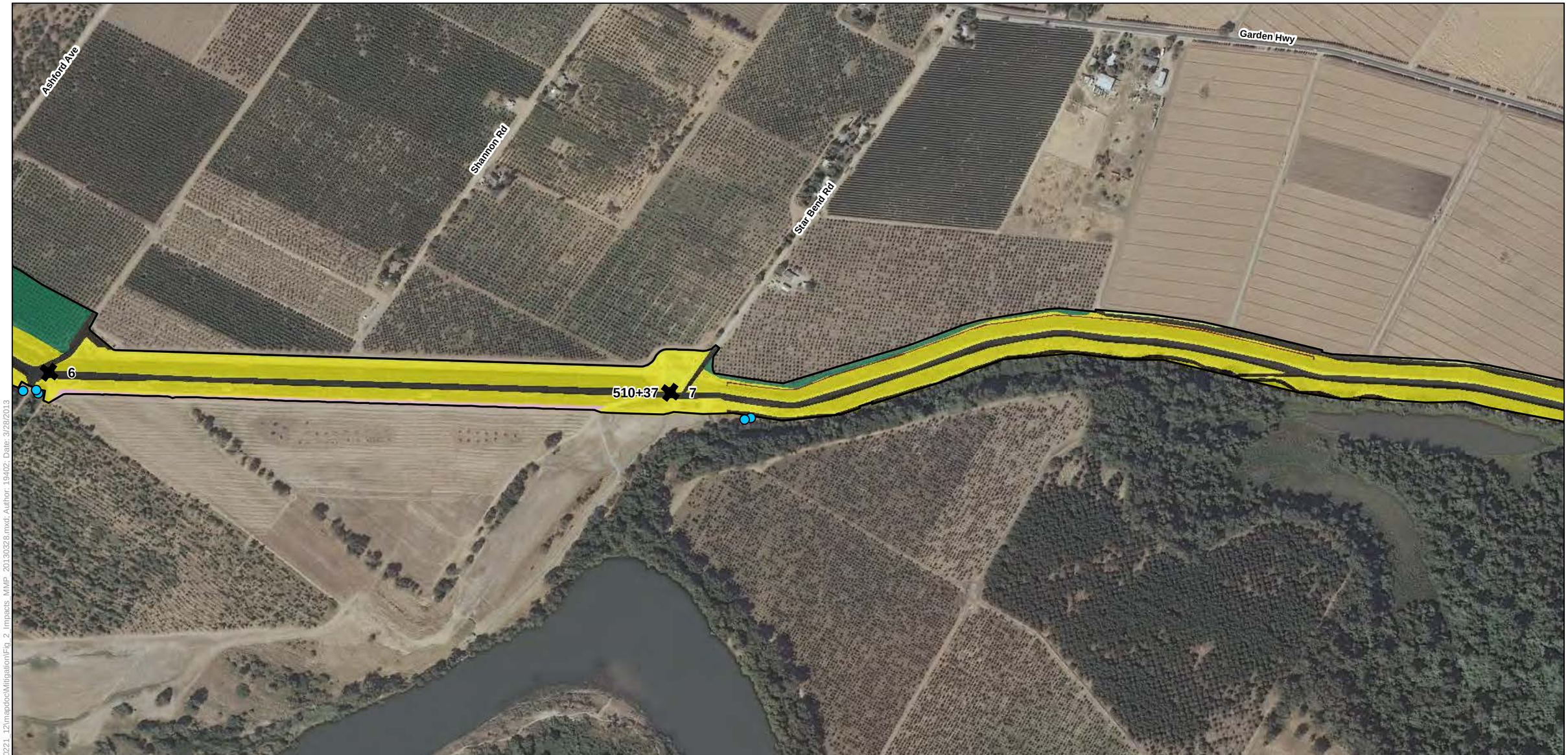

Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-5
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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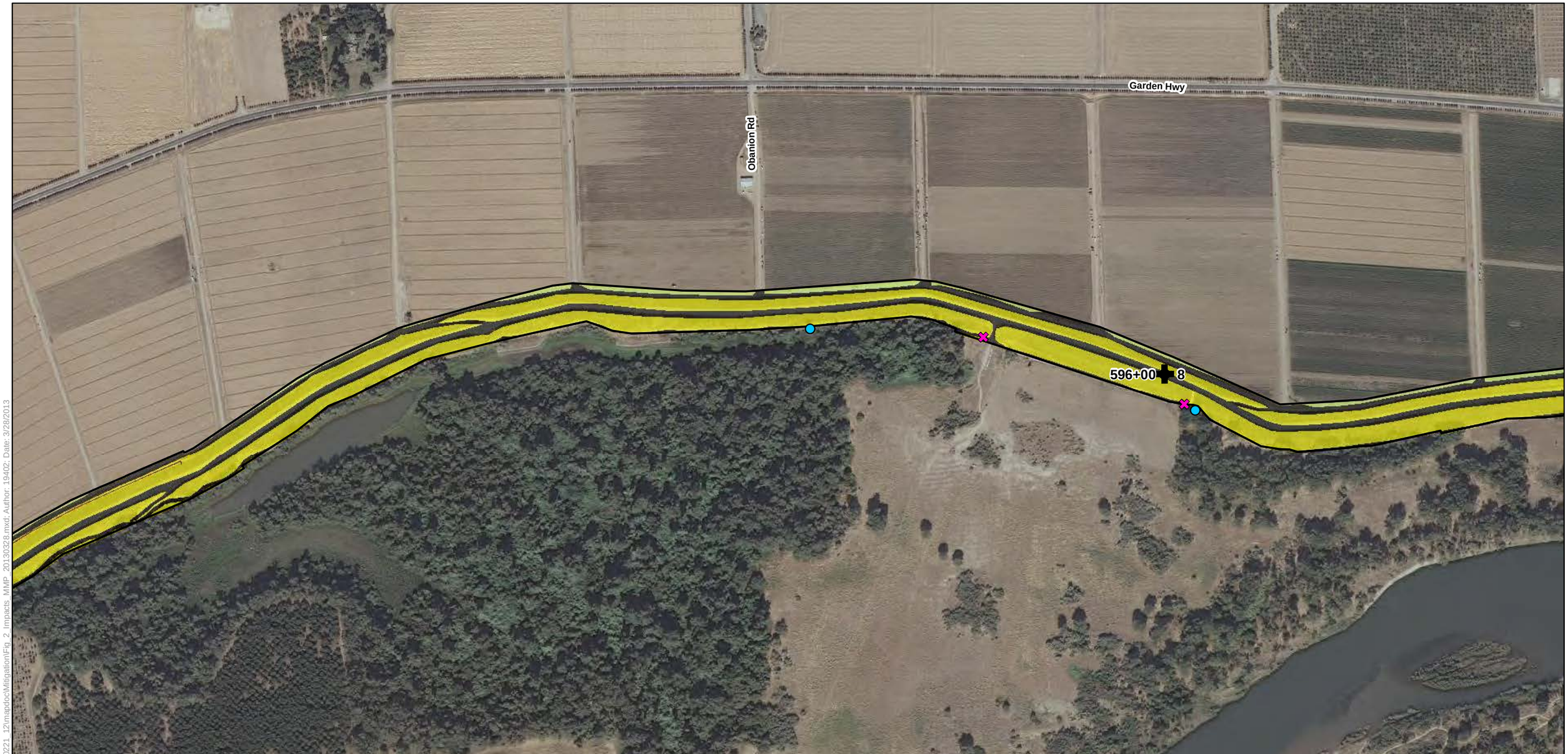

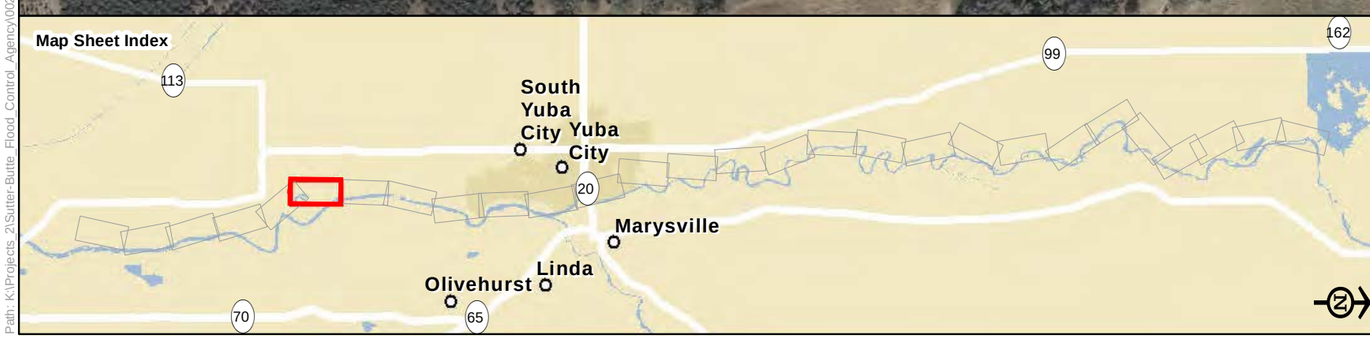

Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-6
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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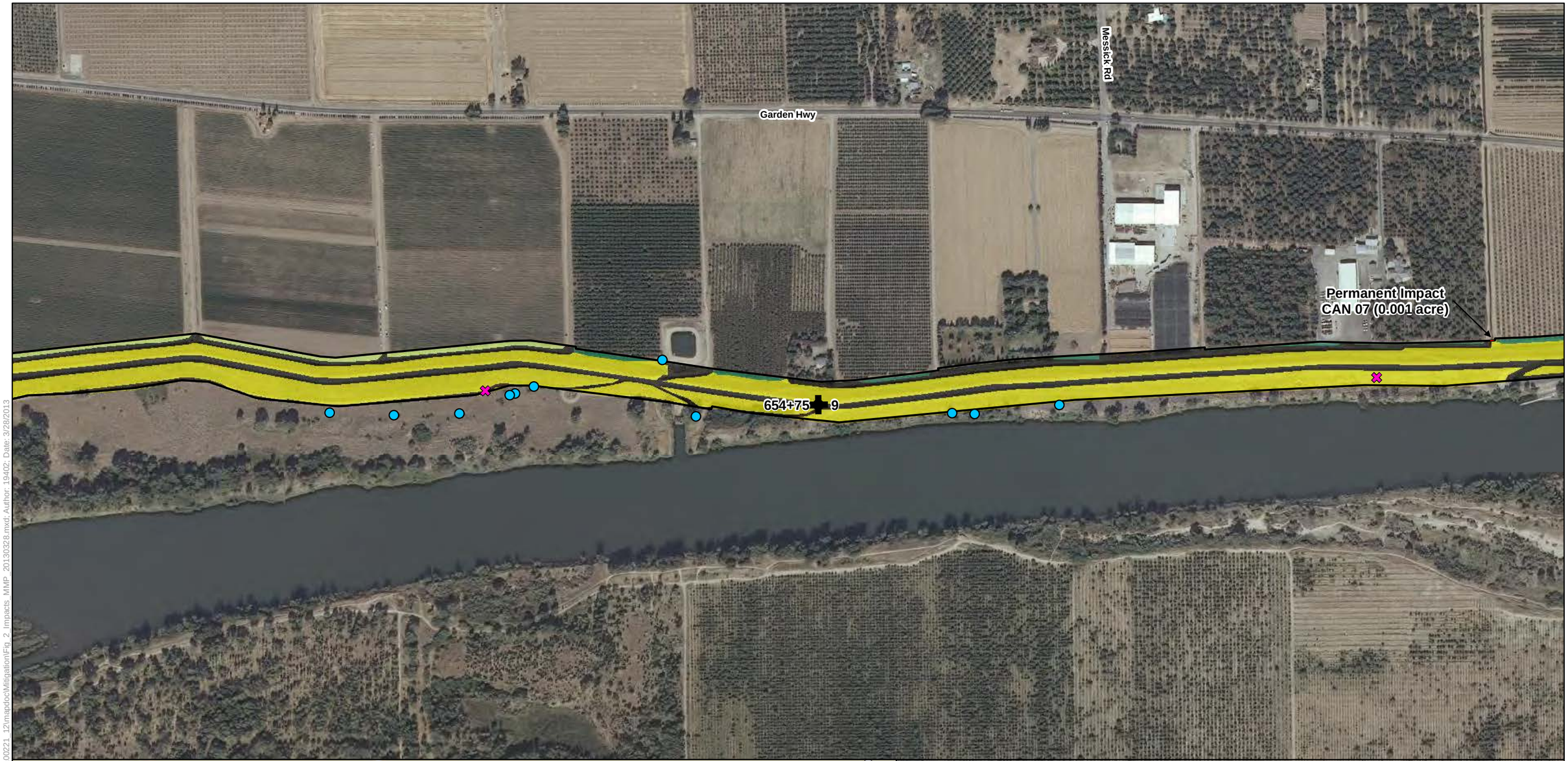

Legend

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- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-7
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
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- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
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- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-8
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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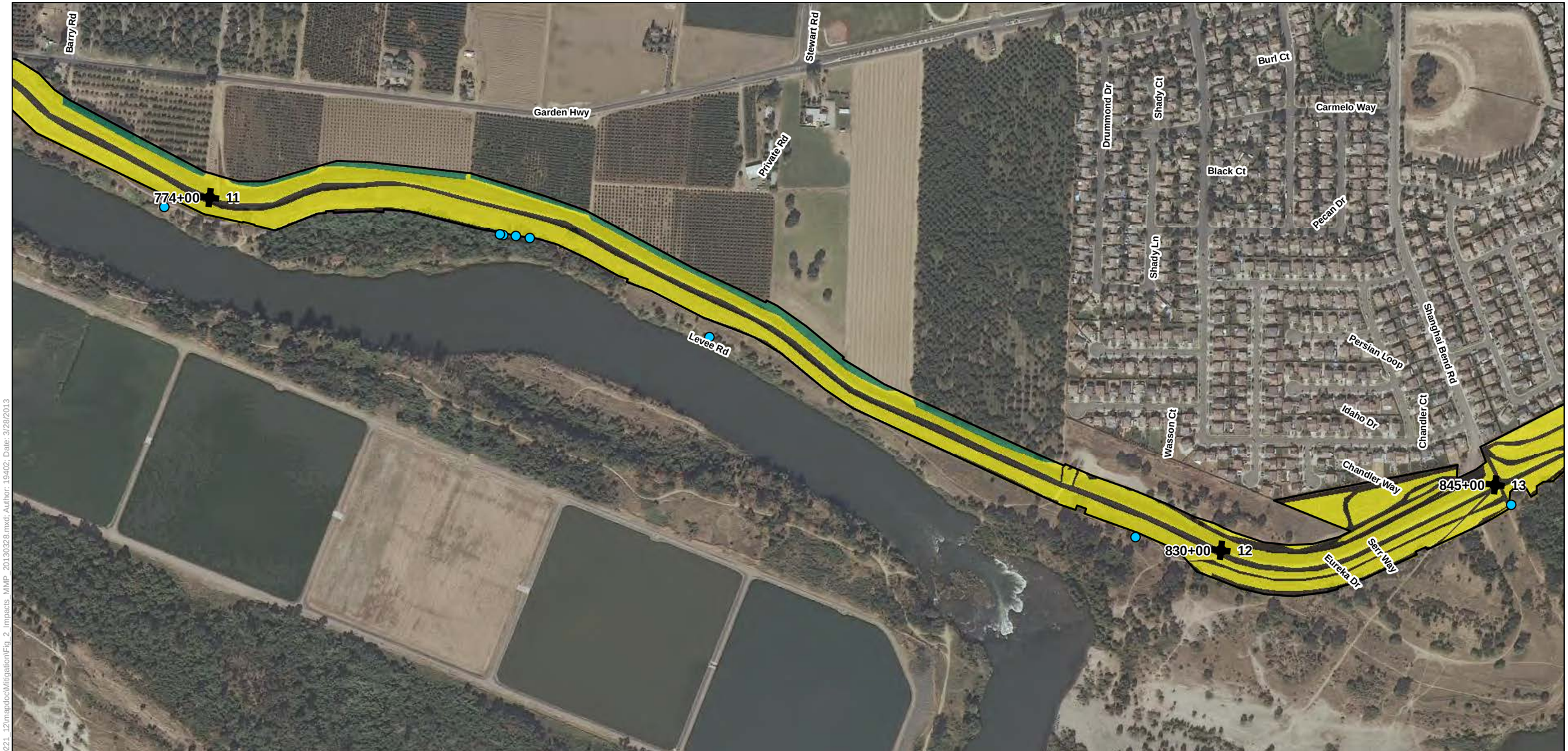

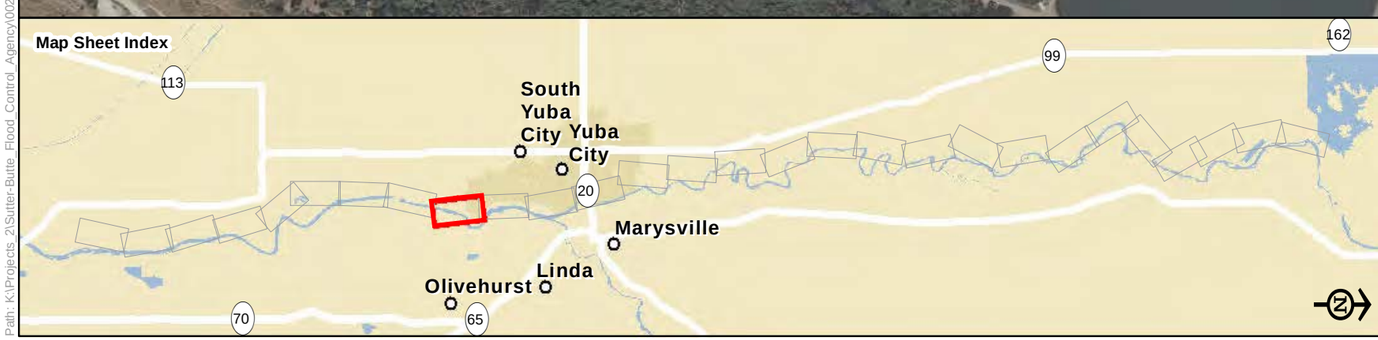

Legend

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- Canal Permanent Impacts (0.969 acre)
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Elderberry Action

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Land Cover Types

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- Field and Row Crops
- Oak Woodland
- Open Water
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- Riparian Scrub-Shrub
- Ruderal
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- Tailings Ponds

Figure 2-9
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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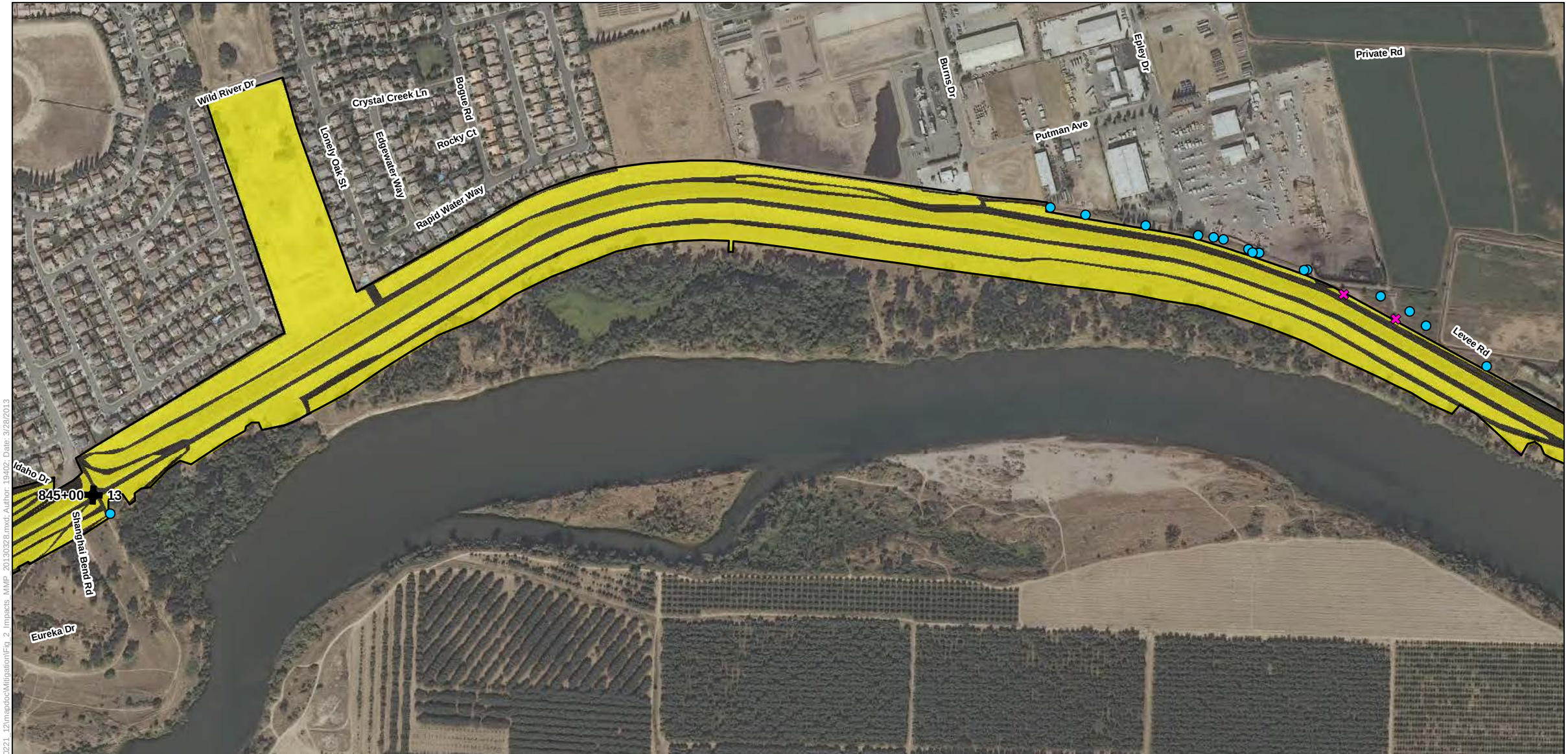

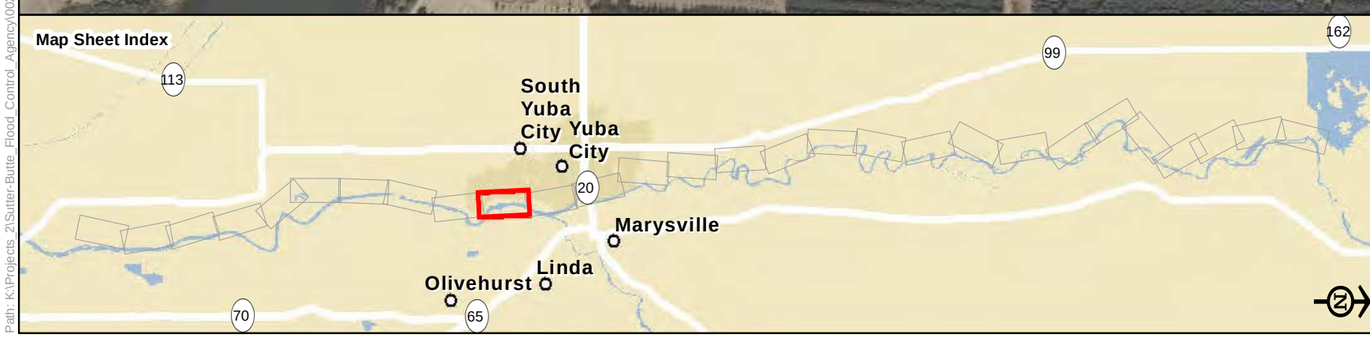

Legend

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Land Cover Types

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- Riparian Scrub-Shrub
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Figure 2-10
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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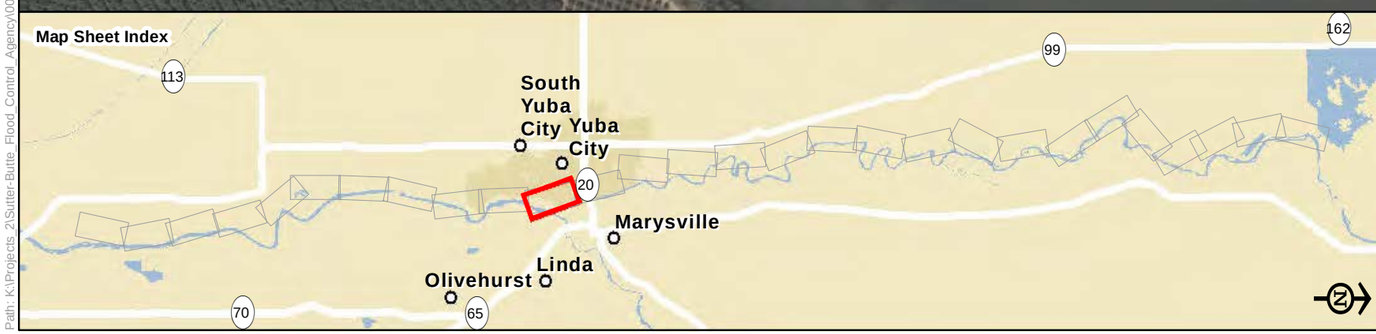

Legend

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Elderberry Action

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- Tailings Ponds

Figure 2-11
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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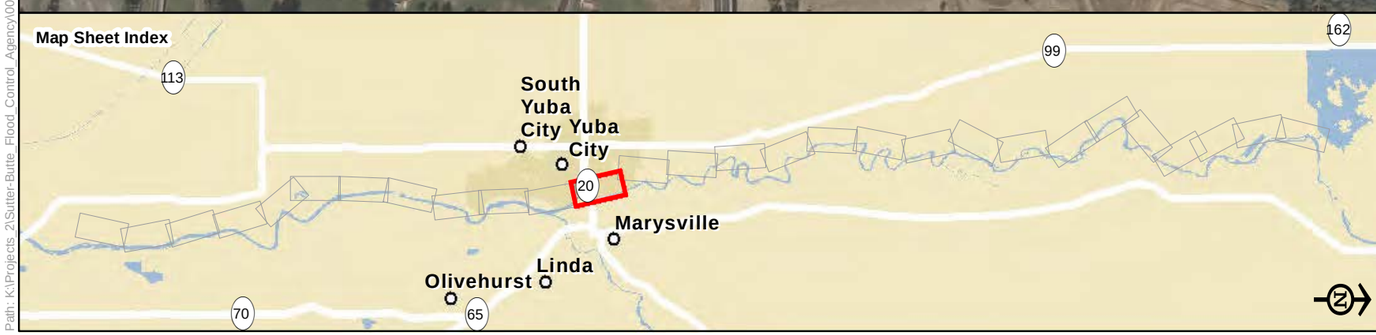

Legend

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Elderberry Action

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Land Cover Types

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- Riparian Scrub-Shrub
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- Tailings Ponds

Figure 2-12
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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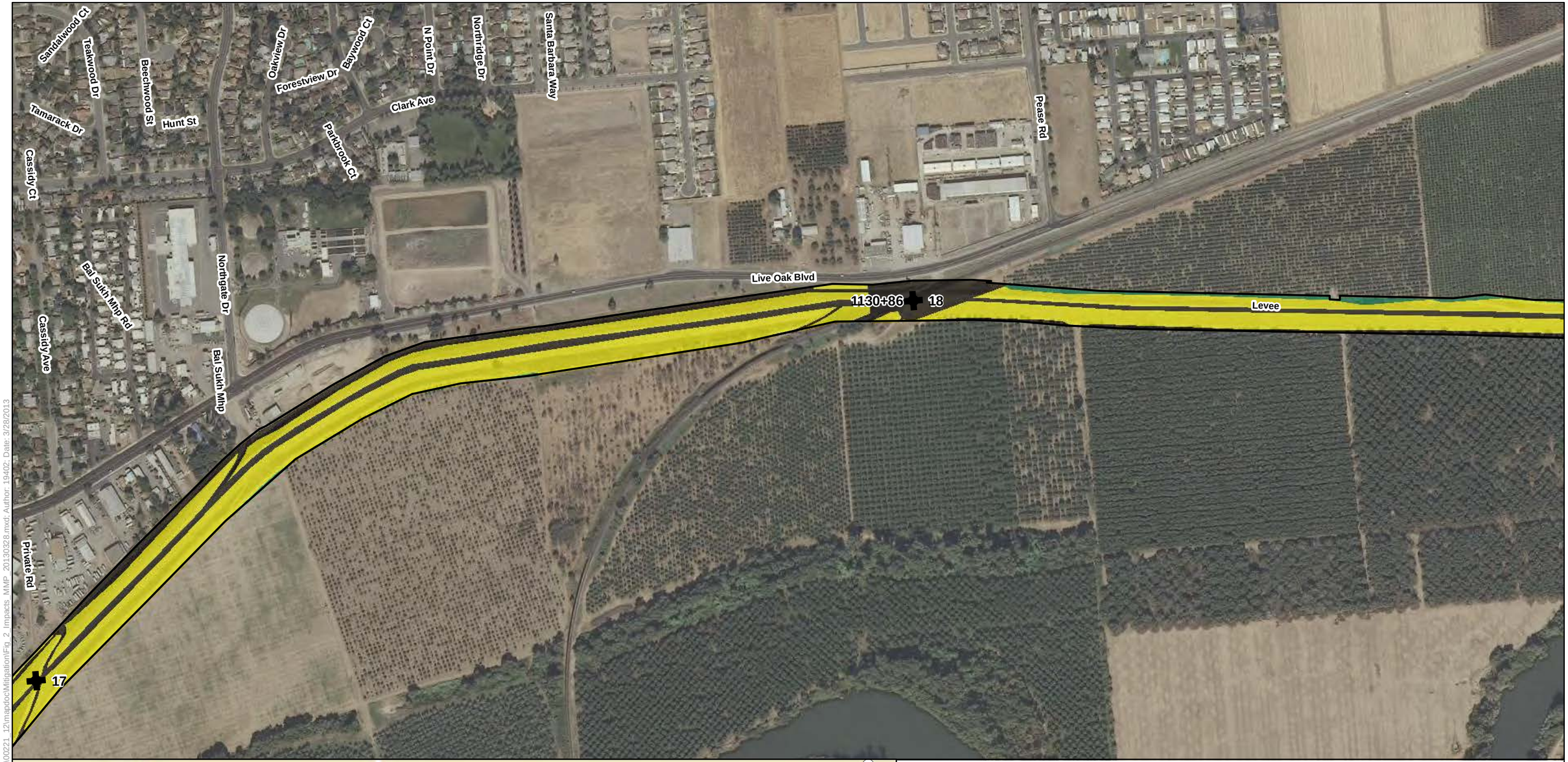

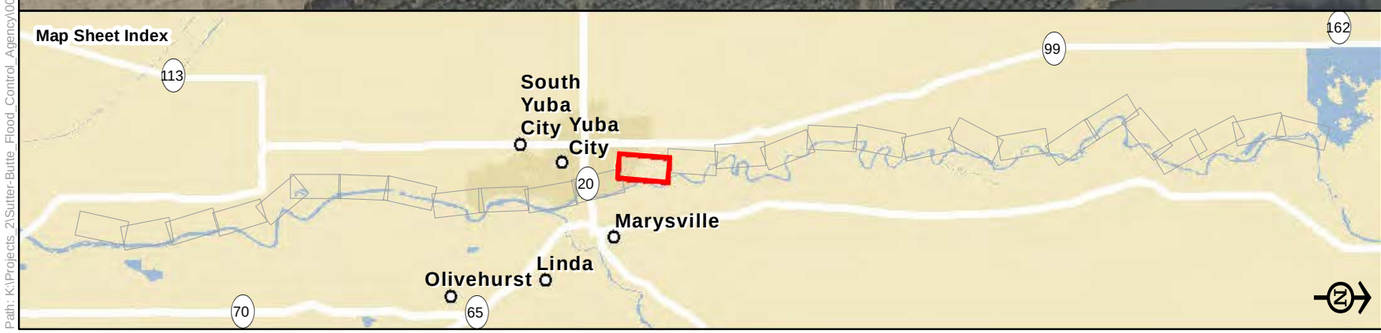

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Figure 2-13
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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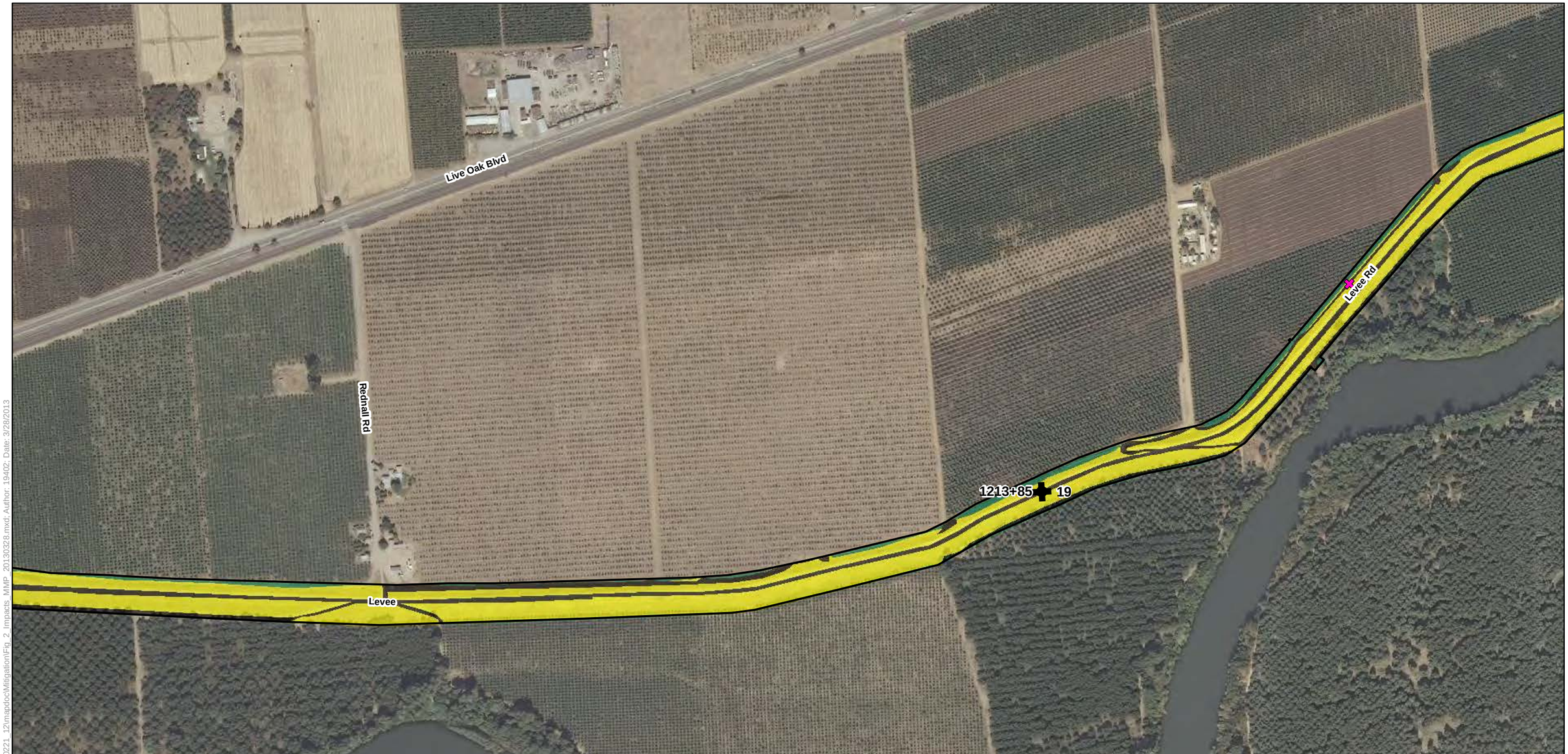

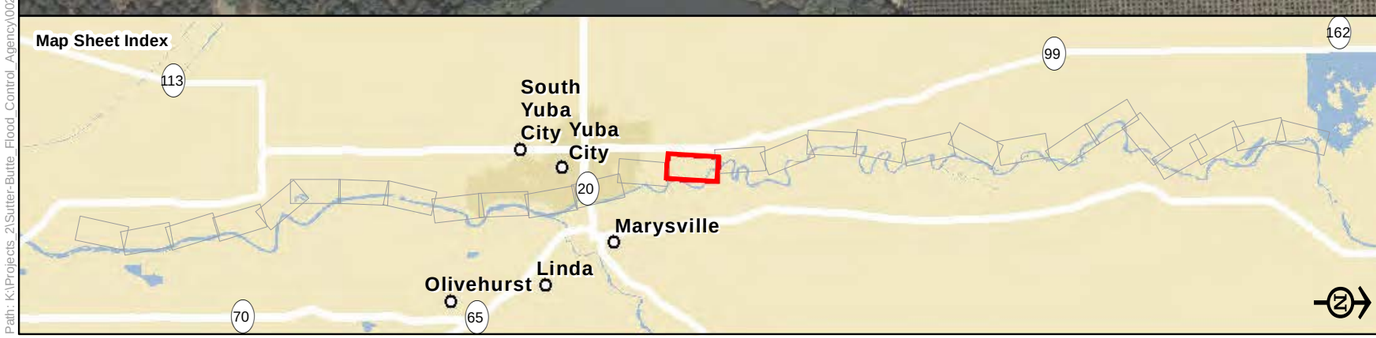

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Figure 2-14
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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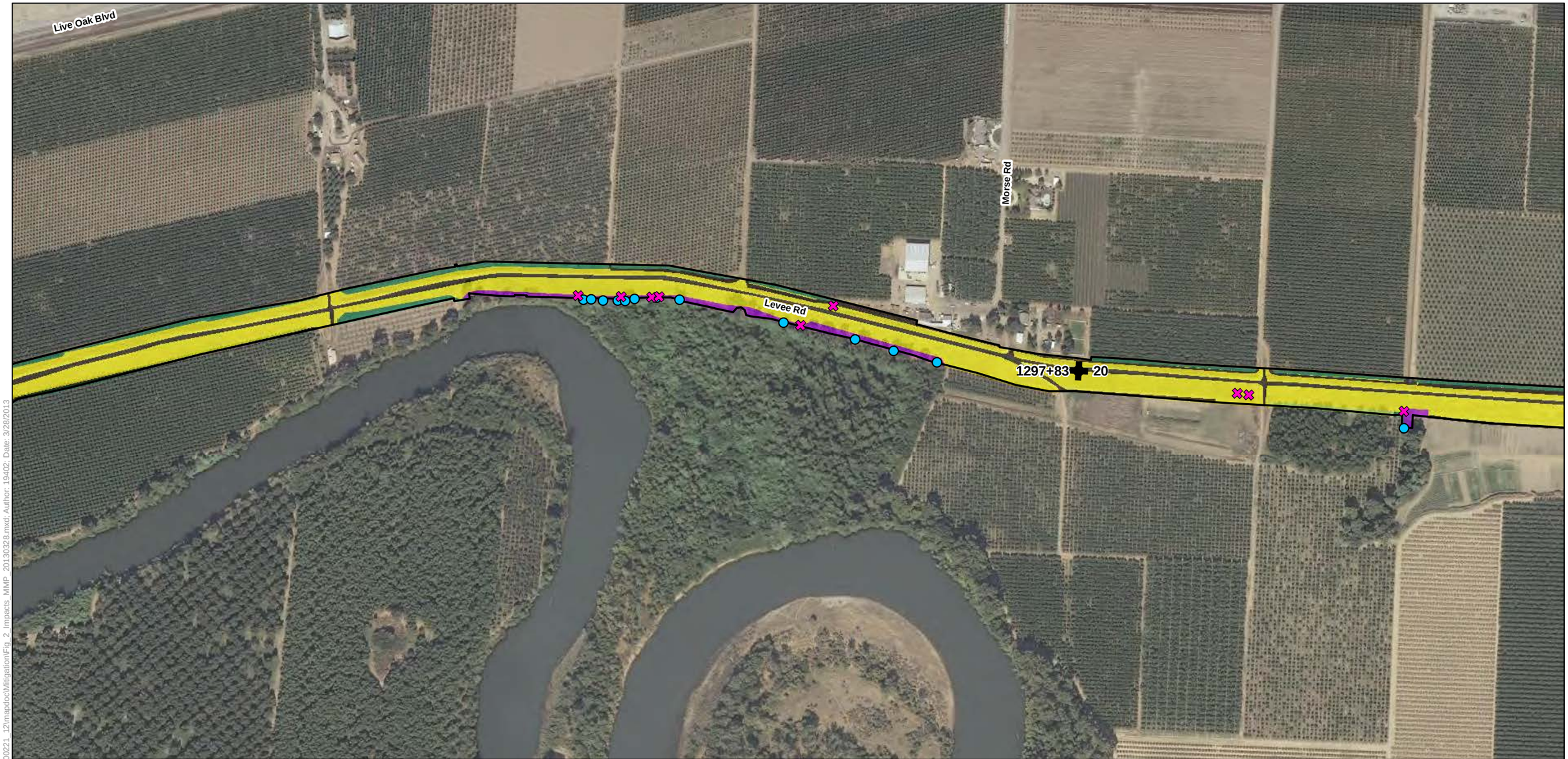

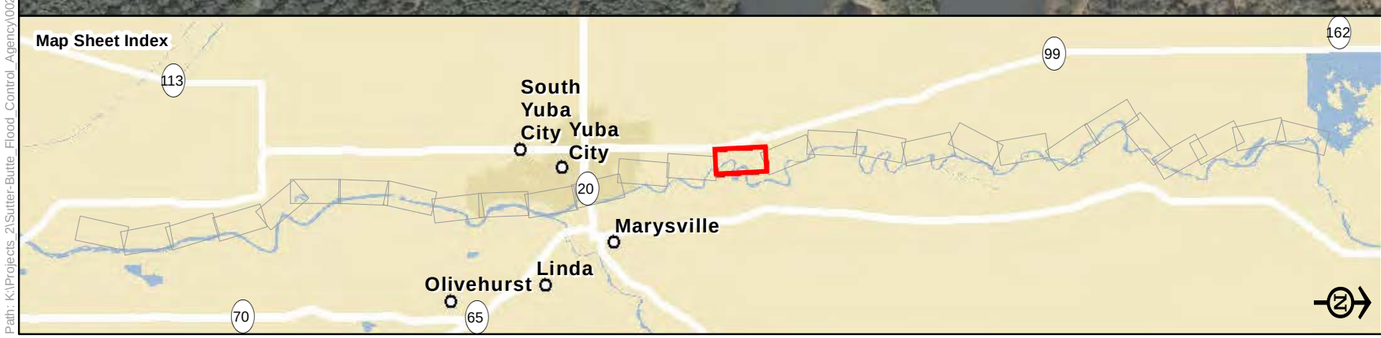

Legend

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- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-15
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

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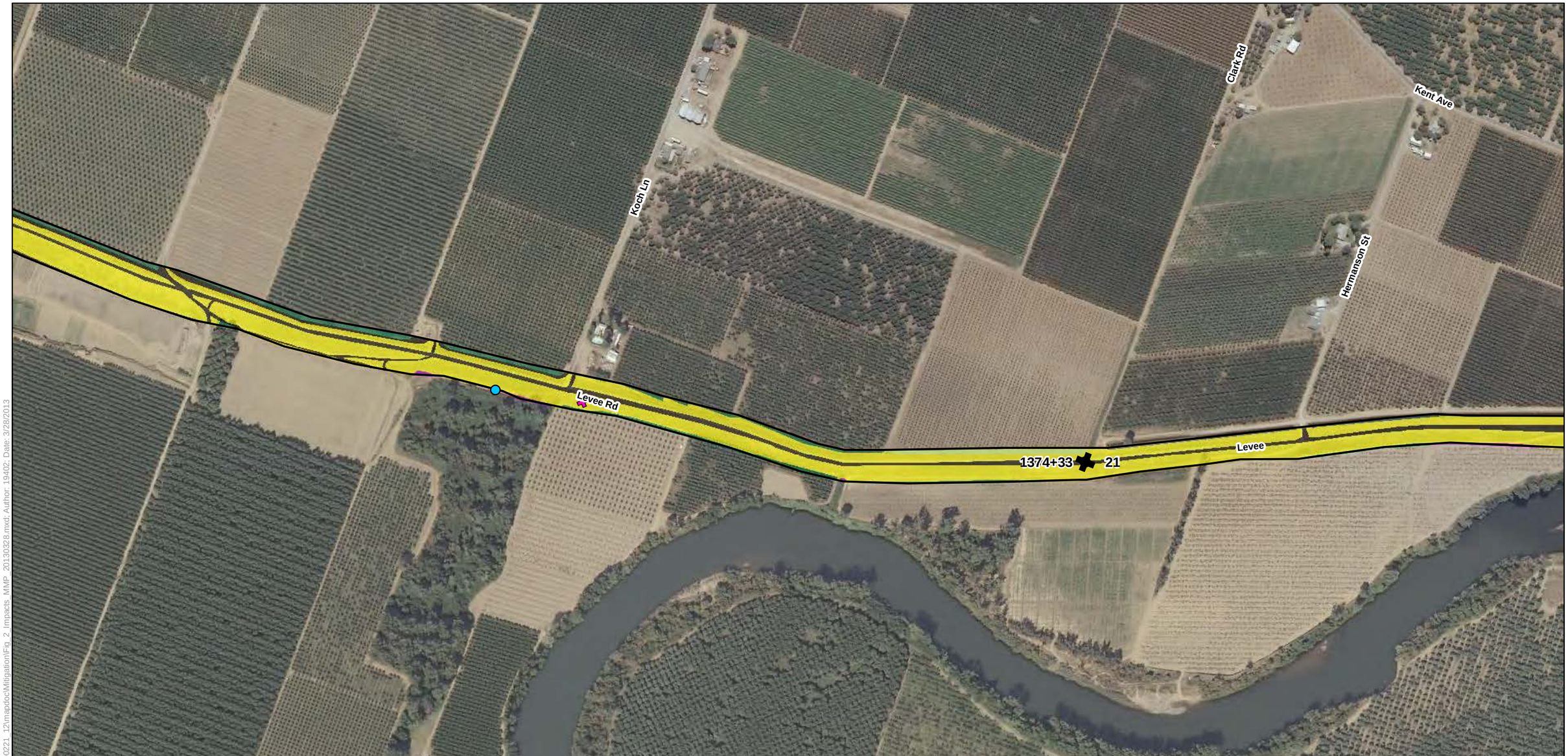

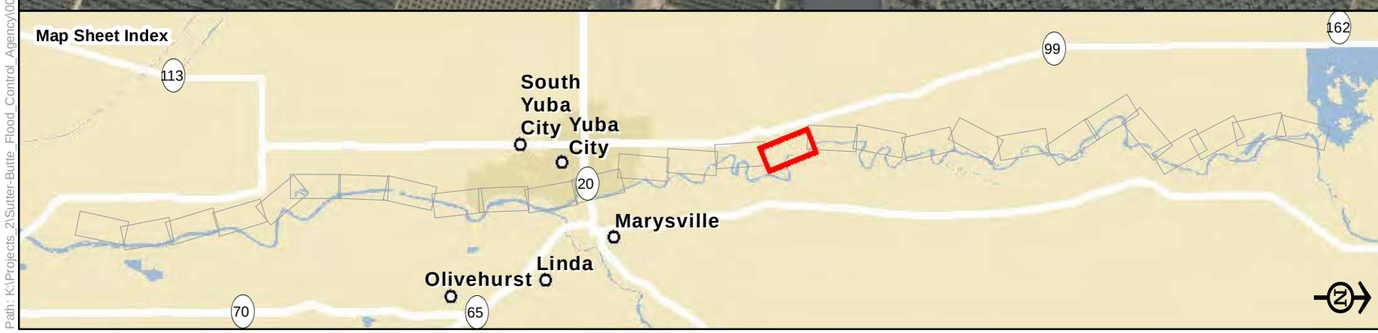

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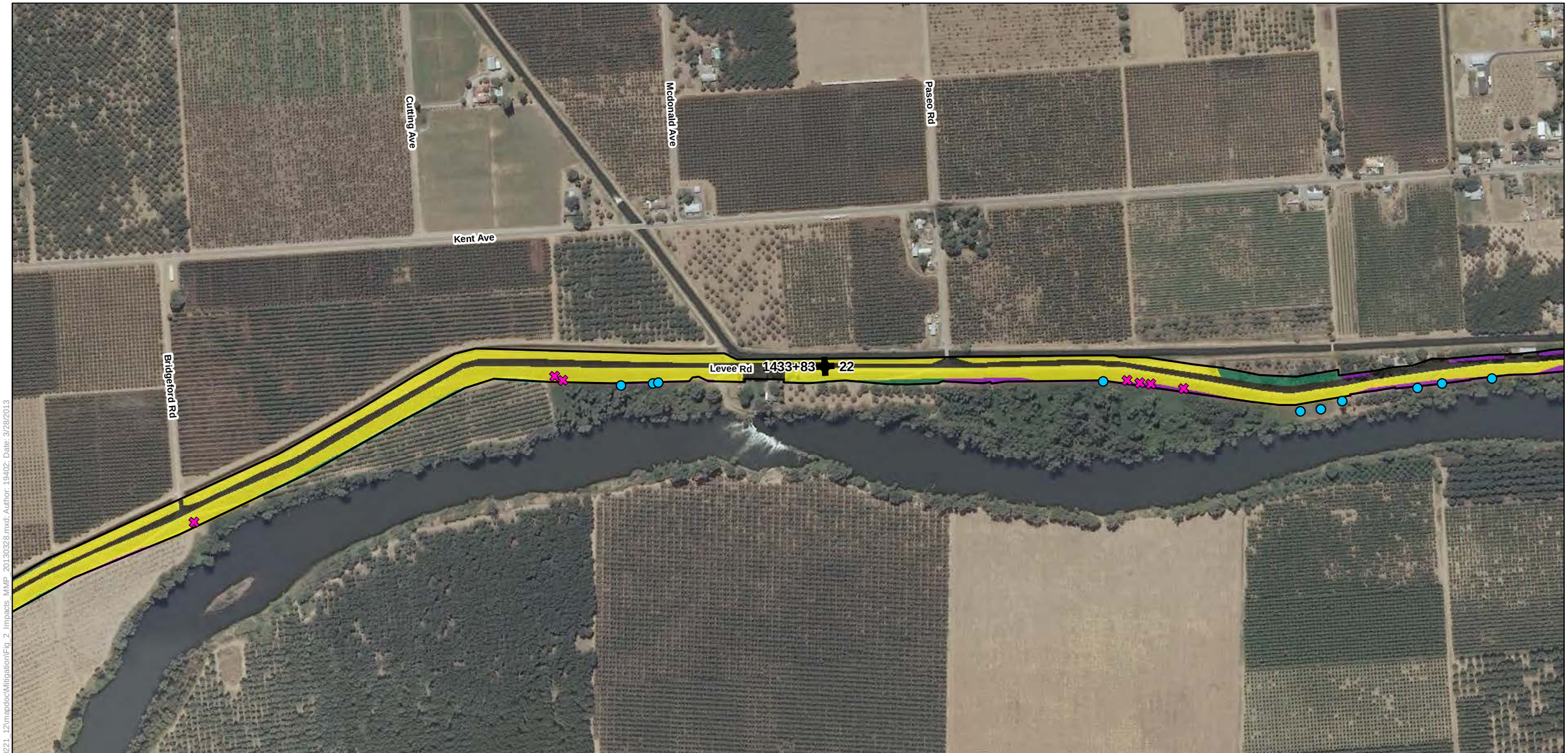
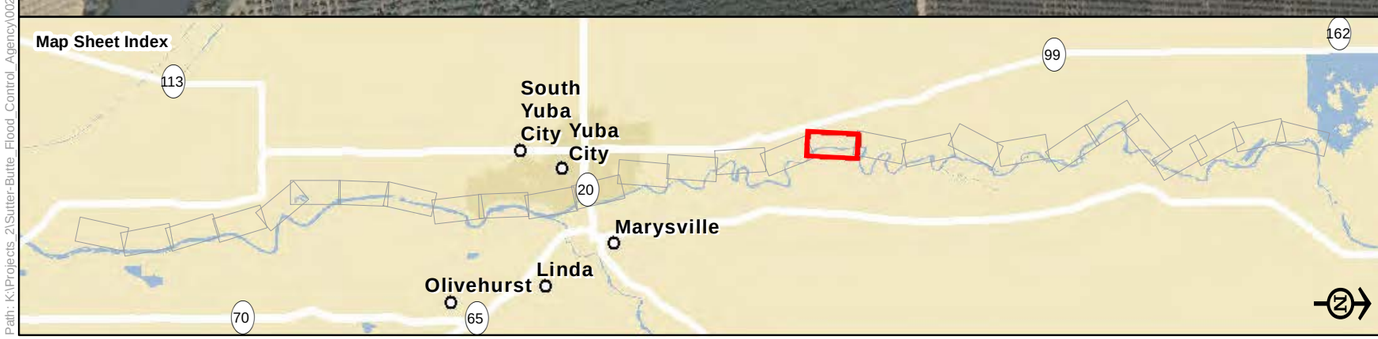
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-16
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

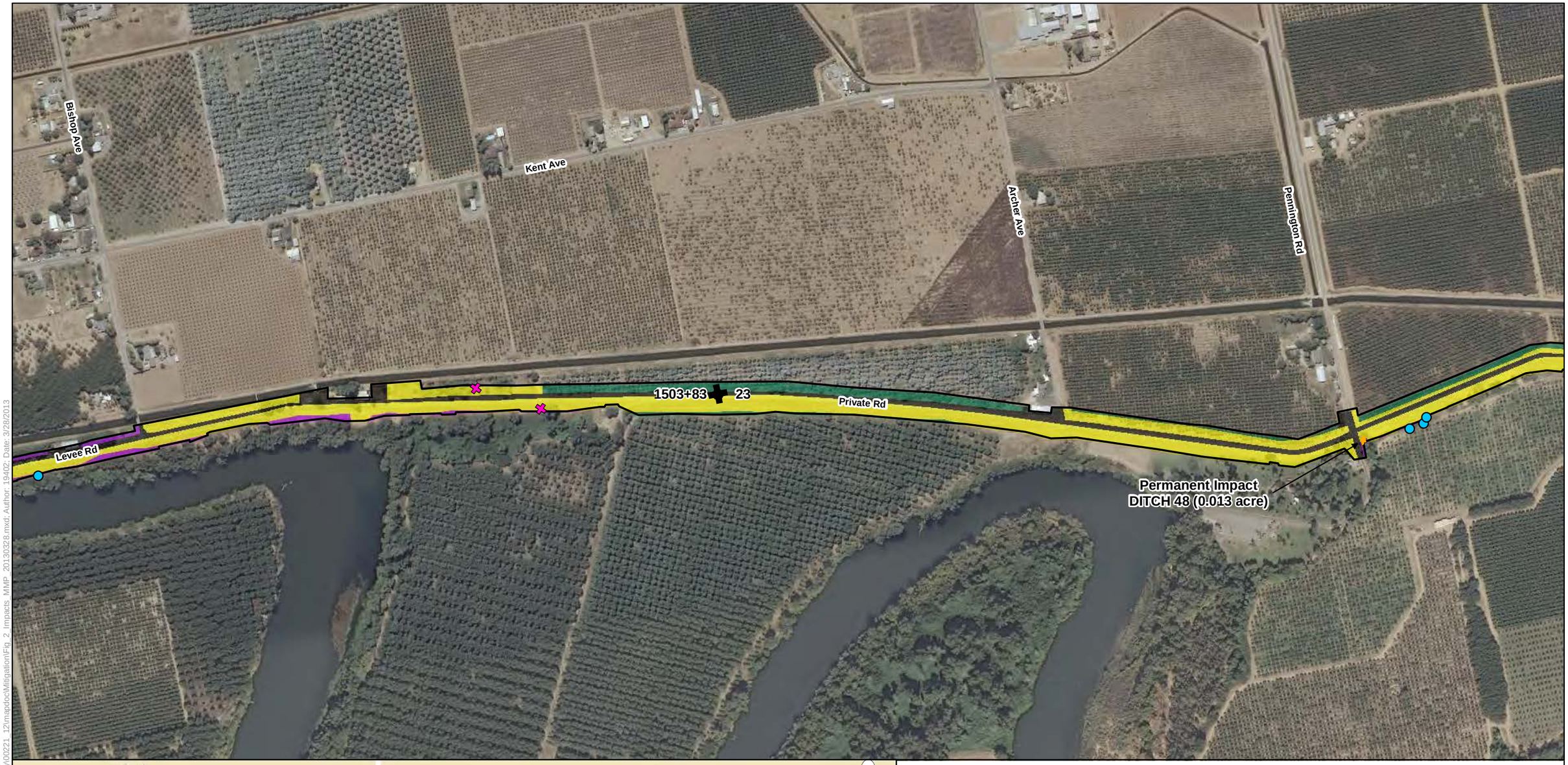
Land Cover Types

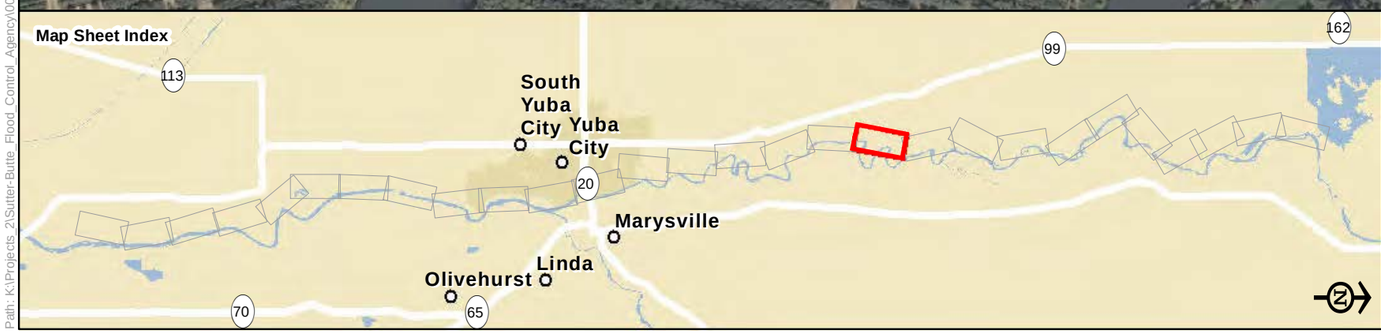
- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-17
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-18
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

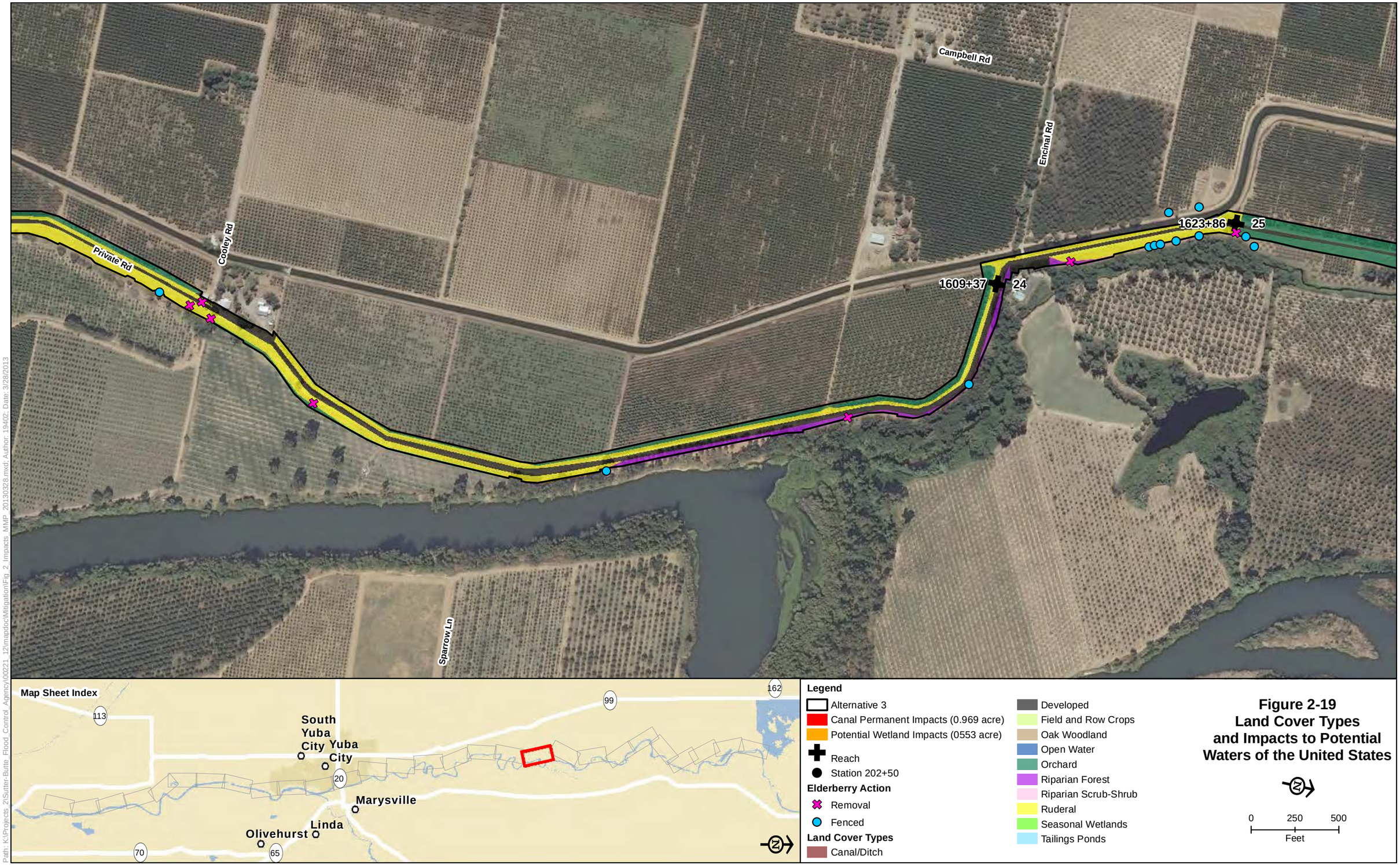
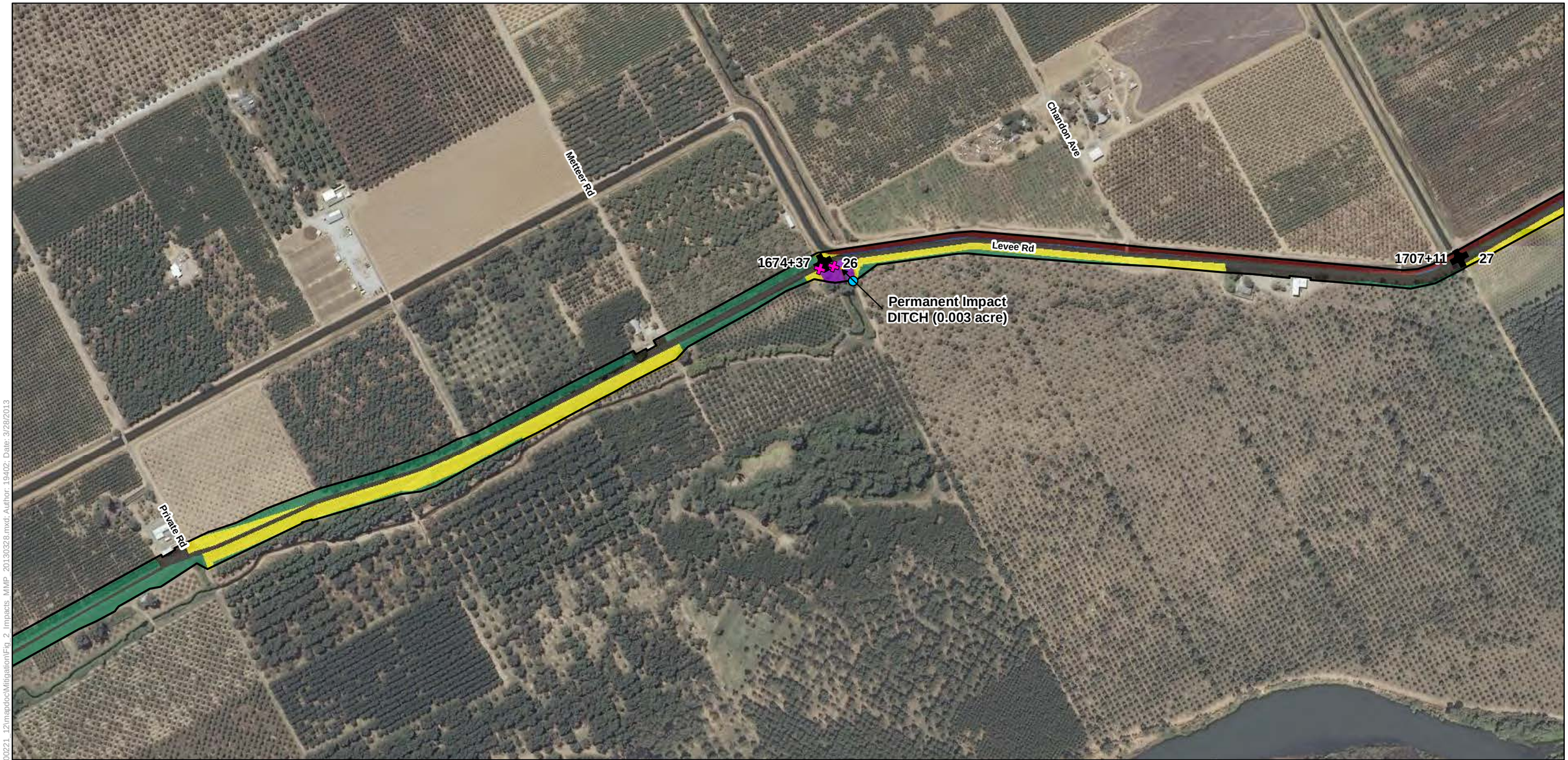
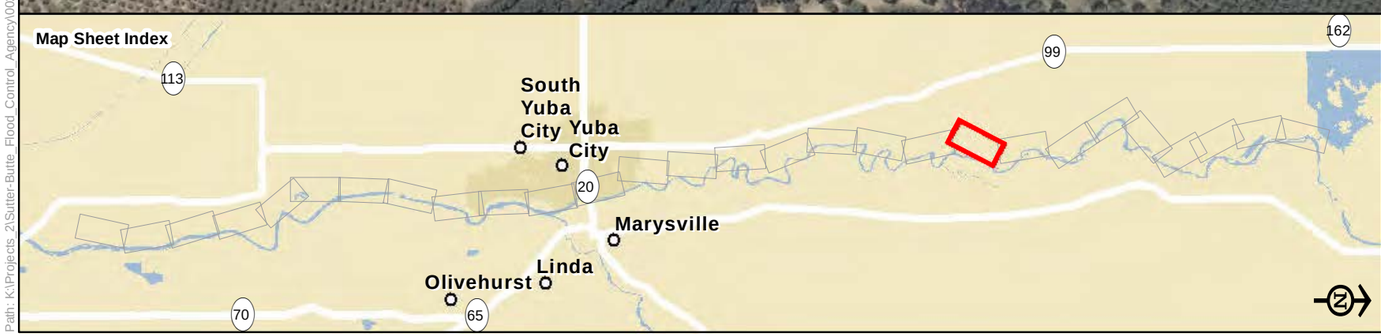


Figure 2-19
Land Cover Types and Impacts to Potential Waters of the United States

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

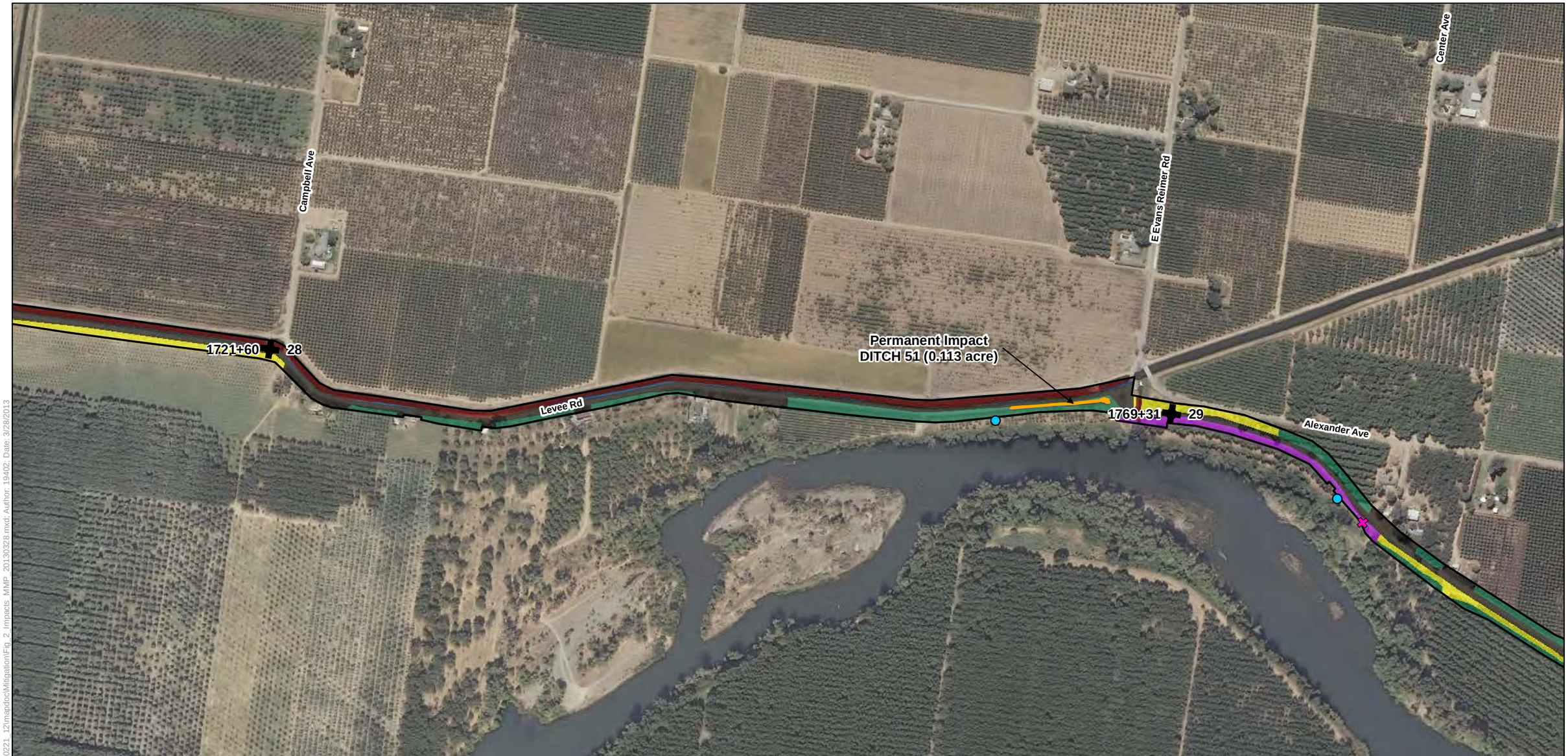
Land Cover Types

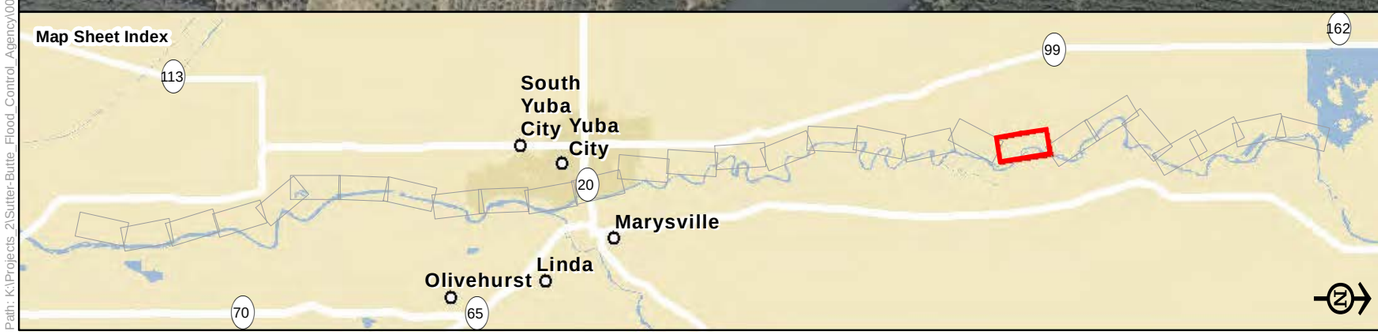
- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-20
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

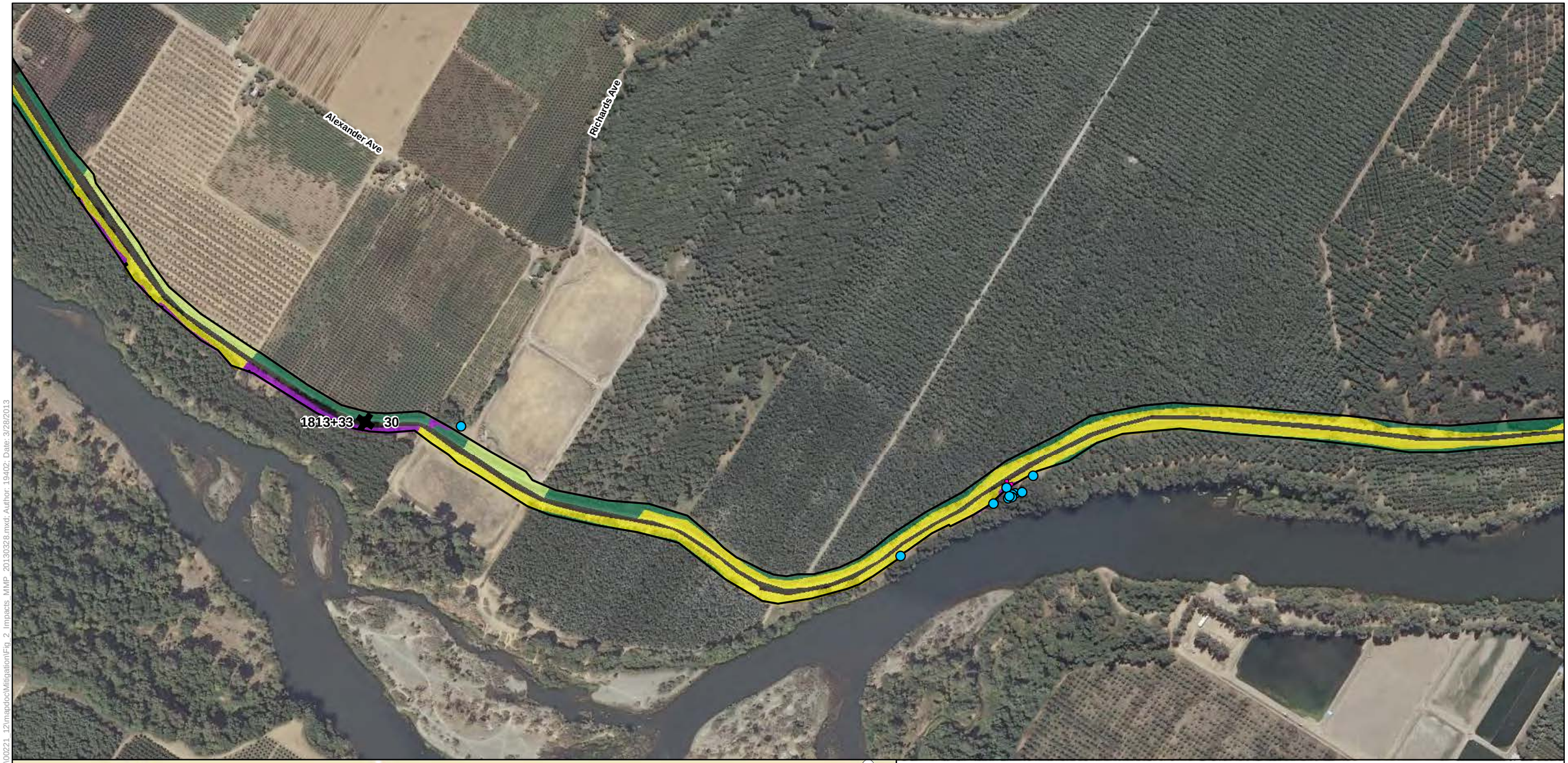
Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-21
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

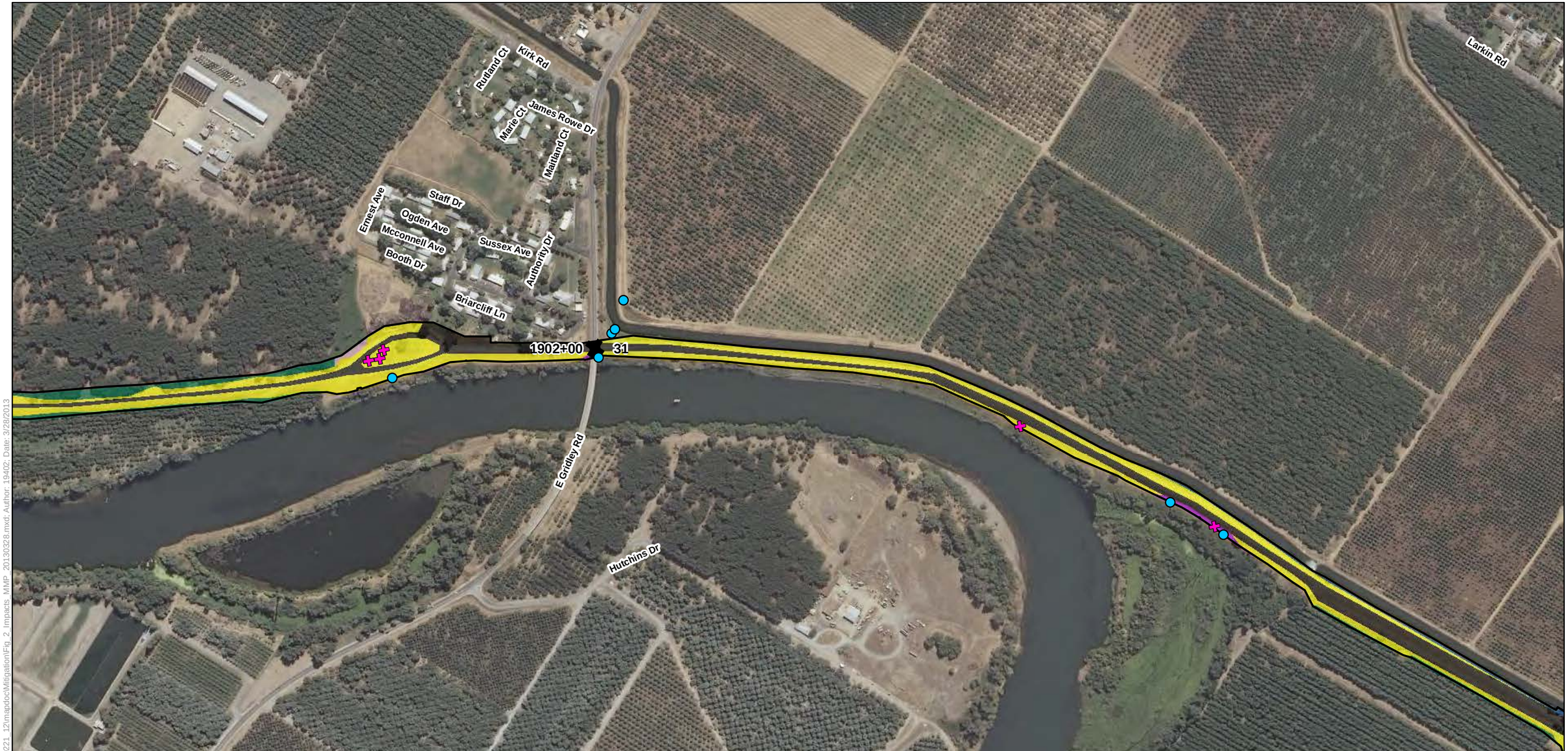
Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-22
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

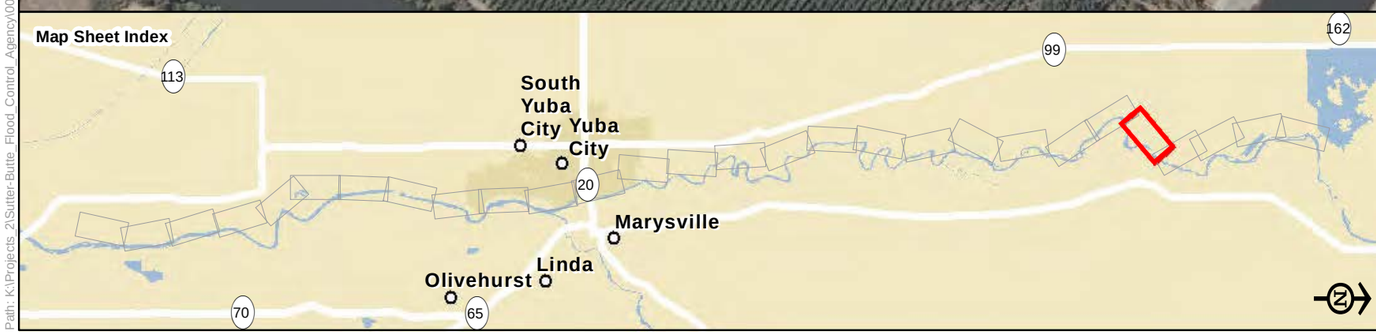
Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-23
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

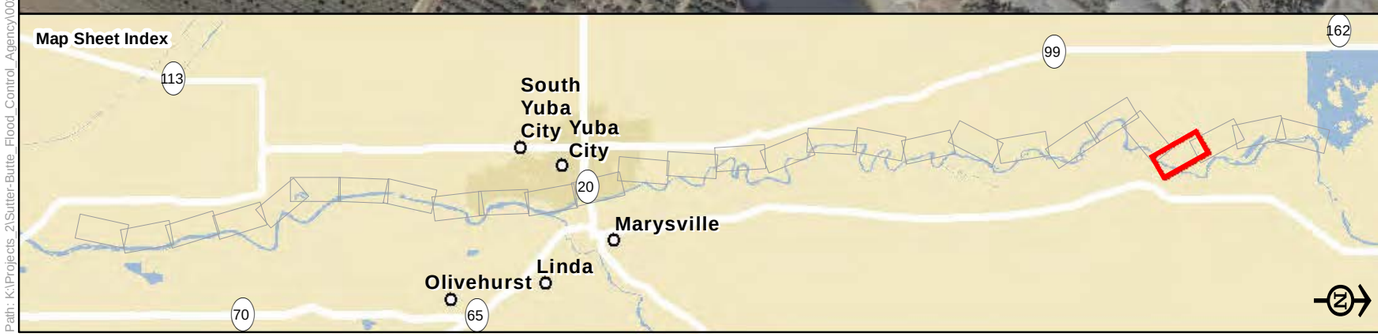
Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-24
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-25
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

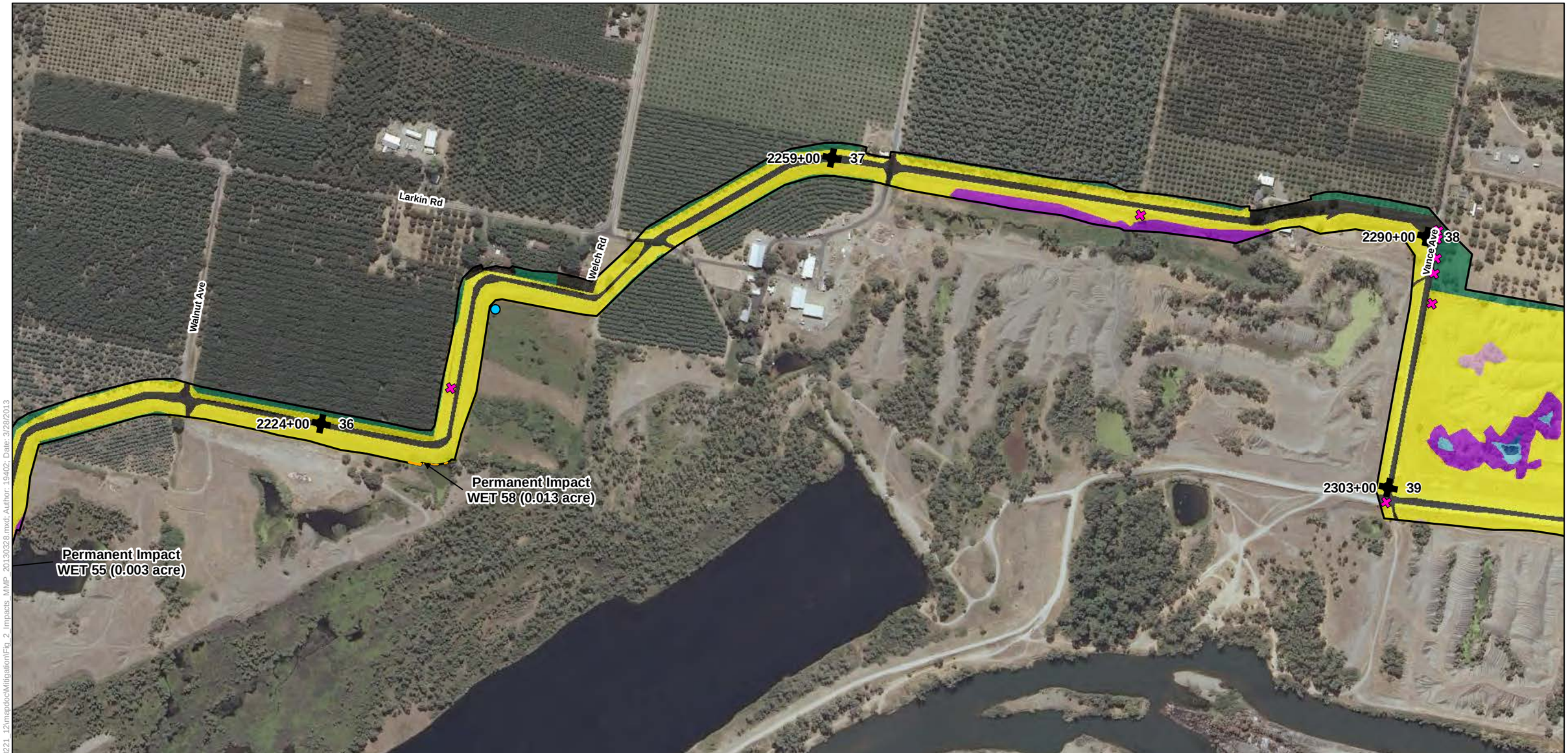
Land Cover Types

- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-26
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

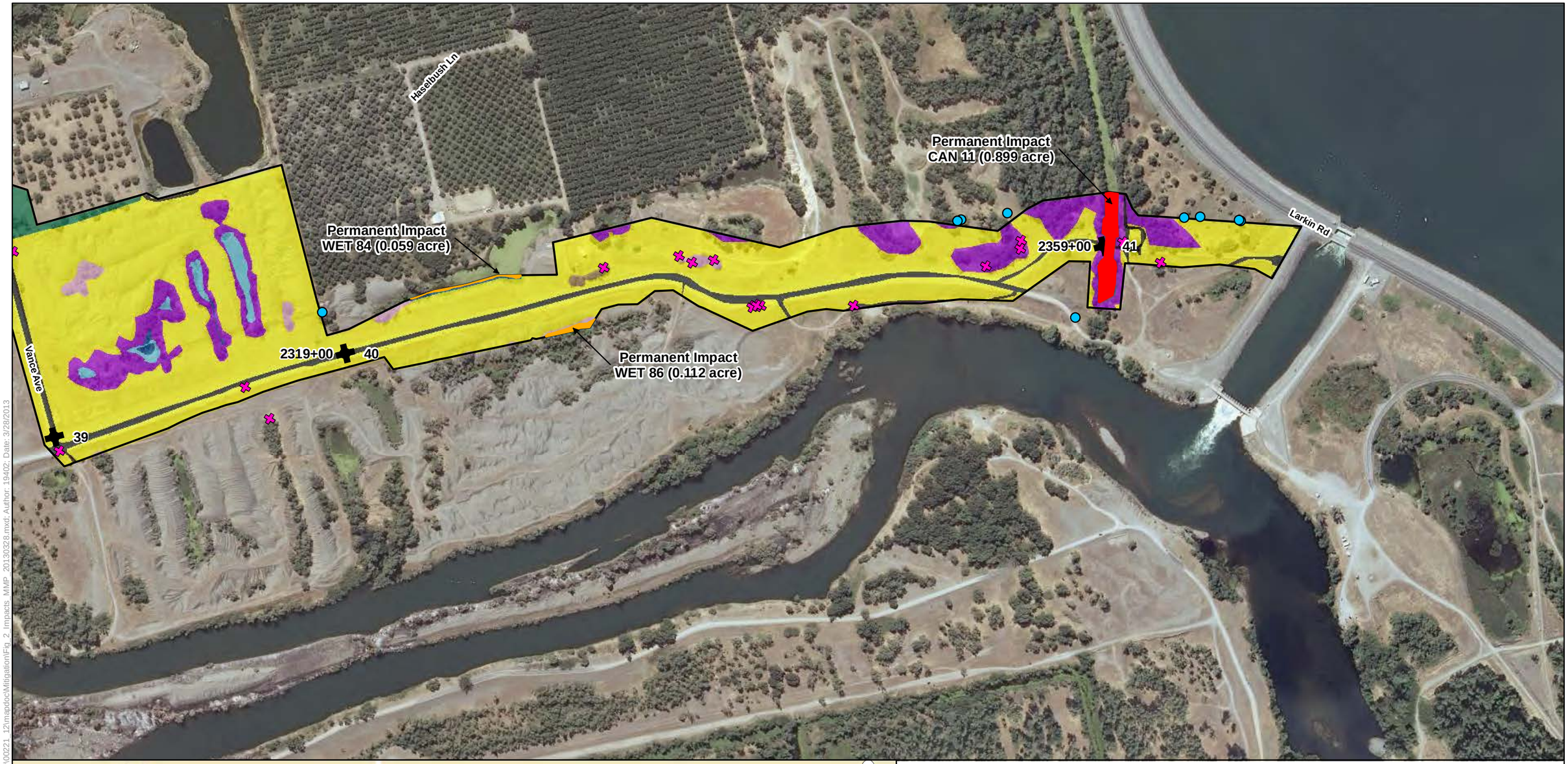
Land Cover Types

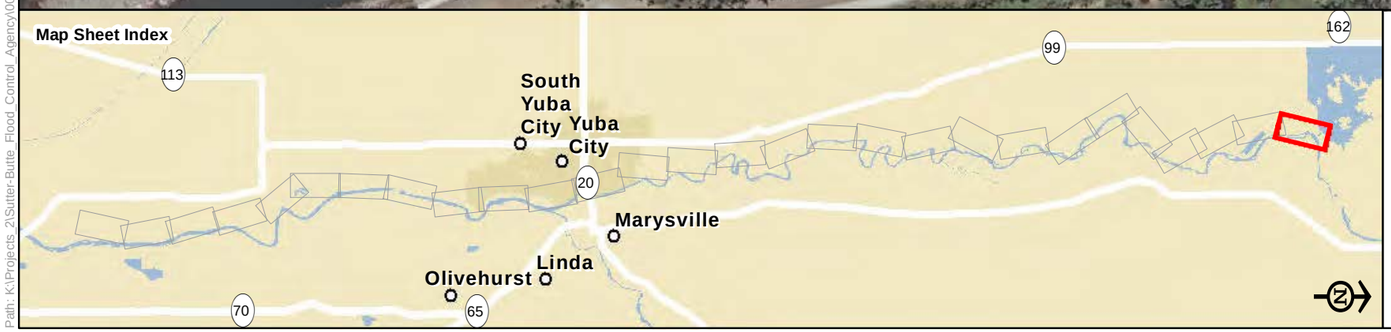
- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-27
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Alternative 3
- Canal Permanent Impacts (0.969 acre)
- Potential Wetland Impacts (0553 acre)
- Reach
- Station 202+50

Elderberry Action

- Removal
- Fenced

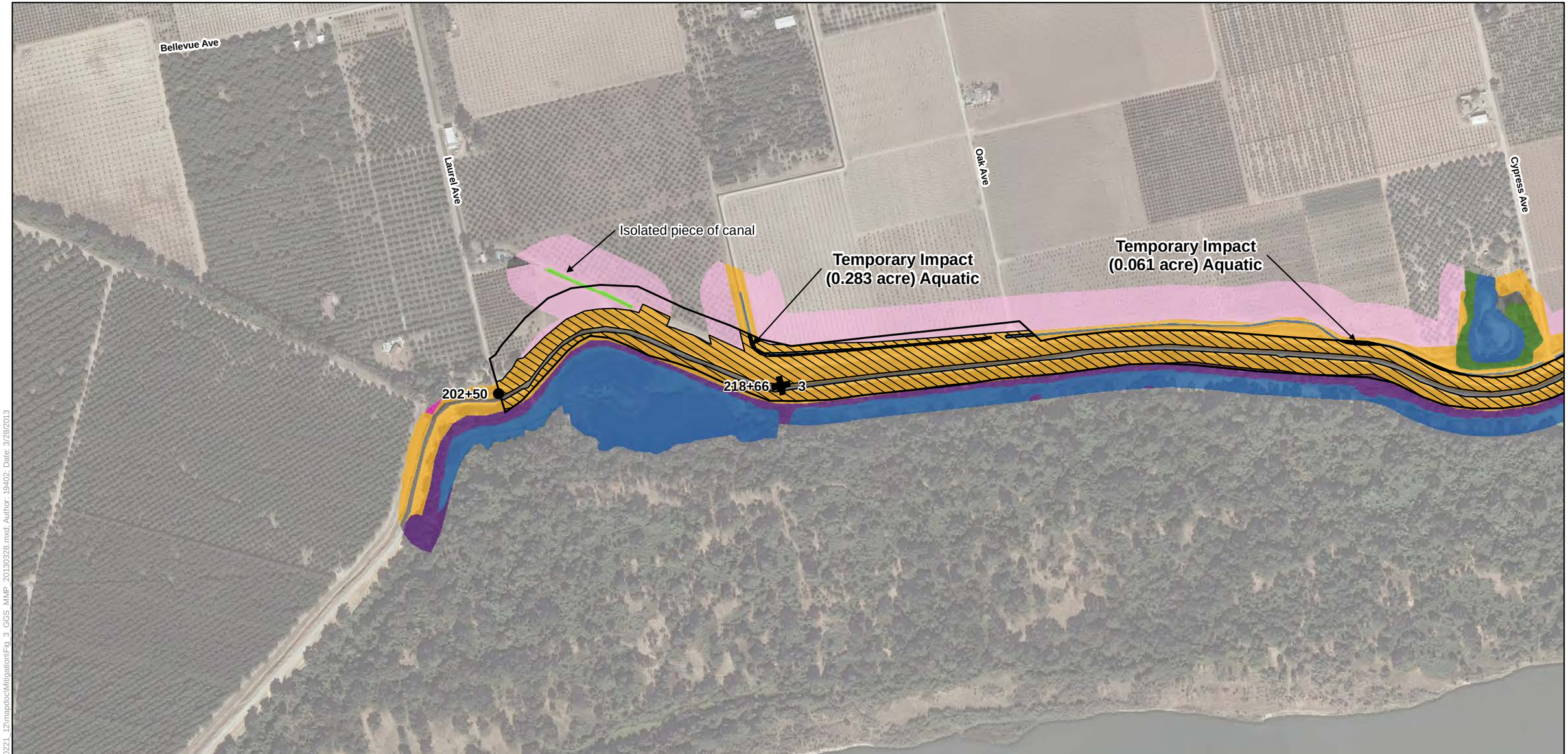
Land Cover Types

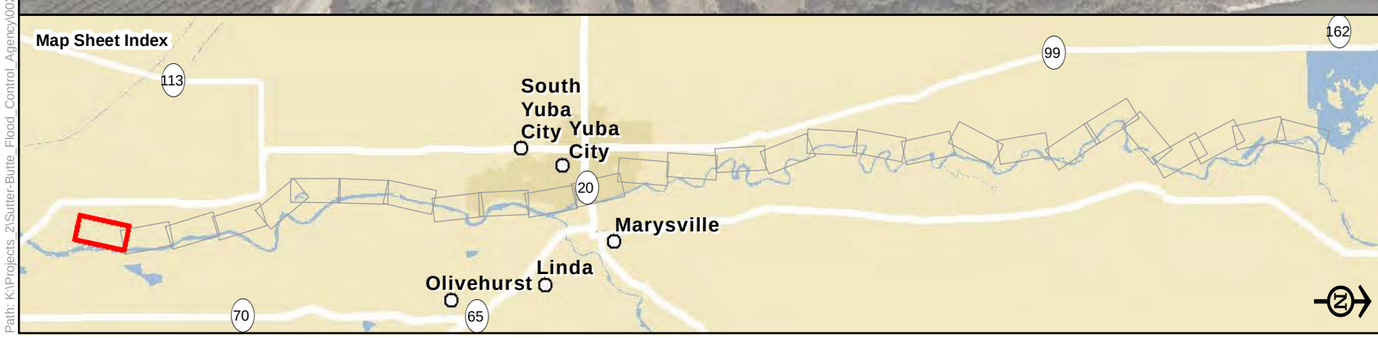
- Canal/Ditch
- Developed
- Field and Row Crops
- Oak Woodland
- Open Water
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Ruderal
- Seasonal Wetlands
- Tailings Ponds

Figure 2-28
Land Cover Types and Impacts to Potential Waters of the United States

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_2_Impacts_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

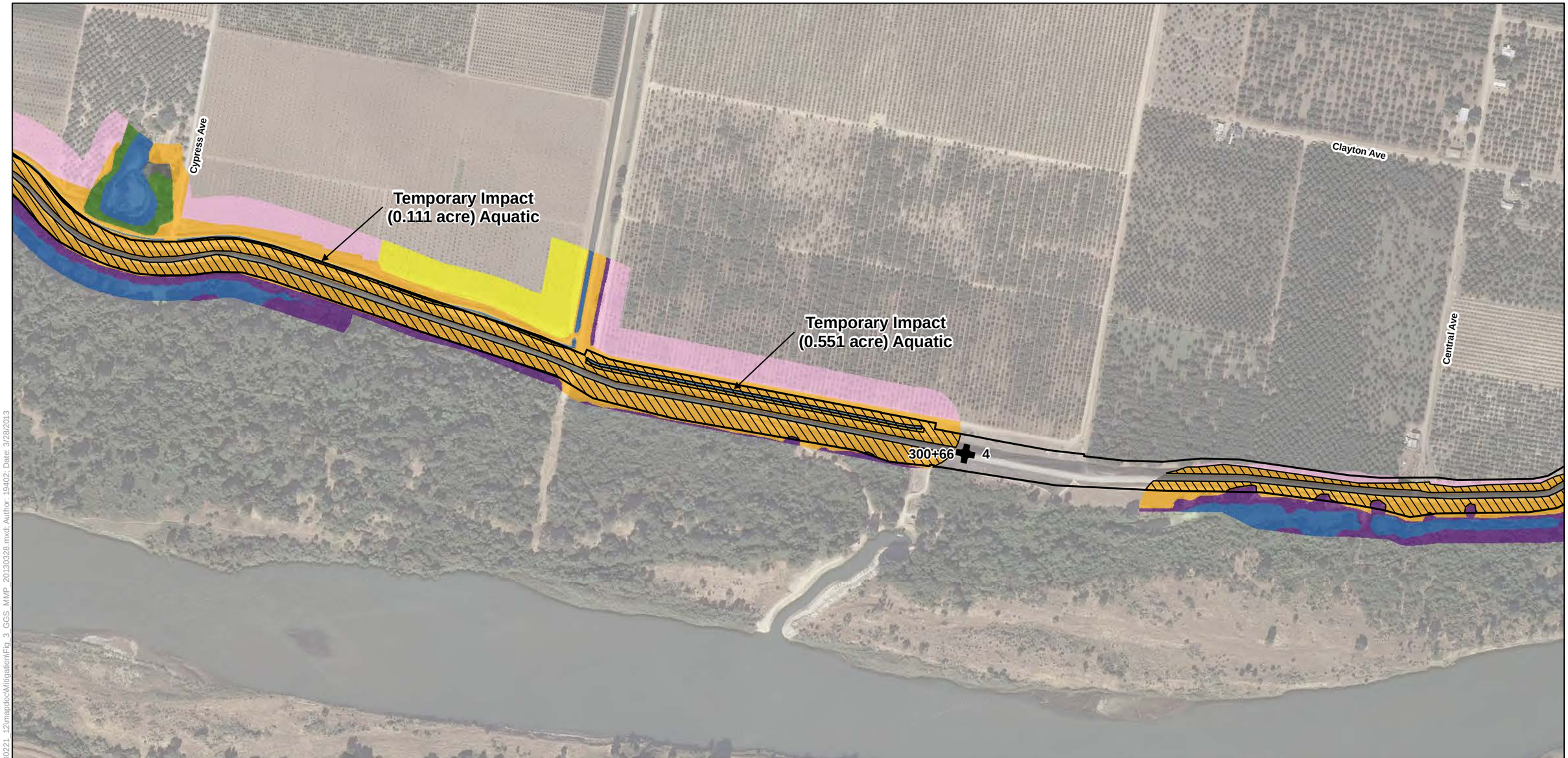
Suitable
- Ruderal Grassland

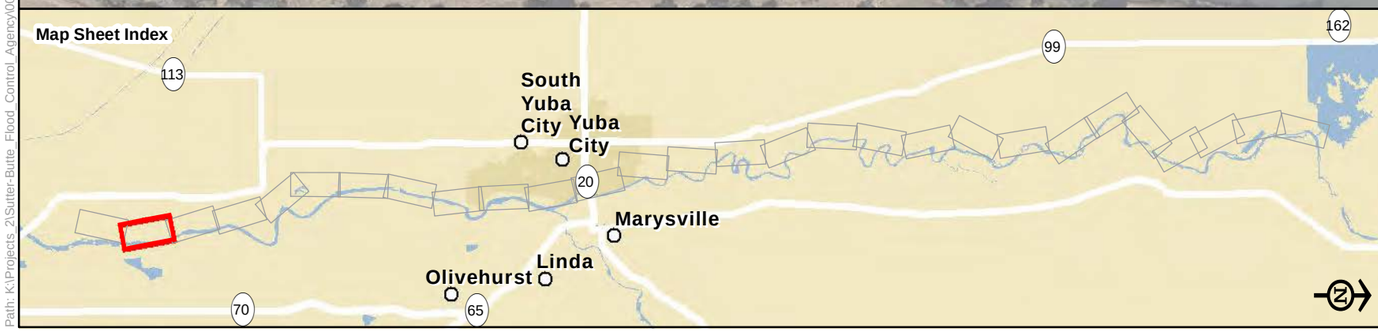
Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-1
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

0 250 500
Feet

Figure 3-2
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

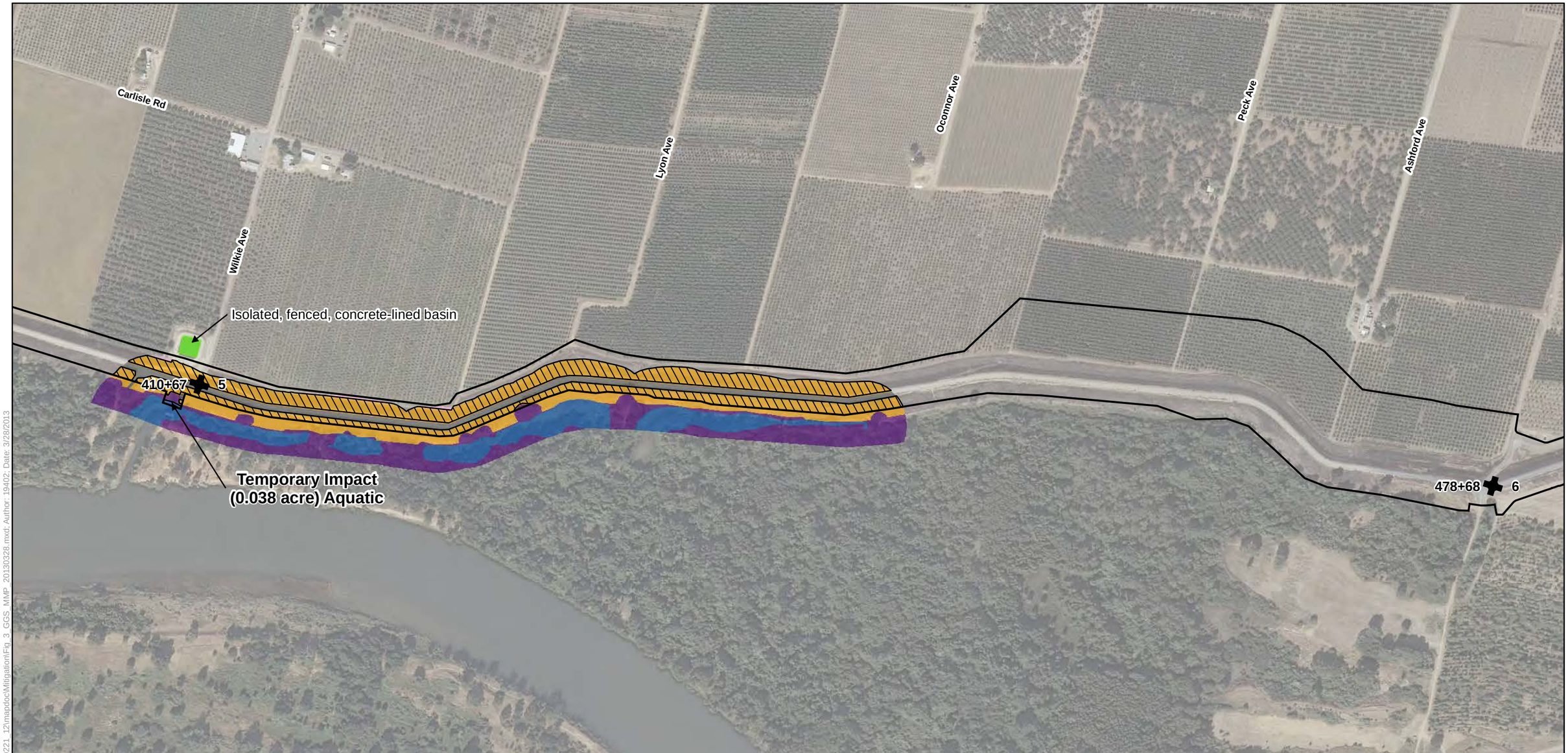
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-3
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

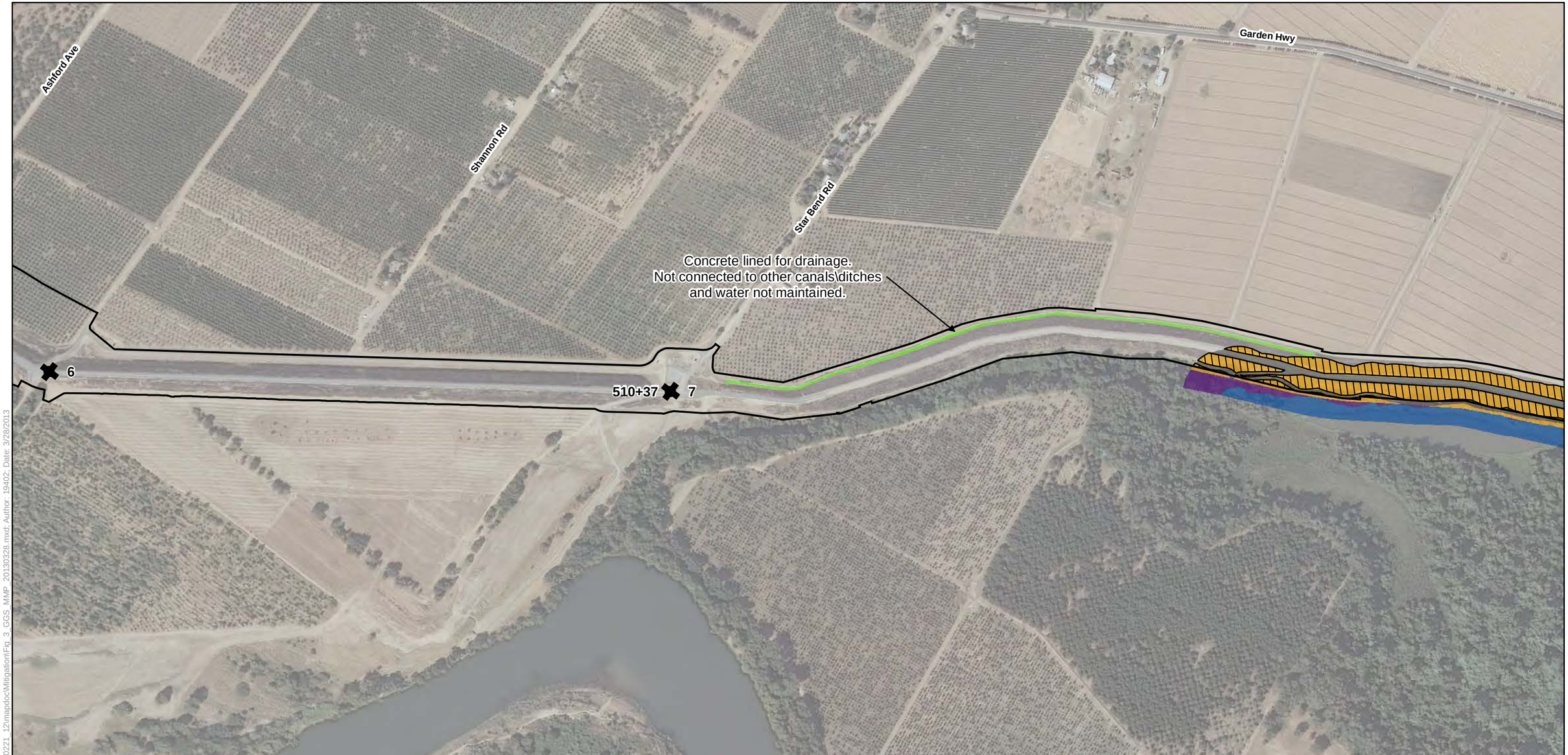
Suitable
- Ruderal Grassland

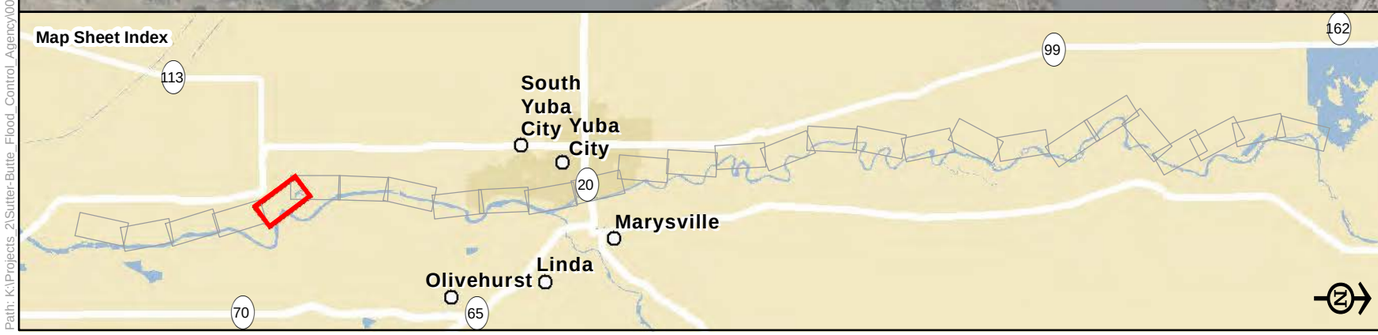
Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-4
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

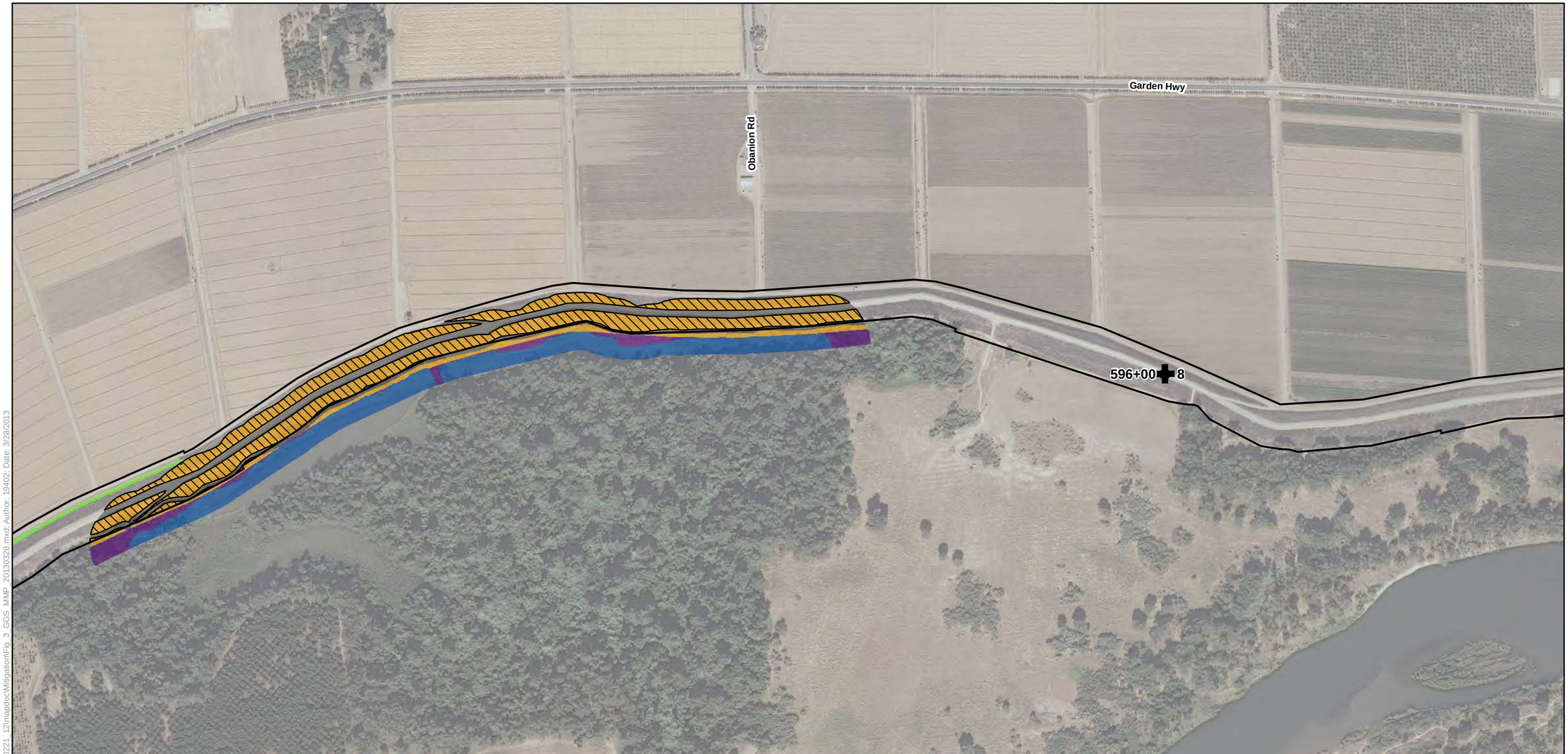
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

0 250 500
Feet

Figure 3-5
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

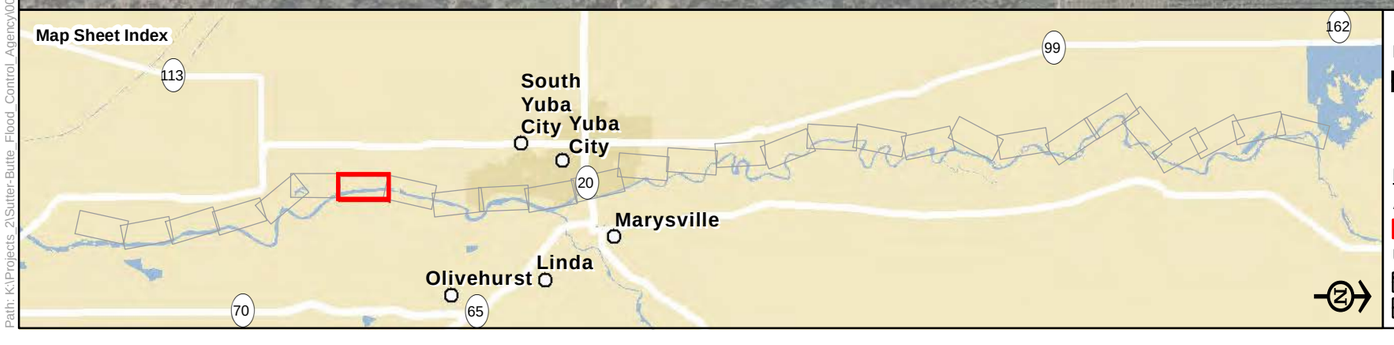
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-6
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

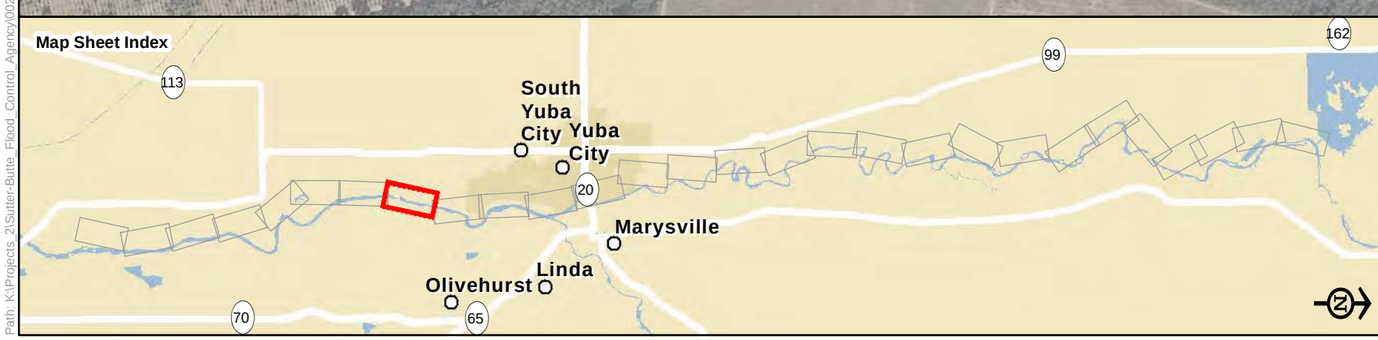
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-7
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

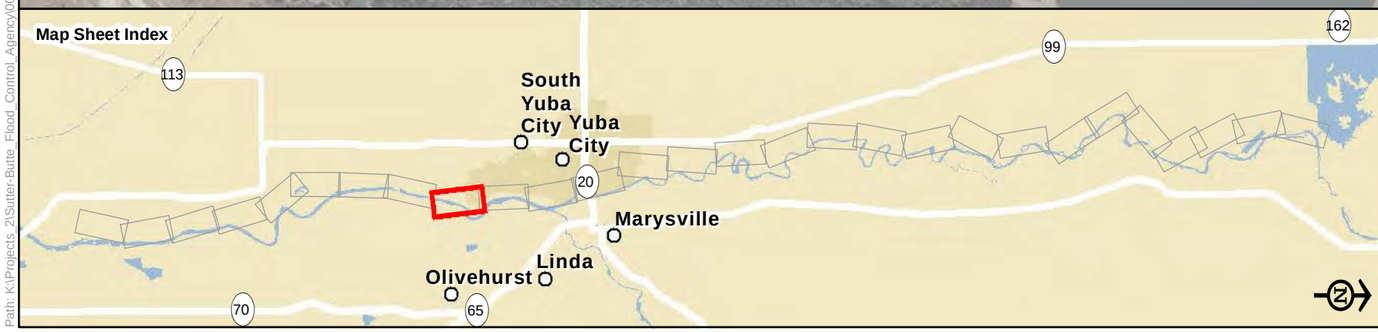
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-8
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

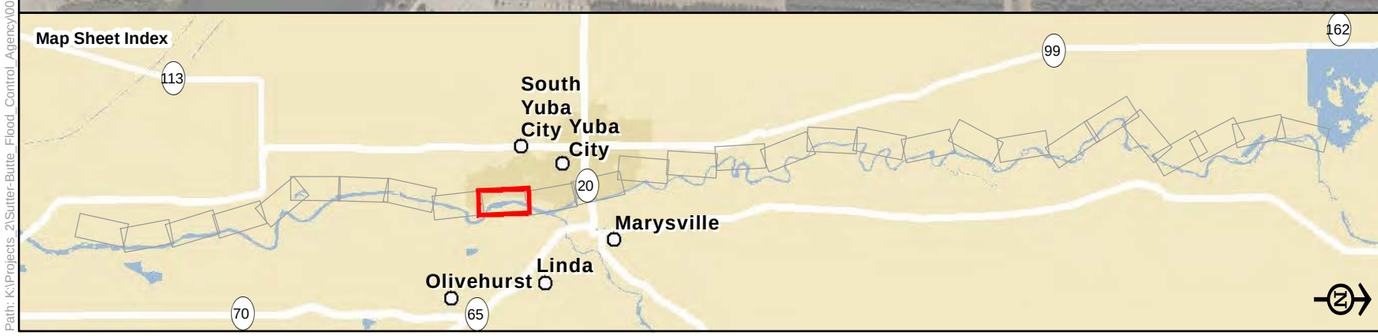
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-9
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

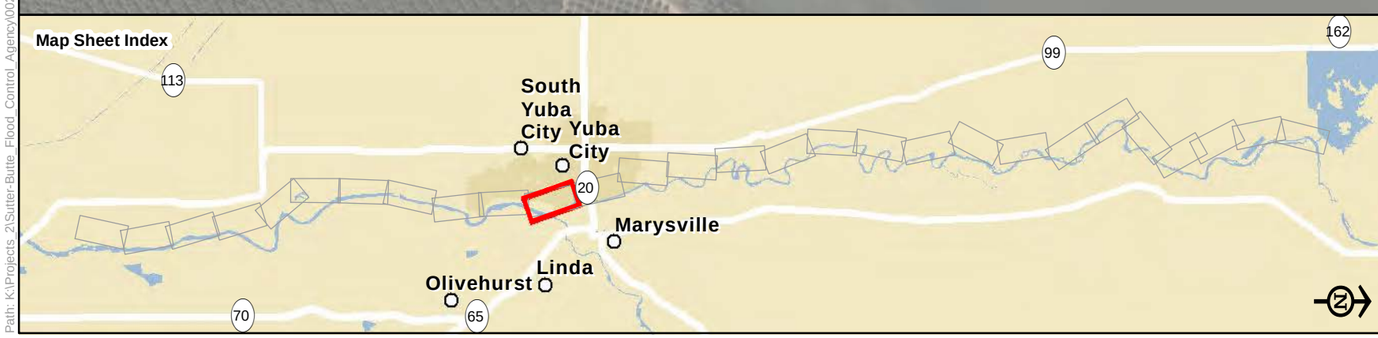
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-10
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

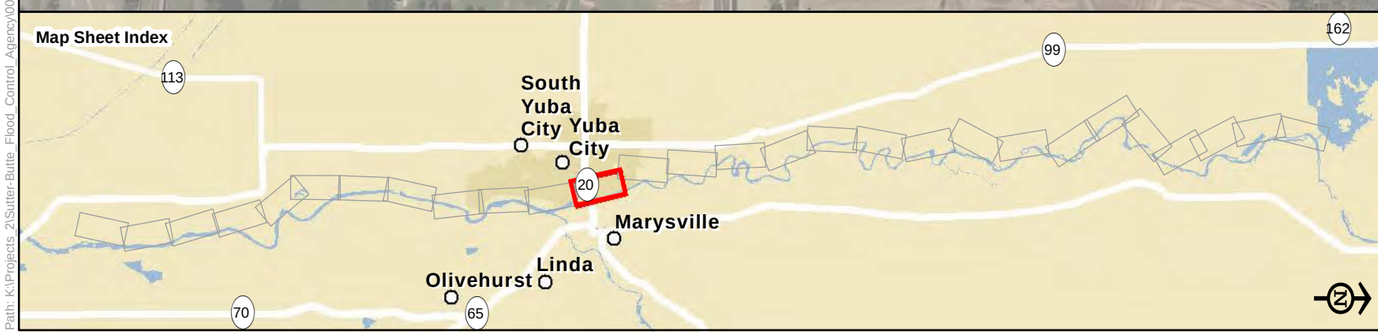
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-11
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

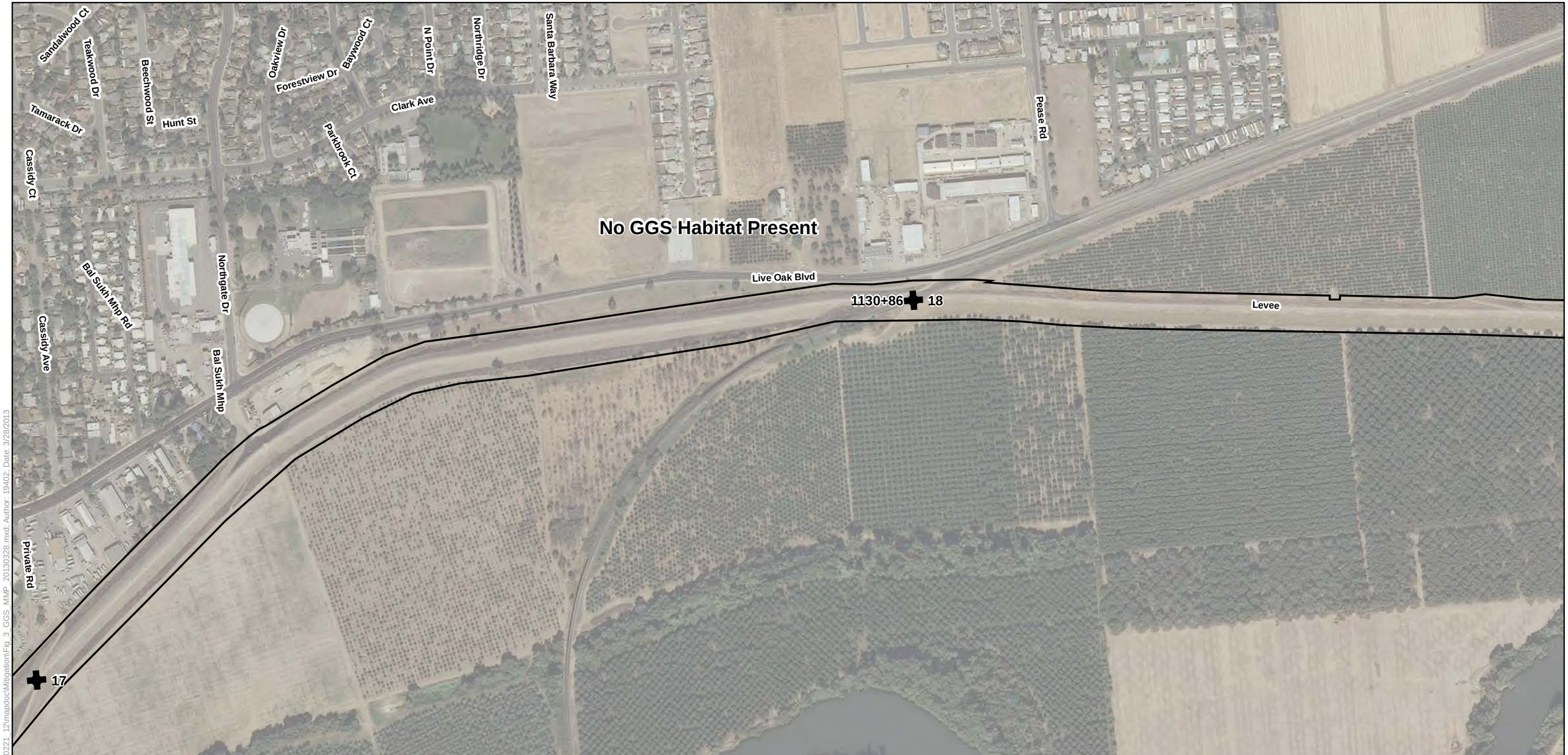
Suitable
- Ruderal Grassland

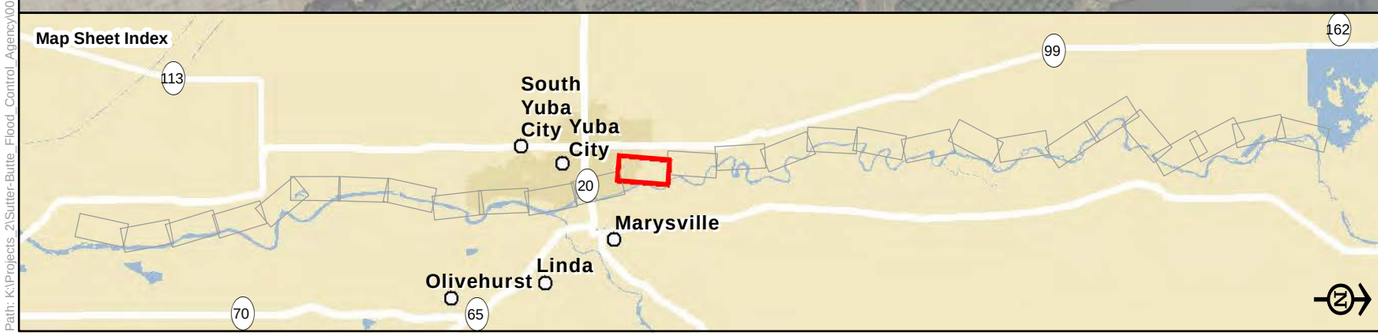
Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-12
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Miligation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

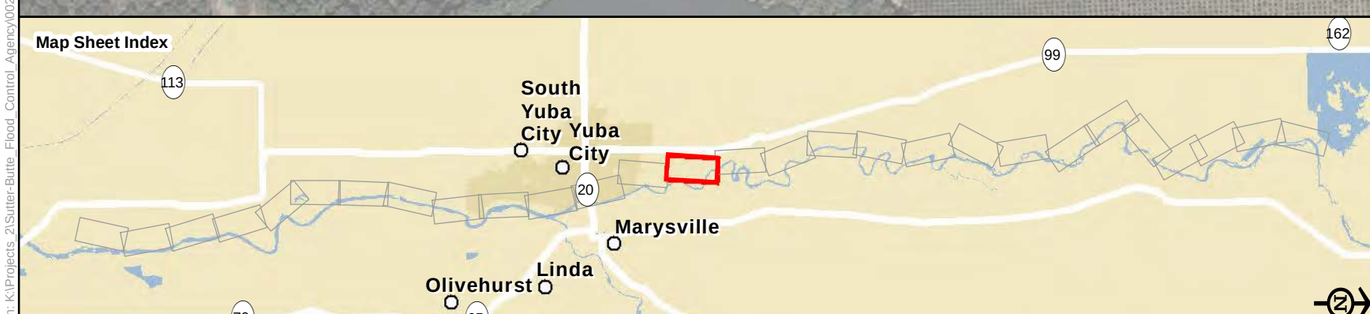
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-13
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

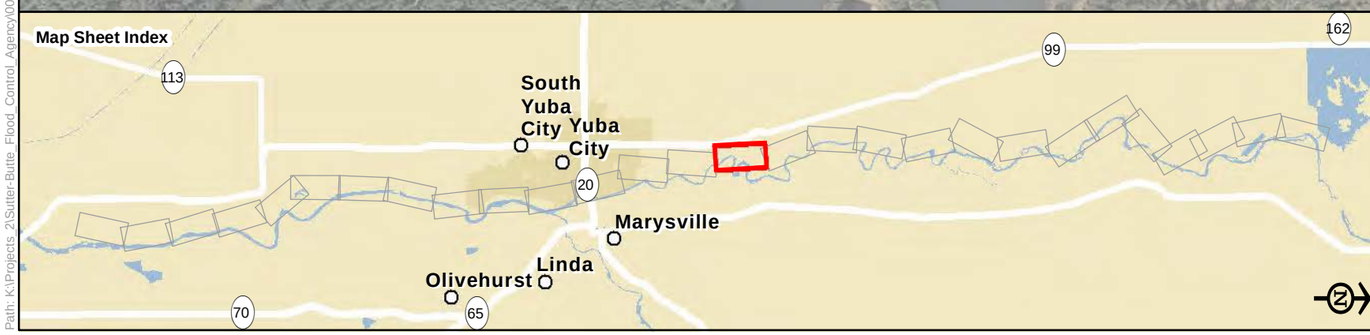
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-14
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

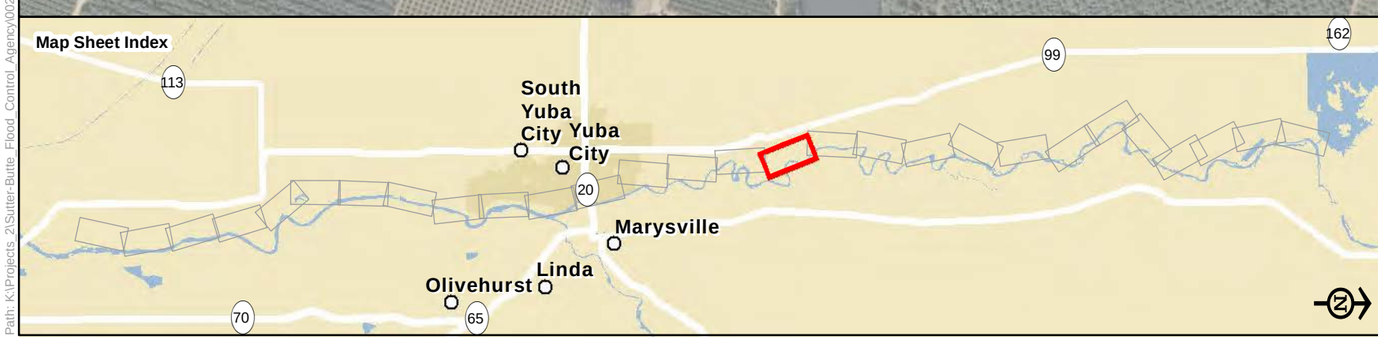
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-15
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-16
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

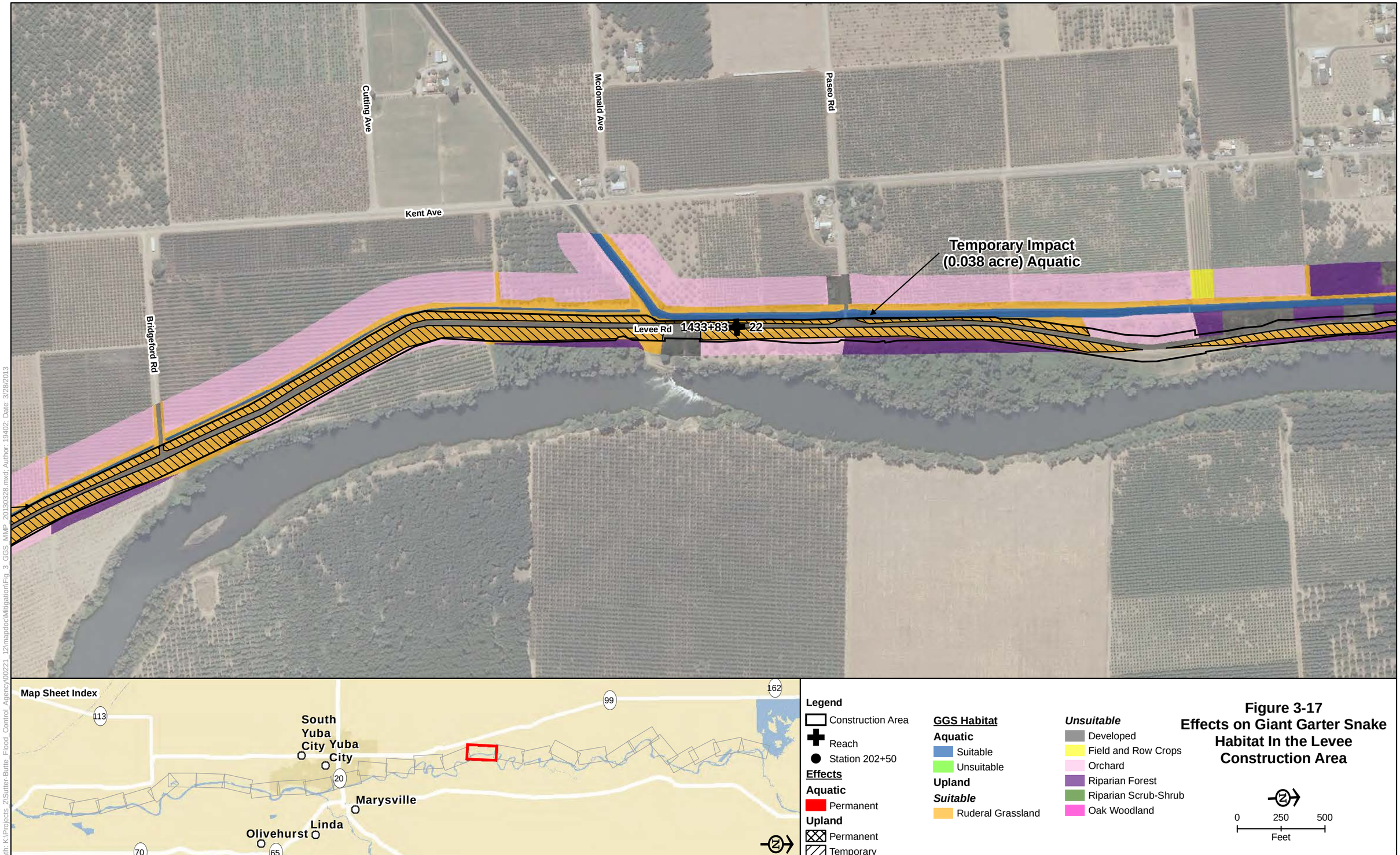
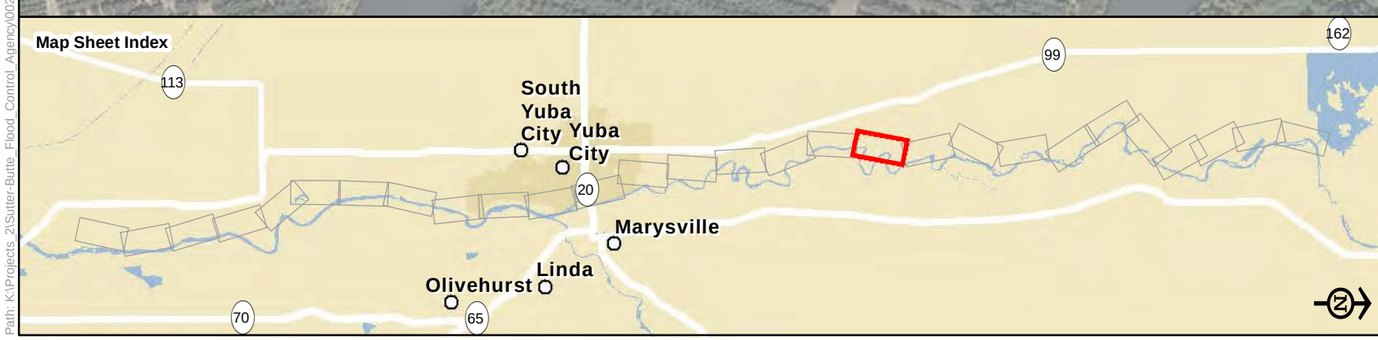


Figure 3-17
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-18
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

Campbell Rd

Encinal Rd

Temporary Impact
(0.023 acre) Aquatic

1623+86

25

1609+37

24

Cooley Rd

Private Rd

Sparrow Ln

Map Sheet Index

113

South Yuba City

Yuba City

20

Marysville

Linda

Olivehurst

70

65

99

162

Legend

Construction Area

Reach

Station 202+50

Effects

Aquatic

Permanent

Upland

Permanent

Temporary

GGS Habitat

Aquatic

Suitable

Unsuitable

Upland

Suitable

Ruderal Grassland

Unsuitable

Developed

Field and Row Crops

Orchard

Riparian Forest

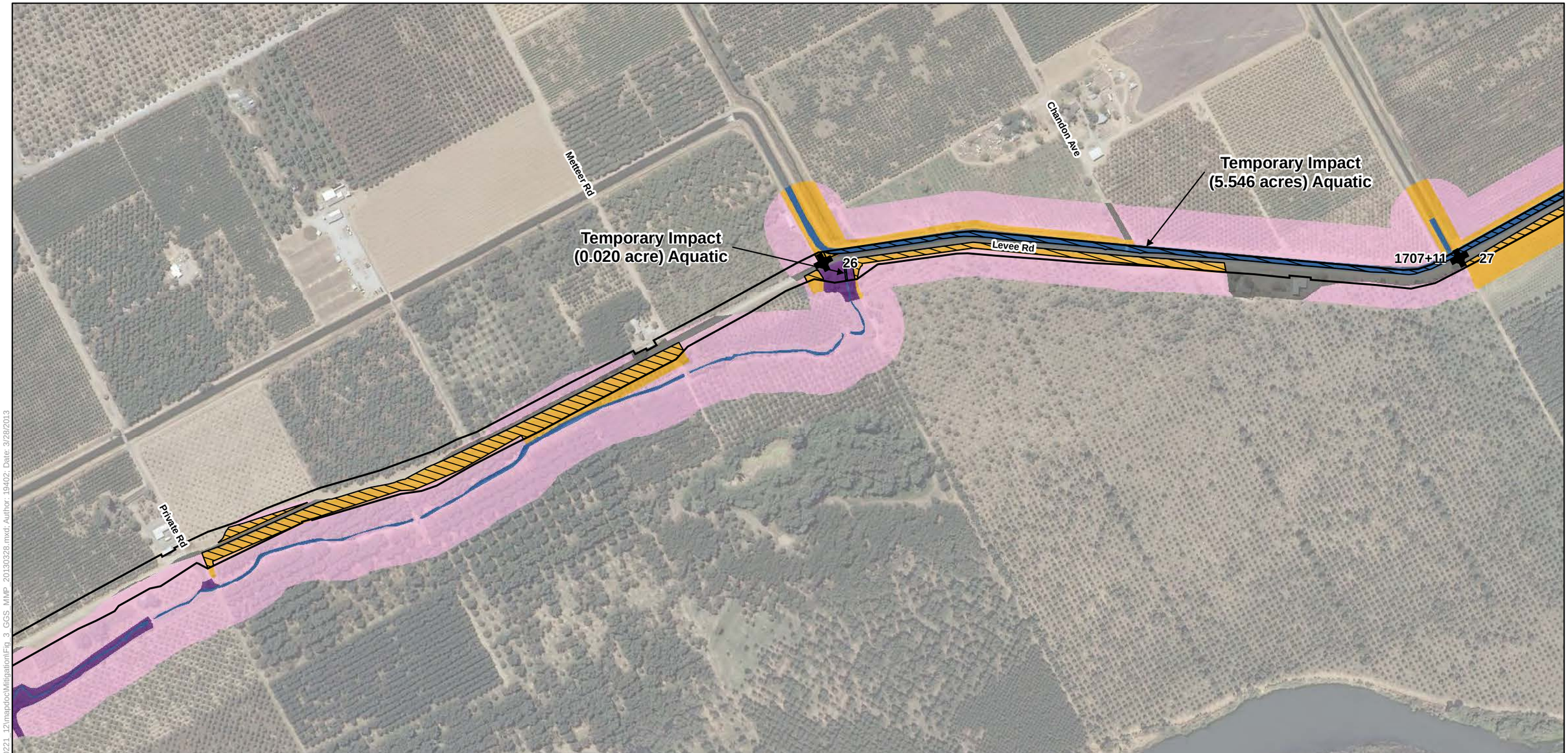
Riparian Scrub-Shrub

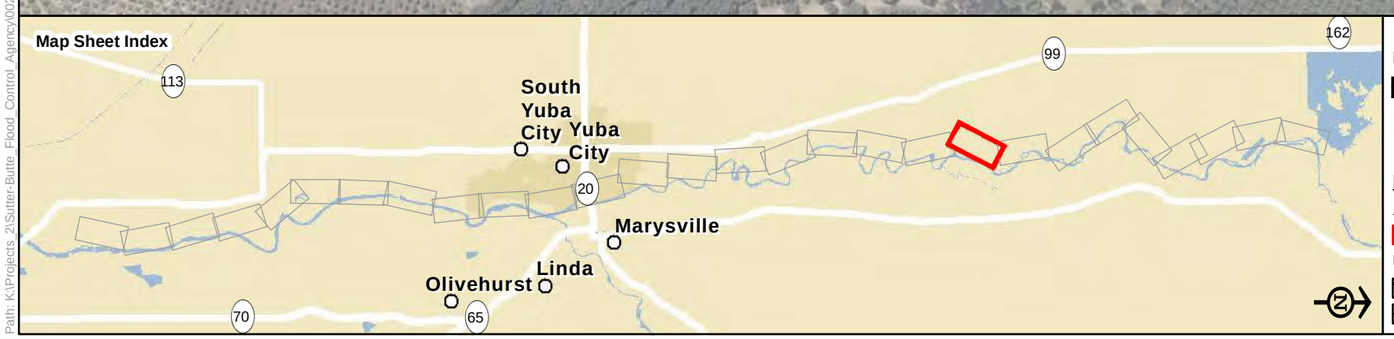
Oak Woodland

Figure 3-19
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013





Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-20
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

Temporary Impact
(5.546 acres) Aquatic

Temporary Impact
(0.068 acre) Aquatic

Campbell Ave

E Evans Reimer Rd

Center Ave

Levee Rd

Alexander Ave

1721+60

28

1769+31

29

Map Sheet Index

South Yuba City

Yuba City

Marysville

Linda

Olivehurst

113

20

70

65

99

162

Legend

Construction Area

Reach

Station 202+50

Effects

Aquatic

Permanent

Upland

Permanent

Temporary

GGS Habitat

Aquatic

Suitable

Unsuitable

Upland

Suitable

Ruderal Grassland

Unsuitable

Developed

Field and Row Crops

Orchard

Riparian Forest

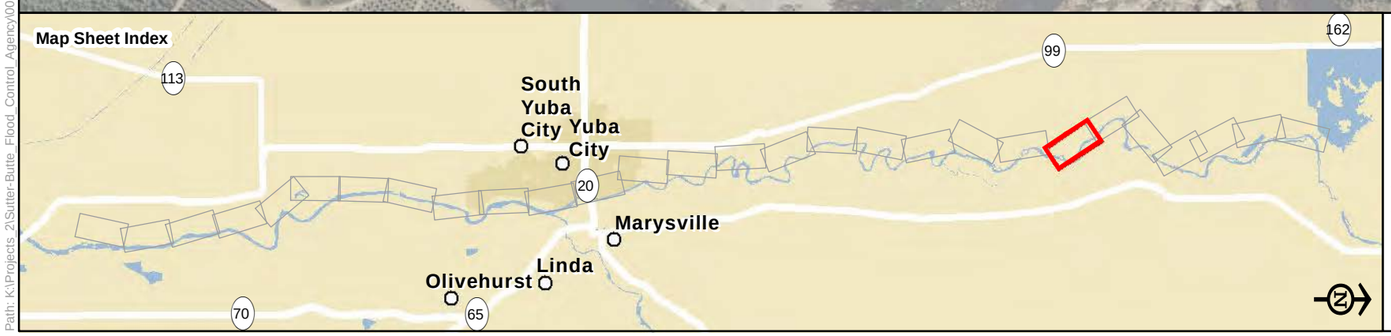
Riparian Scrub-Shrub

Oak Woodland

Figure 3-21
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

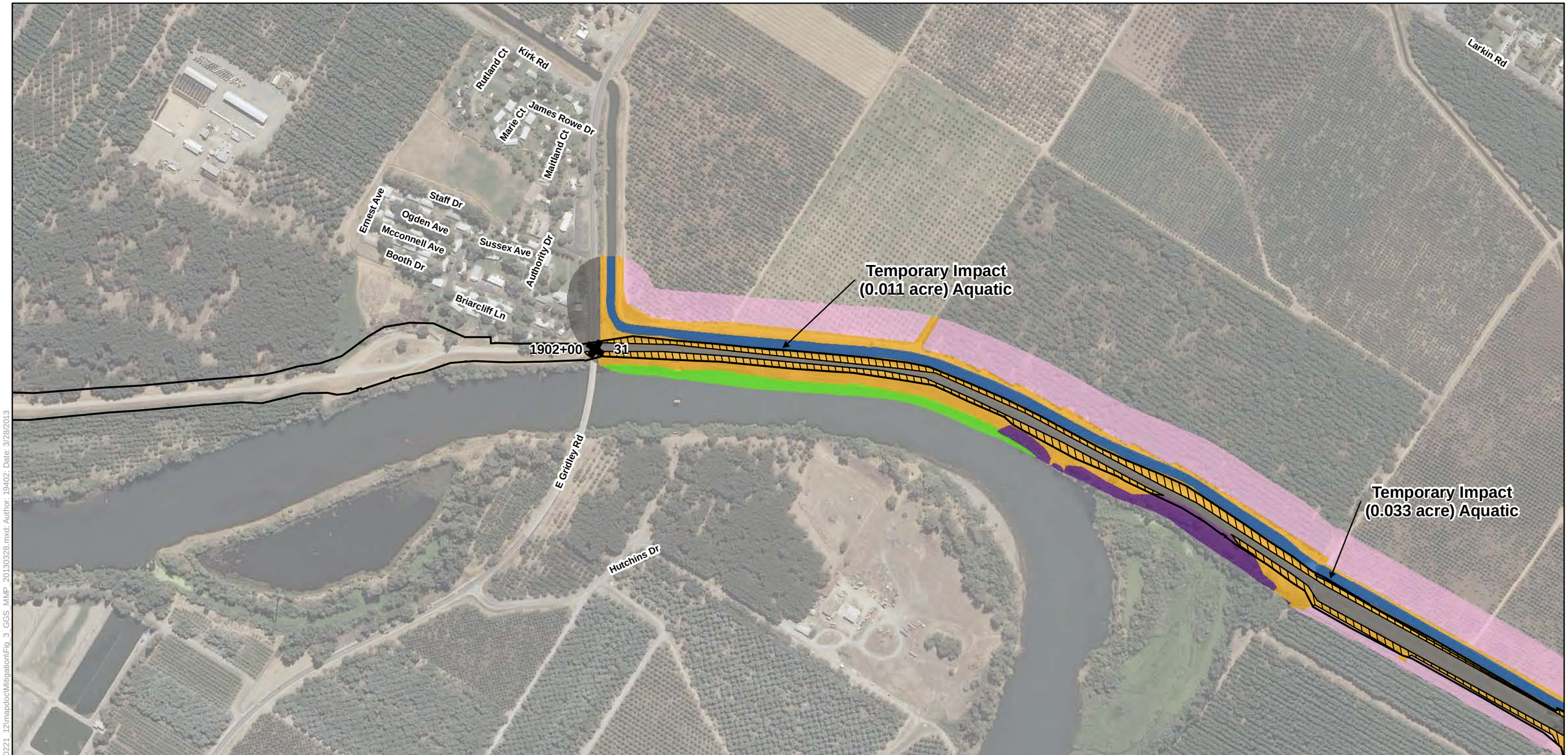
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-22
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

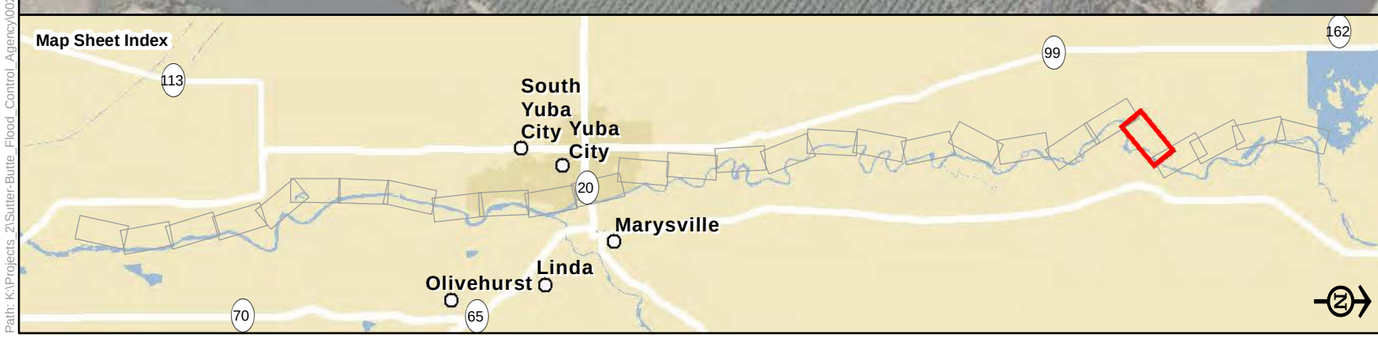
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

0 250 500
Feet

Figure 3-23
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

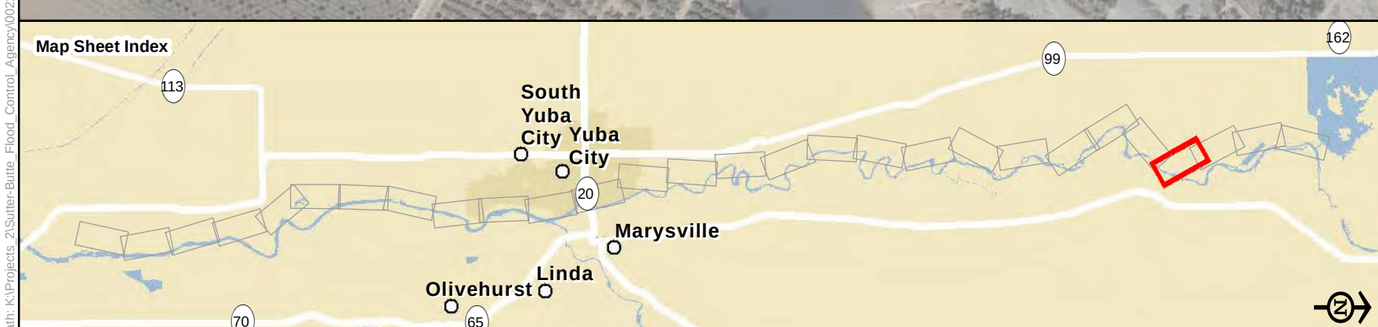
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-24
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

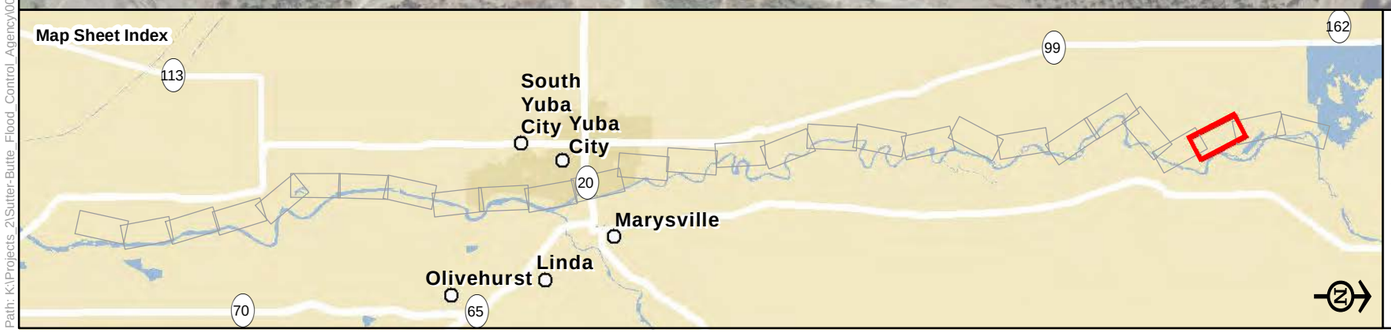
Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

0 250 500
Feet

Figure 3-25
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

0 250 500
Feet

Figure 3-26
Effects on Giant Garter Snake Habitat In the Levee Construction Area

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

No GGS Habitat Present

Larkin Rd

Walnut Ave

Welch Rd

Vance Ave

2259+00 37

2290+00 38

2224+00 36

2303+00 39

Tailings Area not considered suitable because of rocky nature of area

Map Sheet Index

113 99 162 20 70 65

South Yuba City

Yuba City

Marysville

Linda

Olivehurst

Legend

Construction Area

Reach

Station 202+50

Effects

Aquatic

Permanent

Upland

Permanent

Temporary

GGS Habitat

Aquatic

Suitable

Unsuitable

Upland

Suitable

Ruderal Grassland

Unsuitable

Developed

Field and Row Crops

Orchard

Riparian Forest

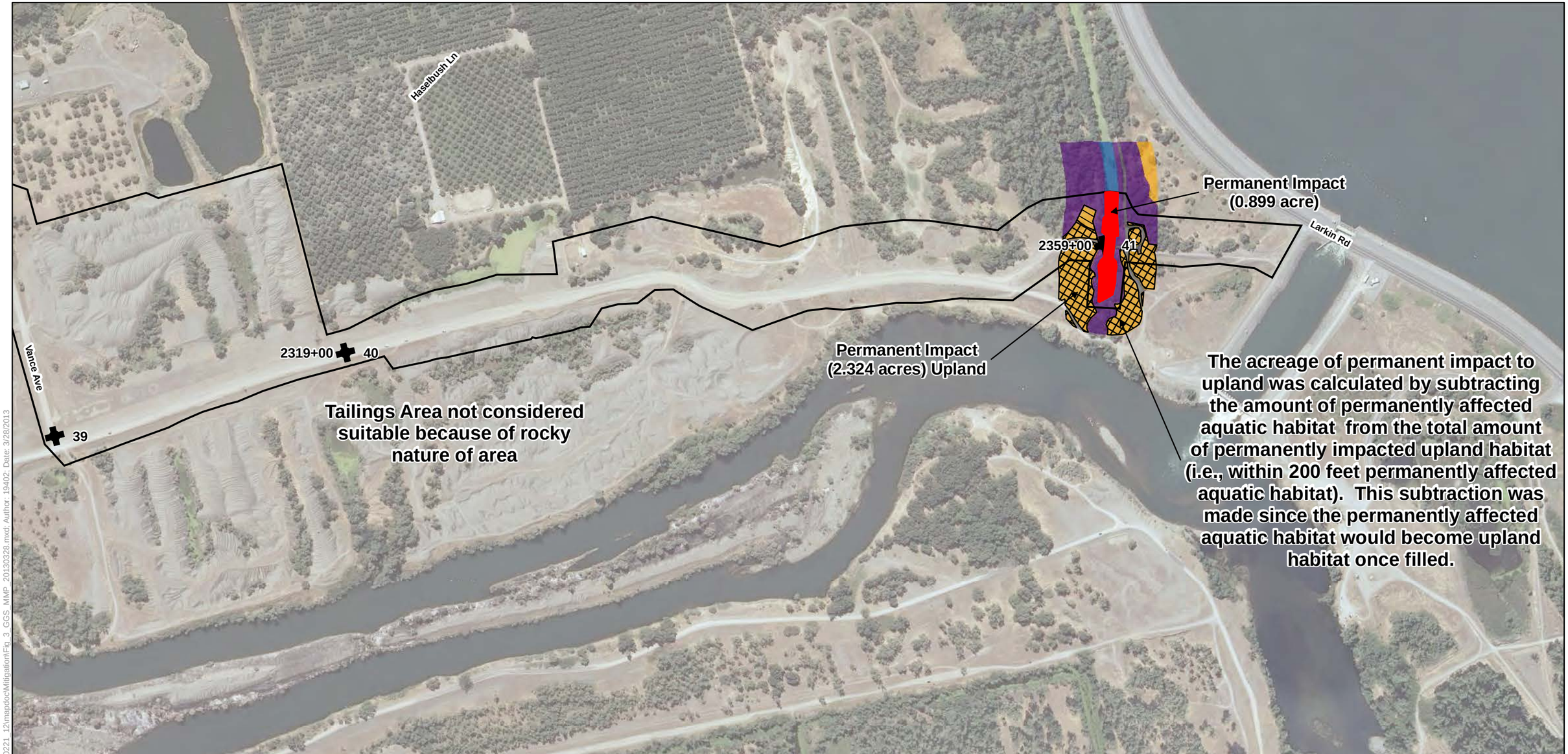
Riparian Scrub-Shrub

Oak Woodland

Figure 3-27
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013



Legend

- Construction Area
- Reach
- Station 202+50

Effects

Aquatic
- Permanent

Upland
- Permanent
- Temporary

GGS Habitat

Aquatic
- Suitable
- Unsuitable

Upland

Suitable
- Ruderal Grassland

Unsuitable
- Developed
- Field and Row Crops
- Orchard
- Riparian Forest
- Riparian Scrub-Shrub
- Oak Woodland

Figure 3-28
Effects on Giant Garter Snake Habitat In the Levee Construction Area

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_MMP_20130328.mxd; Author: 19402; Date: 3/28/2013

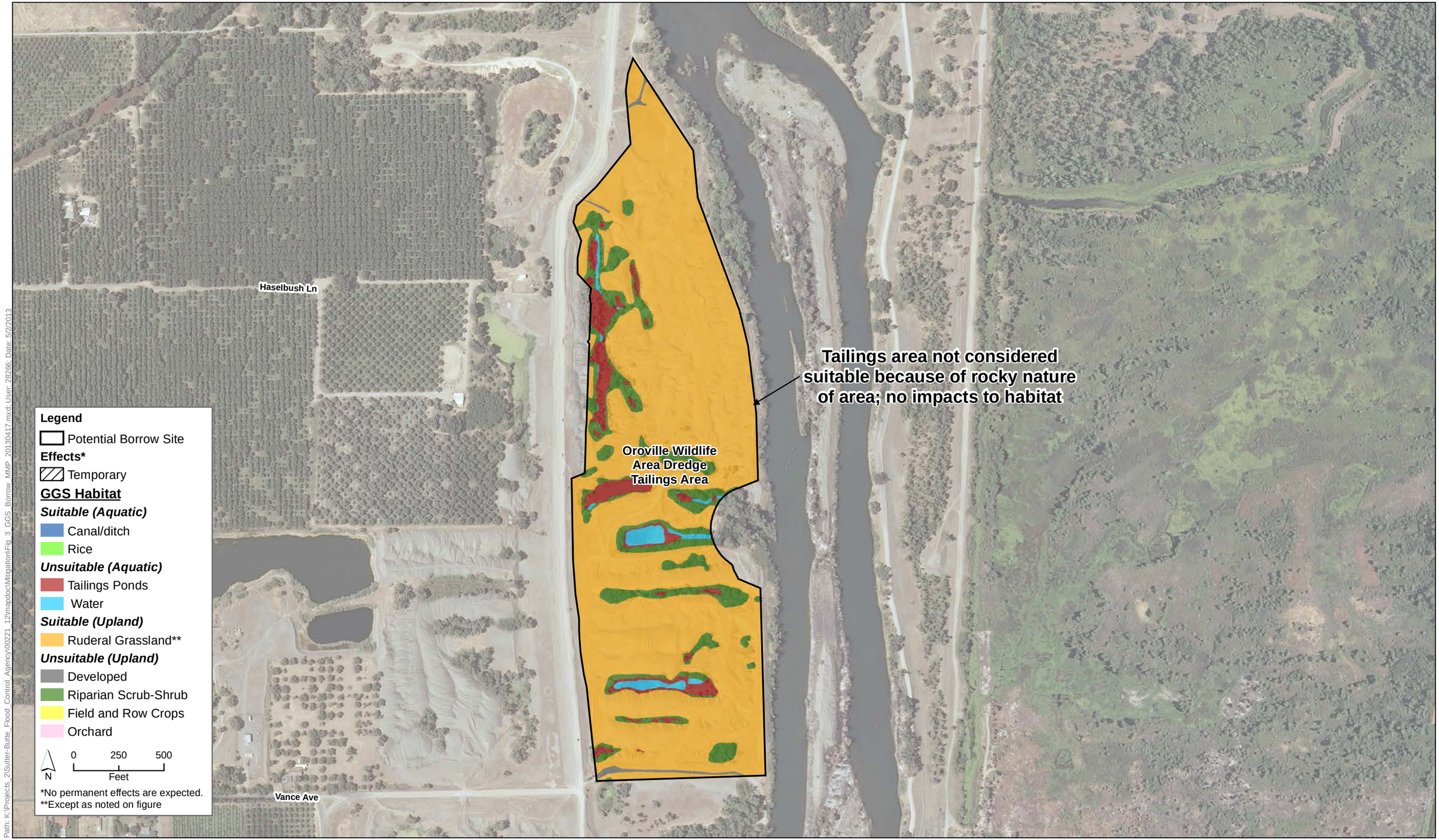


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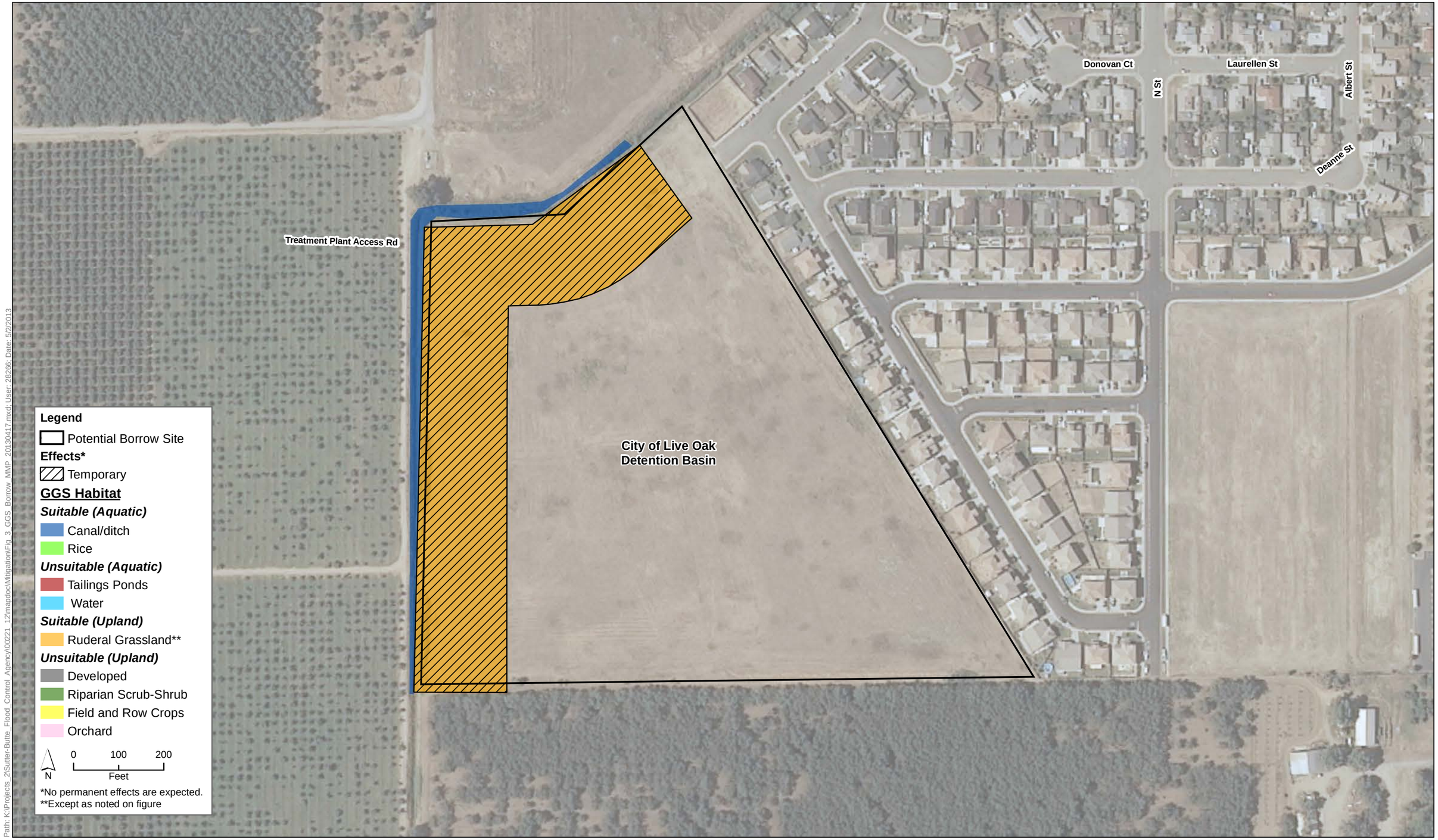
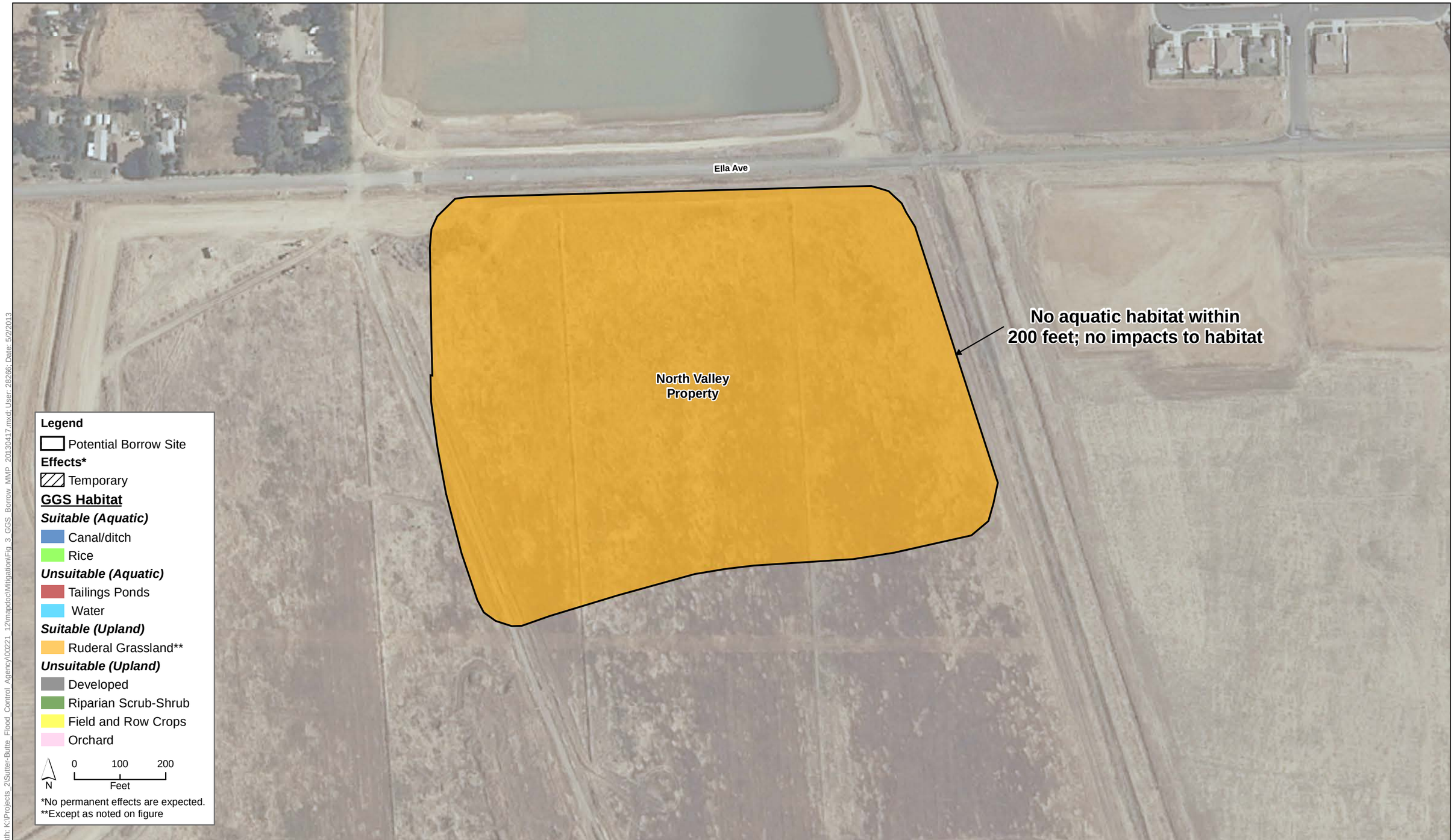
Figure 3-29
Effects on Giant Garter Snake Habitat at Potential Borrow Sites



Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_Borrow_MMP_20130417.mxd; User: 28266; Date: 5/2/2013

Figure 3-30
Effects on Giant Garter Snake Habitat at Potential Borrow Sites



Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_Borrow_MMP_20130417.mxd; User: 28266; Date: 5/2/2013

Figure 3-31
Effects on Giant Garter Snake Habitat at Potential Borrow Sites

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_Borrow_MMP_20130417.mxd; User: 28266; Date: 5/2/2013

Figure 3-32
Effects on Giant Garter Snake Habitat at Potential Borrow Sites

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00221_12\mapdoc\Mitigation\Fig_3_GGS_Borrow_MMP_20130417.mxd; User: 28266; Date: 5/2/2013

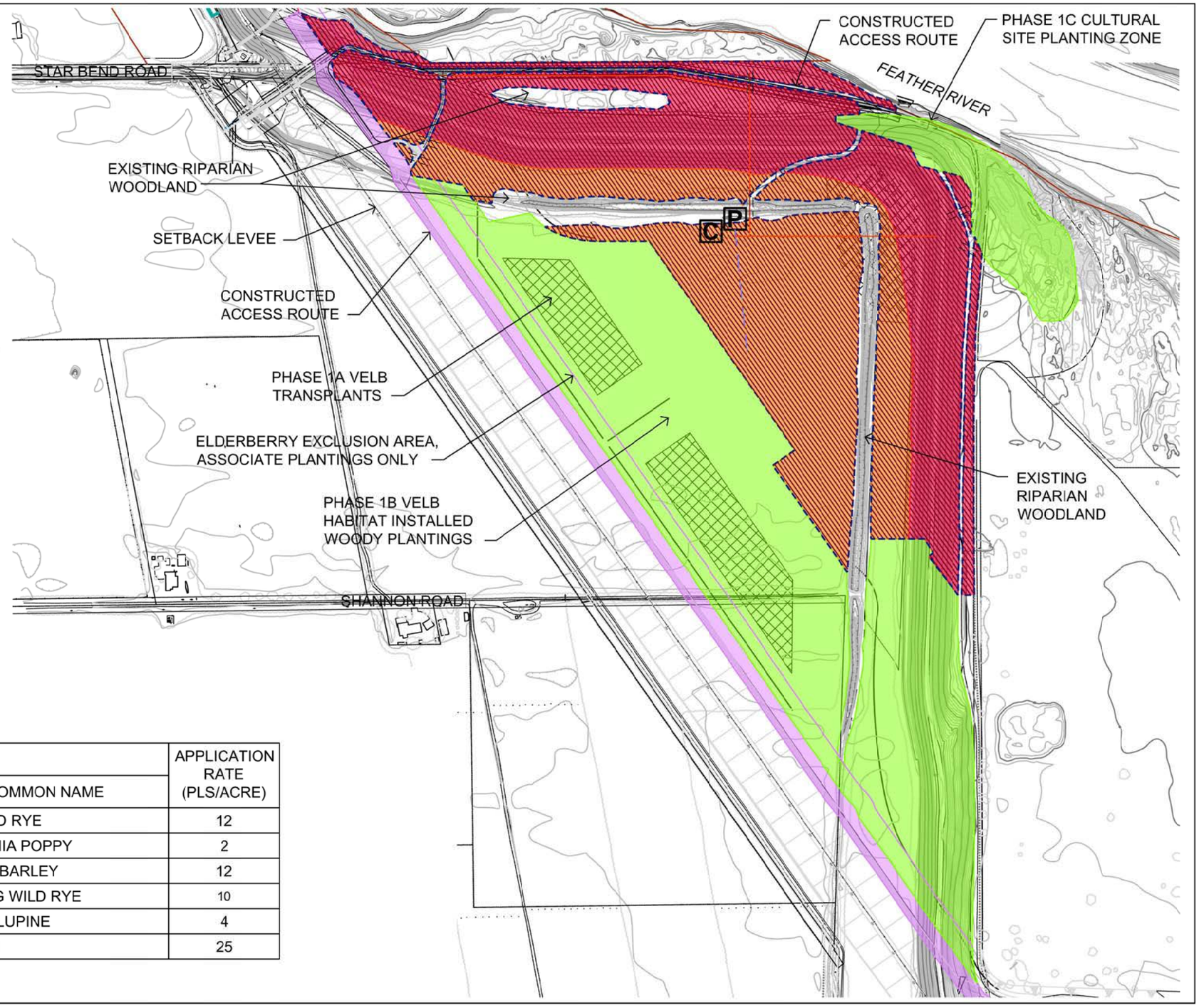
Figure 3-33
Effects on Giant Garter Snake Habitat at Potential Borrow Sites

2012_Project_Graphics:0022112 Sutter Butte Flood Control Agency/006 (05/04/13) SS

Figure 4
Star Bend Conservation Area

Legend:

- Protection Fencing
- Area of Levee Grading Disturbance
- Area of Mitigation Disturbance
- 50' Vegetation Planting Exclusion Area
- Star Bend Mitigation and Enhancement Habitat Phase 1
- Star Bend Elderberry Mitigation Phase 2 (11.16 acres) (Planting rows 10' apart, plants spaced per Restoration Planting Program)
- Star Bend Riparian Tree Mitigation Phase 2 (13.34 acres) (Planting rows 10' apart, plants spaced per Restoration Planting Program)
- P — Existing Well Pump with Filter, 6CLC 2 Stage Goulds Pump 7.5HP 230 Volt 3 Phase Motor Smartflow 7.5 HP VFD with 900 Series Tornado Filter
- C — Existing Irrigation Controller, Hunter ACC-1200 Controller, Mounted in lockable box adjacent to electric sub-panel
- Existing Mainline Pipe, 4" SCH 40 PVC, On-Grade
- New Mainline Pipe, 4" SCH 40 PVC, On-Grade
- New Mainline Pipe, 4" SCH 40 PVC, Below-Grade
- Sleeve, SCH 40 PVC, Below-Grade



RESTORATION SEED MIX

PLANTING ZONE	SPECIES NAME		APPLICATION RATE (PLS/ACRE)
	BOTANICAL NAME	COMMON NAME	
UPLAND SEED MIX	ELYMUS GLAUCUS	BLUE WILD RYE	12
	ESCHSCHOLIZIA CALIFORNICA	CALIFORNIA POPPY	2
	HORDEUM BRACHYANTHERUM	MEADOW BARLEY	12
	LEYMUS TRITICOIDES	CREEPING WILD RYE	10
	LUPINUS SUCCULENTUS	ARROYO LUPINE	4
	TRITICUM X ELYMUS	REGREEN	25

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0 150 300
Scale 1"=300'

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Figure 5
SBFCA West Feather River Levee
Star Bend Restoration Phase 2

RESTORATION PLANTING PROGRAM

PLANTING ZONE	SPECIES NAME		AVERAGE PLANT SPACING (FEET ON CENTER)	PERCENTAGE OF PLANT PALETTE	CONTAINER SIZE
	BOTANICAL NAME	COMMON NAME			
ELDERBERRY MITIGATION AREA	BACCHARIS PILULARIS	COYOTE BUSH	10' O.C.	10	1 GALLON
	POPULUS FREMONTII	FREMONT COTTONWOOD	10' O.C.	10	1 GALLON
	ROSA CALIFORNICA	CALIFORNIA WILD ROSE	10' O.C.	10	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	10' O.C.	10	1 GALLON
	SALIX EXIGUA	SANDBAR WILLOW	10' O.C.	5	1 GALLON
	SALIX LASIOLEPIS	ARROYO WILLOW	10' O.C.	5	1 GALLON
	SAMBUCUS MEXICANA	MEXICAN BLUE ELDERBERRY	10' O.C.	50	1 GALLON
	TOTAL PLANT PALETTE FOR ELDERBERRY MITIGATION AREA =			100	
RIPARIAN MITIGATION AREA	ACER NEGUNDO	BOX ELDER	10' O.C.	15	1 GALLON
	CEPHALANTHUS OCCIDENTALIS	BUTTONWILLOW	10' O.C.	15	1 GALLON
	FRAXINUS LATIFOLIA	OREGON ASH	10' O.C.	10	1 GALLON
	PLATANUS RACEMOSA	CALIFORNIA SYCAMORE	12' O.C.	10	1 GALLON
	POPULUS FREMONTII	FREMONT COTTONWOOD	12' O.C.	10	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	12' O.C.	5	1 GALLON
	ROSA CALIFORNICA	CALIFORNIA WILD ROSE	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	10	1 GALLON
	RUBUS URSINUS	CALIFORNIA BLACKBERRY	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	10	1 GALLON
	SALIX EXIGUA	SANDBAR WILLOW	10' O.C.	5	1 GALLON
	SALIX LASIOLEPIS	ARROYO WILLOW	10' O.C.	10	1 GALLON
	VITIS CALIFORNICA	CALIFORNIA WILD GRAPE	2' O.C. WITHIN CLUSTERS OF 5, 15' O.C. BETWEEN CLUSTERS	5	1 GALLON
	TOTAL PLANT PALETTE FOR RIPARIAN MITIGATION AREA =			100	
NON-RIPARIAN NATIVE TREE MITIGATION AREA	BACCHARIS PILULARIS	COYOTE BUSH	10' O.C.	15	1 GALLON
	QUERCUS LOBATA	VALLEY OAK	10' O.C.	75	1 GALLON
	QUERCUS WISLIZENII	INTERIOR LIVE OAK	10' O.C.	10	1 GALLON
	TOTAL PLANT PALETTE FOR NON-RIPARIAN NATIVE TREE MITIGATION AREA =			100	

NOTES:

1. IRRIGATION IS NECESSARY FOR PLANT SURVIVAL AND ESTABLISHMENT. IRRIGATION WILL BE APPLIED TO ACHIEVE SELF-SUFFICIENT PLANTS BY THE END OF THE THIRD DRY SEASON.
2. THE IRRIGATION SYSTEM WILL UTILIZE WELLS AND INFRASTRUCTURE ESTABLISHED IN PHASE 1.
3. SOIL MOISTURE PROBES WILL BE USED TO MONITOR AND MAINTAIN MOISTURE THROUGHOUT THE SOIL COLUMN. DEEP ROOTING WILL BE ENCOURAGED THROUGH DEEP WATERING WITH DIMINISHING FREQUENCY.
4. STAR BEND MITIGATION AND ENHANCEMENT HABITAT PHASE 2 IS COMPRISED OF 11.16 ACRES OF ELDERBERRY MITIGATION AND 13.34 ACRES OF RIPARIAN TREE MITIGATION FOR A TOTAL OF 24.5 ACRES OF MITIGATION. AN ADDITIONAL 22.46 ACRES OF RIPARIAN TREE AND 0.44 ACRES OF NON-RIPARIAN NATIVE TREE MITIGATION WILL BE FULFILLED AT TRLIA'S FEATHER RIVER FLOOD CORRIDOR RESTORATION PROJECT SITE.

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Figure 6
SBFCA West Feather River Levee
Star Bend Restoration Phase 2

DRAFT FEATHER RIVER WEST LEVEE PROJECT INCREMENTAL COST ANALYSIS

PREPARED FOR:

Sutter Butte Flood Control Agency
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Yuba City, CA 95991
Contact: Mike Inamine
530.755.9859

PREPARED BY:

ICF International
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Carl Jensen
916.737.3000

March 2013

ICF International. 2013. *Draft Feather River West Levee Project Incremental Cost Analysis*. (ICF 00165.12) Sacramento, CA. Prepared for Sutter Butte Flood Control Agency, Yuba City, CA.

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List of Acronyms and Abbreviations

CE/ICA	cost-effectiveness/incremental cost analysis
DFW	California Department of Fish and Wildlife
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
MMP	Mitigation and Monitoring Plan
Project	Feather River West Levee Project applicant-preferred alternative
SBFCA	Sutter Butte Flood Control Agency

Draft Feather River West Levee Project
Incremental Cost Analysis

Analysis Scope and Objective

This section is a cost effectiveness analysis of the options for mitigating habitat and jurisdictional waters impacts associated with Sutter Butte Flood Control Agency's (SBFCA's) Feather River West Levee Project applicant-preferred alternative (Project).

This analysis in presented in compliance with ER 1105-2-100 (April 22, 2000) and its included guidance on cost-effectiveness/incremental cost analysis (CE/ICA). It is intended to determine the least-cost solution for habitat mitigation for the project. As the habitat mitigation needs are directly correlated to the impacts of the project, there are no increments to consider beyond the mitigation requirements. Therefore, incremental cost analysis is not necessary.

Project Description, Impacts, and Mitigation Needs

The project consists of levee improvements in a 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay downstream to approximately 3 miles north of the confluence with the Sutter Bypass. The levee improvements include mostly slurry cutoff walls with short segments of seepage berms and other location-specific measures like removal or treatment of encroachments.

Potential borrow sites that could supply the soil borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites, are also included as part of the work. It is not anticipated that all sites would be used over the multi-year phased construction period but would be available for use if the need arises.

Existing Ecological Resources

Table 1 provides a summary of all existing land cover types within the Project area.

Table 1. Acreages of Existing Land Cover Types in the Project Area

Land Cover Type	Permanent Impacts for Which Mitigation Is Required?	Unit	Levee Construction Footprint [a]	Borrow Sites[a]	Total
Terrestrial					
Native riparian tree	Y	dbh	7,833	0	7833
Non-riparian, native tree (oak)	Y	dbh	4,788	0	4788
Non-native tree	N	dbh	36,074	0	36,074
Elderberry shrubs	Y	Each	92	0	92
Field and row crops	N	acre	137.42	41.22	178.64
Developed	N	acre	412.79	2.94	415.73
Ruderal	N	acre	897.96	105.71	1,003.67
Aquatic					
Freshwater emergent wetland	N	acre	0.57	0	0.57
Seasonal wetland	Y	acre	12.23	0	12.23
Open water	Y	acre	44.52	1.21	45.73
Tailing ponds	Y	acre	6.44	3.59	10.03
Stream	N	acre	0.17	0	0.17
Canal/ditch	Y	acre	22.51	0.64	23.15
Wet agriculture (rice)	N	acre	0	35.74	35.74

[a] Accuracy to 0.01 acre is subject to ±5% accuracy depending upon the accuracy of aerial imagery and topographic maps.

Significant Losses to Ecological Resources, Impact Units and Proposed Mitigation

Detailed discussion of the project impacts may be found in the Project's Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) and Biological Assessments. Table 2 summarizes the project's impacts to sensitive ecological resources, impact unit of measure, and the proposed compensatory mitigation ratios and quantities.

Table 2. Anticipated Project Impacts to Sensitive Ecological Resources

Impact Type	Impact Unit	Impact Quantity	Mitigation Need	Mitigation Area
Riparian Tree	diameter at breast height (inches)	1,746 waterside 3,042 landside 4,788 total	4,788 plantings	9.51 acres at 10' o.c. plant spacing
Non-Riparian Native Tree	diameter at breast height (inches)	2,233 waterside 5,600 landside 7,833 total	7,833 plantings	15.57 acres at 10' o.c. plant spacing
Elderberry	individual shrubs and total stem count within each shrub	92 shrubs with 552 total stems	92 transplants, 1,380 elderberry seedlings, and 1,380 native associates	11.4 acres (276 elderberry units)
Giant Garter Snake	acres of permanent impact	0.9 aquatic 2.32 upland	3.22 acres at 3:1 replacement ratio	9.6 acres
Jurisdictional Waters	acres of permanent impact	0.55	1.1 acres at 2:1 replacement ratio	1.1 acres

Mitigation Planning Objectives and Potential Mitigation Strategies

The mitigation planning objective for this project is to provide compensatory mitigation at resource agency approved ratios for all permanent impacts to sensitive ecological resources.

There were four primary habitat mitigation solutions considered, listed below with a statement of applicability.

- **In-lieu fee program.** This option, wherein a permittee/applicant pays the permitting agency to implement mitigation at its discretion, generally has low favorability with the agencies requiring mitigation because it shifts the burden of responsibility for providing replacement habitat from the applicant/permittee to the permitting agency. It is often regarded as a "last resort" and typically applies only to very small projects and impacts where other mitigation options may not be feasible, upon negotiation with the permitting agency. Approved in-lieu fee programs may not exist for all mitigation needs in the project area. For this combination of reasons, in-lieu fee programs were not considered further as a viable solution for this project.
- **Out-of-kind replacement habitat.** This option involves replacement of habitat with a different type than that which was impacted, either on-site or off-site. Because in-kind replacement habitat is not feasible, this option was not considered further as a viable solution for this project.
- **On-site replacement habitat.** This option involves replacement of affected habitat with new habitat of the same type and at the same location as the loss. Because much of the affected habitat (specifically, woody vegetation) is not compliant in its location with USACE levee vegetation policy, this option is not considered feasible. Further, the highly dispersed nature of the impact locations makes efficient replacement infeasible. On-site replacement was not considered further as a viable option for this project.

- **Off-site, in-kind replacement habitat.** This option involves replacement of affected habitat with new habitat of the same type but at a different location than the loss. This often allows for consolidation of mitigation at a single or small number of sites, allowing for economy of scale and higher quality habitat due to large patch size. There are two sub-types:
  - **Permittee-responsible mitigation.** This option involves replacement of in-kind habitat on habitat lands operated by the permittee. Permittee-responsible mitigation is considered viable and is addressed in the Mitigation and Monitoring Plan (MMP) developed for the project.
  - **Purchase of credits at commercial mitigation banks.** This option involves replacement of in-kind habitat through purchase of credits issued for habitat lands operated by a commercial mitigation bank. Purchase of credits is considered viable and is addressed in the MMP developed for the project.

Permittee-Responsible Mitigation. Permittee-responsible offsite mitigation involves securing an appropriate mitigation site, implementing the mitigation plan, monitoring its performance, maintaining the site during the establishment period, developing a conservation mechanism, and arranging a source of funding for long-term protection of the site.

The Star Bend mitigation site is an existing floodplain habitat restoration site that was created as part of the Star Bend setback levee project and contains sufficient area to accommodate all of the project's upland compensatory mitigation, consisting of mostly woody vegetation. Aquatic habitat mitigation, including giant garter snake habitat and jurisdictional waters, could be created through restoration of a rice field used for soil borrow for the project.

Table 3 provides a summary of the permittee-responsible mitigation and the anticipated costs. Appendix A contains detailed construction and establishment cost breakdowns for each category to establish a unit cost for equitable comparison between mitigation solutions (i.e., "apples-to-apples" comparison).

Table 3. Permittee-Responsible Mitigation Costs

Mitigation Type	Location	Quantity	Unit	Cost per Unit	Cost
Riparian Tree	Star Bend and Abbott Lake	9.51	Acres	$36,294	$345,161
Non-Riparian Native Tree	Star Bend	15.57	Acres	$35,192	$568,411
Elderberry (New Plantings)	Star Bend	276	Units	$1,882	$519,572
Elderberry (Transplants)	Star Bend	92	Each	$1,200	$110,400
Giant Garter Snake	Restored rice field	9.6	Acres	$48,342	$464,084
Jurisdictional Waters	Restored rice field	1.1	Acres	$301,242	$331,367
				Total	**$2,338,994**

Mitigation Bank. Purchase of mitigation bank credits involves utilizing a commercial mitigation bank or banks to fulfill the project's compensatory mitigation obligation. The mitigation bank or banks would need to have been approved by the permitting agencies for the habitat types and service area that covers the impact.

Currently there is not one mitigation bank that can solely fulfill all of the credit types needed for the project's mitigation requirements. For the upland habitat impacts, the River Ranch Wetland Mitigation Bank and River Ranch Elderberry Conservation Bank, both owned and operated by Wildlands, Inc., are located at the confluence of the Sacramento and Feather Rivers in Yolo County. These banks can fulfill the riparian and elderberry mitigation requirements of the project. There are currently no mitigation banks that offer oak woodland (non-riparian native tree) credits.

For the aquatic habitat impacts, the Sutter Basin Conservation Bank, owned and operated by Westervelt Ecological Services in Sutter County, is the only bank that presently offers giant garter snake credits approved by both the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife (DFW). Jurisdictional water credits are available at the River Ranch Wetland Mitigation Bank (discussed above).

Table 4 provides a summary of the agency-approved mitigation credits available at the banks in the service area of the impacts.

Table 4. Mitigation Bank Costs

Mitigation Type	Location	Quantity	Unit	Cost per Unit	Total
Riparian Tree	River Ranch Wetlands Mitigation Bank	9.51	acres	$100,000	$951,000
Non-Riparian Native Tree	None	15.57	acres	$50,000*	$778,500
Elderberry (New Plantings)	River Ranch Elderberry Conservation Bank	276	units	$4.000	$1,104,000
Elderberry (Transplants)		92	each	$1200	$110,400
Giant Garter Snake	Sutter Basin Conservation Bank	9.6	acres	$40,000	$384,000
Jurisdictional Waters	River Ranch Wetlands Mitigation Bank	1.1	acres	$100,000	$110,000
				Total	**$4,437,900**

*Estimate; no market credits are available at this time.

Summary of Results

The total cost for the permitted responsible mitigation option is $2,338,994. The total cost for the mitigation bank option is $4,437,900. On a cost per unit basis, the most cost-effective solution would be a blend between the two options, as shown below in Table 5.

Table 5. Unit Cost Comparison

Mitigation Type	Unit	Permittee-Responsible Mitigation Cost per Unit	Mitigation Bank Cost per Unit	Most Cost-Effective Solution
Riparian Tree	acre	$36,294	$100,000	Permittee-responsible
Non-Riparian Native Tree	acre	$35,192	$50,000*	Permittee-responsible
Elderberry (New Plantings)	unit	$1,882	$4,000	Permittee-responsible
Elderberry (Transplants)	each	$1,200	$1,200	Permittee-responsible
Giant Garter Snake	acre	$48,342	$40,000	Mitigation bank
Jurisdictional Waters	acre	$301,242	$100,000	Mitigation bank

* Estimate; no market credits are available at this time.

Therefore, in accordance with ER 1105-2-100 (Appendix E, page 153), the most cost-effective plan is a combination of permittee-responsible mitigation and purchase of credits at a commercial mitigation bank, as no other plan costs less, and no other plan yields more output for less money. This blended solution is detailed in Table 6.

Because of the limited size of the Star Bend mitigation site, it will be necessary to secure a second offsite mitigation location for approximately 8.48 acres of mitigation credit in order to completely fulfill all project mitigation needs. The Abbot Lake site, which is near the Star Bend mitigation site, is owned by DFW and has been tentatively identified as a second suitable mitigation site.

Table 6. Most Cost-Effective Mitigation Solution

Mitigation Type	Location	Quantity/ Unit	Cost per Unit	Total
Riparian Tree	Star Bend and Abbott Lake	9.51 acres	$36,294	$345,161
Non-Riparian Native Tree	Star Bend	15.57 acres	$35,192	$547,939
Elderberry (New Plantings)	Star Bend	276 units	$1,854	$511,704
Elderberry (Transplants)		92 each	$1,200	$110,400
Giant Garter Snake	Sutter Conservation Bank	9.6 acres	$40,000	$384,000
Jurisdictional Waters	River Ranch Wetlands Mitigation Bank	1.1 acres	$100,000	$110,000
Total				**$2,009,204**

There are other factors influencing favorability of this blended solution. One such factor is that non-riparian native tree mitigation is not presently available at a bank, meaning a bank-only solution is not feasible. Moreover, enhancement of the Star Bend restoration area is favored by the permitting agencies to more fully realize the floodplain habitat potential for this area for fish and wildlife. Additionally, the Star Bend site is under joint control by one of SBFCA's member agencies (Levee District 1) and DFW, easing issues with maintenance, ownership, and protective status in conservation. Conversely, these issues are not resolved for a permittee-responsible aquatic mitigation site, increasing the favorability of mitigation bank solution for these impacts.

Appendix A
Mitigation Cost Tables

Table A1. Elderberry Mitigation Costs at Star Bend

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Elderberry plantings at Star Bend (11.4 acres)	Mobilization	LS	$15,000	1	$15,000	
	Container plant	EA	$20	2,760	$55,200	Assumes 5 elderberry and 5 associates per unit (242 plants/acre)
	Transplants	EA	$1,200	92	$110,400	
	Irrigation system	AC	$8,500	11.4	$96,900	Assumes flood proof drip system
	Irrigation POC	EA	$15,000	1	$15,000	Assumes pumping out of Feather River
	Maintenance Years 1-4	LS	$42,298	1	$67,302	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$92,400	1	$92,000	
	15% Contingency				$67,770	
	Total				**$519,572**	

Table A2. Riparian Mitigation Costs at Star Bend

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Riparian plantings (1.03 acres at Star Bend, 8.48 acres at Abbot Lake)	Mobilization	LS	$15,000	2	$30,000	
	Container plant	EA	$20	4783	$95,660	Assumes 10' O.C. spacing
	Irrigation system	AC	$8,500	9.51	$80,835	Assumes flood proof drip system
	Maintenance Years 1-4	LS	$16,657	1	$56,445	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$13,950	1	$37,200	
	15% Contingency				$45,021	
	Total				$345,161	

Table A3. Non-Riparian Native Tree Mitigation Costs at Star Bend

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Oak plantings at Star Bend (15.57 acres)	Mobilization	LS	$15,000	1	$15,000	
	Container plant	EA	$20	7831	$156,620	Assumes 10' O.C. spacing
	Acorn plantings	EA	$3	7785	$23,355	Assumes 500 acorns/acre
	Irrigation system	AC	$8,500	15.57	$132,345	Assumes flood proof drip system
	Maintenance Years 1-4	LS	$54,213	1	$93,353	Assumes 20% morality for Years 1-3 and 10% for Year 4
	Monitoring Years 1-10	LS	$79,050	1	$55,800	
	15% Contingency				$71,470	
	Total				$547,943	

Table A4. GGS Mitigation at Generic Permittee-Responsible Site

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
GGS (3.2 acres aquatic and 6.4 acres upland)	Land cost	AC	$7,500	9.6	$72,000	
	Mobilization	LS	$15,000	1	$15,000	
	Grading	CY	$4	15,488	$61,952	Assumes 3' of cut over 3.2 acres and on-site spoils disposal
	Seeding	AC	$1,000	9.6	$9,600	Assumes 3.2 acres of GGS aquatic habitat and 6.4 acres of GGS upland habitat
	Erosion control	LS	$5,000	1	$5,000	
	GGS monitoring	YR	$8,000	5	$40,000	
	Endowment	LS	$200,000	1	$200,000	Assumes $4,000/year for long term maintenance and monitoring at 2% annual return on principal
	15% Contingency				$60,532	
	Total				$464,084	

Table A5. Jurisdictional Habitat Mitigation at Generic Permittee-Responsible Site

Habitat Feature	Task Description	Unit	Unit Cost	Quantity	Total Cost	Assumptions
Wetlands and waters (1.1 acres)	Land cost	AC	$7,500	1.1	$8,250	
	Mobilization	LS	$15,000	1	$15,000	
	Grading	CY	$4	5,324	$21,296	Assumes 3' of cut over 1.1 acres and on-site spoils disposal
	Seeding	AC	$1,000	1.1	$1,100	Assumes 1.1 acres of wetland habitat
	Erosion control	LS	$2,500	1	$2,500	
	Wetland monitoring	YR	$8,000	5	$40,000	
	Endowment	LS	$200,000	1	$200,000	Assumes $4,000/year for long term maintenance and monitoring at 2% annual return on principal
	15% Contingency				$43,221	
	Total				$331,367	

Part F.4

Fish and Wildlife Coordination Act Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To
08ESMF00-2013-CPA-0012

MAY 08 2013

Alicia E. Kirchner
Chief, Planning Division
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95825-2922

Dear Ms. Kirchner:

The U.S. Army Corps of Engineers has requested coordination under the Fish and Wildlife Coordination Act (FWCA) for the Sutter Basin Feasibility Study and the Feather River West Levee Project. The proposed levee modifications would occur on the west levee of the Feather River, in Sutter and Butte Counties, California. This report has been prepared under the authority of, and in accordance with, the provisions of section 2(b) of the FWCA (48 stat.401, as amended; 16 U.S.C. 661 et seq.).

By copy of this letter, this report is being circulated to the agencies and offices listed below for review and comment. We would appreciate receipt of any comments on this report within 30 days of receipt of this report.

If you have any questions regarding this report, please contact Jennifer Hobbs at (916) 414-6541.

Sincerely,

Daniel Welsh
Assistant Field Supervisor

Enclosure

cc:
Mike Hendrick, NMFS, Sacramento, California
Brad Johnson, Corps of Engineers, Sacramento, California
Jeff Koschak, Corps of Engineers, Sacramento, California
Kursten Sheridan, CDFW, Region 2, Rancho Cordova, California
Jenny Marr, CDFW Region 2, Chico, California

FISH AND WILDLIFE COORDINATION ACT REPORT
SUTTER BASIN FEASIBILITY STUDY/ FEATHER RIVER WEST LEVEE PROJECT

This is the U.S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act report on the effects of the proposed Sutter Basin Feasibility Study/Feather River West Levee Project, Sutter and Butte Counties, California. This report has been prepared under the authority of, and in accordance with, the provisions of the Fish and Wildlife Coordination Act (48 stat. 401, as amended: 16 U.S.C. 661 et seq.).

INTRODUCTION

The information presented in this report is based primarily upon project planning information made available by the Sutter Butte Flood Control Agency (SBFCA) and the U.S. Army Corps of Engineers (Corps). The Corps, Central Valley Flood Protection Board, and SBFCA are coordinating on the feasibility study to reduce flood risk within the study area. In a parallel but separate action, SBFCA is planning the Feather River West Levee Project (FRWLP) which would construct improvements along the Feather River from Thermalito Afterbay downstream to Laurel Avenue. The FRWLP is scheduled to begin construction in 2013, prior to the Sutter Basin Feasibility Study being authorized. In order to implement the FRWLP, SBFCA must obtain permission from the Corps to alter the Federal project under Section 14 of the Rivers and Harbors Act of 1899 (as amended) (33 USC §408 or Section 408). Consequently, two environmental impact statement/environmental impact reports (EIS/EIR) are being prepared, one for the feasibility study and one for the FRWLP. Both projects are being closely coordinated as they involve similar actions and the same participants. This FWCA report analyzes the effects to fish and wildlife and their habitats due to each of the projects, recognizing that only one of the alternatives discussed would be constructed and that this report will be used for both the Sutter Basin Feasibility EIS/EIR and the FRWLP EIS/EIR.

Major flood events have occurred along the Feather River, with the more significant events that caused levee failures and flooding occurring in 1955, 1986, and 1997. In December of 1955, the most significant flood event along the Feather River is reported to have occurred. Several levee embankment failures caused major flooding of nearly all of Yuba City, as well as flooding in Nicolaus. About 156 square miles were flooded during this event. In February of 1986, heavy snow pack and warm rains elevated water levels and caused a levee embankment failure on the adjacent segment of the Yuba River near Linda, flooding nearly 30 square miles including Linda and Olivehurst. The winter of 1996/1997, heavy snow pack and warm rains again elevated water levels. All citizens in Yuba City, Marysville, Linda, and Olivehurst were ordered to evacuate. Ultimately, in January of 1997, a levee embankment failure occurred south of Olivehurst flooding nearly 50 square miles including Olivehurst and Arboga.

Over the past two decades, several studies have been conducted by the Department of Water Resources (DWR), the Corps, and more recently SBFCA to evaluate the condition of the levees protecting the planning area relative to criteria for stability, seepage, erosion, geometry, and levee height. These studies have indicated that the levee system deficiencies include seepage,

slope instability, erosion, and encroachment, and that the consequences of levee failure from a major flood event would be significant. An emergency preparedness mapping study analyzed hypothetical levee failures and determined the rate and depth at which water would flood SBFCA's planning area if a levee failure occurred in the studied reaches. This study predicted flooding depths that could range from about 1-foot to more than 20 feet in some areas.

Further evaluation has demonstrated that much of the existing system does not provide protection from the 100-year flood event, the commonly accepted minimum level of flood protection per the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program as well as being less than the 200-year level targeted by the State of California for urban areas. The Corps' and SBFCA's goal is to reduce the risk of flooding on the population, property, and critical infrastructure. SBFCA's goal is to achieve a minimum of 200-year flood protection for the more urbanized areas and 100-year for the remaining rural agricultural parts of the planning area.

AREA DESCRIPTION

The Sutter Basin is part of the Sacramento River Flood Control Project, located in north-central California in Sutter and Butte Counties. The elongated, irregularly shaped basin covers about 300 square miles and is about 43 miles long north to south, and up to 14 miles wide east to west. The Sutter Basin is roughly bounded by the Feather River, Cherokee Canal, the Sutter Buttes, and Sutter Bypass. Floodwaters potentially threatening the basin originate from the Feather River watershed or the upper Sacramento River watershed, upstream of the Colusa Weir. These waterways have drainage areas of 5,921 and 12,090 square miles, respectively. In addition to Yuba City, communities in the basin include Biggs, Gridley, Live Oak, and Sutter.

The Corps and SBFCA have determined that flood risk can be reduced by focusing on the Feather River west levee. Consequently, all of the alternatives that they are pursuing deal with remediation of that levee. This portion of the west Feather River Levee extends from Thermalito Afterbay on the north to where the Feather River enters the Sutter Bypass on the south. This corridor is roughly 500 feet from the land side of the existing levees and 100 feet from the water side. The corridor is about 41 miles long.

PROJECT DESCRIPTION

The Sutter Basin Feasibility Study (SBFS) is evaluating two flood-risk reduction alternatives, while the FRWLP is evaluating three flood-risk reduction alternatives. The no-action alternative describes the project without flood-risk reduction measures. All of the alternatives for the SBFS and FRWLP use very similar flood risk-reduction measures. Rather than restate the entire alternatives for SB-7 and SB-8, the FRWLP alternatives will be discussed first and then the SBFS alternative will follow with the differences between these alternatives defined rather than restating the entire alternative.

No Action Alternative

Under the No Action Alternative, the Corps and SBFCA would not implement flood risk-reduction measures. The levees protecting the Sutter Basin would continue to require risk-reduction measures to meet current levee standards, FEMA's minimum acceptable level of flood protection, and State requirements for 200-year for urbanized areas. In addition, the associated risk to human health and safety, property, and the adverse economic impact that serious flooding could cause would continue, and the risk of a catastrophic flood would remain high.

Because of uncertainties in local, State, and federal funding; future state and federal authorization; and other approvals, it is not reasonable to predict construction of levee improvements in the foreseeable future would be completed in a reasonable timeframe. Therefore, for the purpose of evaluating effects under the No Action Alternative, it is assumed that no levee repair or strengthening would be implemented, the purpose and objectives would not be met, and the current level of flood risk would continue.

Alternative 1 (FRWLP)

This alternative would construct a cutoff wall along the centerline of the existing levee to varying depths and a seepage berm along a portion of the landside levee toe. This alternative would predominately keep within the existing footprint of the levee.

For Reaches 2 through 5, Alternative 1 would construct a cutoff wall ranging between 30 feet and 127 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with 2,900 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 1 would construct a 200-foot-wide seepage berm for 2,268 feet.

For Reaches 7 through 11, Alternative 1 would construct a cutoff wall ranging between 39 feet and 124 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with 1,900 feet of the levee being fully degraded.

SBFCA would acquire a temporary construction easement equal to 50 feet from the existing levee toe or toe of the proposed seepage berm for construction of the levee improvements. An additional 20-foot easement would be obtained where required for the relocation of existing utilities.

For Reaches 13 through 24, Alternative 1 would construct a cutoff wall ranging between 21 and 105 feet deep along the centerline of the levee. The levee would be degraded about 50% of its overall height with about 2,600 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 1 would include about 11,150 feet of waterside slope flattening, about 5,100 feet of depression infill, and about 1,500 feet of ditch lining.

For Reaches 26 through 41, a cutoff wall ranging between 18 feet and 97 feet deep along the centerline of the levee would be constructed. The levee would be degraded by about 50% of its overall height.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 4,343,800 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, Controlled Low Strength Material (CLSM) (otherwise known as light-weight concrete) is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

Alternative 2 (FRWLP)

Alternative 2 would construct seepage and stability berms along the landside toe of the levee and a shallow cutoff wall along a portion of the centerline of the levee. The seepage and stability berms would substantially extend beyond the footprint of the current levee, requiring real estate acquisition. In addition, Alternative 2 would include the filling of the existing canal adjacent to the levee in Reaches 26, 27, and 28 with water during periods of high water surface elevation in the river. This would require the construction of regulating structures within the canal to maintain the water level within the canal and create a resistive force against any under-seepage flows.

For Reaches 2 through 5, Alternative 2 would construct an undrained seepage berm ranging between 100 feet and 300 feet wide along the landside toe of the levee. Additionally, an 8-foot high stability berm would be constructed along 20,817 feet of the project. Also, a shallow cutoff wall 20 feet deep would be constructed along the levee centerline for 1,616 feet of the project. The levee would be degraded about 50% of its overall height.

For Reaches 7 through 11, Alternative 2 would construct an undrained seepage berm ranging between 110 feet and 300 feet wide along the landside toe of the levee. A stability berm about 9.5 feet tall would be constructed along 14,163 feet of the project. Also, a shallow cutoff wall ranging between 23 feet and 35 feet deep would be constructed along the levee centerline for 17,800 feet of the project. A portion of the existing Garden Highway would need to be removed and reconstructed to allow construction of the seepage berm.

For Reaches 13 through 24, Alternative 2 would construct an undrained seepage berm ranging between 70 feet and 300 feet wide along the landside toe of the levee. An 8- to 10-foot high stability berm would be constructed along about 24,200 feet of the project. A shallow cutoff wall 20 feet deep would be constructed along the levee centerline for about 14,700 feet of the project. Relief wells would be installed for about 37,400 feet of the project. To facilitate construction of the cutoff wall and to maintain stability of the levee, the levee would be degraded by about 50% of its overall height.

For Reaches 26 through 41, Alternative 2 would construct an undrained seepage berm ranging between 50 feet and 300 feet wide along the landside toe of the levee. A 4- to 10-foot-tall stability berm would be constructed along about 38,600 feet of the project. About 1,300 feet of the existing levee would need to be removed and reconstructed with a zoned filter at the base in combination with a seepage berm. About 15,100 feet of canal would be in-filled.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 7,661,100 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, CLSM is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

Alternative 3 (FRWLP)

Alternative 3 is the applicant-preferred alternative, combining measures from both Alternative 1 and Alternative 2 to produce the optimized alternative based on screening criteria. This alternative is optimal due to its effectiveness in addressing levee deficiencies, compatibility with land use, minimization of real estate acquisition, avoidance of effects, and cost.

For Reaches 2 through 5, Alternative 3 would construct a cutoff wall ranging between 20 feet and 127 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height. In addition to the cutoff wall, Alternative 3 would construct a 100-foot wide seepage berm for 1,616 feet and a 200-foot wide seepage berm for 2,268 feet.

For Reaches 7 through 11, Alternative 3 would construct a cutoff wall ranging between 39 feet and 124 feet deep along the centerline of the levee. Relief wells with 60 feet spacing and 50 feet deep would be distributed at various locations in Reach 7.

For Reaches 12 through 24, Alternative 3 would construct a cutoff wall ranging between 21 and 105 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height with about 2,600 feet of the levee being fully degraded. In addition to the cutoff wall, Alternative 3 would include relief wells for about 8,200 feet, about 11,150 feet of waterside slope flattening, about 5,100 feet of depression infill and about 1,500 feet of ditch lining. Reach 16 includes waterside slope flattening or other remedial measures.

At Reach 17, a seepage berm 7 feet tall and about 50 feet wide would be constructed beneath the Highway 20 crossing. It extends through the existing abandoned railroad tunnel at the levee landside toe. Pedestrian access through the tunnel will remain after the berms construction.

For Reaches 26 through 41, Alternative 3 would construct a cutoff wall ranging between 18 feet and 97 feet deep along the centerline of the levee. The levee would be degraded by about 50% of its overall height. About 1,300 feet of levee would be degraded and reconstructed with a 5 to 1 slope (horizontal to vertical). Reach 31 includes cutoff walls in addition to waterside slope flattening or other remedial measures. In Reach 38 an adjacent levee with a 20-ft wide crown will be constructed using the tailings materials located along the landside of the existing levee. In Reach 41, a 150-feet wide drained seepage berm will be constructed with a 1-ft thick filter drain along the bottom. The filter drain would provide drainage for seepage through the levee. The existing concrete outfall structure located at the south end of this reach would remain in place and would be backfilled with earth materials. This alternative would also include filling of the waterside pit located at the south end of this reach. A 30-foot wide construction access area

would be provided at the toe of the seepage berm. About 9,500 feet of canal would be monitored with a Flood Safety Plan.

Materials imported to the project site would include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,150,000 cubic yards of embankment fill material for the new levee surfaces from off-site commercial borrow sites. For backfill of new pipelines crossing the levee, CLSM is required to be placed to the pipeline's spring line.

Levee improvements are not required for Reaches 6, 14, 15, 29, and 39.

SB-7

This alternative for the feasibility study closely aligns with the FRWLP Alternative 3 alternative description except for the easement that would be acquired and the length of levee that would be repaired. The Corps would only acquire a 20-foot easement on the landside of the levee and a 15-foot easement on the waterside. The Corps would require full compliance with the Corps policy regarding woody vegetation on levees (Engineering Technical Letter 1110-2-571 "Guidelines for Landscape Planting and Vegetation Management on Levees, Floodwalls, Embankment Dams, and Appurtenant Structures") which would result in more vegetation removal with this alternative than with Alternative 3.

SB-7 would only extend through reach 21 of the project area, resulting in a proposed repair length of about 24 miles long. Of this length, 2,250 feet of levee improvement would be made downstream of Laurel Avenue and consist of a 100-foot-wide undrained seepage berm (5-foot thick at berm toe) in combination with a cutoff wall extending to an elevation of 25 feet deep. The additional work is proposed because this area is located in an area that is highly conducive to seepage distress.

SB-8

This alternative for the feasibility study closely aligns with the FRWLP Alternative 3 alternative description. Differences include the reduced easement compared to the FRWLP, as described in SB-7 and the full compliance with Corps' vegetation management standards. Relocation of either the levee or the Sutter-Butte Irrigation Canal (SBIC) would occur where the SBIC is adjacent to the levee. This would provide space for an operations and maintenance road between the canal and levee. The relocation of either the SBIC or levee is described below:

a. Area 1a (Reach 21) would involve 483 linear feet of canal relocation landward into adjacent agricultural land to provide space between the canal and the levee for a landside operations and maintenance road.
b. Area 1b (Reach 22) would move 1,900 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.
c. Area 2 (Reach 24) would move 1,200 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.
d. Area 3a (Reach 28) would move 7,900 linear feet of levee waterward into the floodplain to provide sufficient space for the landside operations and maintenance road.

e. Area 3b (Reach 28) would move 1,200 linear feet of canal landward into adjacent agricultural area to provide space for the operations and maintenance road.

Canal relocation would occur during the regular construction season. The new canal is offset from the old canal and a berm would separate the two. The greatest distance between the old and new canal would be 81 feet. Plugs would remain at each end of the canal where it ties into the existing canal. In the winter following construction, when the irrigators no longer send water through the canal and it is dry for 2 months, the plugs would be removed and the abandoned canal section would be filled. The small relocation of the canal at the sunset pump station can be accomplished by simply excavating the opposite side of the canal (widening the canal) when the canal is dry and filling the opposite side of the canal.

An additional 2,250 feet of levee improvement would be made downstream of Laurel Avenue and consist of a 100-foot wide undrained seepage berm (5-foot thick at berm toe) in combination with a cutoff wall extending to an elevation of 25 feet deep. The additional work is proposed because this area is located in an area that is highly conducive to seepage distress.

To provide protection in the event of water overtopping the levee the Corps is proposing to use Anchored High Performance Turf Reinforced Mat along two levee sections. This would occur for 5,760 linear feet in Reaches 7 and 8 and 1,900 linear feet in Reach 23.

EXISTING BIOLOGICAL RESOURCES

Vegetation

Seven land cover category types can currently be found in the project area: riparian forest, riparian scrub-shrub, oak woodland, wetland, agricultural lands, ruderal, and developed/disturbed areas.

Riparian Forest habitat occurs along the Feather River and its tributaries, and supports an overstory dominated by mature native and nonnative trees. The dominant overstory species are valley oak, Fremont cottonwood, and Gooding's black willow. Other trees commonly observed within the riparian habitat were box elder, arroyo willow, Oregon ash and western sycamore. Understory species include horsetails, mugwort and curly dock.

California grape covers many of the trees and shrubs in the riparian forest and several patches of the invasive giant reed were found to occur along the edges of the riparian areas.

Riparian Scrub-Shrub habitat within the biological study area consists of shrubs such as willows, blue elderberry, coyote brush, Himalayan blackberry, and button bush.

Oak Woodland habitat is found in two small patches just south of Almond and Laurel Avenues in the study area. The oak woodland are dominated by valley oak and have an understory that includes wild oat, soft chess, ripgut brome, field hedge parsley and invasive yellow starthistle.

Wetland habitat in the study area consists of natural and agricultural waterbodies: irrigation ditches, open water, seasonal wetlands, streams, and tailing wetlands. Irrigation and drainage

canals typically occur along the landside of the levee and service the agricultural fields. There tends to be sparse vegetation growing along the edge of the canals. Seasonal wetlands and tailing wetlands typically have aquatic and/or emergent vegetation such as common duckweed, primrose, or narrowleaf cattail. The tailing wetlands are typically bounded by trees and shrubs. Open water areas consist of standing water with little vegetation. These occur at the northern and southern portions of the project area.

Agricultural lands are a predominant habitat in the project area and are made up largely of orchards and field and row crops. Orchards are the dominant land cover-type and occur throughout the study area. The majority of the orchards consist of walnut, plum and peach trees that are actively maintained. Herbaceous ground cover under the tree rows is highly variable and depends on the type and frequency of maintenance. When present, the herbaceous vegetation is mostly nonnative weedy species. Field and row crops can largely be found in the southern portion of the study area. Both active and fallow fields that showed indicators of tillage were included in this habitat type. Common field and row crops in the area include sweet corn, alfalfa, wheat, and tomatoes.

Developed areas within the study area consist of urban (residential and commercial) centers, ranchettes, rural neighborhoods, agricultural outbuildings, farm equipment storage areas, pumping stations, and a plant nursery.

Ruderal areas within the study area occur as swaths on both sides of the centerline of the levee where the native soil has been substantially altered. The largest ruderal areas are located between Vance Avenue and the northern terminus of the study area. These areas represent past and ongoing disturbance associated with agriculture, levee construction and maintenance, and excavation.

Trees found in ruderal areas include valley oak, Fremont cottonwood, and black willow. Common shrubs found consist of coyote bush, tree tobacco, Himalayan blackberry, and blue elderberry. Herbaceous vegetation is dominated by annual grasses such as wild oat, soft chess, ripgut brome, and foxtail barley. Non-native forbs such as yellow star-thistle, prickly lettuce, field hedge parsley, mustard, and rose clover occur in the study site as well as native forbs, Spanish lotus, California poppy, fireweed, and western verbena.

Wildlife

Riparian habitat communities provide wildlife with dispersal and migration corridors, foraging areas, cover, and breeding habitat. Riparian trees provide nesting habitat for a variety of raptors, egrets, herons, songbirds, and bats. Riparian forest also provides foraging habitat for numerous species of migratory and wintering birds. Typical mammal species that can be found in riparian areas include deer, raccoons, beavers, coyotes, and skunks. Reptiles and amphibians are also associated with a riparian habitat. Species of reptiles and amphibians include the giant garter snake, western fence lizard, western pond turtle, Pacific tree frog, western toad, and bullfrog.

Oak Woodland provides nesting habitat for a variety of raptors and other tree nesting migratory birds. Additionally, great-horned owl, barn owl, and yellow-billed magpie are known to utilize

this habitat as well. Reptiles and mammals that occur in the riparian habitat may also utilize oak woodlands for foraging and cover habitat.

Wetland habitats in the affected area include riverine areas, ponds, canals, and small ditches. In addition to providing habitat for fish, open water habitat provides foraging, cover and reproductive sites for a variety of wildlife species. Open water areas provide foraging habitat for raptors, herons, egrets, waterfowl, water birds, and land birds. Many of the reptiles and amphibians that use riparian habitat use open water habitat for breeding, foraging, and cover.

Canals and ditches that contain water through mid-fall, have suitable prey, and adequate cover have the potential to support giant garter snake. Mammals that use the open water habitats include different species of bats that forage for insects over open water. Terrestrial mammals such as deer, raccoon, skunk, and opossum, use open water habitat for water sources. Semi-aquatic and aquatic mammals that are found within open water habitat include beaver, river otter, mink, and muskrat.

Orchards have limited value for wildlife, although certain birds, such as the red-shouldered hawk, American crow, yellow-billed magpie, mourning dove, European starling, and rock pigeon may nest or forage in these areas.

Row and field crops provide foraging opportunities for a variety of raptors and other migratory and resident birds such as sandhill crane, blackbirds, western meadowlark, and rock pigeon. Similar species are known to use irrigated fields for foraging, and birds such as burrowing owl, northern harrier, and western meadowlark are known to nest in these areas.

Developed lands provide limited habitat for wildlife but are known to support common "urban-dwelling species" such as northern mockingbird, rock pigeon, mourning dove, house sparrow, house finch, western scrub jay, Botta's pocket gopher, California ground squirrel, house mouse, black rat, and coyote. Semi-developed areas with grass, trees, and a water source can provide habitat for additional wildlife species.

Ruderal areas in the project site have a variety of native and non-native trees, shrubs, grasses, and forbs like described in the vegetation section. Similar to developed lands, these areas support mostly common wildlife species, although some elderberry bushes, which support valley elderberry longhorn beetle, were found scattered in the area.

Fisheries

The study area includes over 40 miles of the Feather River's western bank, and the various water bodies in the study area provide spawning, rearing, and migratory habitat for a diverse assemblage of native and non-native fish species. Native species present in these streams can be separated into anadromous and resident species. Native anadromous species include two runs of Chinook salmon, steelhead, green and white sturgeon, Pacific and river lamprey. Native resident species include Sacramento pikeminnow, Sacramento splittail, Sacramento sucker, hardhead, California roach, and rainbow trout. Non-native anadromous species include striped bass and American shad. There are numerous non-native resident species such as catfish, black bass, crappie, sunfish and minnows.

There are many factors affecting the abundance of fish species on the Feather River and its tributaries. Riparian and shaded riverine aquatic habitat has decreased significantly with the building of dams, levees, and water diversions, and floodplain access for spawning and rearing has been diminished from what it once was. In addition to habitat alterations, other factors that limit fish species abundance include non-native fish introductions, food availability, entrainment due to water diversions, and water temperature.

Endangered Species

Appendix A provides the Service's biological opinion for the FRWLP, dated May 2, 2013, pursuant to section 7(a) and (c) of the Endangered Species Act (Act) of 1973, as amended.

In addition, the western yellow-billed cuckoo, a candidate species, may occur in the project area. Although candidate species are not protected under the Act, the 1988 amendments require the Service or NOAA Fisheries to monitor their status. If this species declines precipitously during the planning of this project, it could be listed on an emergency basis.

NOAA Fisheries has responsibility for most marine fish and wildlife, including anadromous salmonids, and should be consulted on activities which may affect any such listed or proposed species in the project area. The Service has consultation responsibility for the remaining species.

The California Department of Fish and Wildlife (CDFW) has responsibility for State listed species and species of concern. The CDFW should be contacted regarding any State listed species or species of concern that may be impacted by project activities.

FUTURE CONDITIONS WITH THE NO ACTION ALTERNATIVE

Vegetation

The No Action Alternative represents the continuation of the existing deficiencies in the levee along the west bank of the Feather River between the Sutter Bypass and Thermalito Afterbay. No levee improvements would be made and no construction related effects on vegetation or wetland would occur. Compliance with the Corps levee vegetation policy could lead to permanent loss of woody vegetation which would result in a significant effect on riparian habitat.

Wildlife

Under the No Action Alternative, the aquatic resources of the project area are not expected to change significantly from existing conditions. Since current levee operations and maintenance activities would continue as is, and there would be no change in the geomorphic or flood control regimes, resident and migratory wildlife would continue to use the area as they do today.

Because no levee improvements would be made under the No Action Alternative, the risk that the levees along the west bank of the Feather River could fail due to seepage or slope stability/geometry issues would continue. A catastrophic levee failure would result in flooding and inundation that could significantly affect wildlife and their upland or wetland habitats. A

major flood event could result in damage to the riparian forest, and given the importance of the riparian corridor to numerous special-status species, loss or fragmentation of this habitat would be a significant effect. Given the uncertainty of the occurrence or magnitude of such an event, potential effects on wildlife and their habitats cannot be quantified based on the available information.

Fisheries

Under the No Action Alternative, the aquatic resources of the project area are not expected to change significantly from existing conditions. Since current levee operations and maintenance activities would continue as is, and there would be no change in the geomorphic or flood control regimes, resident and migratory fishes would continue to use the area as they do today. Compliance with the Corps levee vegetation policy could lead to permanent loss of woody vegetation which would result in a significant effect on riparian habitat.

Because no levee improvements would be made under the No Action Alternative, the risk that the Feather River levee could fail and cause major damage would be greater. If the levees were to fail, it could result in the displacement of fish into flooded areas where the potential for stranding and mortality is high. In addition, flooding could cause adverse water conditions due to hazardous materials being released, which could adversely affect fish populations.

FUTURE CONDITIONS WITH THE PROJECT

Vegetation and Wildlife

Given the similarities in all the alternatives the following discussion on vegetation and wildlife applies to all the alternatives. Where there are substantial differences in the alternatives they are discussed below.

Habitat losses would occur linearly along the 41 miles of levee. Currently the position of the levee varies in distance from the river, with a minimum of the levee and bank of the river being the same to a maximum of about 5,000 feet. Using a GIS layer of the footprint of the various alternatives and measuring the lengths of the levee, the Service calculated that about 11 discontinuous miles of levee would be constructed within 300 feet of the Feather River's edge. Because Alternatives 1, 2, and 3 footprints are almost exactly the same on the waterside of the levee the above number applies to all of these alternatives. The SB-8 alternative is longer by 2,250 linear feet; however, the above number would also apply to this alternative because the additional length of levee is more than 300 feet from the edge of the river. The SB-7 alternative is the shortest of all the alternatives with the total length of levee being about 23 miles. Of this about 7 discontinuous miles of riparian habitat would be removed within 300 feet of the edge of the Feather River. The majority of the riparian forest and riparian scrub shrub that would be removed due to any of the alternatives occurs on the waterside. Removing trees and shrubs along these discontinuous segments of riparian habitat where the stand widths are already narrow is a greater loss of the habitat and therefore a larger effect on the wildlife species that would be using this habitat. Narrowing of riparian corridors decreases the diversity of species and vegetative layers that wildlife species can use. Narrowing of riparian habitat could isolate some species that may require contiguous vegetated areas to move up and down the river course.

All of the alternatives address deficiencies in the levees primarily using cutoff walls and seepage berms which result in potential adverse effects on wildlife resources. Effects of construction on wildlife in the area include disturbance from construction activity and noise. Amphibian and reptile species typically are not as mobile as other types of wildlife. Consequently they have a greater chance of being killed during construction activities. Wildlife such as birds and mammals, typically respond to this type of activity by leaving the construction area. It is likely they would move into adjacent habitat outside of the zone of construction noise and disturbance. However they may be forced to move to less than optimal habitat conditions as other animals may have established territories in the surrounding habitat. Pre-construction nesting bird surveys would avoid disturbing or destroying any nests within the vegetation removal area and comply with the Migratory Bird Treaty Act.

Oak woodland would be minimally affected with SB-8 affecting, at most, 1.3 acres. Effects to species from the loss of this habitat would be similar to what is described above during construction. The loss of wetland types varies with alternative. Small farm canals would be filled for all alternatives due to the construction of the seepage berm adjacent to agricultural lands. The majority of these are small (about 3 feet wide) and only have water in them when the farmers irrigate their fields. While some bird species such as herons and egrets can use this habitat for foraging, the inconsistent water regime and yearly disturbance by the farmers keeps most vegetation out of the canals, thus they tend to not provide much habitat value for wildlife species. Alternative 2 is the only alternative affecting pond habitat. There is a privately owned pond at the lower end of the project area which would be filled due to construction of a seepage berm. The loss of this habitat would likely affect bird species such as herons, egrets, and waterfowl, and amphibian species such as toads and frogs. Given the location is on the landside of the levee and the surrounding landuse is predominately agricultural, this habitat type is not common in the area and would adversely affect native wildlife species.

Seasonal wetlands, open water, and tailing wetlands are affected in almost every alternative. This habitat is scattered along the project area, though the tailing wetlands are at the upper end of the project area near Thermalito Afterbay. These areas typically have frequent bird use as well as serve as habitat for native amphibians such as chorus frogs and spadefoot toad. Construction within and around these areas would adversely affect these wildlife species through the direct loss of habitat as well as effects to species using surrounding areas due to noise and construction activity.

Because the construction would be accomplished over a 4-year period and along a long linear footprint and adjacent habitat in the form of riparian forest and scrub shrub would remain unaffected due to the project, it is likely the birds and mammals not dependent on woody vegetation would move back into the area once construction is completed. Species which rely on riparian vegetation would experience a loss of habitat within the corridor. The Corps and SBFCA would mitigate for the loss of riparian habitat by creating the Star Bend Conservation Area. However, there would be a temporal loss of habitat for all of the alternatives until the habitat grows mature enough to be habitat for certain species. For example raptors require large trees to build nests in; the trees at the Conservation Area may not reach a suitable size until 20 or more years post-planting. Species such as woodpeckers which require snags would not have that habitat available to them for a longer period of time. Once established and maturing, new

riparian habitat at Star Bend Conservation Area would connect existing riparian habitat within the corridor providing better connectivity and dispersal corridors than what currently exist.

Effects to ruderal habitat would be primarily temporary, with the habitat disturbed and replaced within a year. However; with SB-7 and SB-8, the Corps is proposing to place 5,760 linear feet and 7,660 linear feet respectively of erosion protection on the landside of the levee face. This would prevent erosion in the event of a levee overtopping. Placement of this material would prevent this area from being used by ground burrowing animals such as ground squirrels. While much of the surrounding area would still be available for these animals, the animals that depend on these burrows may find this loss detrimental since species such as giant garter snakes and burrowing owls do not create burrows themselves, but rely on other species to create them.

Table 1 summarizes the affected habitat types by Alternative.

Table 1. Acreages of Habitat Types Affected by Alternative

Habitat Type	Alternative 1	Alternative 2	Alternative 3	SB-7	SB-8
Riparian Forest	17.83	26.67	22.19	24.40	42.00
Riparian Scrub Shrub	0.39	3.09	1.29	0.02	0.50
Oak Woodland	0.22	0.24	0.22	1.00	1.30
Canal/Ditch	24.96	27.54	.21	1.4	7.1
Pond/Basin	0.00	1.91	0.00	0.00	0.00
Stream/River	0.00	0.00	0.00	0.02	1.9
Tailing Wetlands	0.14	0.58	0.13	0.00	0.13
Seasonal Wetlands	0.18	0.19	0.03	0.18	0.18
Open Water	0.17	0.62	0.04	0.19	0.19
Orchards	223.38	666.70	101.71	37.80	85.80
Field and Row Crops	17.42	92.03	4.76	0.70	3.80
Ruderal	522.01	559.87	550.80	395.50	552.00
Developed	222.40	259.56	196.00	125.00	199.00

Fisheries

Riparian habitat provides nutrients to the water which supports the feeding of many fish species. When immediately adjacent to the water, riparian habitat can provide shade and structure for fish to use for escaping higher velocity flows and predators. The loss of this type of habitat would adversely affect fish species. Other effects include increases in turbidity and suspended sediment due to construction activities, possible contaminant discharge from the construction equipment, and adverse effects caused by construction noise and vibration. Only certain reaches of the project are immediately adjacent to the river. Over the course of the 41 miles, about 11 miles of levee come within 300 feet of the Feather River. It is at these locations where vegetation loss

and its effects to fishes are most critical. In the other locations the remaining riparian vegetation can serve as a buffer and minimize effects to sediment making its way into the river. Where the buffer is lacking, the loss of vegetation would affect the addition of nutrients through leaf drop to the water. In these locations the vegetation loss would not be replaced by creating habitat at Star Bend Conservation Area. However, Star Bend Conservation area is adjacent to the river and a wider band of riparian habitat would be planted along the 1,250 linear feet which borders the Feather River. Ultimately, at the widest point, a 1,250 wide band of riparian habitat would be created at the Star Bend Conservation Area.

Endangered Species

The Corps and SBFCA have completed section 7 consultation with the Service on Alternative 3 of the FRWLP (Appendix A). Consultation with CDFW under California Endangered Species Act (CESA) needs to be completed to determine the effects of this project on State listed species.

DISCUSSION

The Service would like to comment on the lack of incorporating a setback levee into any of the alternatives. All of the current alternatives consist of fixing the existing levee in place. Setting the levee back in strategic locations would benefit both fish and wildlife species, by creating more floodplain habitat, as well as the flood system by increasing channel capacity and decreasing maintenance by lessening levee erosion. While the Service appreciates the attempts to minimize effects to existing habitat, we would like to see active movement toward creating a sustainable, reliable, and resilient flood and riparian system. Would the current levee alignment that is being improved in place be able to withstand changing future conditions such as climate change? While the EIS/EIR addresses climate change it does not address the ability of the flood control system to adapt to climate change and potentially the different precipitation patterns which may occur. DWR's Central Valley Flood Protection Plan also outlines the goals for flood control projects that DWR participates in. One of the secondary goals is promoting ecosystem restoration. Inclusion of setback levees into this project would help DWR progress on that goal as well as meet DWR's Environmental Stewardship Policy. Both SBFCA and the Corps should consider looking at opportunities to expand the floodway and include these within the selected alternative.

The Service's primary concern with the effects to fish and wildlife is the loss of riparian and wetland habitats. These habitat types would have the largest native habitat loss in each alternative. SBFCA completed section 7 consultation on Alternative 3 for species listed under the Service's jurisdiction. This Alternative avoids as much vegetation removal as possible by working around vegetation when possible. Additionally, it minimizes temporary effects to habitats such as canals/ditches and various waters by limiting the amount of time they are disturbed and restoring them once the construction in the area is completed. Any permanent effects to native habitats, riparian, oak woodland, and seasonal wetlands should be mitigated. To mitigate effects to wetlands SBFCA has proposed to buy credits at a wetland mitigation bank at a ratio of 2:1. The Service concurs this would mitigate the effects to wildlife species due to the loss of wetland habitat.

To offset the loss of riparian forest, riparian scrub, and oak woodland, SBFCA has calculated the total diameter at breast height (dbh) of all native trees which would be removed due to the project. They have proposed to plant a variety of native seedlings at the Star Bend Conservation Area to create a diverse riparian habitat which would restore 28 acres of ruderal floodplain habitat to riparian habitat. Restoration of this area would expand riparian habitat within the area because it is immediately upstream of the O'Connor Lakes Unit of the Feather River Wildlife Area which has had riparian habitat planted within the last 10 years. The Service believes the restoration of this area would mitigate for some of the effects to the loss of riparian and oak woodlands; however, the Service does not agree that the 28 acres adequately mitigates for the entire loss. Many large trees would be removed as a result of the project. The trees planted to mitigate this impact would not reach the size of the some of the affected oak, cottonwood, and sycamore trees for 50 years. To mitigate the loss of this habitat for wildlife species the Service believes that a ratio of at least 2:1 should be used to mitigate the loss of riparian forest, riparian scrub shrub, and oak woodland. Even with the increase in riparian habitat within the Feather River Corridor with the Starbend Conservation Area there will still be a temporal loss to species that use large trees for nesting, foraging, or sheltering. The additional acreages should be found within the 41 mile proposed project area in order to maintain or benefit connectivity of the riparian corridor along the Feather River.

The Service also has concerns about effects to wildlife and fish due to ongoing operation and maintenance (O&M) of the flood control facility. Under the SBFS, the Corps has included O&M as part of the project description. The FRWLP is not proposing to change existing O&M activities and therefore they have not covered these activities in their project description. Currently, effects to federally threatened and endangered species due to O&M activities have not been analyzed. As the Corps is a federal agency that requires DWR and the local maintaining agencies to operate and maintain the flood control structures according to the federal guidelines, the Corps should initiate section 7 on these activities if there are effects to listed species. The Service feels that some of the ongoing O&M activities are likely to adversely affect the valley elderberry longhorn beetle and giant garter snake in this area. Should the Corps reinitiate section 7 consultation for the SBFS, they should include O&M activities in the reinitiation. Additionally, the Corps should provide information regarding O&M to the Service so we can update this Fish and Wildlife Coordination Act report and include effects to fish and wildlife due to O&M activities. Should the Corps not reinitiate section 7 consultation under the SBFS they should initiate section 7 consultation with the Service for ongoing O&M activities given their role as a federal agency and their discretion over the O&M manual.

RECOMMENDATIONS

If the project is constructed, the Service recommends that the Corps implement the following:

1) Mitigate the loss of any natural habitat types (riparian forest, riparian scrub shrub, oak woodland, wetland, pond, canal, stream) at a ratio of at least 2:1.

2) Should the Feasibility Study move forward the Corps should work with DWR and SBFCA to develop a variance to allow vegetation within the Corps' vegetation free zone to remain in place.

3) Work with the Service on the development of the mitigation area.

4) Lands disturbed by construction activities, including the staging areas, should be reseeded with native grasses and forbs. Reseeding should be conducted just prior to the rainy season to enhance germination and plant establishment.

5) Conduct pre-construction surveys for breeding birds including the State listed Swainson's hawk and burrowing owl.

6) Develop and implement a vegetation monitoring program as part of the project. Monitoring the riparian restoration effort should focus on (a) recording tree survival rates, (b) the quantification of improved habitat values for wildlife (primarily bird species) by measuring percent tree and shrub cover, average height of overstory trees, canopy layering, and total woody riparian vegetation, and (c) developing recommendations for alternative methods of riparian restoration should initial efforts fail. A vegetation monitoring report should be submitted annually for the first 5 years after planting activities, and on the 10th, 15th, and 20th year after planting. The monitoring reports should also identify any shortcomings in the restoration effort and include remedial actions on how to improve restoration efforts. All phases of the revegetation, and monitoring programs should be coordinated with, and approved by, the Service, CDFW, and NOAA Fisheries.

7) Comply with the Conservation Measures and Terms and Conditions in the biological opinion (Appendix A).

8) Complete the appropriate consultation with the CDFW regarding impacts to State listed species, and NOAA Fisheries, as required under section 7 of the Endangered Species Act, for potential impacts to anadromous fish under NOAA Fishery's jurisdiction.

9) SB-7 or SB-8 (depending on the alternative selected) should mitigate for the loss of upland habitat lost due to erosion protection. Effects resulting from this action should be discussed both under the FWCA as well as the federal and State endangered species acts.

10) Initiate section 7 consultation with the Service on the effects of O&M activities to federally listed species.

Appendix A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
08ESMF00-2013-F-0342-1

MAY 02 2013

Ms. Alicia Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Formal Consultation on the Feather River West Levee Project, Sutter County, California

Dear Ms. Kirchner:

This is in response to your March 22, 2013, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Feather River West Levee Project (FRWLP) (proposed project) in Sutter County, California. Your request was received on March 28, 2013. You requested our concurrence that the proposed project may affect, and is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)(beetle) and the giant garter snake (*Thamnophis gigas*)(snake). The Service concurs with your determination and this biological opinion addresses the effects of the proposed projec: on these two species. Critical habitat has been designated for the beetle; however, the proposed project is not located within any designated or proposed critical habitat. Critical habitat has not been designated for the snake; therefore, none will be affected. This response is in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This biological opinion is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter requesting consultation and their biological assessment. A complete administrative record is on file at the Sacramento Fish and Wildlife Office.

CONSULTATION HISTORY

July 13, 2012. The Service, ICF International, HDR Inc., consultants to Sutter Butte Flood Control Agency (SBFCA), SBFCA, California Department of Fish and Wildlife (CDFW), California Department of Water Resources, and the Corps participated in a site visit to the proposed project. Potential effects to giant garter snake were discussed on the trip.

September 27, 2012. The Service, Corps, HDR, and ICF met to discuss the biological opinion and the level of detail that will be available in order to initiate consultation. The applicant determined that they will have sufficient information to initiate consultation at the project level.

December 18, 2012. The Service, Corps, SBFCA, ICF, and HDR met to discuss effects to giant garter snake. Permanent and temporary effects were discussed as well as the Service providing suggestions on conservation measures that could be incorporated.

February 12, 2013. The Service, Corps, ICF, CDFW, and HDR met to discuss long-term operations and maintenance (O&M). The outcome of this meeting was that the SBFCA FRWLP will not include operations and maintenance in their project description because their project will not be changing O&M. However, the Corps will be initiating consultation on the Sutter Feasibility Study in the next 6 months and this project description will include O&M activities.

March 22, 2013. The Corps initiated section 7 consultation with the Sacramento Fish and Wildlife Office.

BIOLOGICAL OPINION

DESCRIPTION OF ACTION AREA

North to south, the Action Area consists of the 41-mile corridor along the west levee of the Feather River from the Thermalito Afterbay to a point about 4 miles north of the Sutter Bypass. The Action Area includes the project construction area and a 100-foot buffer around this area which includes staging and spoils areas. The project construction area was defined as the area in which levee improvements—such as seepage berms, stability berms, relief wells, sheet-pile walls, and slurry cutoff walls—are likely to be constructed. All direct and indirect effects will occur within this area and the 100-foot buffer around this area.

The corridor is divided into 41 relatively homogeneous reaches for ease of describing existing conditions, project components, land cover-types, and potential effects (note that this number is coincidental and one reach does not correspond to a length of 1 mile; additionally, Reach 1 is not part of the FRWLP) (Figure 1).

The Action Area also includes six potential borrow sites that could supply the borrow material necessary for levee construction and upgrades, and routes from the project construction area to the borrow sites. It is not anticipated that all six sites will be used over the multi-year phased construction period, but until additional geotechnical and soil samplings are completed, all sites will be available for use and are included in the Action Area.

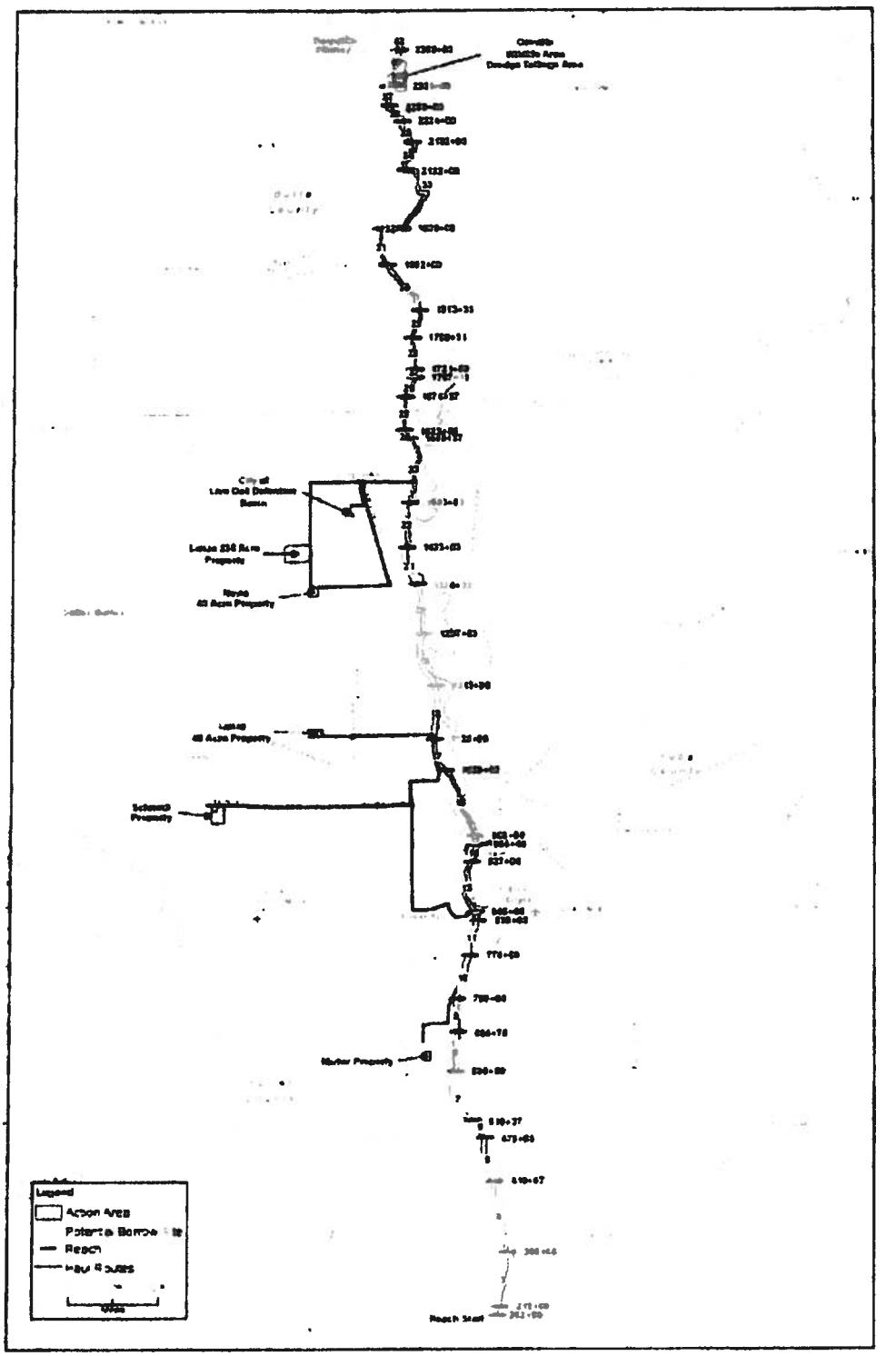

Figure 1. Proposed Project

Finally, the Action Area includes the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. Compensation for the Proposed Action's effects on the beetle is proposed to occur in a portion of this conservation area, which is discussed below under Conservation Measure 5.

Description of Proposed Action

The primary purpose of the FRWLP is to reduce flood risk in the Sutter Basin by addressing known levee deficiencies along the Feather River West Levee from Thermalito Afterbay downstream to a point about 4 miles upstream of the Feather River's confluence with the Sutter Bypass. While the FRWLP will not by itself reduce all flood risks affecting the Sutter Basin, it will address the most immediate risks based on the following.

- The proximity of the Feather River to population centers and key infrastructure.
- The nature of the Feather River West Levee being the longest and most contiguous portion of the planning area perimeter.
- The location of known levee deficiencies and the clarity and feasibility of available measures to address them.

The construction of the FRWLP will be divided into four separate construction contracts. Contract A begins near the intersection of the Feather River West Levee and Laurel Road. It continues north to the beginning of the improvements constructed as part of the Star Bend Setback Levee Project. The total length of the levee in this portion of the FRWLP is 27,618 linear feet. Contract B begins at the end of the improvements constructed as part of the Star Bend Setback Levee Project, and continues north for 31,963 linear feet. Contract C begins near the north end of the Shanghai Bend Setback Levee, and continues north for a total of 77,886 linear feet. Contract D then begins and continues north for 69,363 linear feet.

For Contract A, a cutoff wall ranging between 10 and 35 feet deep will be constructed along the centerline of the levee for the entire length of levee. The overall height of the levee will be degraded by about 50%. In addition to the cutoff wall, a portion of the levee will have a 9,816-foot-long; 100-foot-wide seepage berm installed.

For Contract B, a cutoff wall ranging between 5 and 25 feet deep will be constructed along the centerline of the levee for 31,600 linear feet. The overall height of the levee will be degraded by about 50%. Relief wells 60 feet apart and 50 feet deep will be installed along a 2,500 linear foot section. Finally, two small sections will involve pipe crossing work.

For Contract C, a cutoff wall ranging between 5 and 65 feet deep will be constructed along the centerline of the levee for 62,117 linear feet. The overall height of the levee will be degraded by about 50%, with about 5,900 linear feet of the levee needing to be fully degraded. A 7-foot tall

and 50-foot-wide seepage berm will be placed near the 10th Street bridge and extend through the existing abandoned railroad tunnel. Finally, there will be a few storm drain pipes replaced within the levee.

For Contract D, a cutoff wall ranging between 10 and 90 feet deep will be constructed along the centerline of the levee for 57,361 linear feet. For all but 317 linear feet of levee, the levee will be degraded by about 50%. The remaining 317 linear feet will have a full levee degrade and reconstruction. A canal runs adjacent to the landside of the levee for 4,723 feet. The landside levee will require reconstruction to the bottom of the canal. Six storm drain and irrigation pipes will need to be replaced along a section of the levee. About 4,800 linear feet of seepage berm will be constructed at the northern end of the proposed project. The berm will very in width between 100 and 170 feet. Additionally, a waterside pit located in this area will be filled.

Materials imported to the construction site will include water, bentonite, cement, incidental construction support materials, aggregate base rock, hydroseed, and up to 1,500,000 cubic yards of embankment fill material for the new levee surfaces from offsite commercial borrow sites or local landowners willing to sell borrow material. For backfill of new pipelines crossing the levee, controlled low strength material (CLSM) (otherwise known as lightweight concrete) will be placed to the pipeline's spring line.

Construction methods for the flood management measures are described in detail below.

Slurry Cutoff Wall

A slurry cutoff wall consists of impermeable material that is placed parallel to the levee, typically through the center of the levee crown. There are three methods for constructing a slurry cutoff wall: (1) conventional slot trench, (2) deep soil mixing (DSM), and (3) jet grouting. The first two are the primary methods for application over longer areas, while jet grouting is a spot application based on limiting conditions. A slurry cutoff wall addresses the deficiency of seepage (through- and under-seepage).

Conventional Slot Trench Method - To begin construction, the construction site and any necessary construction staging or slurry mixing areas are cleared, grubbed, and stripped.
In the conventional slot trench method, a trench is excavated at the top center of the levee and into subsurface materials. The size of the trench is based on the severity of the seepage but can be typically 3 feet wide and up to 80–90 feet deep. As the trench is excavated, it is filled temporarily with bentonite water slurry to prevent cave-in. The soil from the excavated trench is hauled to a nearby location where it is mixed with hydrated bentonite to reduce permeability and cement in some applications where increased strength is desired. The soil-bentonite mixture then is returned to the levee and backfilled into the trench. This mixture hardens and creates the impermeable barrier wall in the levee.

In most cases, degradation of the levee crown is necessary to create a large enough working platform to reduce the risk of hydraulic fracturing from the insertion of slurry fluids, and allowing greater depths to be reached. Dependent on the conditions of the particular levee, it may be necessary to degrade the levee by one- to two-thirds its existing height. The material

from degrading the levee is hauled to a nearby stockpile area. Following completion of the slurry cutoff wall, the material is hauled back to the levee to restore the levee to its original dimensions. The material may need to be hauled offsite to a local landfill, and borrow material may need to be imported if the in-situ levee material is found to be unsuitable for current levee standards.

One construction crew typically is able to construct 75–100 linear feet of slurry wall (about 70–80 feet deep) in an 8-hour shift. Equipment needed for the crew includes a long-reach track hoe, three or four dump trucks (15 cubic yard capacity each), two loaders at the mixing location, bulldozers, excavators, loaders, a rough terrain forklift, compactors, maintainers, and a water truck. Vertical clearance of about 40 feet is needed for the excavator boom. Horizontal clearance of about 30 feet beyond the levee crest may be required for excavator swing when loading dump trucks.

A mixing area is located at the construction staging area. The mixing area is to prepare the soil-bentonite mixture and supply bentonite-water slurry. The mixing area is contained to avoid inadvertent dispersal of the mixing materials. Dump trucks haul material between the excavator and the mixing area along the levee.

An access road made of aggregate base rock is constructed on the levee crown to enable regular levee inspections. Post-construction, areas used for construction staging, mixing, the levee crown, slopes, and any other disturbed areas are hydroseeded.

Deep Soil Mixing Method - The DSM method of constructing a slurry cutoff wall uses a crane-supported set of two to four mixing augers (typically 36 inches in diameter) set side by side. These augers are drilled through the levee crown and foundation to the required depth (capable of a maximum depth of about 200 feet). As the augers are inserted and withdrawn, a soil-bentonite grout is injected through the augers and mixed with the native soil. An overlapping series of mixed columns is drilled to create a continuous seepage cutoff barrier.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee requires excavation with a paddle wheel scraper. Material is scraped and stockpiled at a nearby stockpile area. Dependent on the depth of the wall required, vertical clearance for the crane also may be needed. An excavator manipulates injector return spoils near the DSM rig, and transport trucks are used to haul spoils offsite. A crane is used for in-place sampling of DSM material and also for loading bentonite into the batch plant hopper. A mobile batch plant (diesel-powered) is required near each DSM rig at the work area to prepare the cement-bentonite grout. The grout is transported to the DSM rig through flexible hoses. Each batch plant requires a pad of 50 by 100 feet. Hauling at the work area involves scraper runs along the levee to the staging area and cement and bentonite deliveries to the batch plant.

During DSM slurry wall construction, one DSM rig typically can construct 50 linear feet of DSM wall per 8-hour shift (for wall depths up to 135 feet). Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Jet Grouting Method - Jet grouting involves injecting fluids or binders into the soil at very high pressure. The injected fluid can be grout; grout and air; or grout, air, and water. Jet grouting breaks up soil and, with the aid of a binder, forms a homogenous mass that solidifies over time to create a mass of low permeability. Jet grouting typically is used in constructing a slurry cutoff wall to access areas other methods cannot. In this regard, it is typically a spot application rather than a treatment to be applied on a large scale along an entire reach.

Equipment required for jet grouting consists of a drill rig fitted with a special drill string; a high pressure, high flow pump; and an efficient batching plant with sufficient capacity for the required amount of grout and water. The high-pressure pump conveys the grout, air, and/or water through the drill string to a set of nozzles located just above the drill bit. The diameter of the jet grout column is dependent on site-specific variables such as soil conditions, grout mix, nozzle diameter, rotation speed, withdrawal rate, and grout pressure. Jet grouted columns range from 1 to 16 feet in diameter and are typically interconnected to form cutoff barriers or structural sections. Under ideal conditions, one construction crew—consisting of a site supervisor, pump operator, batch plant operator, chuck tender, and driller—can construct two 6-foot diameter, 50-foot columns per day consisting of about 100 cubic yards of grout injected per 8-hour shift. Ideal conditions will be characterized by no technical issues occurring at either the batch plant or the drilling site, such as loss of fluid pressure, breakdown of equipment, or subsurface obstructions to drilling operations.

To initiate jet grouting, a borehole is drilled through the levee crown and foundation to the required depth (to a maximum depth of about 130 feet) by rotary or rotary-percussive methods using water, compressed air, bentonite, or a binder as the flushing medium. When the required depth is reached, the grout is injected at a very high pressure as the drill string is rotated and slowly withdrawn. Use of the double, triple, and superjet systems create eroded spoil materials that are expelled out of the top of the borehole, this material is frequently used as a construction fill.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee may require degradation with a paddle wheel scrapper. Material is scraped and stockpiled at a nearby stockpile area. Hauling at the work area involves scraper runs along the levee to the staging area and grout, bentonite, and water deliveries to the batch plant.

Batch plants are typically centrally located to the injection site, with pipelines for mixed grout that run the length of the work. Grout mixing and injection equipment consists of grout mixers, high powered grout pumps and supporting generators and air compressors, holding tanks, and water tanks, with bulk silos of grout typically used to feed large mixers. Smaller equipment can be used in combination with the single phase-fluid system and can be permanently trailer-mounted to permit efficient mobilization and easy movement at the job site.

Prior to commencing production jet grouting, a field test program is typically completed to evaluate injection parameters and to assess jet grout column geometries, and mechanical and permeability properties. Where possible, jet grout test elements are exposed by excavation and properties are obtained by direct measurement. Where excavation is not possible, core drilling is employed to obtain samples from the jet grout test columns for strength testing.

Areas used for construction staging, the levee slope, and any other disturbed areas are restored and hydroseeded following construction.

Slope Flattening

Slope flattening is a mechanical method to repair or reshape slopes that do not meet standards for geometry and stability. Levee slopes are typically subject to a standard of 3:1 (horizontal to vertical), but this may vary based on site-specific conditions and supporting engineering analysis. Slope flattening addresses the deficiency of slope stability and geometry. To begin slope flattening activities, the area is cleared, grubbed, and stripped to provide space for construction and reshaping of slopes. Additional embankment fill material may be necessary to achieve slope flattening—if so, bulldozers excavate and stockpile borrow material from a nearby permitted borrow site. Front-end loaders load haul trucks with the borrow material. The haul trucks transport the material to slope flattening site. Motor graders spread material evenly according to levee design plans, and sheepsfoot rollers compact the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

To reshape a waterside slope, the existing crown of the levee is shifted farther landward and the waterside slope is trimmed and reshaped to a 3:1 slope. The shifted levee crown will be a minimum of 20 feet wide, with a 3:1 slope on the landward side. An access road made of aggregate base rock is constructed on the levee crown. Post-construction, the construction staging areas, levee slopes, and any other disturbed areas will be hydroseeded.

Stability Berm

A stability berm will be constructed against the landside slope of the existing levee with the purpose of supplying support as a buttress. The height of the stability berm is generally two-thirds the height of the levee; the structural needs of the levee determine the distance it extends along that reach. A stability berm addresses the deficiency of stability. To begin the construction of a stability berm, the site is cleared, grubbed, and stripped to provide space for construction and shaping of the berm. Embankment fill material necessary to construct the berm is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material, and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

Stability berms may be drained or undrained. An undrained berm consists of embankment fill only. A drained berm includes a layer of drain rock placed along the ground surface underneath the fill material, separated by a casing of filter fabric. Drainage water seeping from the berm will sheetflow on the adjacent landside surface.

Levee Reconstruction

Levee reconstruction will be necessary where a levee has been degraded to facilitate implementation of another measure (such as a slurry cutoff wall), where a substantial

encroachment has been removed from within the levee prism, or otherwise where the levee is found to be deficient and needs to be replaced with materials and methods that meet current engineering standards. The existing levee is first cleared, grubbed, and stripped to the desired surface to allow a working platform for other measures (such as a slurry cutoff wall), to remove an encroachment, or to remove substandard material. Embankment fill material necessary to construct the new levee is excavated by a bulldozer from a nearby borrow site. Front-end loaders load haul trucks with the borrow material and the haul trucks transport the material to the stability berm site. Motor graders spread the material evenly according to design specifications, and a sheepsfoot roller compacts the material. Water trucks distribute water over the material to ensure proper moisture for compaction. The new levee will be built in cross section to meet current engineering standards.

Sheet-Pile Wall

A sheet-pile wall is a series of vertical panels of interlocking steel that is placed parallel to the levee, typically through the center of the levee crown to provide an impermeable barrier. A sheet-pile wall addresses the deficiencies of seepage and will be used only as a site-specific treatment (rather than applied on a reach-wide basis) such as at roadway or railroad crossings. The site where sheet piles are to be installed is cleared, grubbed, and stripped to allow for construction activities, including removal of the roadway or railroad. A hydraulic- or pneumatically-operated pile-driving head attached to a crane drives the sheet pile into the levee crown to the desired depth (up to 135 feet). If the levee material is particularly solid, pre-drilling may be necessary. The conditions of the site and the desired life of the project determine the thickness and configuration of the sheet piles.

Post-construction, construction staging areas, the levee crown, slopes, and any other disturbed areas are hydroseeded and the roadway or railroad will be replaced in-kind to the pre-project condition.

Seepage Berm

Seepage berms are wide embankment structures made up of low-permeability materials that resist accumulated water pressure and safely release seeping water. A seepage berm is typically one-third the height of the levee, extending outward from the landside levee toe for 300–400 feet, and laterally along the levee as needed relative to the seepage conditions. A seepage berm addresses the deficiency of under-seepage. A seepage berm can vary in width, from a minimum of four times the levee height to a maximum of 300 feet. Berm heights can also vary but are typically a minimum of 5 feet tall at the landside toe of the levee and generally taper down to 3 feet at the end of the berm.

Construction consists of clearing, grubbing, and stripping the ground surface. Bulldozers then excavate and stockpile borrow material from a nearby borrow site. Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the berm site. The haul trucks dump the material and motor graders spread it evenly, placing 3–5 feet of embankment fill material. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Seepage berms may have an optional feature of a drainage relief trench under the toe of the berm. Drained seepage berms include the installation of a drainage layer (gravel or clean sand) beneath the seepage berm backfill and above the native material at the levee landside toe. A drained seepage berm does not increase the overall footprint of the berm. Post-construction, areas used for construction staging, the levee, the berm, and any other disturbed areas are hydroseeded.

Relief Wells

Relief wells are passive systems that are constructed near the levee landside toe to provide a low-resistance pathway for under-seepage to exit to the ground surface in a controlled and observable manner. A low-resistance pathway allows under-seepage to exit without creating sand boils or piping levee foundation materials. Relief wells are an option only in reaches where geotechnical analyses have identified continuous sand and gravel layers. Relief wells are constructed using soil-boring equipment to drill a hole vertically through the fine-grained blanket layer (sand) into the coarse-grained aquifer layer (gravel) beneath. Pipe casings and gravel/sand filters are installed to allow water to flow freely to the ground surface, relieving the pressure beneath the clay blanket without transporting fine materials to the surface, which can undermine the levee foundation. Relief wells will be designed to discharge onto a cobble splash, and the water will then sheet flow into adjacent agricultural fields. In areas where sheet flow is not feasible, a swale will be excavated and connected to a drainage canal.

Relief wells generally are spaced at 50- to 100-foot intervals, dependent upon the amount of under-seepage, and extend to depths of 150 feet. Areas for relief well construction are cleared, grubbed, and stripped. During relief well construction, a typical well-drilling rig is used to drill to the required depth and construct the well (including well casing, gravel pack material, and well seal) beneath the ground surface. The drill rig likely will be an all-terrain, track-mounted rig that could access the well locations from the levee toe.

Piezometers, also called monitoring wells, could be installed between relief wells to allow monitoring of groundwater levels to ensure the wells are relieving the pressure within the aquifer.

Areas along the levee toe may be used to store equipment and supplies during construction of each well. Construction of each well and the lateral drainage system typically takes 10–20 days. Additional time may be required for site restoration. Post-construction, areas used for construction staging, the levee slopes, and any other disturbed areas are hydroseeded.

Depression/Ditch Infilling

Landside depressions and ditches can contribute to risk of levee failure if a seepage pathway forms under the levee and the water then surfaces through the depression or ditch, exploiting its less resistive nature compared to surrounding soil mass. This measure involves placing fill soil in such depressions and ditches to remove localized susceptibility to seepage. Construction consists of clearing, grubbing, and stripping the ditch or depression surface to remove vegetative material. Bulldozers then excavate and stockpile borrow material from a nearby borrow site.

Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the fill site. The depression or ditch may be further excavated to provide a surface that the fill soil may be keyed into. The haul trucks dump the material and motor graders or bulldozers smooth the material level with the surrounding land surface. An excavator may also be used for placement. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction.

Removal and Relocation of Pacific Gas & Electric Facilities

Prior to and/or concurrent with levee rehabilitation construction, Pacific Gas and Electric Company (PG&E) will need to remove and relocate facilities located within the footprint of the FRWLP. PG&E's utility relocations will need to occur in advance of SBFCA's construction activities at any given location. Construction sequencing for SBFCA's work will be dynamic throughout SBFCA's project planning and design. PG&E's construction schedule will be determined by further engineering to clarify and determine efficacy of site-specific measures; the availability of funding for FRWLP; easement and right-of-way acquisition; availability of borrow material for the levee improvement activities; and/or environmental clearances based on wildlife presence, lifecycle activity, and location of habitats. PG&E's construction schedule will be further influenced by utility operation and maintenance constraints, particularly for relocation activities that require taking existing facilities temporarily out of service. As necessary, geotechnical mitigation measures will be incorporated into construction design to ensure that utility facilities effectively co-exist with the FRWLP, relocation will be done where this is not feasible.

For PG&E's electrical transmission and distribution activities, PG&E will install and remove new electrical transmission and distribution poles. Electrical transmission and distribution pole removal is conducted by a line crew, who typically access each pole site with a line truck and trailer or a boom truck, except in those instances when the pole is located on the levee crown (a crane may be used in those instances). On average, removal of vegetation up to 50 feet from the toe of the levee will need to occur to accommodate pole installation activities; this distance may be greater in instances where the installation activity is located further than 30 feet from the levee toe. After vegetation is cleared, PG&E will remove and replace the existing wood distribution and power poles and related equipment.

For PG&E's natural gas transmission and distribution activities, PG&E will install gas transmission and distribution steel pipe. This also typically includes the removal and disposal of existing pipe. Other typical types of gas transmission and distribution equipment that may be installed include Electric Test System/ Gas Cathodic Test System meter stations for future pipe monitoring purposes, and pipeline markers at angle points and at levee crossing locations. Clearing and grading operations in support of installation of natural gas facilities typically involve preparation of the right-of-way, including vegetation removal, debris disposal, and land leveling. Installation sites are backfilled using sand to create a 6-inch insulation zone around the pipe and then covered by native soil from the project area. In some instances, a crane may be required to place pipe at crossing sites located at the crowns of the levees. Dump trucks will be used to transport sand and soil materials. Spoil piles may be temporarily placed onsite while the installation activities are occurring.

Hydrostatic testing associated with installation of natural gas facilities will be performed to test the strength of the new pipeline. Test water intake and discharge will be performed in accordance with all regulations and permit requirements.

Typical electrical and natural gas transmission and distribution project work schedules are comprised of an average 9-hour day, at an average of 6 days per week per crew. Typical crews consist of 3 to 5 members.

PG&E work areas will be about 125 feet by 125 feet in diameter and located in close proximity to installation activity locations. On average, PG&E will require up to 10 work areas per contract phase. PG&E will utilize the work areas identified by SBFCA whenever possible. Typically, PG&E project access is achieved through existing public and private roads. Removal of vegetation to utilize access roads by PG&E equipment and transport of facilities may be required. PG&E currently owns easements along the entire project corridor. However, temporary and/or permanent easements as required for construction and maintenance of these facilities are being acquired by SBFCA.

Encroachment and Vegetation Removal

Encroachments - Existing facilities found within the footprint of an alternative may require removal and replacement nearby, abandonment, or relocation. Encroachments are numerous (over 400 identified) along the Feather River West Levee and may need to be addressed if they present a threat to the stability of the levee, do not currently comply with the levee encroachment criteria, or will be disrupted or otherwise impacted by construction activities. Typical encroachments include pressure pipelines (water supply pipelines from waterside pump stations and drainage pipelines from landside drainage pump stations), gravity drainage pipes, gas lines, telephone utilities, overhead utilities, structural encroachments, and other types and variations. Debris from structure and embankment fill material of poor quality will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Vegetation Removal - Vegetation removal will involve stripping of herbaceous (non-woody) vegetation by bulldozer. Vegetation will be removed only from within the direct construction footprint and the minimum areas necessary for staging and access. Consistent with the Central Valley Flood Protection Plan guidance for levee repair or improvement, vegetation will be removed to meet specific project objectives. Any vegetation removed as part of direct construction activities will not be replaced at that location, but will involve offsite, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

In accordance with the State of California's Urban Levee Design Criteria, at a minimum, all roots larger than 1.5 inches in diameter that are within 3 feet of the perimeter of the tree trunk will be removed. Immature trees less than 4 inches in diameter at breast height that will be removed may be cut off at or below ground level, generally without root removal. Any excavation will be

backfilled with engineered fill using appropriate placement, moisture conditioning, and compaction methods. Additional measures for removing non-compliant vegetation are listed below.

- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Debris from vegetation removal will be hauled offsite to a permitted disposal site within 20 miles of the removal location.

Construction Staging, Access, and Temporary Facilities

Staging areas will only be provided within the Action Area. Staging areas will be used for staging construction activities and to provide space to house construction equipment and materials, offices, employee parking, and other uses needed for construction of the proposed project.

To facilitate construction, temporary earthen ramps will be constructed for equipment access between the levee crown and the staging area(s). The earthen ramps will be removed when construction is complete.

Cutoff wall construction requires temporary establishment of an onsite slurry batch plant that will occupy about 1–2 acres. Batch plants will be located at about 1-mile intervals along the levee. The batch plant site will likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. Slurry ingredients will be mixed with water and the mixture will be pumped from tanks through pipes to the construction work sites. The batch plant will produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethelene pipes, will be laid on the ground and will extend to all work sites. An additional pipe may be used to supply water to the work sites.

Staging, access, and other temporary construction areas will be located away from wetlands, woody vegetated areas, wildlife species habitat, known cultural resources, or other sensitive areas and will be limited to disturbed or ruderal grasslands subject to review by Corps and resource agencies.

Material Importation, Reuse, and Borrow

Materials imported to the FRWLP construction area will include water, bentonite, cement, incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, and embankment fill soil. Large quantities of fill soil, or borrow will be required. To meet borrow demands, embankment fill material excavated as part of construction will be evaluated for reuse. Embankment fill material deemed suitable will be used as part of levee reconstruction and berms. The total volume of material required is 1,500,000 cubic yards.

SBFCA has explored the option of purchasing fill or borrow material from a local commercial quarry or other permitted source; however, there are not currently any sites near the Action Area that could supply the volume and type of material required. Consequently, SFBCA plans to purchase fill from local landowners willing to sell borrow material.

Six borrow sites have been identified in the Action Area. Each site was investigated to determine the quantity of available material, hauling distance, material composition, groundwater elevation, and prospects for acquisition. Sufficient fill volume is estimated to be present within an approximate 10-mile, one-way haul distance from the area of construction.

SBFCA will maximize the potential borrow sites' use through gradation, placement, and treatment so that they could continue to be used for their current use or otherwise returned to their pre-project condition. As part of borrow operations, the upper 4–6 inches of topsoil will be set aside and replaced after construction in each construction season. After the FRWLP is completed, the borrow site will be re-contoured and reclaimed.

Through outreach efforts, SBFCA identified a number of sites owned by individuals or government agencies willing to sell their property or provide material on a cubic yard basis. Each borrow site is described below.

North Valley Property - The North Valley property is owned by North Valley Properties, LLC and is located south of Ella Road between Feather River Boulevard and Arboga Road. The Wheeler Ranch housing development is proposed at the site. Borrow for the FRWLP will be taken from the northeast corner of the property to create a 24.5 acre detention pond (referred to as the Drainage Basin C Regional Detention Pond, but commonly referred to as the South Ella Detention Pond). The Ella Basin is being constructed as part of Reclamation District No. 784's Master Drainage Plan. Historically, the site was cultivated for agricultural purposes. Currently, the site is disked ruderal grassland with some roads cut in the southern portion of the property for the Wheeler Ranch development. The depth of excavation is anticipated to be 15–20 feet and the yield of material from this site could be 400,000–500,000 cubic yards. Borrow material from this site will be used for work in Contracts B and C. If borrow material is remaining, it may also be used for Contract D. The haul route to Contract C will use existing roads. The post-project land use of the site will be a regional detention pond for Reclamation District No. 784.

Marler Property - The Marler property is a 10-acre property at Johnson Road near Messick Road, north of Star Bend and south of Shanghai Bend. The site is currently an orchard. The depth of

excavation could be upwards of 6 feet. The yield of material from this site could be 75,000 cubic yards. The haul route will use existing roads. The post-project land use for the property will be agricultural production, likely row crops or orchard.

Lanza Property - The Lanza property is 40 acres in size and is currently farmed in field/row crops. It is located at North Township Road and Pease Road south of Live Oak and north of Yuba City. The site has not yet been investigated to determine the types of materials present. Excavation of the site to a depth of 6 feet may occur. The yield of material from this site could be 200,000 cubic yards. The likely haul route will be along Pease Road directly east to the levee. The post-project land use for the property will be rice production.

City of Live Oak Detention Basin - Live Oak owns the property formerly known as the Caltrans Detention Basin Site located west of SR 99 and south of Paseo Avenue. The site is currently fallow. Live Oak intends to construct soccer fields and a stormwater detention basin at the site in 2013 or later. Although the site will require hauling for a short distance through a residential neighborhood, it is anticipated the residents will be amenable to the hauling as it will be a part of the public amenity constructed by Live Oak. This site is about 25 acres, and the depth of excavation is anticipated to be 3–6 feet. The yield of material from this site could be 125,000 cubic yards, and will likely be used for Contract C. Haul routes will use existing roads.

Live Oak (2012) reports that land at this location has historically been cultivated for agricultural purposes and reported that there was no evidence of any wetland or other sensitive plant or wildlife areas remaining onsite. No wetland features were identified during a preliminary wetland delineation of the area in December 2012. The previous agricultural use has displaced native species of plants and animals except those varieties capable of co-existing with humans in urban settings. The post-project use of the site will be a community park and stormwater detention basin facility.

Oroville Wildlife Area Dredge Tailings Area - This site is within the Oroville Wildlife Area and consists of several mounds of dredge tailings waterside of the existing levee. The material is suitable for use in seepage berms in Contract D. The availability of tailings in the area should be sufficient to meet the total deficit for berm material in these reaches. The excavation of the material will be coordinated to maximize hydraulic benefits from the reshaping of the overbank area. The site also represents an opportunity to provide waterside habitat enhancements. The useful area of this site could be about 75 acres and the depth of excavation could be upwards of 10 feet. The yield of material from this site could be 375,000 cubic yards. Hauling from this site will not take place on public roads. It is anticipated the contractor will use an existing waterside levee ramp (or create one), directly accessing the levee patrol road. The future land use for this site will be similar to its present day use (managed habitat area).

Construction Timing

Specific sequencing of construction will be dynamic throughout planning and design of the FRWLP, subject to change based on factors including the following.

- Further engineering in determining the clarity and efficacy of site-specific measures.

- Easement and right-of-way acquisition (where necessary).
- Availability of proximate, suitable, and cost-effective borrow material.
- Environmental clearances based on wildlife presence, lifecycle activity, and location of habitats.

Based on current planning analysis for the FRWLP, construction will occur in more than one annual construction season (typically April 15 to November 30, subject to conditions). Although subject to change, the four contracts and their respective areas for construction of the FRWLP are identified below.

- Contract A, 2016 – 2017
- Contract B, 2014 – 2015
- Contract C, 2013 – 2014
- Contract D, 2014 – 2015

Construction is anticipated to occur in single 10-hour shifts, 6 days per week. An exception to this schedule is slurry cutoff wall construction, which is anticipated to occur in two 10-hour shifts (essentially 24-hour construction), 6 days per week. While actual construction will not occur between the two 10-hour shifts, equipment maintenance and preparations for the upcoming work shift will occur.

Conservation Measures

SBFCA will implement the following conservation measures to avoid and minimize effects on federally listed species. To ensure their implementation, the measures listed below will be included in the project specifications.

General

Conservation Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the Action Area, a Service-approved biologist will conduct a mandatory biological resources awareness training for all construction personnel about federally-listed species that could potentially occur onsite (beetle and snake). The training will include the natural history, representative photographs, and legal status of each federally-listed species and avoidance and minimization measures to be implemented. Proof of personnel attendance will be provided to the Service within 1 week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- Where suitable habitat is present for listed species, SBFCA will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project construction area. Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- All food-related trash will be disposed of in closed containers and removed from the project construction area at least once per week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project construction area.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.
- Any worker who inadvertently injures or kills a federally-listed species or finds one dead, injured, or entrapped will immediately report the incident to the biological monitor and construction foreman. The construction foreman will immediately notify SBFCA, who will provide verbal notification to the Sacramento Fish and Wildlife Office and the local CDFW warden or biologist within 1 working day. SBFCA will follow up with written notification to Service and CDFW within 5 working days. The biological monitor will follow up with SBFCA to ensure that the wildlife agencies were notified.
- The biological monitor will record all observations of federally-listed species on California Natural Diversity Database (CNDDB) field sheets and submit to CDFW.

Valley Elderberry Longhorn Beetle

Conservation measures for the beetle are based on Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (U.S. Fish and Wildlife Service 1999a).

Conservation Measure 2: Fence Elderberry Shrubs to be Protected and Monitor Fencing during Construction

Elderberry shrubs/clusters within 100 feet of the construction area that will not be removed will be protected during construction. A qualified biologist (i.e., with elderberry/beetle experience), under contract to SBFCA, will mark the elderberry shrubs and clusters that will be protected during construction. Orange construction barrier fencing will be placed at the edge of the respective buffer areas. The buffer area distances will be proposed by the biologist and approved by the Service. No construction activities will be permitted within the buffer zone other than those activities necessary to erect the fencing. Signs will be posted every 50 feet (15.2 meters) along the perimeter of the buffer area fencing. The signs will contain the following information:

This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

In some cases, where the elderberry shrub dripline is within 10 feet of the work area, k-rails will be placed at the shrub's dripline to provide additional protection to the shrub from construction equipment and activities. Temporary fences around the elderberry shrubs and k-rails at shrub driplines will be installed as the first order of work. Temporary fences will be furnished, constructed, maintained, and later removed, as shown on the plans, as specified in the special provisions, and as directed by the project engineer. Temporary fencing will be 4 feet (1.2 meters) high, commercial-quality woven polypropylene, orange in color.

Buffer area fences around elderberry shrubs will be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 3: Conduct Beetle Surveys Prior to Elderberry Shrub Transplantation

Surveys of elderberry shrubs to be transplanted will be conducted by a qualified biologist prior to transplantation. Surveys will be conducted in accordance with the Conservation Guidelines (U.S. Fish and Wildlife Service 1999a). The biologist will survey the area surrounding the shrub to be transplanted to ensure that there are not additional elderberry shrubs that need to be removed. Surveys will consist of counting and measuring the diameter of each stem, and examining elderberry shrubs for the presence of beetle exit holes. Survey results and an analysis of the number of elderberry seedlings/cuttings and associated native plants based on the survey results will be submitted to the Service. SBFCA plans to plant elderberry seedlings/cuttings and associated native plants prior to transplantation of elderberry shrubs. The data collected during the surveys prior to transplantation will be used to determine if SFBCA is exceeding their compensation needs or if additional plantings are necessary. Because the Proposed Action will be constructed in four separate contracts, elderberry survey data for each contract will be used to rectify any discrepancies in compensation for the previous contract and to ensure that SBFCA has minimized effects to the beetle.

Conservation Measure 4: Water Down Construction Area to Control Dust

SFBCA or the contractor will ensure that the project construction area will be watered down as necessary to prevent dirt from becoming airborne and accumulating on elderberry shrubs within the 100–foot buffer.

Conservation Measure 5: Compensate for Direct and Indirect Effects on Valley Elderberry Longhorn Beetle Habitat

Before construction begins, SBFCA will compensate for direct effects on elderberry shrubs by transplanting shrubs that cannot be avoided to a Service-approved conservation area (described below). Elderberry seedlings or cuttings and associated native species will also be planted in the conservation area. Each elderberry stem measuring 1 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) will be replaced, in the conservation

area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). The numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether the shrub lies in a riparian or non-riparian area. Stock of either seedlings or cuttings will be obtained from local sources (including the Action Area if acceptable to the Service).

At the discretion of the Service, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that will be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, compensation ratios will be increased to offset the additional habitat loss.

The relocation of the elderberry shrubs will be conducted according to Service-approved procedures outlined in the Conservation Guidelines (U. S. Fish and Wildlife Service 1999a). Elderberry shrubs within the project construction area that cannot be avoided will be transplanted during the plant's dormant phase (November through the first 2 weeks of February). A qualified biological monitor will remain onsite while the shrubs are being transplanted.

Property inaccessibility and the high density of vegetation along portions of the Feather River riparian corridor limited the number of elderberry shrubs that could be surveyed (73 shrubs were surveyed). For this reason, compensation for the removal of 91 shrubs was estimated based on the average number of stems in each stem diameter range for the 73 shrubs that could be surveyed. Those average shrub stem counts are as follows.

- Number of stems $\geq$1 inch and $\leq$3 inches = 4.
- Number of stems >3 inches and <5 inches = 1.
- Number of stems $\geq$5 inches = 1.

Table 1 shows the estimated compensation. Because the shrubs are located in riparian habitat and did not have exit holes, the compensation ratios for these conditions were used. As noted in Table 1, one elderberry shrub will need to be transplanted prior to the start of work in 2013 (in Reach 13) and outside of the elderberry dormancy period.

Based on the information in Table 1, the conservation area will be at least 12.15 acres in size to accommodate about 91 elderberry shrubs, 1,470 elderberry cuttings or seedlings, and 1,470 native plants. The conservation area in which the transplanted elderberry shrubs and seedlings are planted will be protected in perpetuity as habitat for the beetle.

Evidence of beetle occurrence in the conservation area, the condition of the elderberry shrubs in the conservation area, and the general condition of the conservation area itself will be monitored over a period of 10 consecutive years or for 7 years over a 15-year period from the date of transplanting. SBFCA will be responsible for funding and providing monitoring reports to the Service in each of the years in which a monitoring report is required. As specified in the Conservation Guidelines, the report will include information on timing and rate of irrigation, growth rates, and survival rates and mortality.

Table 1. Elderberry Stem Sizes and Compensation

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Multiplier for transplanting between June 15 – August 15	Number of Stems	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	No	360	720	720
Riparian	stems > 3" & <5"	No	3:1	1:1	No	90	270	270
Riparian	stems > 5"	No	4:1	1:1	No	90	360	360
2013 Construction - Reach 13								
Riparian	stems ≥1" & ≤3"	No	2:1	1:1	2.5	1	5	5
Riparian	stems > 3" & <5"	No	3:1	1:1	2.5	2	15	15
Riparian	stems > 5"	No	4:1	1:1	2.5	10	100	100
Total replacement plantings							1,470	1,470
Total elderberry shrubs to be transplanted								91
2940 /10 = 294 valley elderberry longhorn beetle credits or 12.15 acres								

To meet the success criteria specified in the Conservation Guidelines, a minimum survival rate of 60% of the original number of elderberry replacement plantings and associated native plants must be maintained throughout the monitoring period.

Proposed Conservation Area

SBFCA proposes to transplant elderberry shrubs to the existing 48.5-acre Star Bend Conservation Area, located on the west levee of the Feather River, about 6 miles south of Yuba City. In 2009, Levee District 1 of Sutter County proposed to construct the Feather River Setback Levee and Habitat Enhancement Project at Star Bend to replace a portion of existing levee that poses a high risk of failure in order to decrease the flood stage, velocity, and scour potential; increase and improve floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of CDFW's Feather River Wildlife Area. The Star Bend project created 48.5 acres of floodplain habitat, which included habitat enhancement and onsite compensation for impacted elderberry shrubs.

In 2009, River Partners and Stillwater Sciences prepared a *Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend* to be implemented by Levee District 1. It provides further information on the conditions at the time the site was proposed. About 20 acres have been used for elderberry transplants and associated native plants. In early 2012, a fire at the Star Bend site damaged portions of the site; however, elderberry shrub

planting losses were minimal. The remaining 28.5 acres are available at the conservation area for compensating for impacts on elderberry shrubs from construction of the FRWLP. The long-term goal of the conservation area is to merge this area with CDFW's adjoining O'Conner Lakes and Abbott Lakes Wildlife Units. SBFCA will prepare a mitigation and monitoring plan for the 28.5 acres that are available and will be used as a conservation area for effects to the beetle, as well as riparian impacts. This plan is currently being coordinated with the Service, Corps, and CDFW. Additionally, SBFCA will obtain a conservation easement for the 28.5 acre conservation area.

Giant Garter Snake

Conservation Measure 6: Conduct Construction Activities during the Active Period for Giant Garter Snake

Construction activity within giant garter snake aquatic and upland habitat (200 feet of aquatic habitat) will be conducted during the snake's active period (May 1–October 1). During this timeframe, potential for injury and mortality are lessened because snakes are actively moving and avoiding danger. The only work that will be conducted outside of the active season is levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction at two sites in the same reaches because these activities must be conducted when the canal is dry (February–March). Additional protective measures will be implemented at these locations (see Conservation Measure 14 below).

Conservation Measure 7: Install and Maintain Exclusion and Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, SBFCA will install exclusion fencing and orange construction barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The exclusion and construction barrier fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that SBFCA or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The exclusion fencing will consist of 3-foot-tall silt fencing buried 6 inches below ground level. The exclusion fencing will ensure that giant garter snakes are excluded from the construction area and that suitable upland and aquatic habitat is protected throughout construction. The construction barrier fencing will be commercial-quality, woven polypropylene, orange in color,

and 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Barrier and exclusion fences will be inspected daily by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead and the Service.

Conservation Measure 8: Minimize Potential Impacts on Giant Garter Snake Habitat

SBFCA will implement the following measures to minimize potential impacts on giant garter snake habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the Action Area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

Conservation Measure 9: Prepare and Implement a Stormwater Pollution Prevention Plan

SBFCA will prepare a stormwater pollution prevention plan (SWPPP) that describes the BMPs that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP will be prepared prior to commencing earth-moving construction activities. This will also comply with the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit.

The specific BMPs that will be incorporated into the erosion and sediment control plan and SWPPP will be site-specific and will be prepared by the construction contractor in accordance with the California Regional Water Quality Control Board Field Manual. However, the plan likely will include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction.** The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials.** To the extent possible, equipment and materials will be staged in areas that have already been disturbed.

- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in part through the establishment of designated equipment staging areas, ingress and egress corridors, and equipment exclusion zones prior to the commencement of any grading operations.
- **Stabilize grading spoils.** Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers.** The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area. Natural/biodegradable erosion control measures (i.e., coir rolls, straw wattles or hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because animals can become caught in this type of erosion control material.
- **Stormwater drain inlet protection.** The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization.** The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

Conservation Measure 10: Prepare and Implement a Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, SBFCA will ensure the contractor will prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). The plan will be subject to approval by the Corps, Service, and SBFCA before excavation can begin. The BSSCP will include measures intended to minimize the potential for a frac-out (short for "fracture-out event") associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-effect" response in the event of a frac-out and release of excavation fluid (i.e., bentonite). The BSSCP will require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, the Service, CDFW, and the RWQCB will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be onsite and used if a frac-out occurs. Containment materials, such as straw bales, also will be onsite prior to and during all operations, and a vacuum truck will be on

retainer and available to be operational onsite within notice of 2 hours. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.

- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1-foot, contained, and properly disposed of, as required by law. The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.
- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that will potentially suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material, and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (onsite) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of excavation operations.

Conservation Measure 11: Prepare and Implement a Spill Prevention, Control, and Counter-Measure Plan

A spill prevention, control, and counter-measure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. SBFCA or its contractor will develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP will be completed before any construction activities begin. Implementation of this measure will comply with State and Federal water quality regulations. The SPCCP will describe spill sources and spill pathways in addition to the actions that will be taken in the event of a spill (e.g., an oil spill from engine refueling will be immediately cleaned up with oil absorbents). The SPCCP will outline descriptions of containments facilities and practices such as doubled-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. It will also describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

SBFCA will review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. SBFCA will notify its contractors immediately if there is a non-compliance issue and will require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that results in one or more of the following.

- Violates applicable water quality standards.
- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent will notify SBFCA, and SBFCA will take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Central Valley RWQCB. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

Conservation Measure 12: Conduct Preconstruction Surveys and Monitoring for Giant Garter Snake

Prior to ground-disturbing activities within 200 feet of suitable habitat, a Service-approved biological monitor will conduct a preconstruction survey of suitable aquatic and upland habitat and inspect exclusion and orange barrier fencing to ensure they are both in good working order each morning. If any snakes are observed within the construction area at any other time during construction the Service-approved biological monitor will be contacted to survey the site for giant garter snakes. The biological monitor will have the authority to stop construction activities until appropriate corrective measures have been completed or it is determined that the snake will not be harmed. Giant garter snakes encountered during construction activities will be allowed to move away from construction activities on their own. If unable to move away on their own, trapped or injured giant garter snakes will be only be removed by a biologist with a federal 10(a)1(a) permit which allows them to handle the snake and will be placed in a location determined through discussions with the Service. The biological monitor will immediately report the finding of a snake to Service by phone and will provide a written account of the details of the incident within 24 hours.

Once all initial ground-disturbing activities are completed, the biological monitor will perform weekly checks of the site for the duration of construction in order to ensure that construction barrier fences and exclusion fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to the Service within 1 week of each monitoring visit.

Conservation Measure 13: Provide Escape Ramps or Cover Open Trenches at the End of Each Day

To avoid entrapment of giant garter snake, thereby preventing injury or mortality resulting from falling into trenches, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, then holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. Capture and relocation of trapped or injured individuals can only be attempted by personnel or individuals with current Service recovery permits pursuant to section 10(a)1(A) of the Act.

Conservation Measure 14: Implement Additional Protective Measures during Work in Suitable Habitat during the Giant Garter Snake Dormant Period

SBFCA will implement additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2–April 30), when snakes are more vulnerable to injury and mortality. It is expected that these additional measures will be implemented during levee slope flattening within the Sutter-Butte Canal in Reaches 26–28 (scheduled for 2016) and pipe reconstruction adjoining the canal at two sites in the same reaches during February–March, and if construction activities extend to the period between October 2 and November 1. SBFCA will implement additional protective measures when conducting work in suitable giant garter snake habitat between October 2 and April 30.

- A full-time Service-approved biological monitor will be onsite for the duration of construction activities.
- All emergent vegetation within the Sutter-Butte Canal on the levee side, and vegetation within 200 feet of the canal will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1 for following winter work).
- Exclusion fencing will be installed around the perimeter of the work area and across the Sutter-Butte Canal where construction activities associated with levee slope flattening and pipe reconstruction activities will occur. The fencing should enclose the work area to the maximum extent possible to prevent giant garter snakes from entering the work area. Fencing will be installed during the active period for giant garter snakes (May 1–October 1) to reduce the potential for injury and mortality during fence installation. The Service-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation. The exclusion fencing will consist of 3-foot-tall erosion fencing buried 4– 6 inches below ground level. The exclusion fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area (between canal and existing levee).
- Portions of the Sutter-Butte Canal that are temporarily disturbed during construction will be revegetated with emergent vegetation and adjacent disturbed upland habitat will be revegetated with native grasses and forbs after construction is complete.

Conservation Measure 15: Restore Temporarily Disturbed Aquatic and Upland Habitat to Pre-Action Conditions

Upon completion of the proposed project, SBFCA will restore 42.52 acres of suitable aquatic habitat and 118.80 acres of suitable upland habitat for the giant garter snake to pre-project conditions. Restoration of aquatic vegetation and annual grassland will be detailed in a mitigation and monitoring plan that will be reviewed and approved by the Corps and Service prior to the start of construction. Habitat will be restored within one season (defined as May 1–October 1) and providing vegetative cover within 1 year of construction beginning in that area.

Conservation Measure 16: Compensate for Permanent Loss of Aquatic Habitat for Giant Garter Snake

SBFCA will compensate for the permanent loss of 0.004 acre of suitable aquatic habitat for giant garter snake by purchasing preservation credits equal to 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. This bank has available giant garter snake credits and is approved by both the Service and CDFW.

The 0.012 acre of habitat at the conservation bank will be protected in perpetuity for giant garter snake. Prior to the start of construction (excluding Reach 13, as there is no giant garter snake habitat in this reach), SBFCA will provide funding to Westervelt Ecological Services for preservation credits equivalent to 0.012 acre of giant garter snake habitat at the Sutter Basin Conservation Bank. The transaction will take place through a purchase and sale agreement, and funds must be transferred within 30 days, and before any construction activities are initiated. SBFCA will provide the Service and CDFW with copies of the credit sale agreement and fund transfer.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle's and snake's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle and the snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle and snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on the beetle and snake; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the beetle and snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the beetle's and snake's current status, taking into account any cumulative effects, to determine if implementation of the proposed

action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the beetle and snake.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the beetle and snake and the role of the action area in the survival and recovery of the beetle and snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

Valley Elderberry Longhorn Beetle

Please refer to the *Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) 5-year Review: Summary and Evaluation* (Service 2006) for the current status of the species.

Giant Garter Snake

Please refer to the *Giant Garter Snake (Thamnophis gigas) 5-year Review: Summary and Evaluation* (Service 2012) for the current status of the species.

Environmental Baseline

Valley Elderberry Longhorn Beetle

The closest beetle occurrence in the CNDDB (2013) is about 0.5 mile from the proposed project. Suitable habitat for the beetle (in the form of elderberry shrubs) exists in numerous places along the 41 miles of proposed levee repair. A total of 267 elderberry shrubs were mapped within the action area. Many others exist at various locations between the levee and the river. Of these SBFCA is proposing to avoid 175 elderberry shrubs and transplant 91 elderberry shrubs. Because the action area is within the range of the species, there are known occurrences from the vicinity of the action area, and suitable habitat is present, the Service concludes that it is reasonably likely for the beetle to occupy the action area.

Giant Garter Snake

The *Draft Recovery Plan for the Giant Garter Snake* subdivides the range of the species into four recovery units (Service 1999b). The action area for the proposed project is located within the Sacramento Valley Recovery Unit. There are 20 records of the snake within 5 miles of the action area. The closest occurrence documented in the CNDDB is 2 miles from the action area. Snakes have the potential to occur within the action area because suitable aquatic and upland habitat is present as it is hydrologically connected to areas that support rice agriculture and areas where the snake has previously been detected. The action area is a long corridor that occasionally has irrigation ditches, which run parallel to the levee for limited stretches. The main threat to the snake in the action area is loss of habitat or connectivity due to channel and levee maintenance.

Effects of the Proposed Action

Valley Elderberry Longhorn Beetle

Ninety-one elderberry shrubs will be removed and transplanted. The 91 affected shrubs have 361 stems between 1 and 3 inches, 92 stems between 3 and 5 inches and 100 stems greater than 5 inches at ground level.

Loss of an elderberry shrub or even a stem can affect the beetle breeding and feeding because adult beetles rely solely on elderberry foliage and flowers for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae will be killed or the beetle's life cycle will be interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the valley elderberry longhorn beetle, or impair their production of habitat-quality stems in the future.

2. Elderberry shrubs may die as a result of transplantation.

3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

SBFCA has proposed to transplant one shrub outside of the elderberry shrub's dormant season (November 1 to February 15). To offset the increased risk of the transplantation not being successful SBFCA has proposed to plant 2.5 times the number of elderberry seedlings at the Star Bend Conservation Area.

Temporal loss of habitat will occur. Although conservation measures for effects on the beetle will involve creation or restoration of habitat, it generally takes 5 or more years for elderberry plants to become large enough to support beetles, and it may take 25 years or longer for riparian habitats to reach their full value. Temporal loss of habitat may cause fragmentation of habitat and isolation of subpopulations.

Permanent and temporary habitat loss adversely affects the beetles breeding and foraging requirements. Habitat creation and transplantation of the shrubs will minimize these effects. Success of a restoration site has been linked to presence of transplanted elderberry shrubs that have served to colonize a newly created riparian habitat. Transplants that survive also provide diversity within the conservation area as they are older, larger shrubs within the plantings of young small elderberry seedlings. The Star Bend Conservation Area will be protected with a conservation easement and managed in perpetuity for riparian habitat including valley elderberry longhorn beetle habitat, through development of the *Feather River West Levee Project Mitigation and Monitoring Plan.*

Giant garter snake

Aquatic habitat for the snake near the levee construction varies along the 41 miles of the proposed project. Small areas of aquatic habitat are present in Contract A and C and they are hydrologically connected to areas that support habitat for the snake (rice). Contract D has the largest amount of snake aquatic habitat as the Sutter Butte Canal parallels the levee for longer lengths. Canal filling due to cutoff wall construction will permanently fill 0.004 acre of snake aquatic habitat. Upland habitat around this aquatic habitat will be temporarily disturbed but returned to pre-project condition within one year. Temporary effects will result from temporary fill of aquatic habitat for construction access, reshaping the slope of the Sutter Butte Canal and adjacent levee, and degradation and reconstruction of the levee. These activities will temporarily affect 6.81 acres of aquatic habitat. Levee degradation and reconstruction will temporarily affect 112.47 acres of upland habitat. All temporarily affected areas will be restored to pre-project conditions within the same year the disturbance will occur. This will minimize effects to giant garter snakes because the amount of time the habitat will be unavailable to the snake will be minimized. Permanently affected habitat, such as the canals that will be made smaller will be offset by purchasing 0.012 acre of giant garter snake habitat at Westervelt Ecological Services' Sutter Basin Conservation Bank in Sutter County. None of the borrow sites in the project description have upland or aquatic giant garter snake habitat.

The majority of the construction work will occur during the giant garter snake active season (May 1 to October 1). Increased construction activity in areas where snakes are known to occur could expose snakes to increased risks of injury and mortality from predation, exposure, vehicular traffic, and construction equipment. Because snakes are more mobile during the active season, these effects should be lessened. There are a few activities which SBFCA could not construct during the active season. Because of cooler temperatures in the inactive season (October 1 to May 1), the snake is not as mobile and is most frequently found within burrows. Ground disturbing activities during this timeframe will increase the likelihood of snake mortality when the burrows are disturbed with heavy equipment. SBFCA has proposed to disturb (clear and grub) the out of season work area and place exclusion fencing around the work area during the active season which will create an area that will not support overwintering snakes (lack of burrows). This will minimize the chance of injuring or killing an overwintering snake during out of season construction. This will only occur on one side of the canal, leaving the other side of the canal available as overwintering habitat for the snake.

Temporary effects within the action area will affect both aquatic and upland snake habitat. In some locations degradation of the levee could cause soil to fall into the aquatic habitat or fuel or oil leaks could also adversely affect the habitat and the snake. Placement of sediment fencing and implementing sediment and contaminant BMPs will lessen this effect. Levee degradation will temporarily make upland habitat unavailable to the snake during the active season. Snakes use upland habitat for thermoregulation both as a place to bask and as a place to escape extreme heat (burrows) and cover for shedding and giving birth to young. While snakes are more active during the summer months and more likely to move away from construction, some snakes may choose to remain where they are and therefore will be subject to mortality when construction activities are occurring. In addition to direct mortality, the upland habitat will be temporarily unavailable to the snake during construction. Even once construction is completed it will take a

year or two for the upland habitat to become completely functional for the snake, with burrows or crevices available for them to use. This is likely to result in disturbance, displacement, injury, and/or mortality of snakes. To lessen these effects SBFCA is implementing the conservation measures described above as well as affecting only one side of the canal. This will leave the other side of the canal intact and available to the snake for use, minimizing displacement of snakes. Additionally, because of the staging of construction not all of the upland habitat will be unavailable for use at one time. It will be staged as construction progresses through the various contracts.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. Any future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or result in take of listed valley elderberry longhorn beetle or giant garter snake and are, therefore, cumulative to the proposed project.

Conclusion

After reviewing the current status of the valley elderberry longhorn beetle and giant garter snake, the environmental baselines for these species, the effects of the proposed project, and the cumulative effects on this species, it is the Service's biological opinion that the proposed FRWLP, as described herein, is not likely to jeopardize the continued existence of these species. Although critical habitat has been designated for the beetle, the proposed action will not affect critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary for listed species of this biological opinion and must be implemented by the Corps and SBFCA in order for the exemption in section 7(o)(2)

to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

Valley Elderberry Longhorn Beetle

The Service expects that incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of this species and their relatively small body size make the finding of an injured or dead specimen unlikely. The species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of levee construction. Therefore, the Service estimates that all beetles inhabiting 91 elderberry plants containing stems 1 inch or greater at ground level (361 stems between 1-3 inches, 92 stems between 3 and 5 inches and 100 stems $\geq$5 inches; see Table 1 in the text) will be taken as a result of the proposed action.

Giant Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect or quantify for the following reasons: the snake is cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during construction activities (staging areas, work on canal banks, levee degradation and reconstruction, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is difficult to detect, the Service may use the quantification of acreage as a surrogate for the individuals that will be taken. Therefore, the Service anticipates take incidental to this project as the 0.004 acre of suitable habitat that will be permanently lost and the 119.28 acres (6.81 acres aquatic and 112.47 acres upland) of suitable snake habitat that will be temporarily lost. Upon implementation of the Reasonable and Prudent Measure, Terms and Conditions, and the Proposed Conservation Measures considered herein, incidental take within this acreage for the proposed project, will be exempt from the prohibitions described under Section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the beetle or snake.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the adverse effects of the Feather River West Levee Project to the beetle and snake and their habitat in the action area.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and SBFCA must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions implement the Reasonable and Prudent Measure:

1. All the conservation measures as described in the project description, and as restated here in this biological opinion, must be fully implemented and adhered to.

2. The Corps, SBFCA, and PG&E shall include full implementation and adherence to the conservation measures as outlined in the biological opinion as a condition of any permit or contract issued for the project.

3. In order to monitor whether the amount or extent of take anticipated from implementation of the proposed project is approached or exceeded, the Corps and SBFCA shall adhere to the following reporting requirement. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

    a. For those components of the proposed project that will result in habitat degradation or modification whereby incidental take in the form of harm or mortality is anticipated, the Corps and SBFCA will provide weekly updates to the Service with a precise accounting of the total acreage of habitat effected or number of elderberry shrubs and size of stems at ground level transplanted. Updates shall also include any information about changes in the Project Description and not analyzed in this biological opinion.

4. SBFCA shall provide a photo documentation report showing pre- and post-project area conditions for giant garter snake.

Salvage and Disposition of Individuals

The Sacramento Fish and Wildlife Office will be notified within 1 day of the finding of any dead or injured snake or beetle to determine the appropriate measures for salvage and disposition. The Service contact person is the Habitat Conservation Division Chief. In addition, the Recovery Division Chief shall also be notified within 1 day of the procedures implemented for salvage and disposition of the snake or beetle. The applicant must report to the Service immediately any information about take or suspected take of listed species not authorized in this biological

opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured listed species. The Habitat Conservation and Recovery Divisions Chiefs can be contacted at (916) 414-6600. The California Department of Fish and Wildlife should also be contacted at (916)358-2900.

CONSERVATION RECOMMENDATIONS

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of new information. These measures may serve to further minimize or avoid the adverse effects of a proposed action on listed, proposed, or candidate species, or on designated critical habitat. They may also serve as suggestions on how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing you with the following conservation recommendations:

1. The Corps and SBFCA should assist in the implementation of the draft, and when published, the final Recovery Plan for the snake.

2. The Corps and SBFCA should provide funding to researchers studying topics identified by the Service in the draft, and when published, the final Recovery Plan for the snake.

3. The Corps should use environmental restoration authorities to acquire and restore beetle and snake habitat.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Feather River West Levee Project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the proposed action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this Feather River West Levee Project biological opinion, please contact Jennifer Hobbs, at (916) 414-6541 or Doug Weinrich, Deputy Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Roberta Gerson

for Jan C. Knight
Acting Field Supervisor

cc:
Jeff Koschak, Corps, Sacramento, CA
Jenny Marr, CDFW, Chico, CA
Jennifer Haire, ICF, Sacramento, CA

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Part F.5

U.S. Fish and Wildlife Service Special-Status Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

February 10, 2012

Document Number: 120210051632

Jennifer Haire
ICF International
630 K Street, Suite 400
Sacramento, CA 95814

Subject: Species List for Feather River West Levee Project

Dear: Ms. Haire

We are sending this official species list in response to your February 10, 2012 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 10, 2012.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found here.

Endangered Species Division

These buttons will not appear on your list.

Revise Selection

Print this page

Print species list before going on to letter.

Make Official Letter

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 120210051632

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

- Branchinecta conservatio
  - Conservancy fairy shrimp (E)
- Branchinecta lynchi
  - vernal pool fairy shrimp (T)
- Desmocerus californicus dimorphus
  - valley elderberry longhorn beetle (T)
- Lepidurus packardi
  - vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris
  - green sturgeon (T) (NMFS)
- Hypomesus transpacificus
  - delta smelt (T)
- Oncorhynchus mykiss
  - Central Valley steelhead (T) (NMFS)

- Critical habitat, Central Valley steelhead (X) (NMFS)

- Oncorhynchus tshawytscha
  - Central Valley spring-run chinook salmon (T) (NMFS)
  - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
  - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense
  - California tiger salamander, central population (T)

- Rana draytonii
  - California red-legged frog (T)

Reptiles

- Thamnophis gigas
  - giant garter snake (T)

Plants

- Orcuttia tenuis
  - slender Orcutt grass (T)

- Tuctoria greenei
  - Greene's tuctoria (=Orcutt grass) (E)

Candidate Species

Birds

- Coccyzus americanus occidentalis
  - Western yellow-billed cuckoo (C)

Quads Containing Listed, Proposed or Candidate Species:

NICOLAUS (529A)

YUBA CITY (544A)

SUTTER (544B)

OLIVEHURST (544D)

PALERMO (560A)

BIGGS (560B)

GRIDLEY (560C)

County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.
See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information

for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 10, 2012.

Part F.6

California Natural Diversity Database Special-Status Species List—Plants

California Department of Fish and Game
Natural Diversity Database
Special-status plants & sensitive natural communities
Biggs, Gridley, Nicolaus, Olivehurst, Palermo, Sutter, & Yuba City Quads

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Astragalus tener var. ferrisiae Ferris' milk-vetch	PDFAB0F8R3			G1T1	S1	1B.1
2	Delphinium recurvatum recurved larkspur	PDRAN0B1J0			G3	S3	1B.2
3	Great Valley Cottonwood Riparian Forest	CTT61410CA			G2	S2.1	
4	Great Valley Mixed Riparian Forest	CTT61420CA			G2	S2.2	
5	Juncus leiospermus var. ahartii Ahart's dwarf rush	PMJUN011L1			G2T1	S1.2	1B.2
6	Monardella douglasii ssp. venosa veiny monardella	PDLAM18082			G5T1	S1.1	1B.1
7	Navarretia leucocephala ssp. bakeri Baker's navarretia	PDPLM0C0E1			G4T2	S2	1B.1
8	Northern Hardpan Vernal Pool	CTT44110CA			G3	S3.1	
9	Orcuttia tenuis slender Orcutt grass	PMPOA4G050	Threatened	Endangered	G2	S2	1B.1
10	Pseudobahia bahiifolia Hartweg's golden sunburst	PDAST7P010	Endangered	Endangered	G2	S2	1B.1
11	Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0			G3	S3	1B.2
12	Tuctoria greenei Greene's tuctoria	PMPOA6N010	Endangered	Rare	G1	S1	1B.1

Part F.7

California Natural Diversity Database Special-Status Species List—Wildlife

California Department of Fish and Game
Natural Diversity Database
Feather River West Levee Project - animals
Quads searched: Nicolaus, Yuba City, Sutter, Olivehurst, Biggs, Gridley, and Palermo

	Common Name/Scientific Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1	Antioch Dunes anthicid beetle *Anthicus antiochensis*	IICOL49020			G1	S1	
2	California black rail *Laterallus jamaicensis coturniculus*	ABNME03041		Threatened	G4T1	S1	
3	California linderiella *Linderiella occidentalis*	ICBRA06010			G3	S2S3	
4	Sacramento Valley tiger beetle *Cicindela hirticollis abrupta*	IICOL02106			G5TH	SH	
5	Sacramento anthicid beetle *Anthicus sacramento*	IICOL49010			G1	S1	
6	Sacramento splittail *Pogonichthys macrolepidotus*	AFCJB34020			G2	S2	SC
7	Swainson's hawk *Buteo swainsoni*	ABNKC19070		Threatened	G5	S2	
8	bald eagle *Haliaeetus leucocephalus*	ABNKC10010	Delisted	Endangered	G5	S2	
9	bank swallow *Riparia riparia*	ABPAU08010		Threatened	G5	S2S3	
10	burrowing owl *Athene cunicularia*	ABNSB10010			G4	S2	SC
11	chinook salmon - Central Valley spring-run ESU *Oncorhynchus tshawytscha*	AFCHA0205A	Threatened	Threatened	G5	S1	
12	giant garter snake *Thamnophis gigas*	ARADB36150	Threatened	Threatened	G2G3	S2S3	
13	greater sandhill crane *Grus canadensis tabida*	ABNMK01014		Threatened	G5T4	S2	
14	northern harrier *Circus cyaneus*	ABNKC11010			G5	S3	SC
15	silver-haired bat *Lasionycteris noctivagans*	AMACC02010			G5	S3S4	
16	tricolored blackbird *Agelaius tricolor*	ABPBXB0020			G2G3	S2	SC
17	valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened		G3T2	S2	
18	vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened		G3	S2S3	
19	vernal pool tadpole shrimp *Lepidurus packardi*	ICBRA10010	Endangered		G3	S2S3	
20	western mastiff bat *Eumops perotis californicus*	AMACD02011			G5T4	S3?	SC
21	western pond turtle *Emys marmorata*	ARAAD02030			G3G4	S3	SC
22	western spadefoot *Spea hammondii*	AAABF02020			G3	S3	SC
23	western yellow-billed cuckoo *Coccyzus americanus occidentalis*	ABNRB02022	Candidate	Endangered	G5T3Q	S1	

Part F.8

California Native Plant Society Inventory of Rare and Endangered Plants List

Inventory of Rare and Endangered Plants

v7-12feb 2-21-12

Status: Home Page - Mon, Feb. 27, 2012 11:18 c

Basic Tools:

- All CNPS-listed plants
- Checkbox and Preset search
- Getting Started guide

Tech Tools:

- Query Builder
- Query by list of names
- Nine-quad search

Database indexes

- CNPS List
- State Status
- Federal Status
- Family
- County
- Life Form
- Topo Quad
- Common Name

Members and Friends:

- Request assistance
- Submit survey data
- Show your Plant Press

other things:

- Documentation and Resources
- Looking for common plants?
- Home of CNPS

Quick Search Form:

Search

- **more**

8th EDITION interface now available online!.....
Same data, but now includes GIS and many improvements. Not all 7th Edition features have been added yet - you can continue to use them here. To simplify access to the new features, such as GIS, each record in the 7th Edition now has a link to the corresponding details page in the 8th Edition.

INTRODUCTION to the 7th EDITION

CalPhotos archive
What rare plant is this?
(Click on image.)

The CNPS Inventory of Rare and Endangered Plants is now published on-line and updated quarterly. Along with the latest Inventory data from CNPS, you will find a variety of search tools, maps, thumbnail illustrations, and links to additional information.

The statewide CNPS website has extensive • **background information** about the Inventory. Since the publication of the last hardcopy 6th Edition in 2001, the review process and revisions have been ongoing. Stay informed and get involved!

Users of the Inventory may find it helpful to read the • **FAQ**.
example: "Which search method should I use?" (answer)
New users might want to consult the • **Getting Started** guide.

The last hardcopy edition was August 2001, but much of the front matter remains useful and informative:

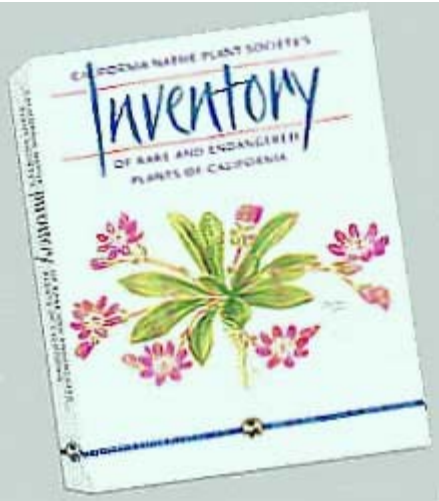
Rarity in Vascular Plants - Peggy L. Fiedler
Rare Bryophytes in California - James R. Shevock
Bibliography for Biology and Conservation of Rare Plants - Peggy L. Fiedler and James P. Smith, Jr.
Conserving Plants with Laws and Programs under the California Department of Fish and Game - Sandra Morey and Diane Ikeda
The California Natural Diversity Database- Roxanne L. Bittman
The Natural Communities Program - Todd Keeler-Wolf

The Federal Endangered Species Act and Rare Plant Protection in California - Jim A. Bartel, Jan C. Knight, and Diane Elam

Sensitive Plant Management on the National Forests and Grasslands in California - Bradley E. Howell

Rare Plant Conservation on Bureau of Land Management Lands - John Willoughby

History of the CNPS Rare Plant Program



CNPS Inventory of Rare and Endangered Plants

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Reformat list as: Standard List - with Plant Press controls -

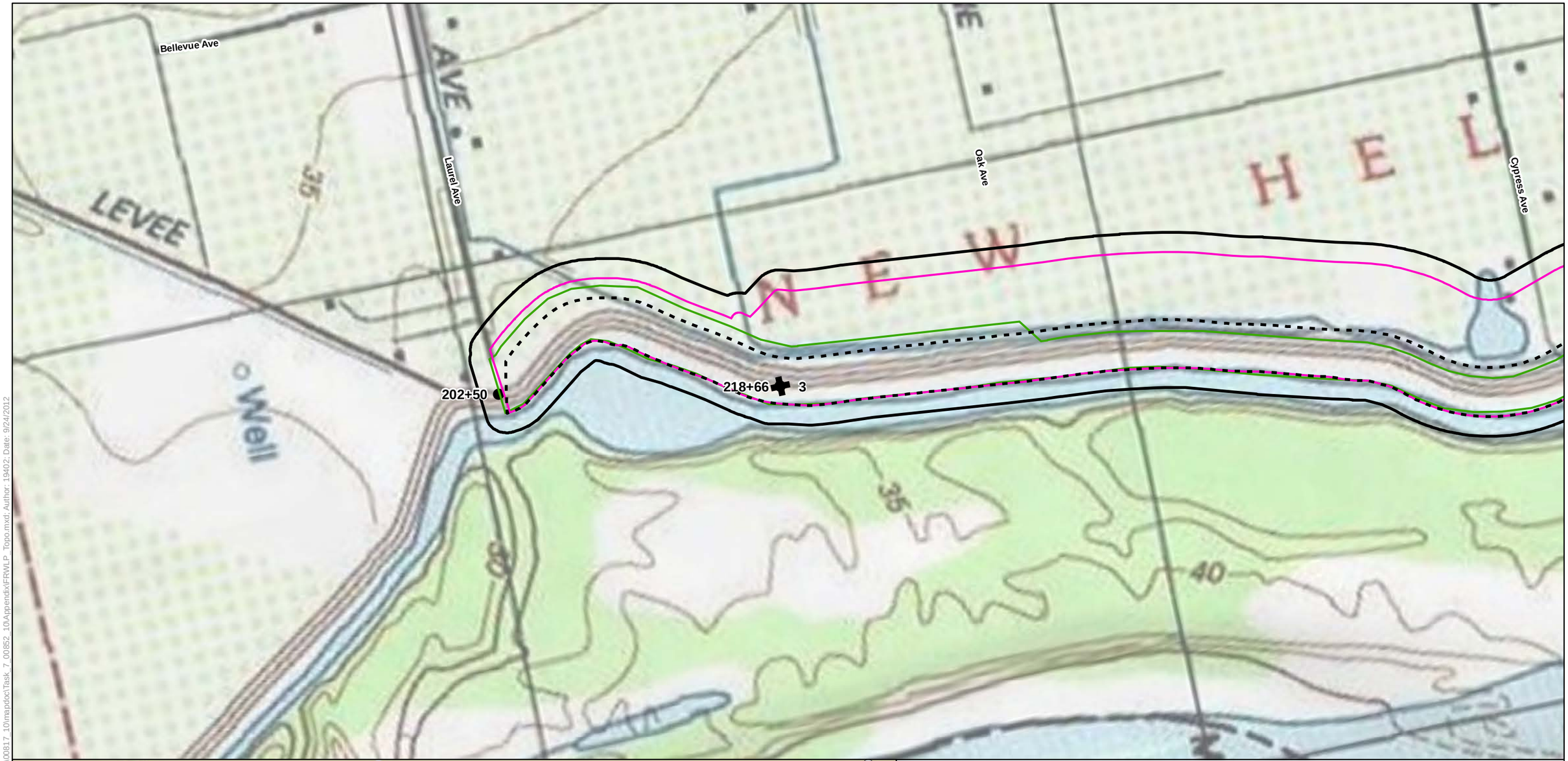
ECOLOGICAL REPORT

scientific	family	life form	blooming	communities	elevation	CNPS
Astragalus tener var. ferrisiae	Fabaceae	annual herb	Apr-May	•Meadows and seeps (Medws)(vernally mesic) •Valley and foothill grassland (VFGrs)(subalkaline flats)	2 - 75 meters	List 1B.1
Delphinium recurvatum	Ranunculaceae	perennial herb	Mar-Jun	•Chenopod scrub (ChScr) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/alkaline	3 - 750 meters	List 1B.2
Juncus leiospermus var. ahartii	Juncaceae	annual herb	Mar-May	•Valley and foothill grassland (VFGrs)(mesic)	30 - 229 meters	List 1B.2
Monardella douglasii ssp. venosa	Lamiaceae	annual herb	May-Jul	•Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/heavy clay	60 - 410 meters	List 1B.1
Orcuttia tenuis	Poaceae	annual herb	May-Sep(Oct), Months in parentheses are uncommon.	•Vernal pools (VnPls)	35 - 1760 meters	List 1B.1
Pseudobahia bahiifolia	Asteraceae	annual herb	Mar-Apr	•Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/clay, often acidic	15 - 150 meters	List 1B.1
Sagittaria sanfordii	Alismataceae	perennial rhizomatous herb emergent	May-Oct	•Marshes and swamps (MshSw)(assorted shallow freshwater)	0 - 650 meters	List 1B.2
Tuctoria greenei	Poaceae	annual herb	May-Jul(Sep), Months in parentheses are uncommon.	•Vernal pools (VnPls)	30 - 1070 meters	List 1B.1

Part F.9

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

[28 Sheets]



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 1

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USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 2

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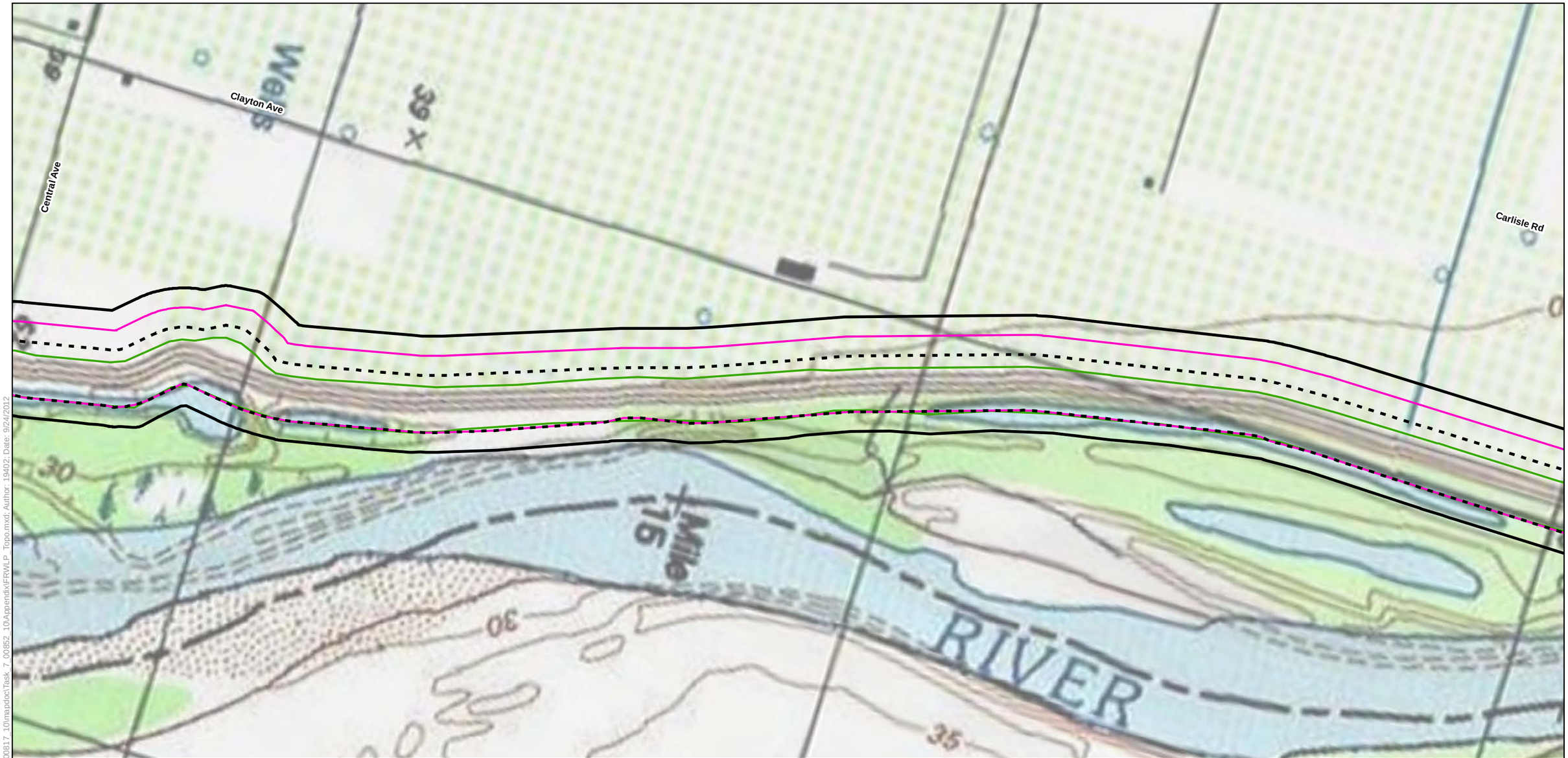

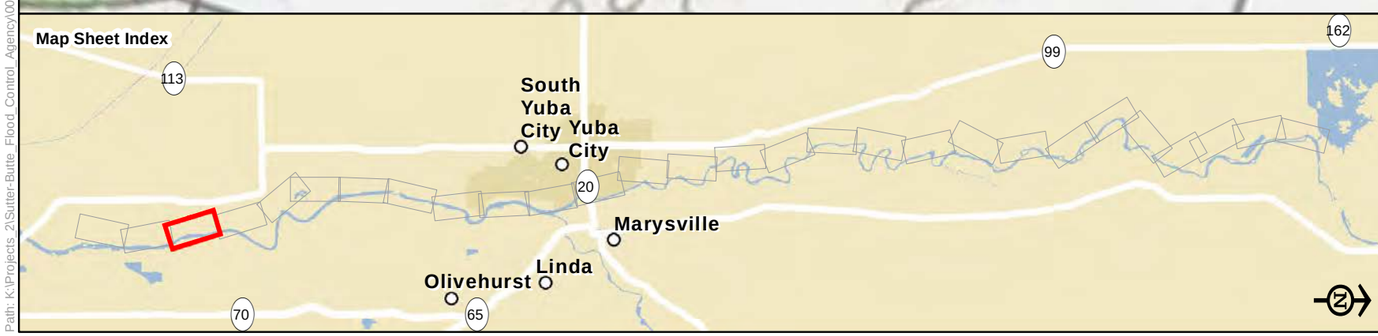

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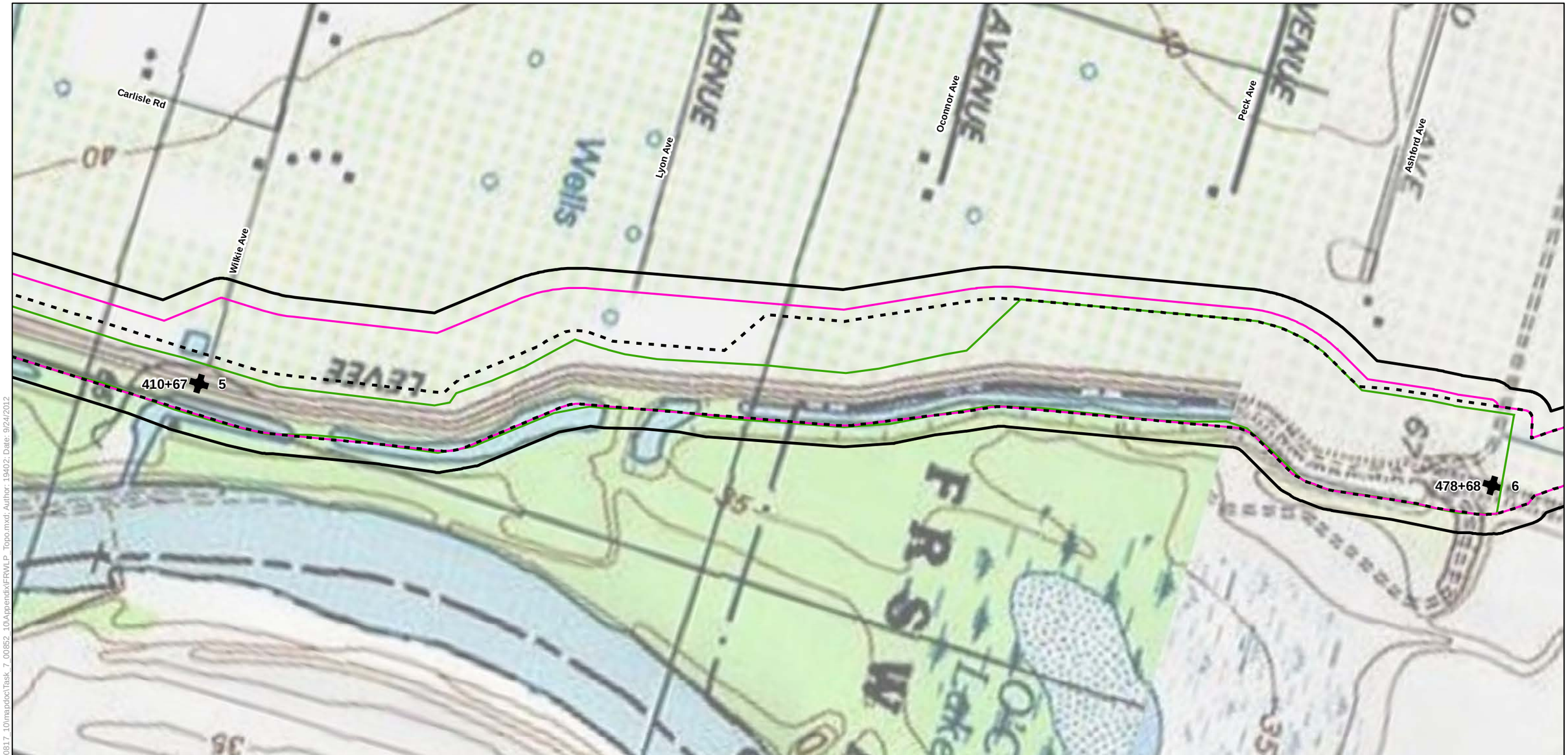

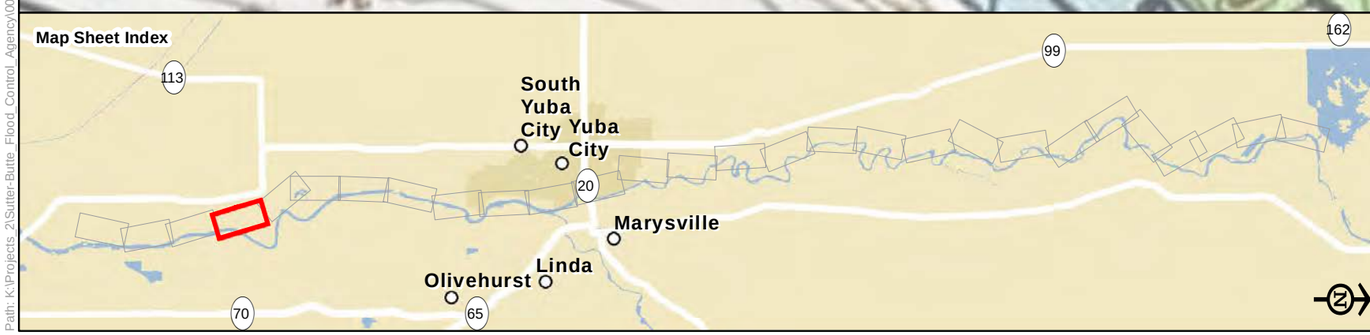

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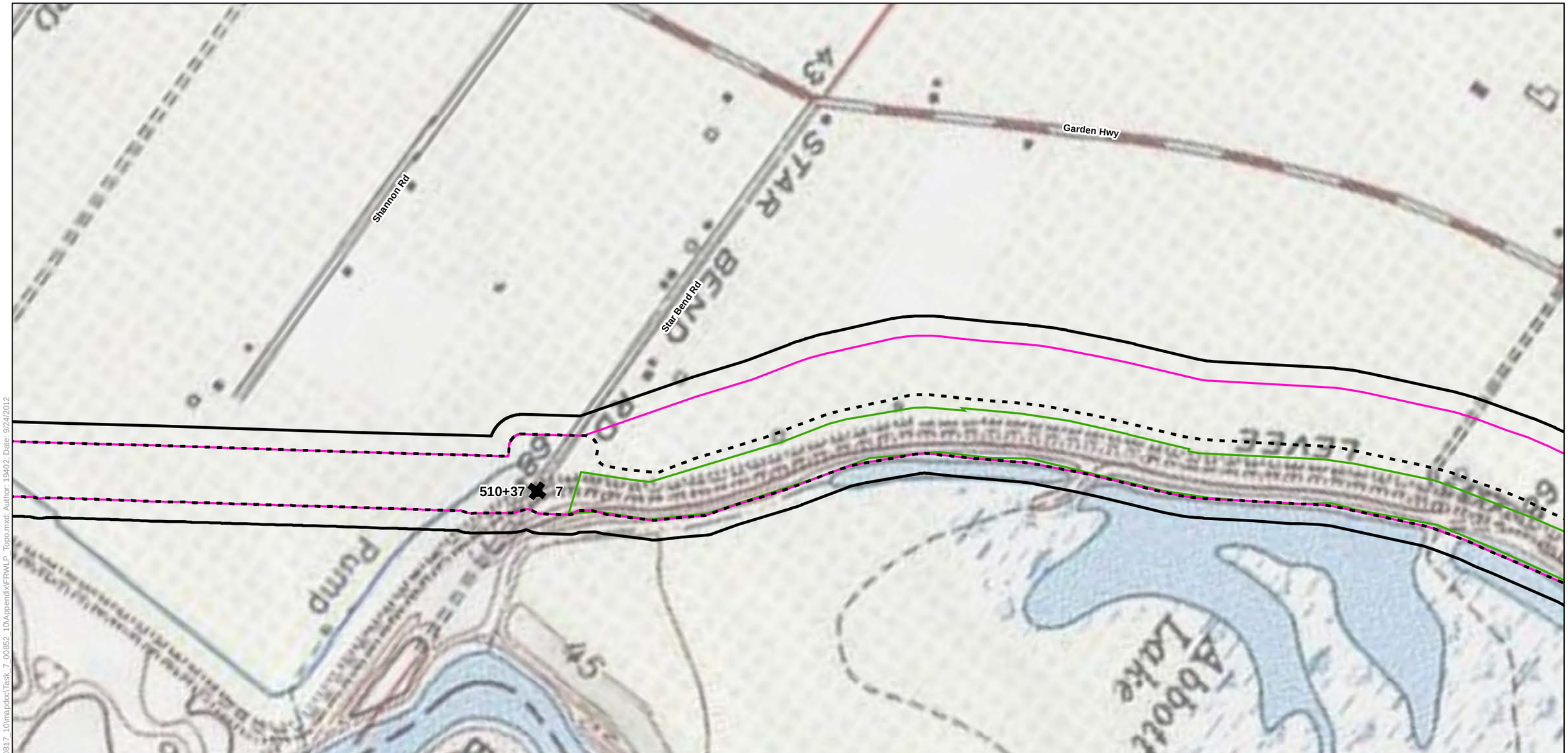

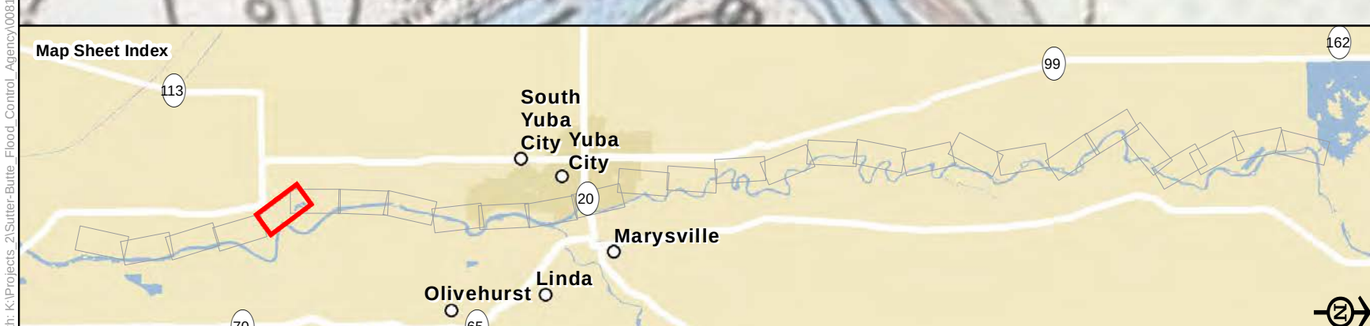

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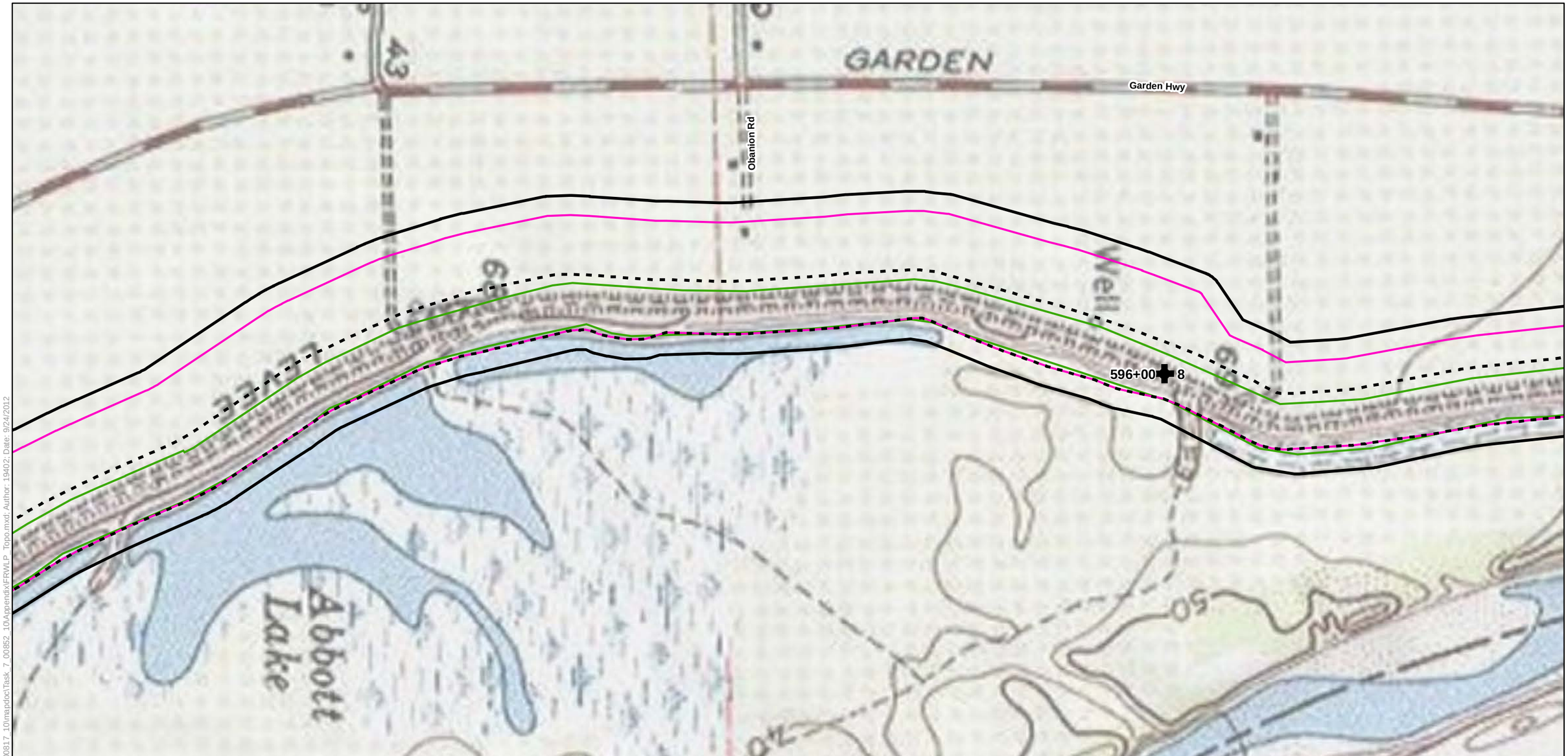

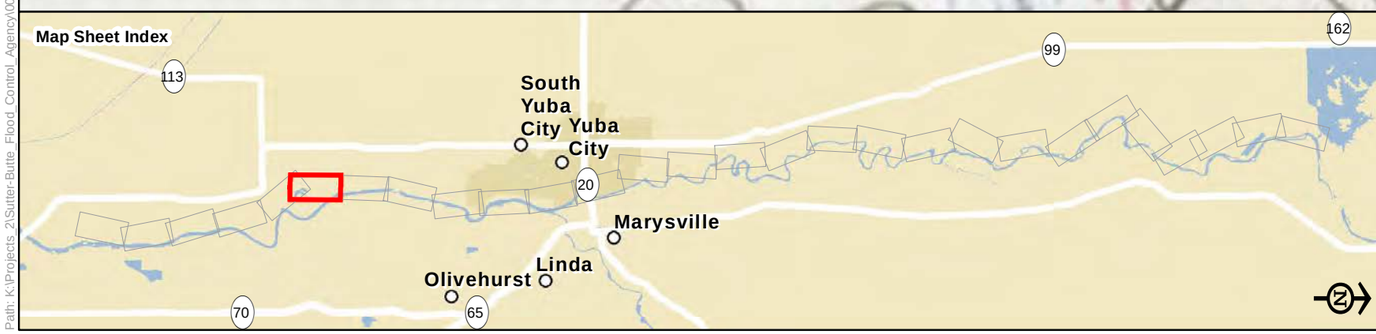

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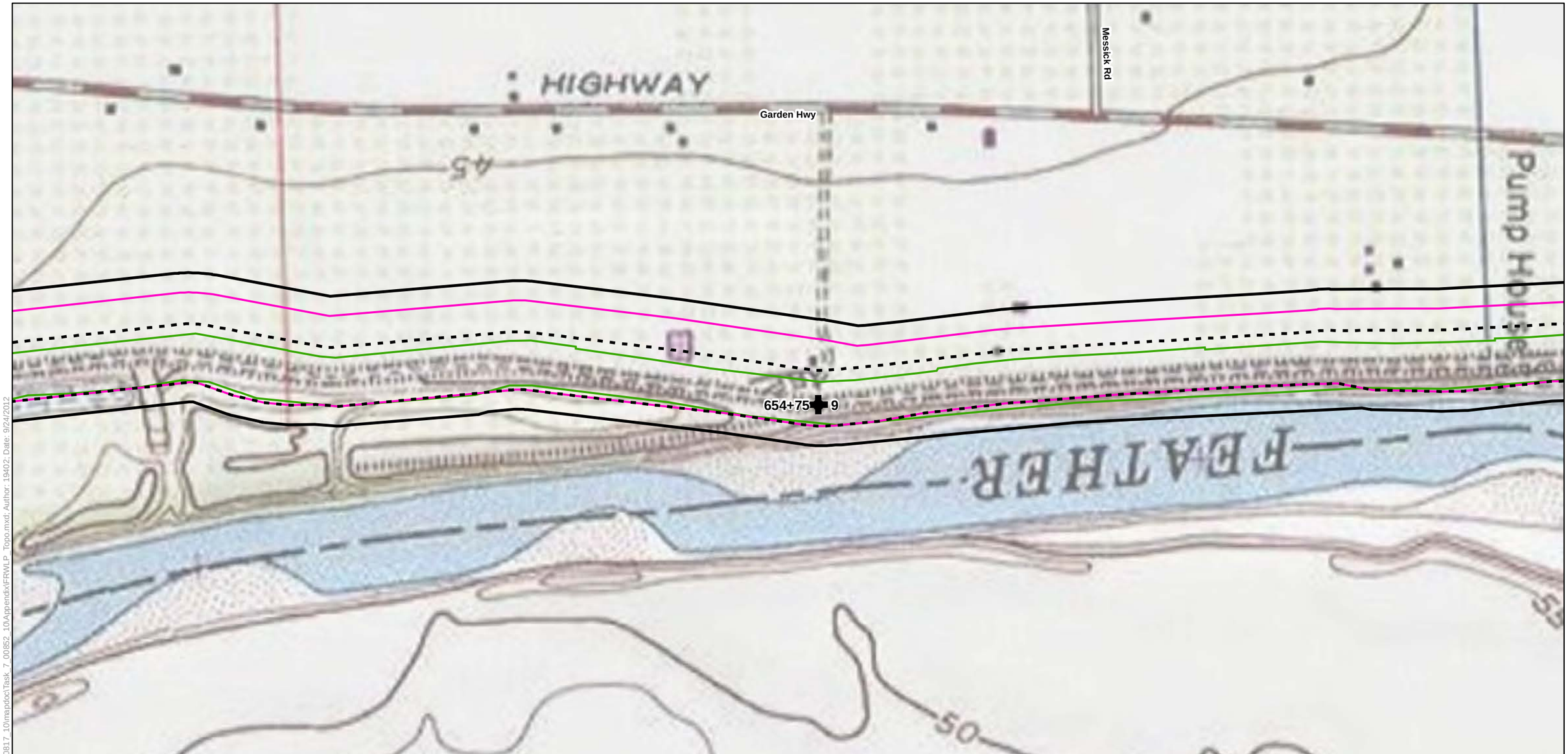

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Sheet 8

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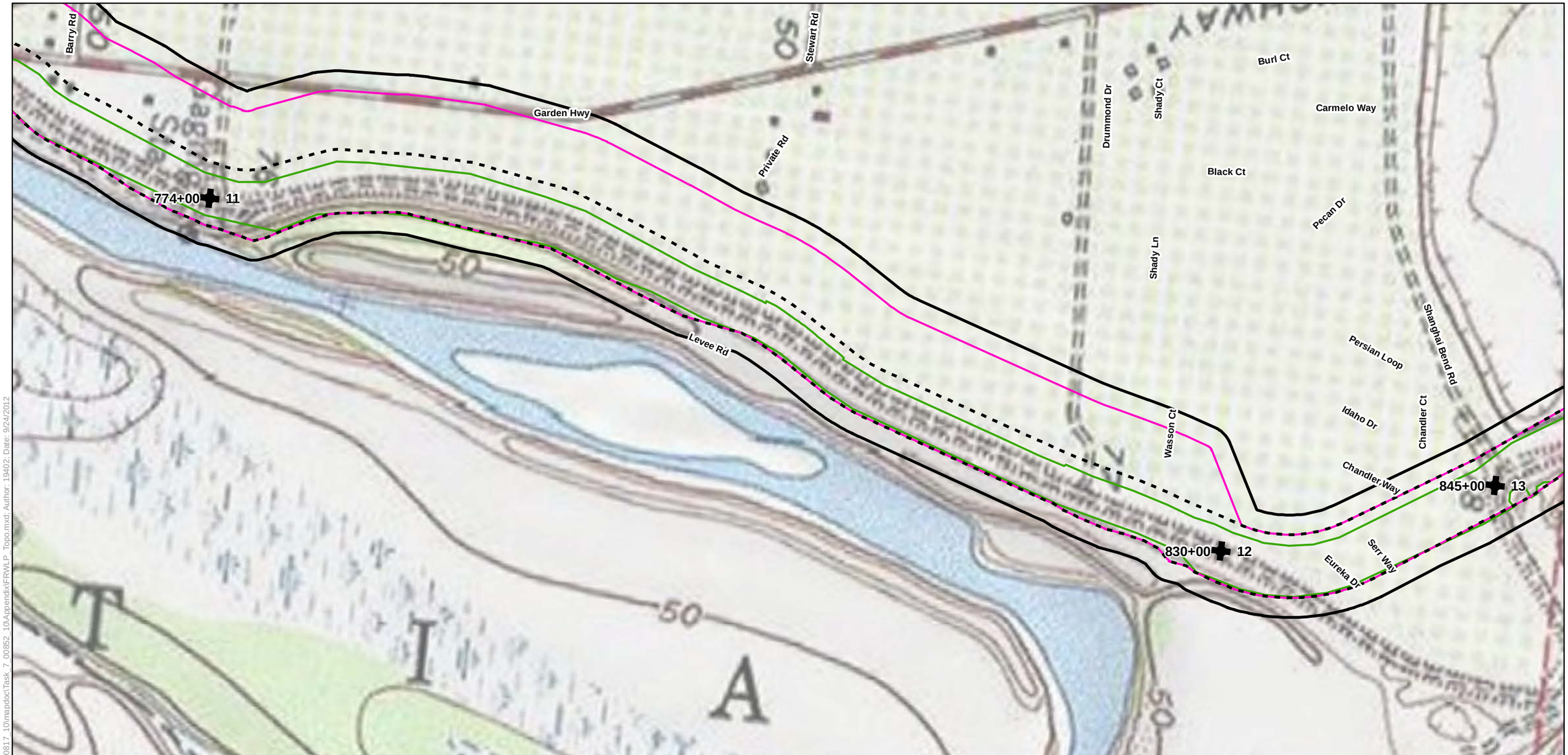

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USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 9

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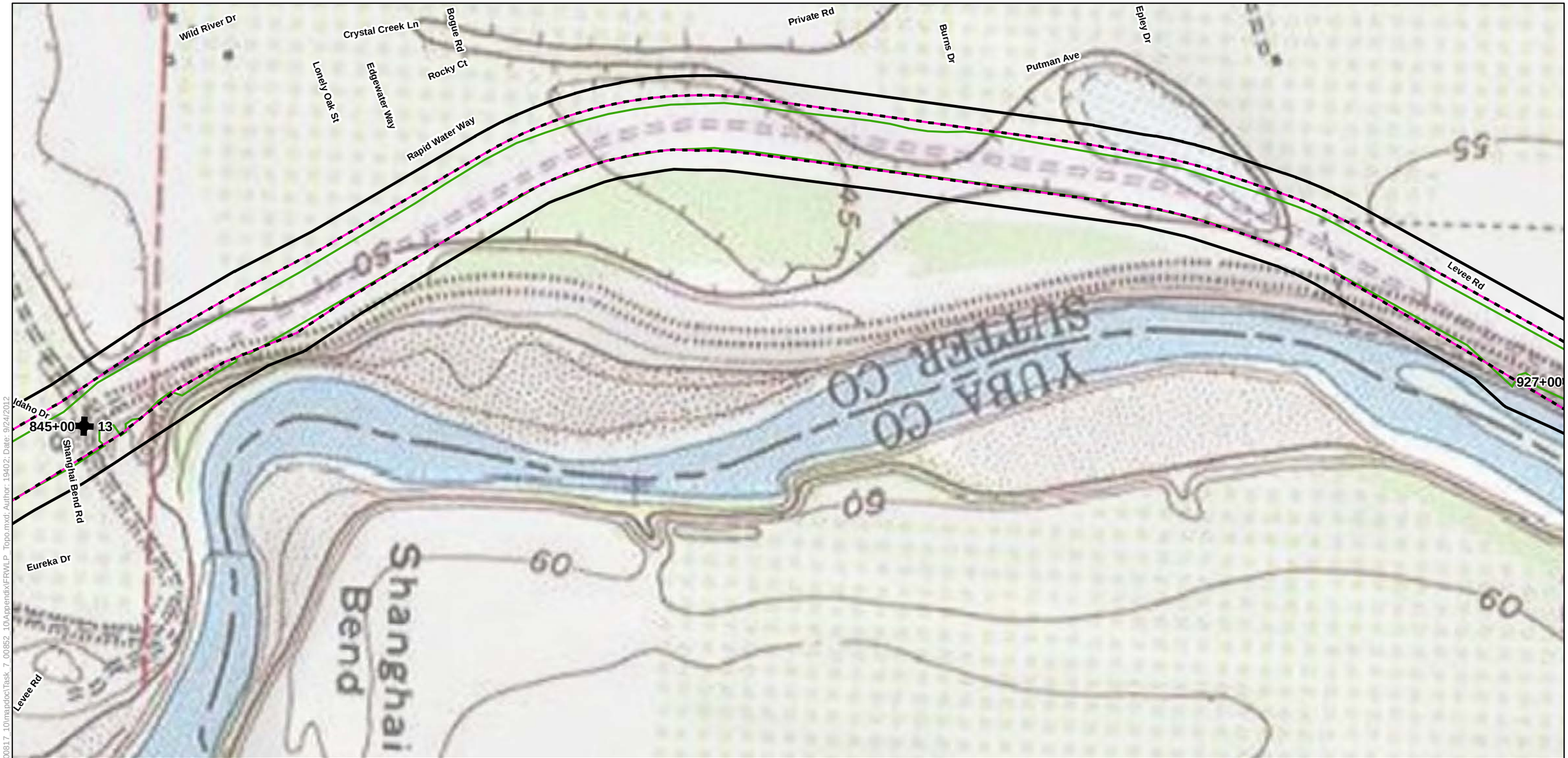

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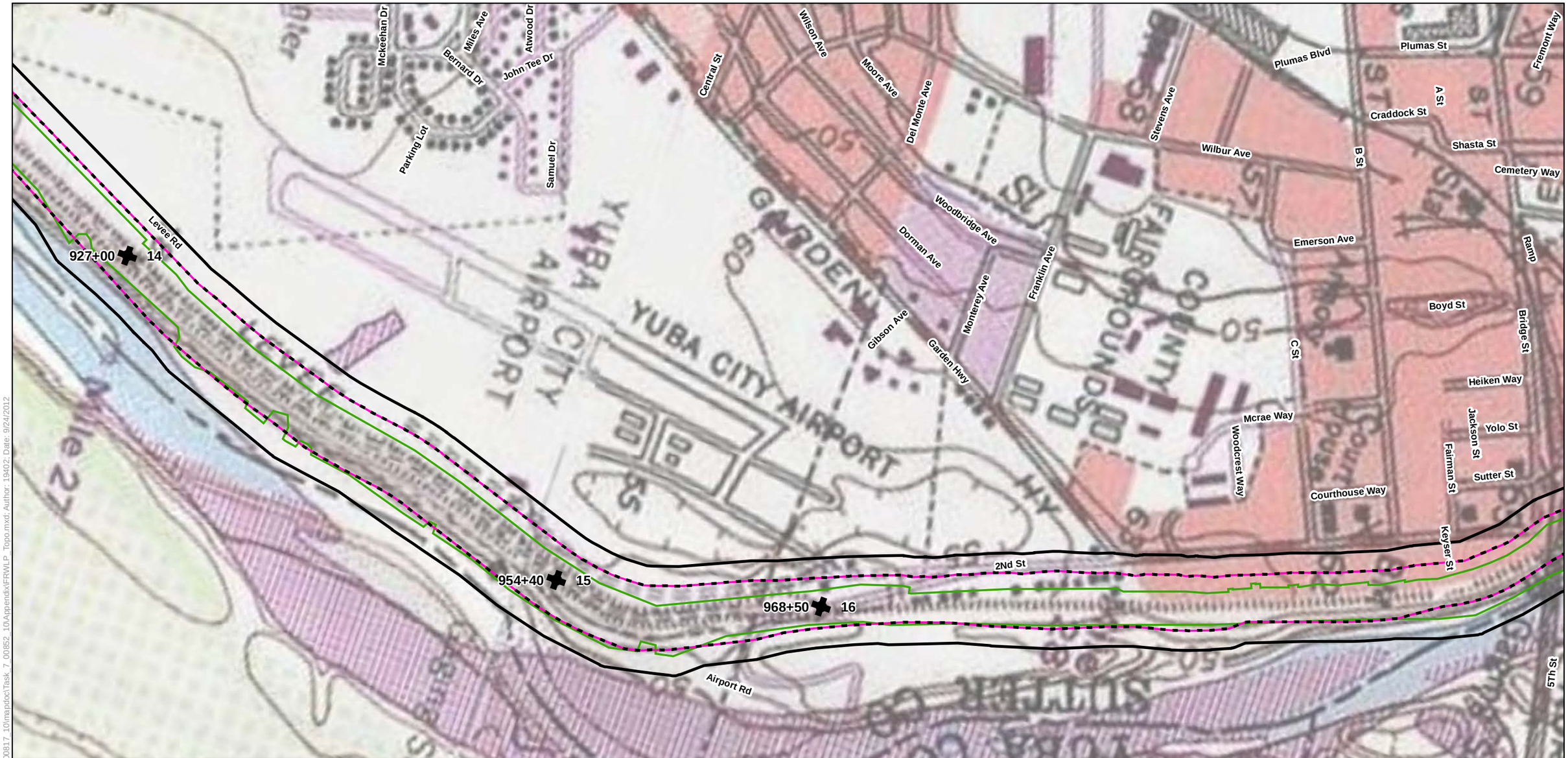
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 10

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012



Legend

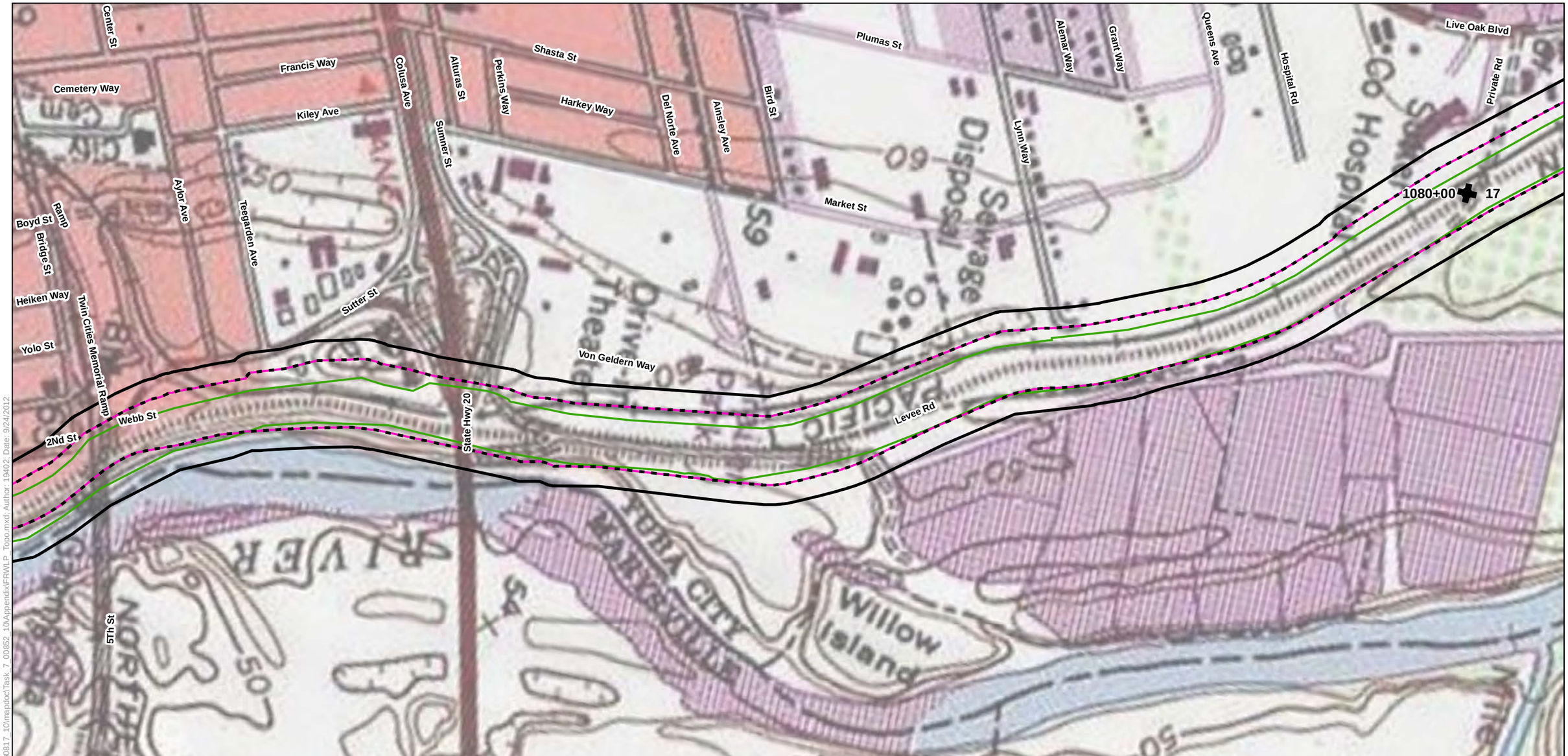
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

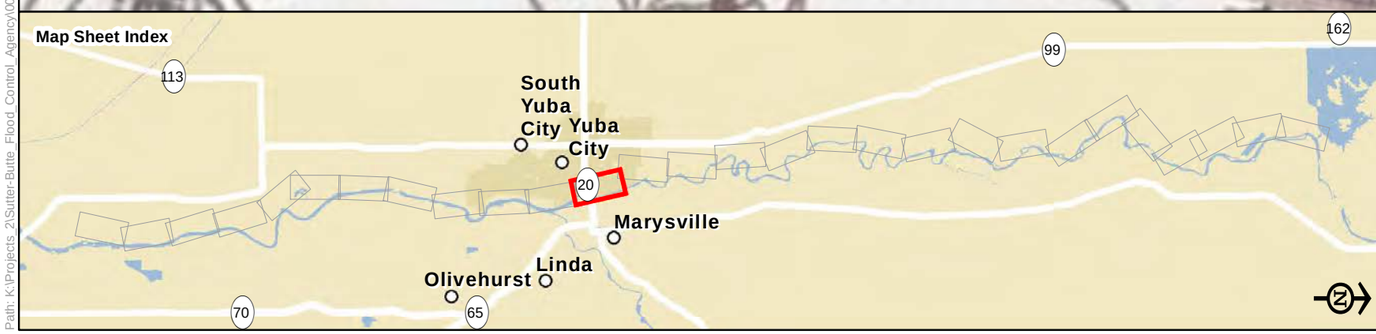
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 11

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\AppendixIFRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

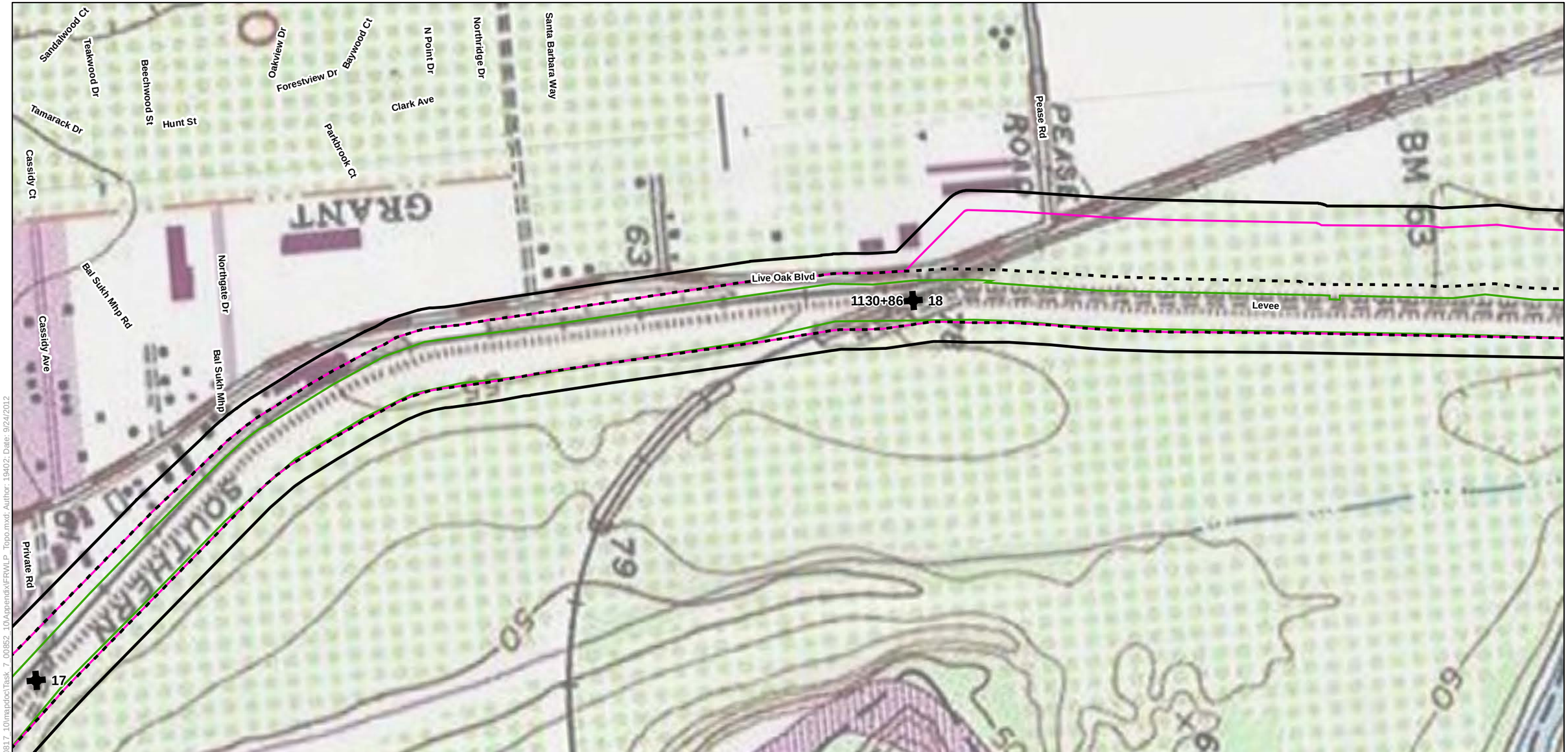
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 12

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012



Legend

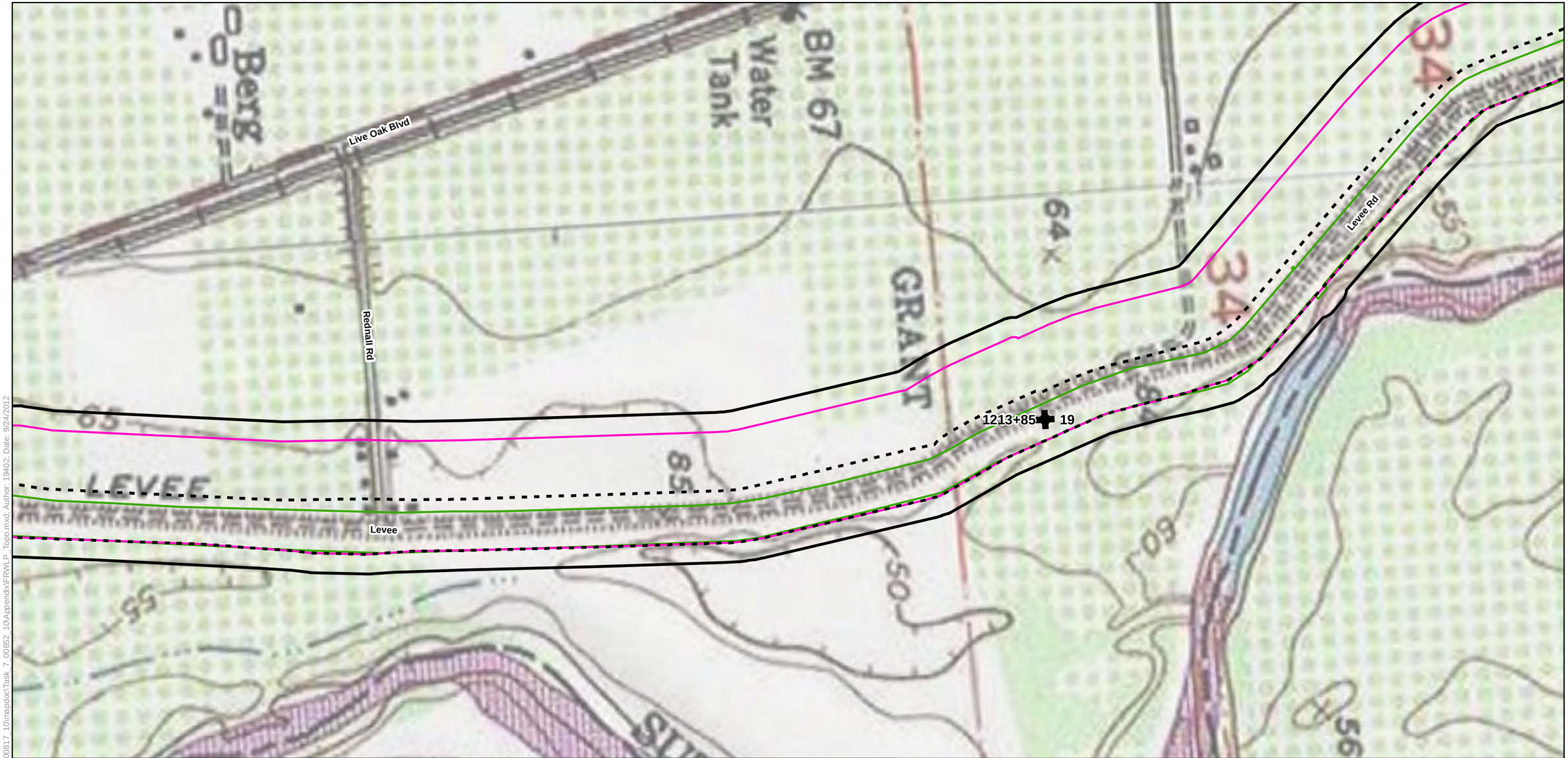
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

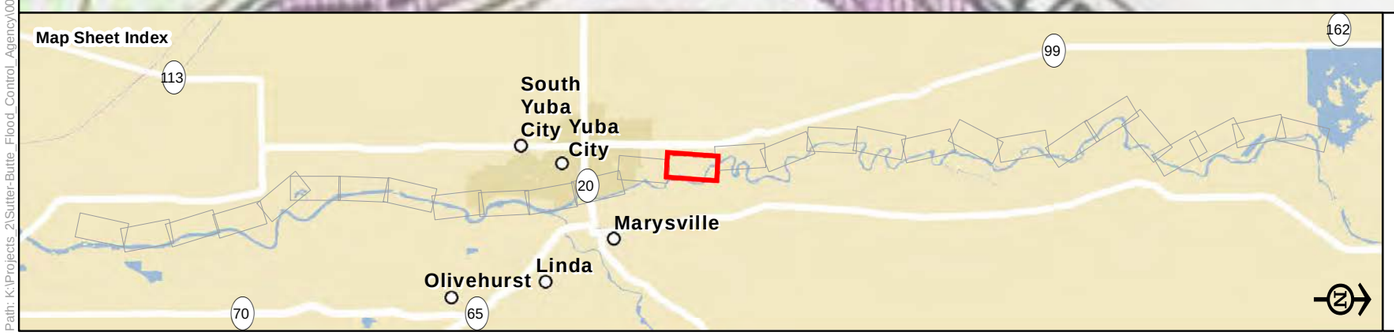
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 13

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FR\WLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

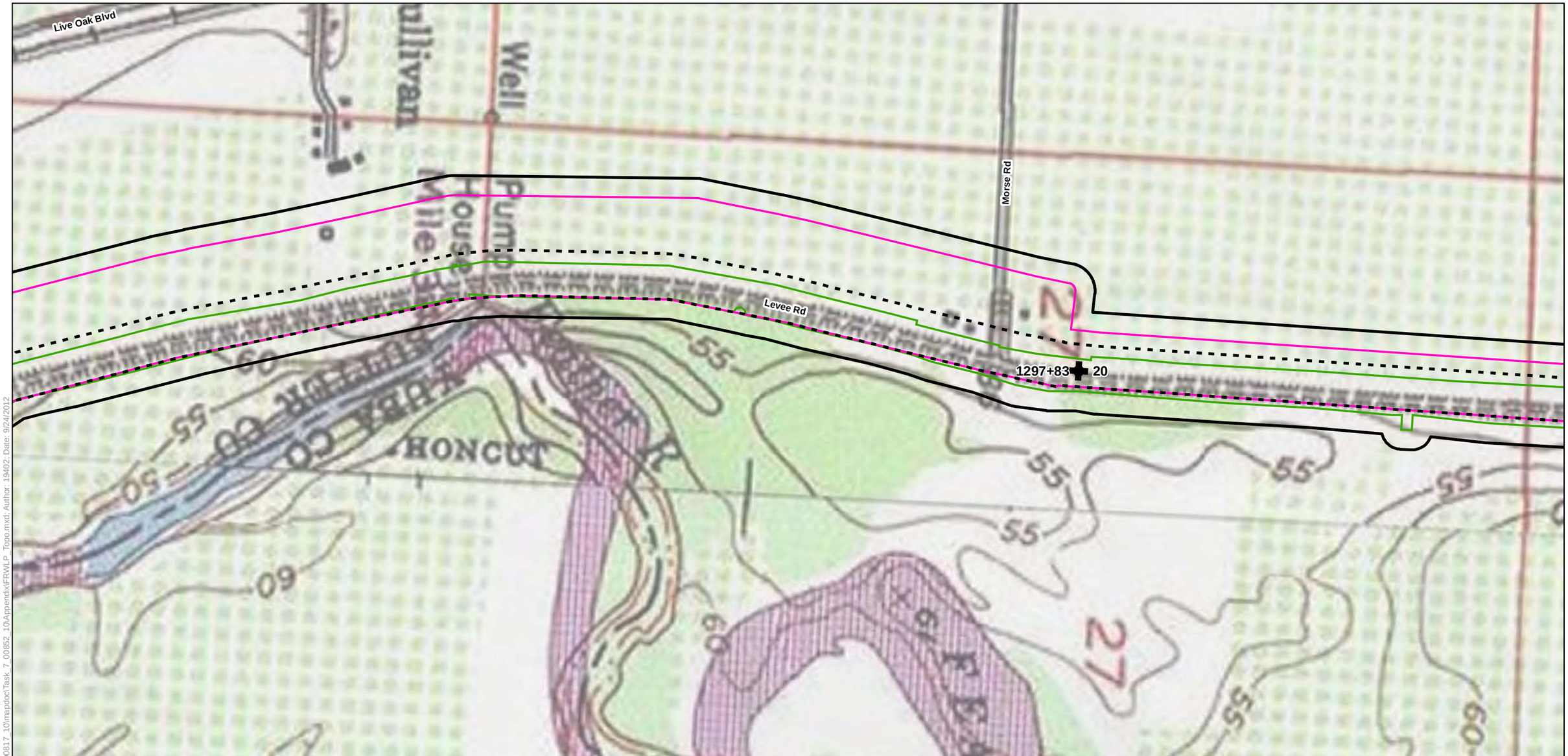
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

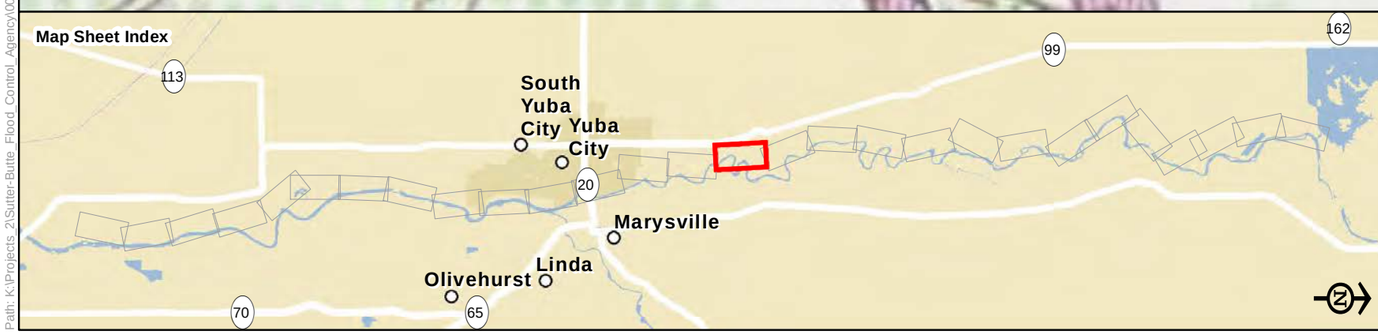
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 14

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 15

0 250 500
Feet

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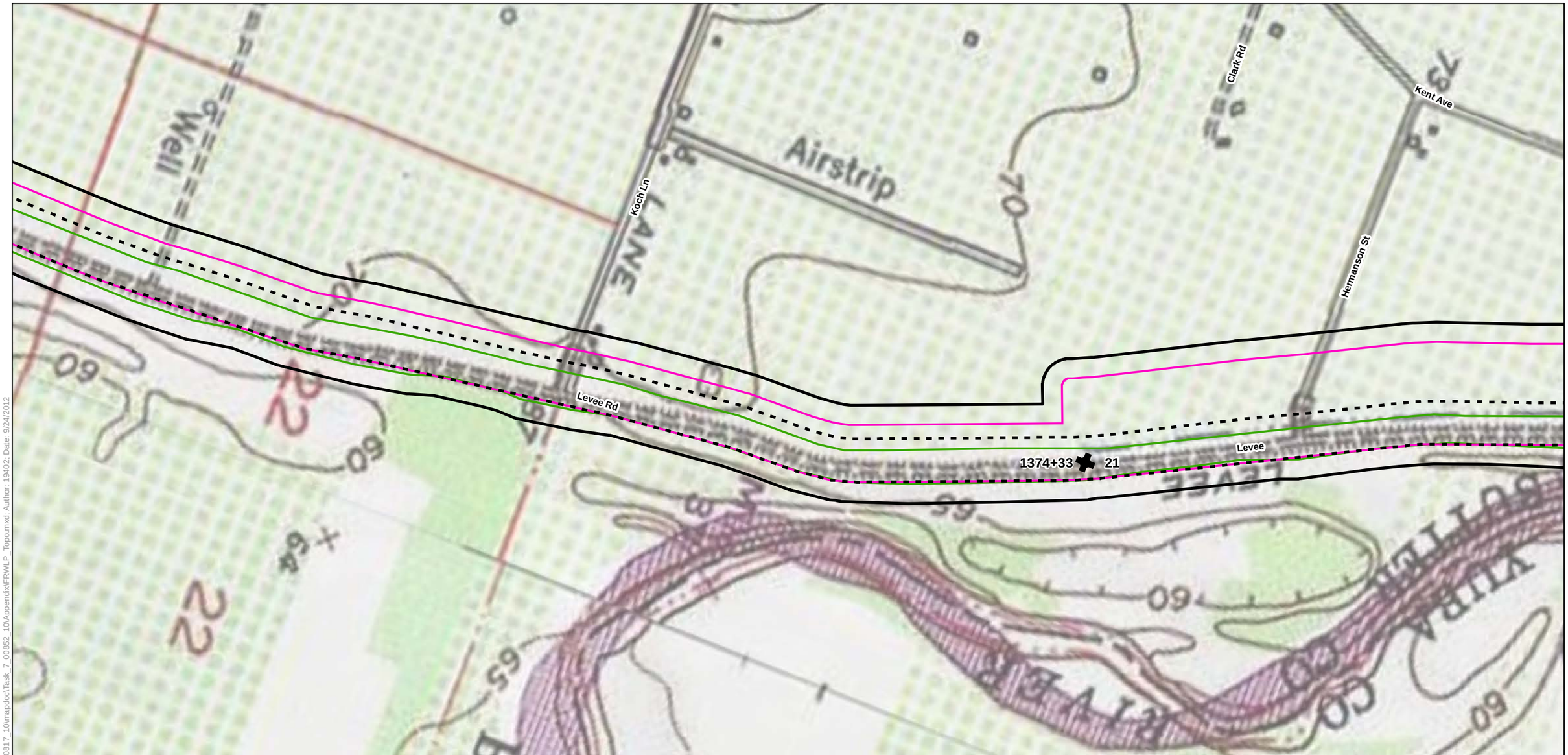
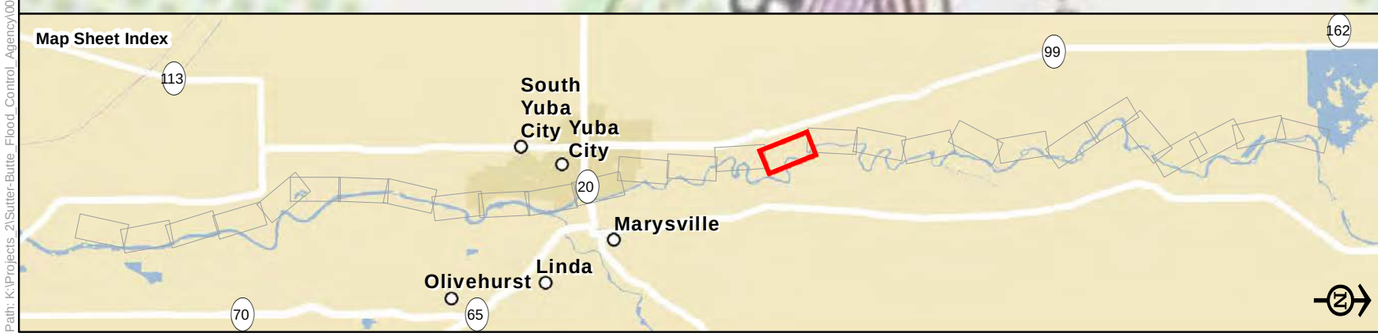




Legend

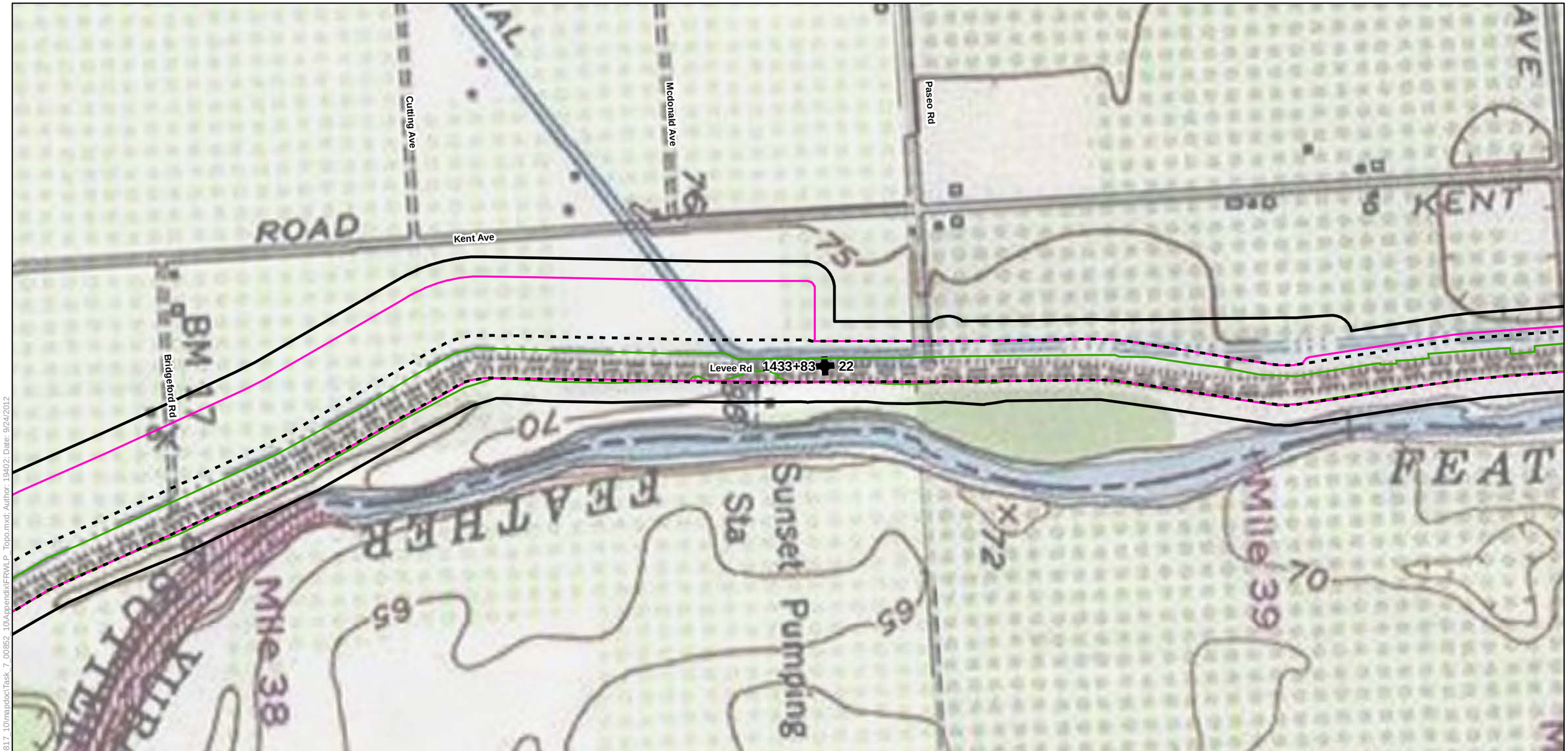
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

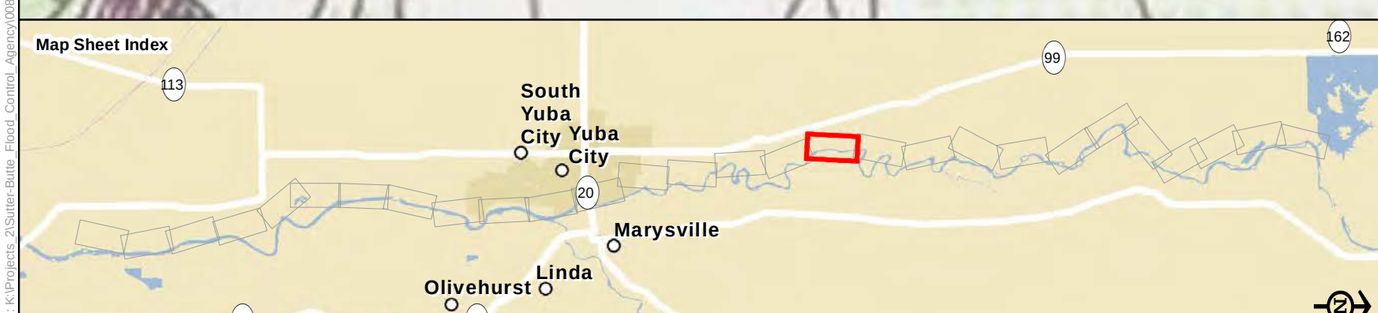
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 16

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

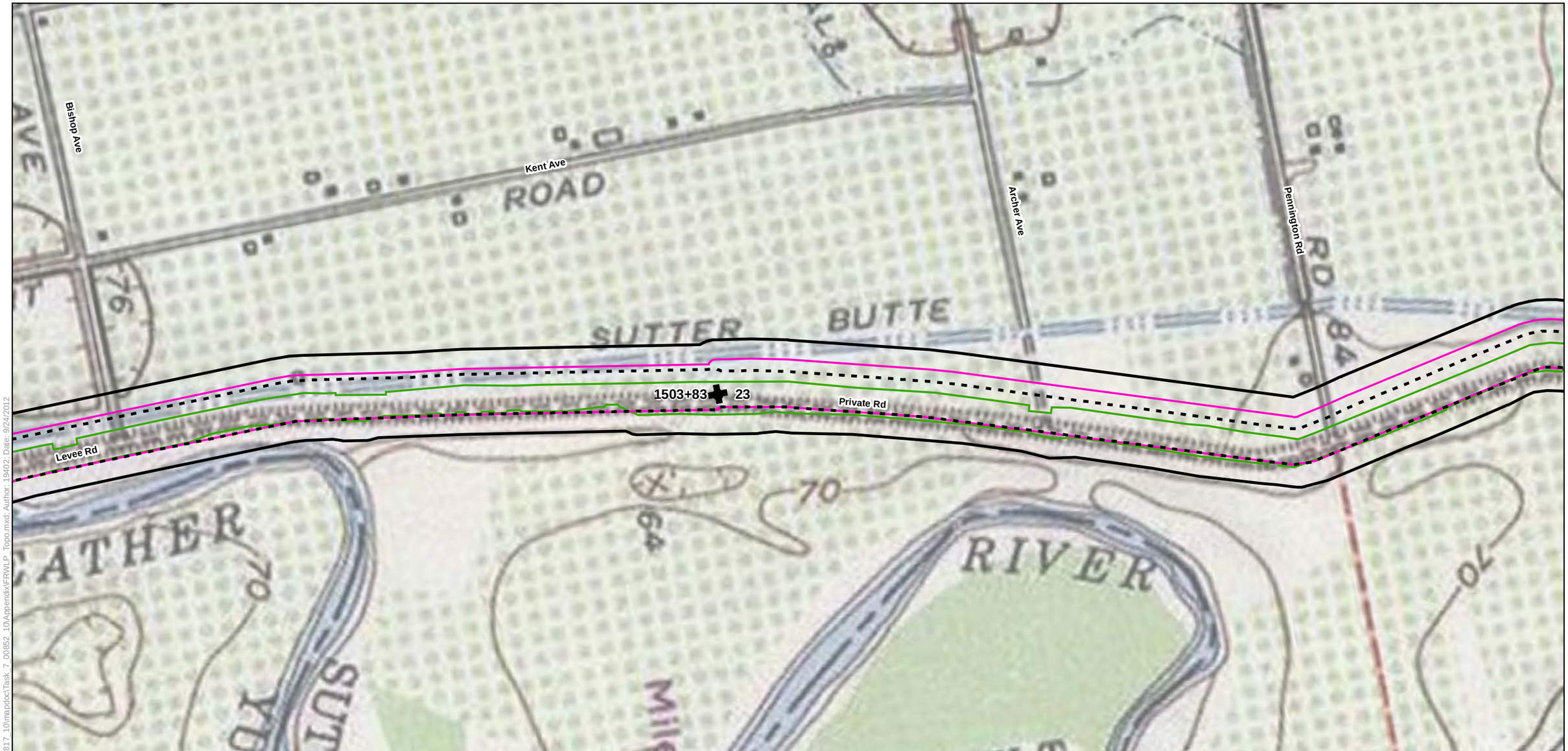
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 17

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012



Legend

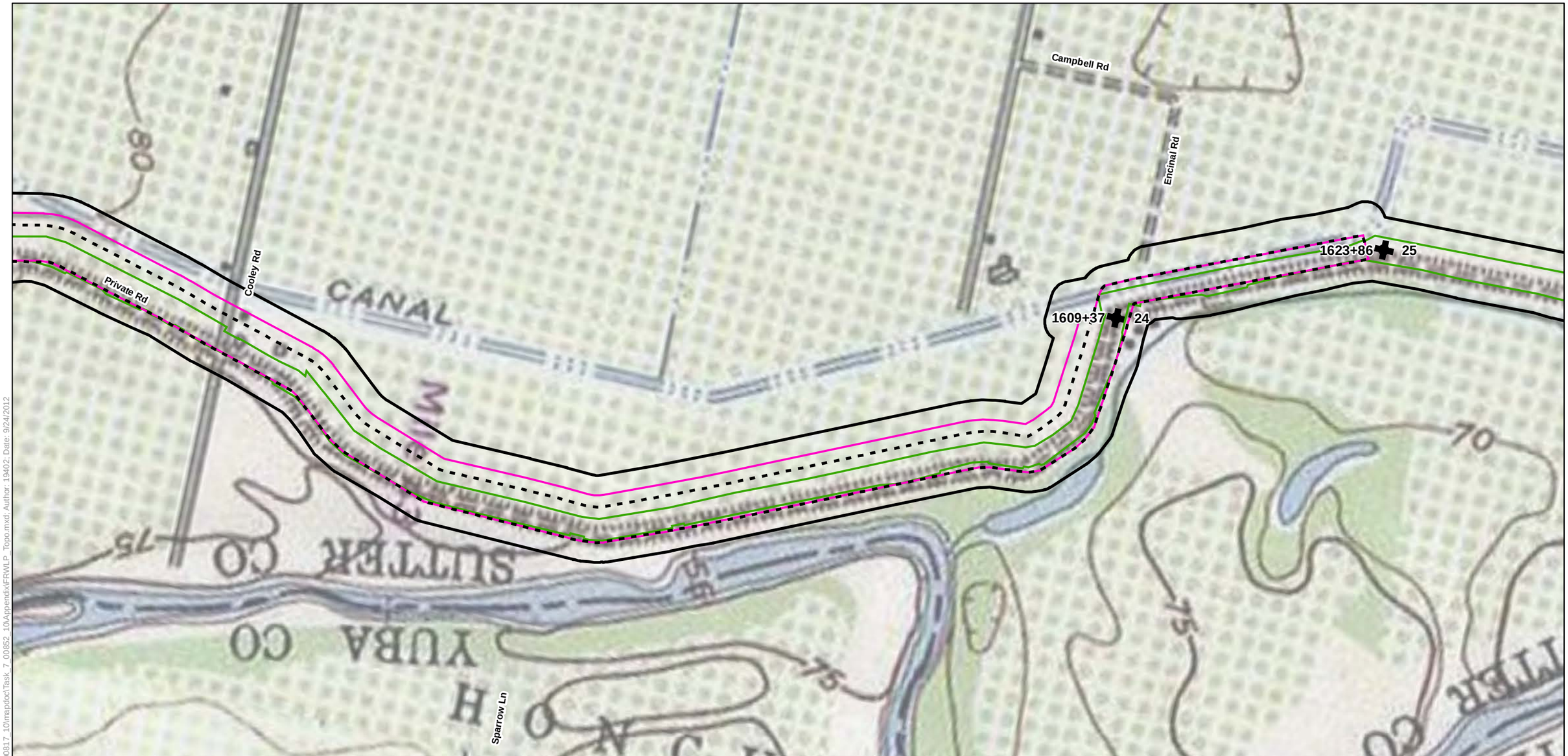
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

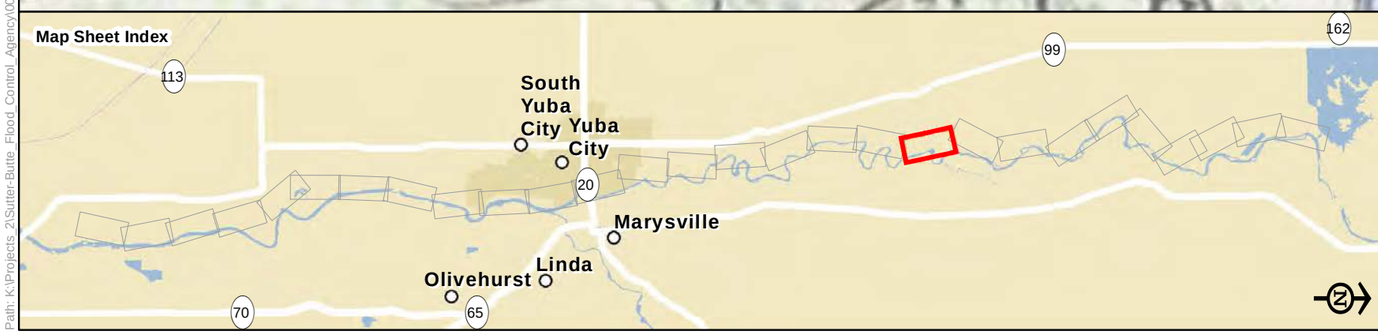
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 18

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 19

0 250 500
Feet

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Legend

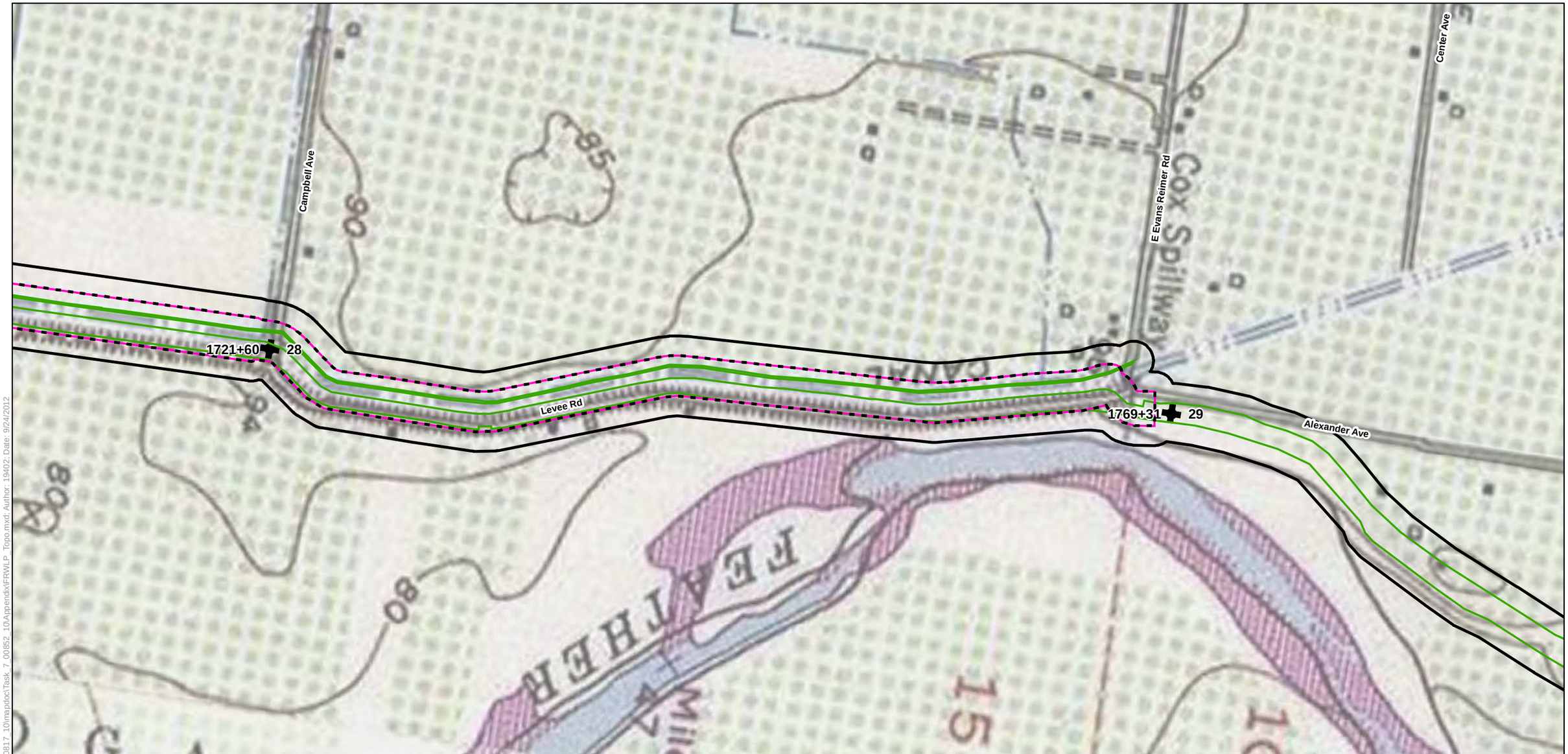
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 20

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012



Legend

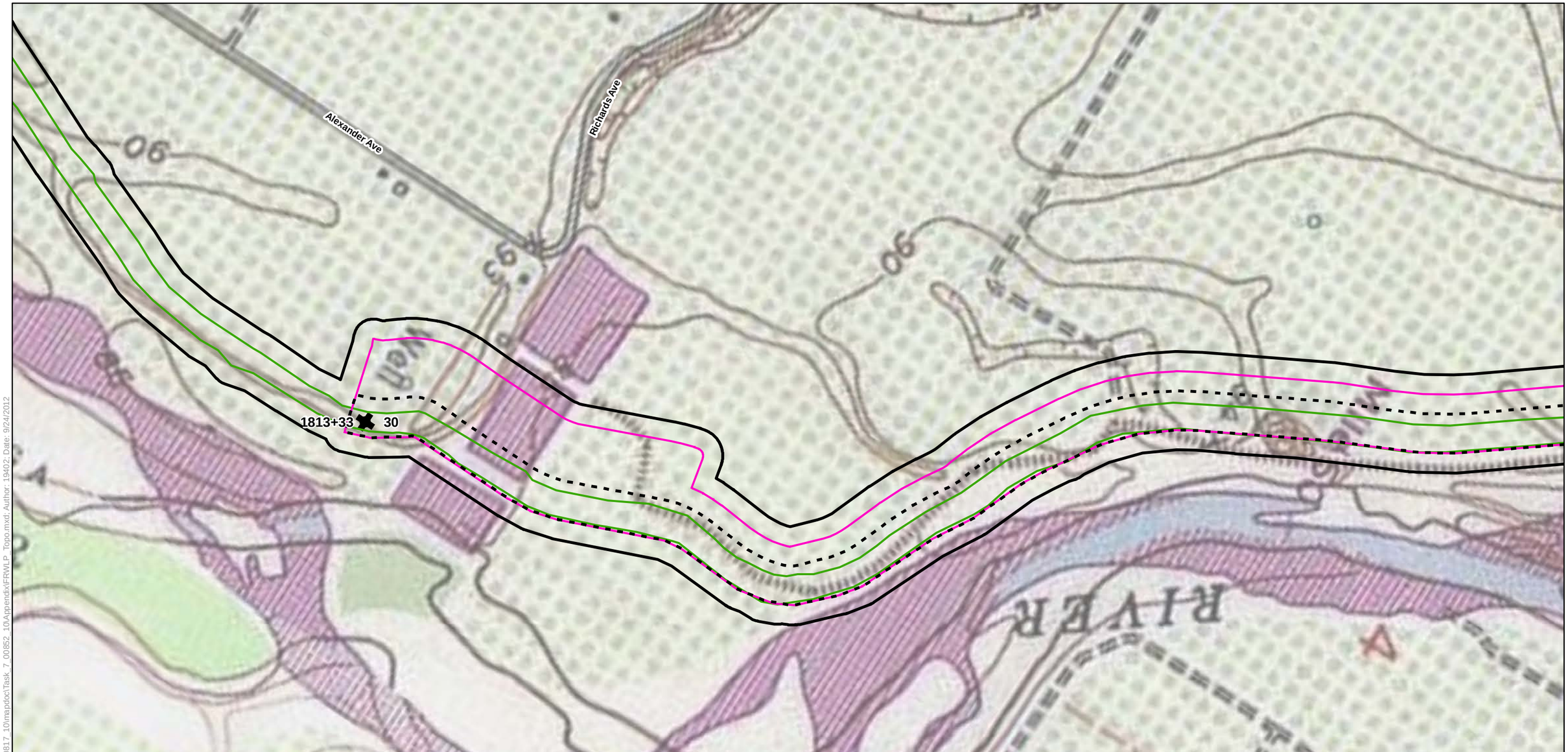
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

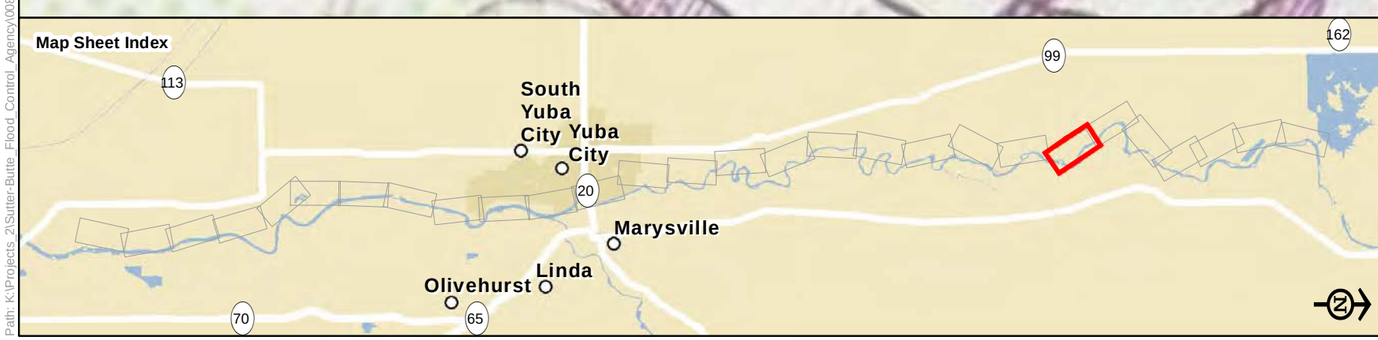
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 21

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 22

0 250 500
Feet

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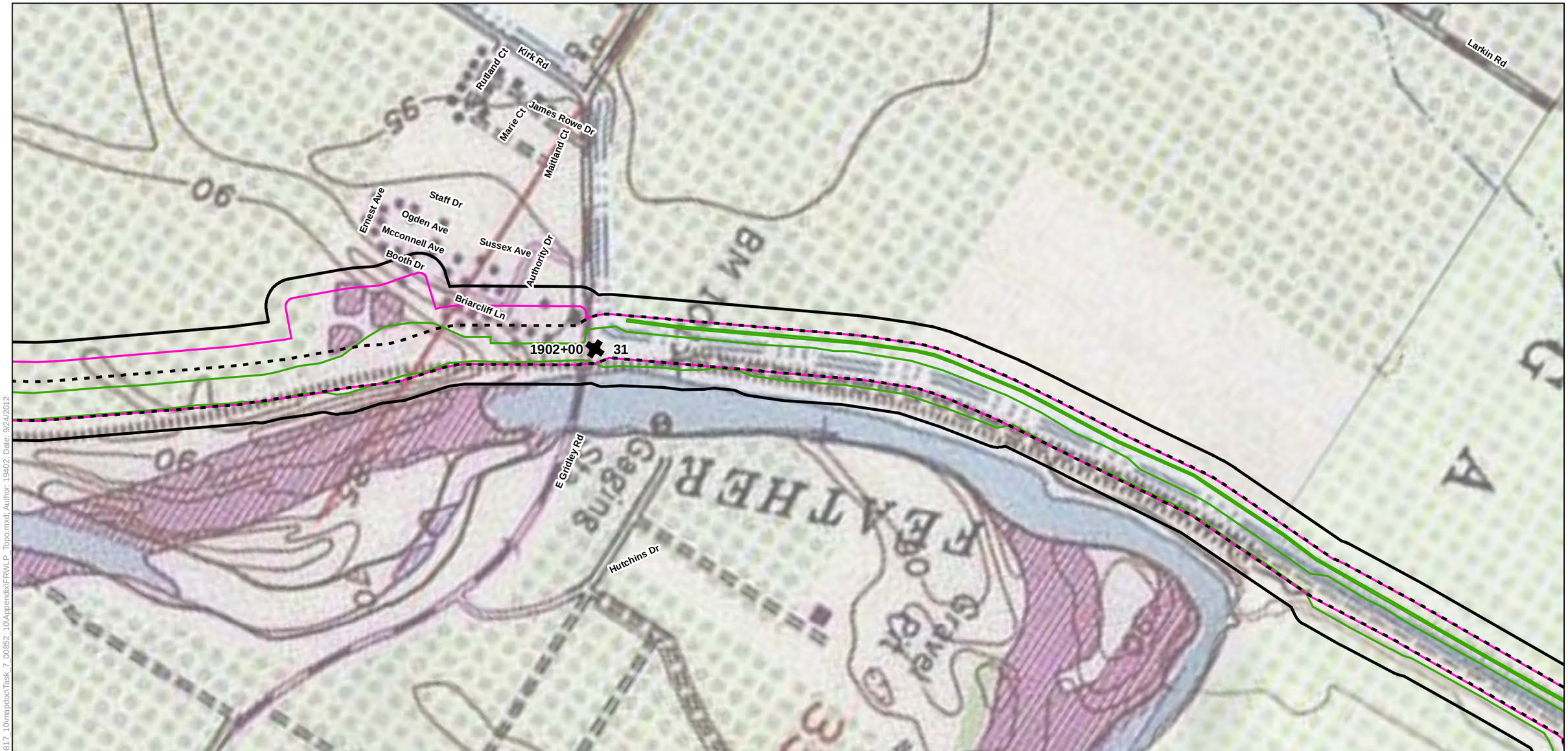


Legend

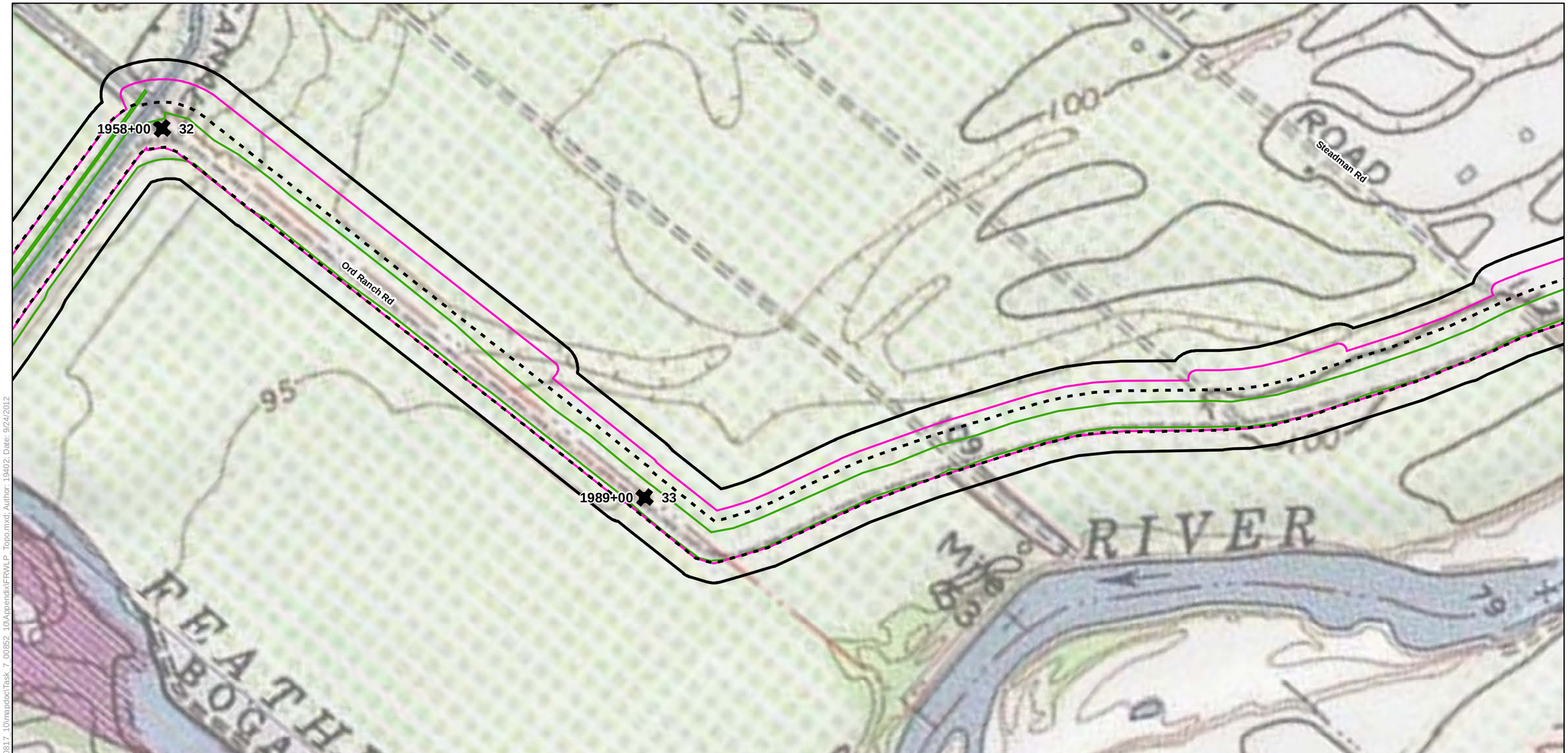
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 23

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 24

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012

Legend

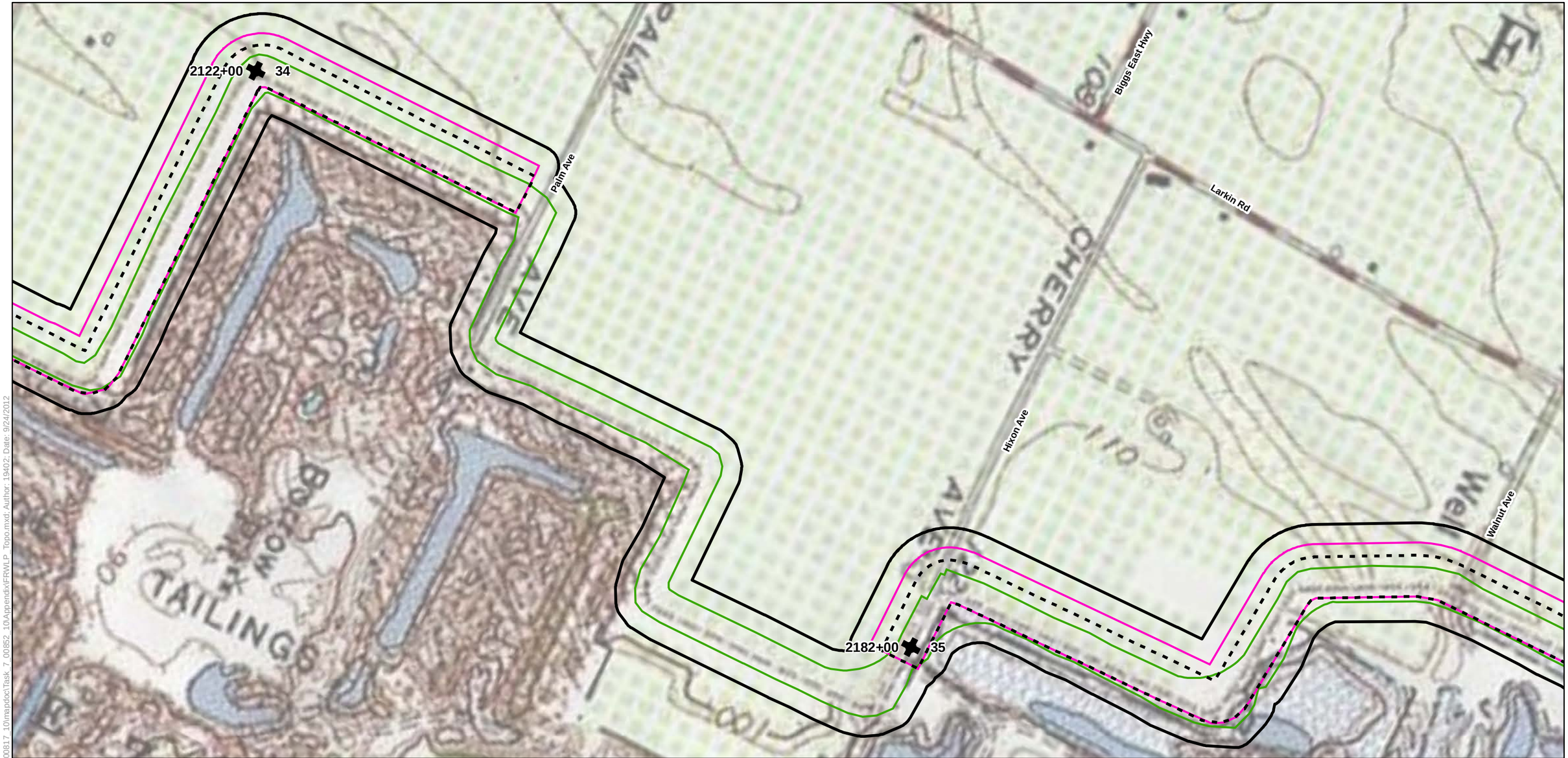
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

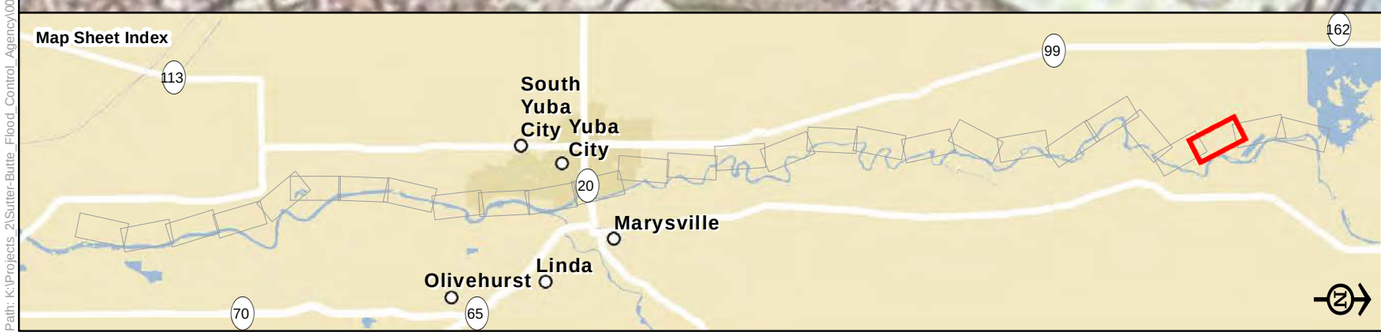
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 25

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

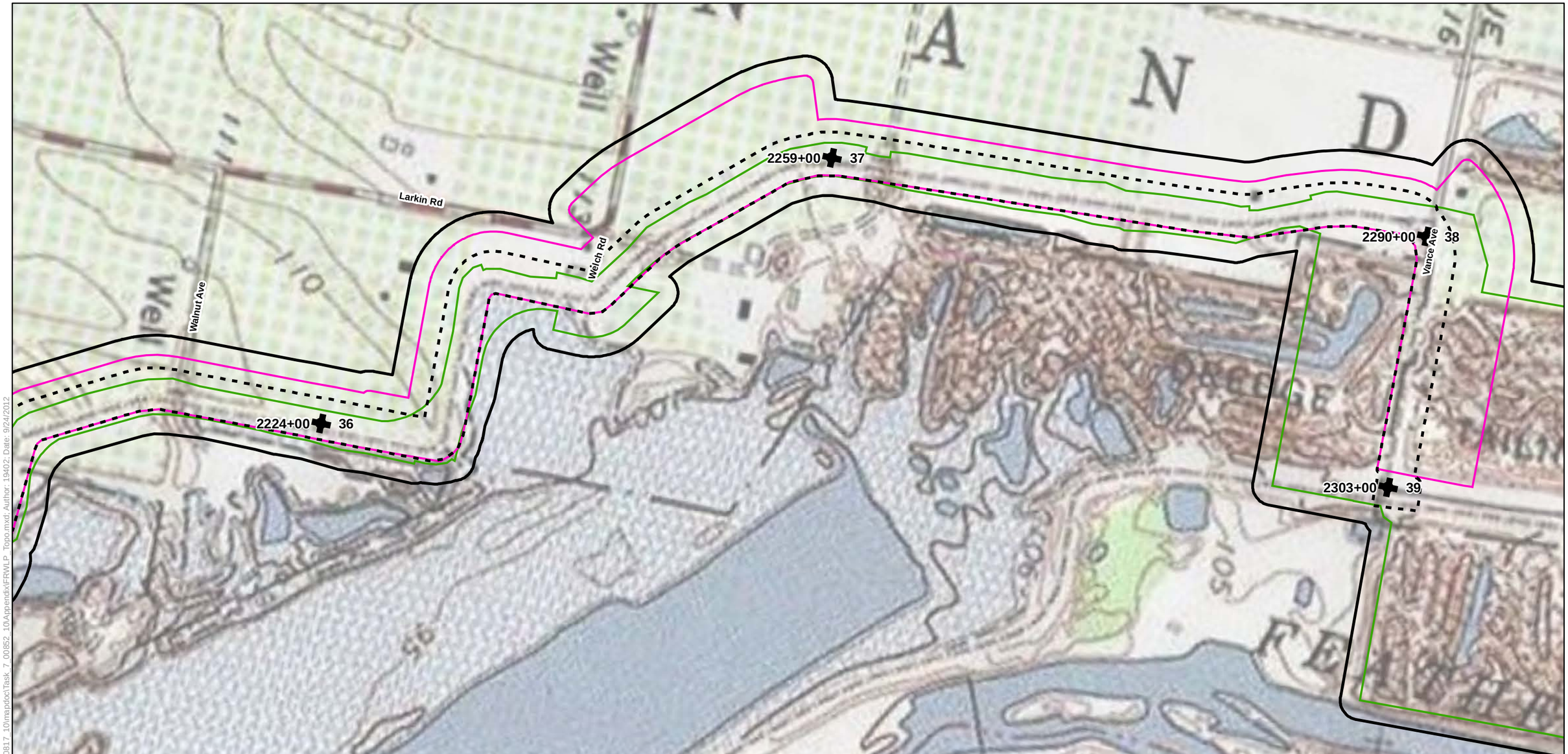
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

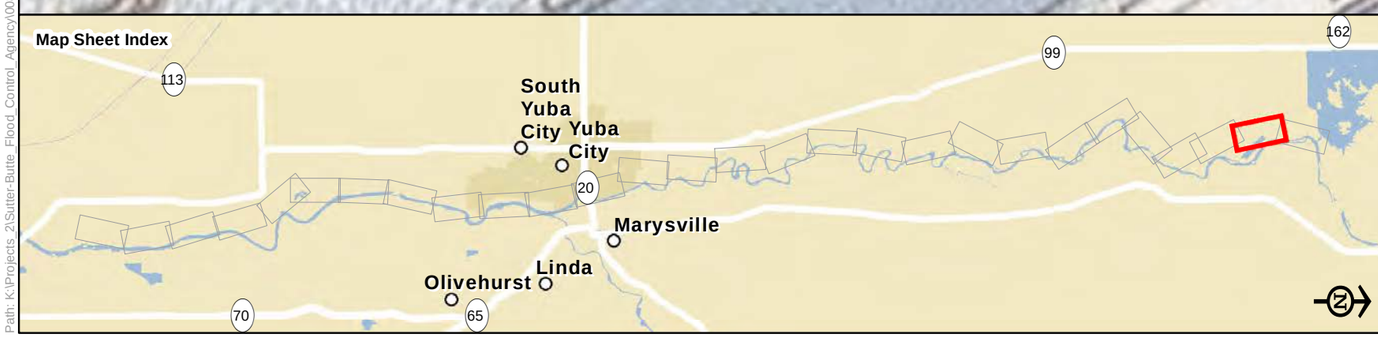
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 26

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

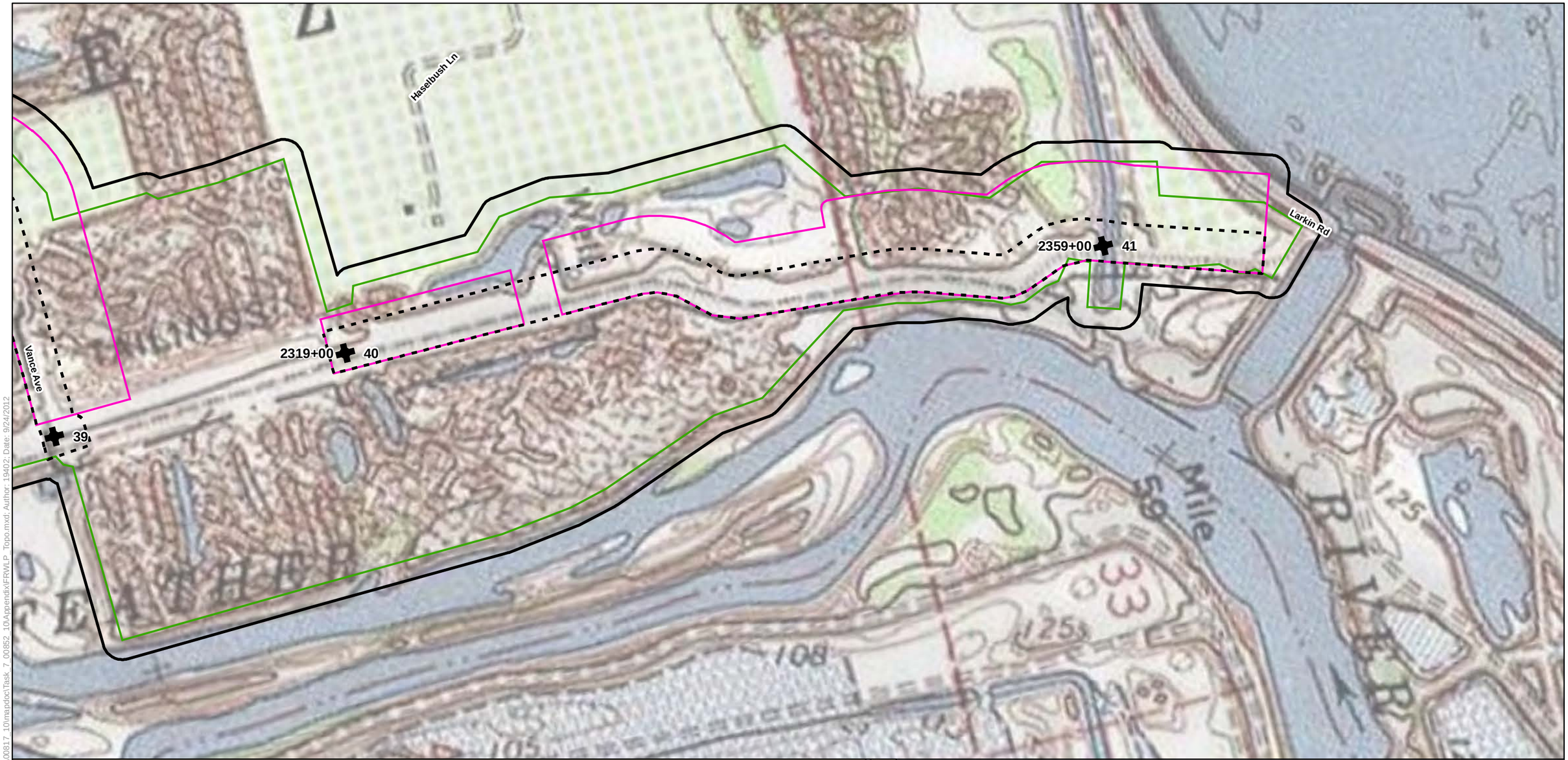
- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

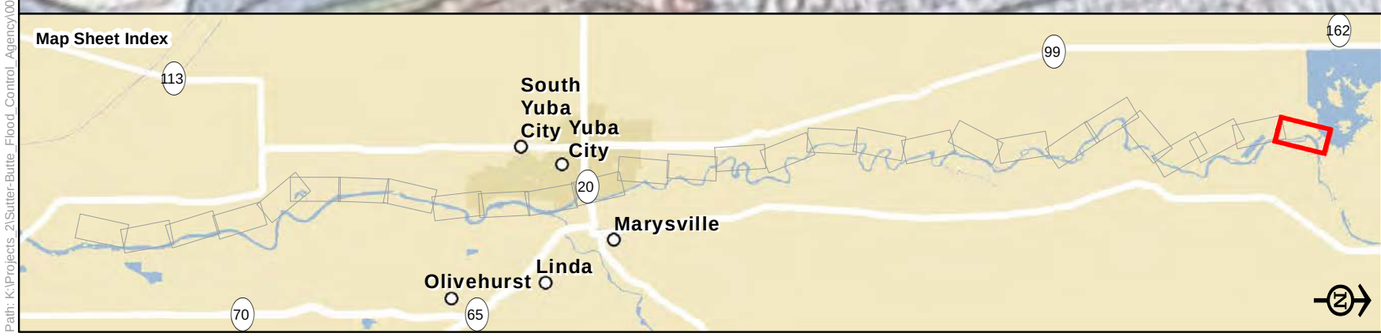
USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 27

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

USGS 7.5-minute Topographic Maps in the Vicinity of the Biological Study Area

Sheet 28

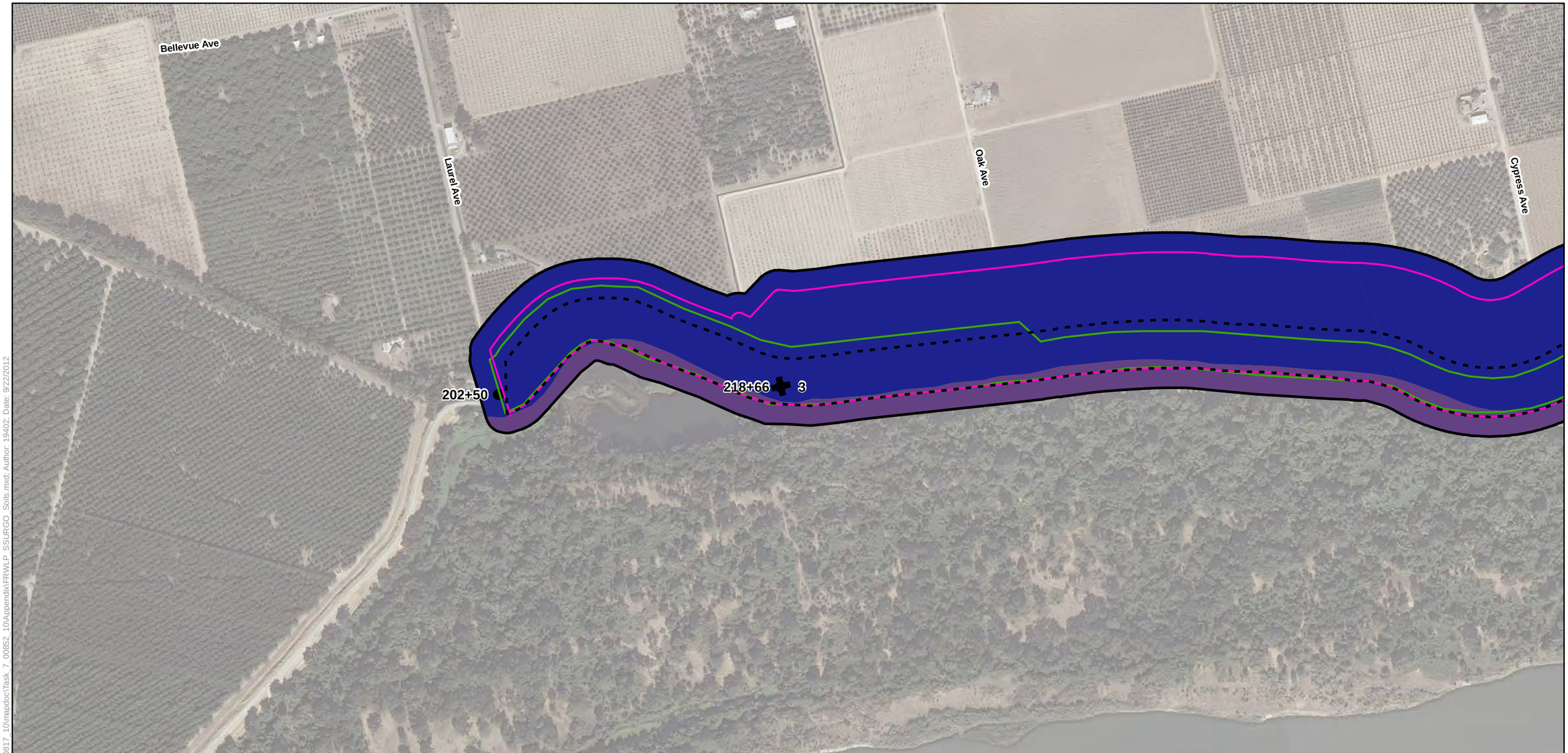
0 250 500
Feet

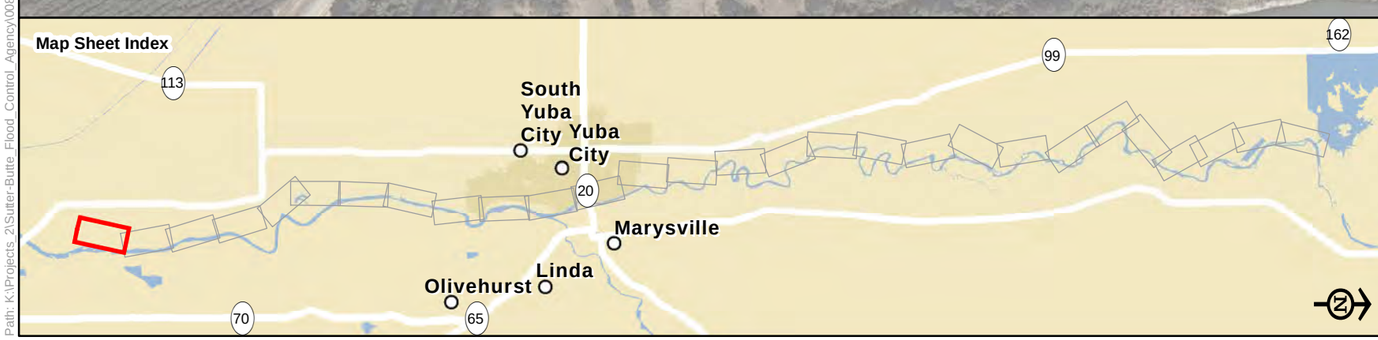
Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Topo.mxd; Author: 19402; Date: 9/24/2012

Part F.10

Soil Map Units in the Biological Study Area

[28 Sheets]





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

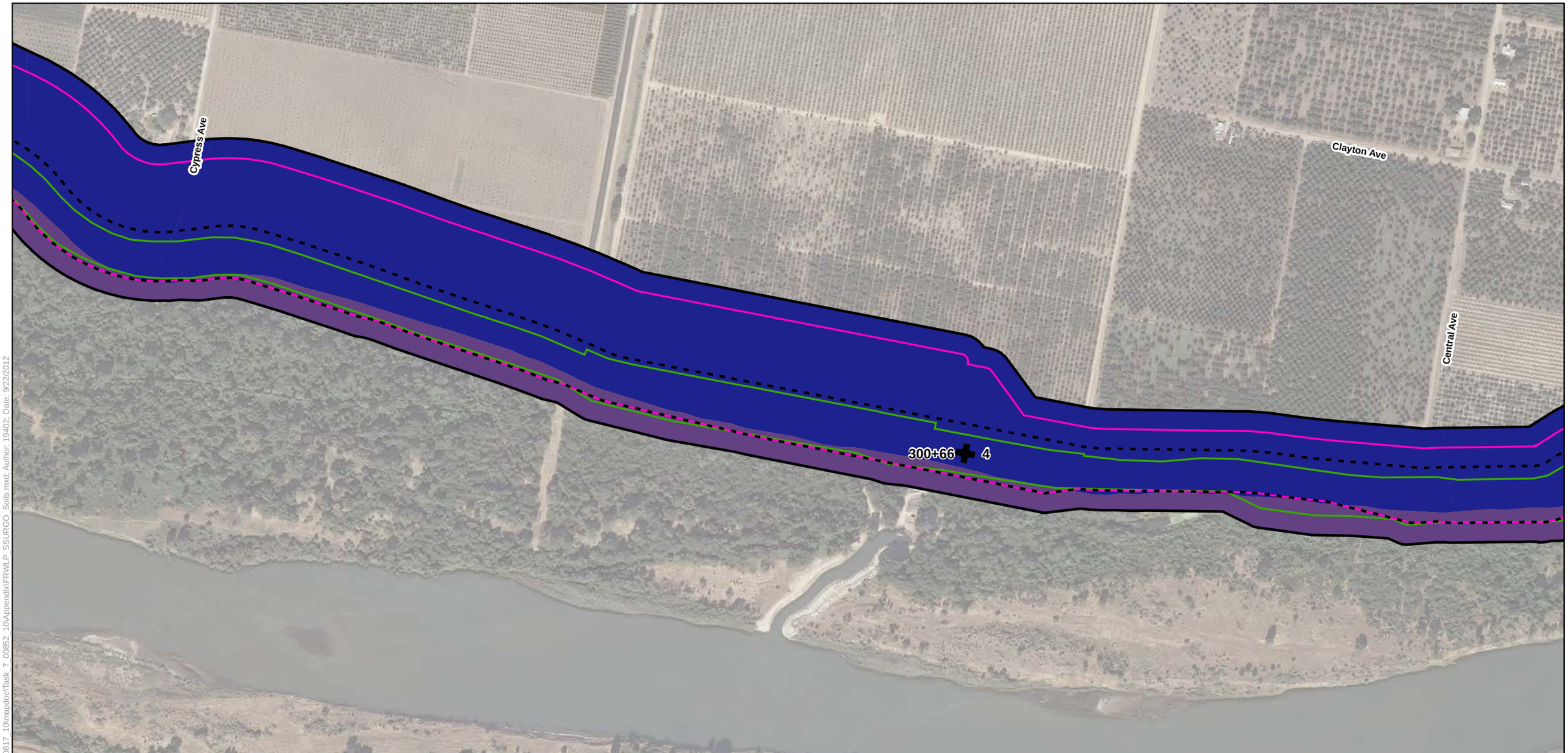
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 1

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/22/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

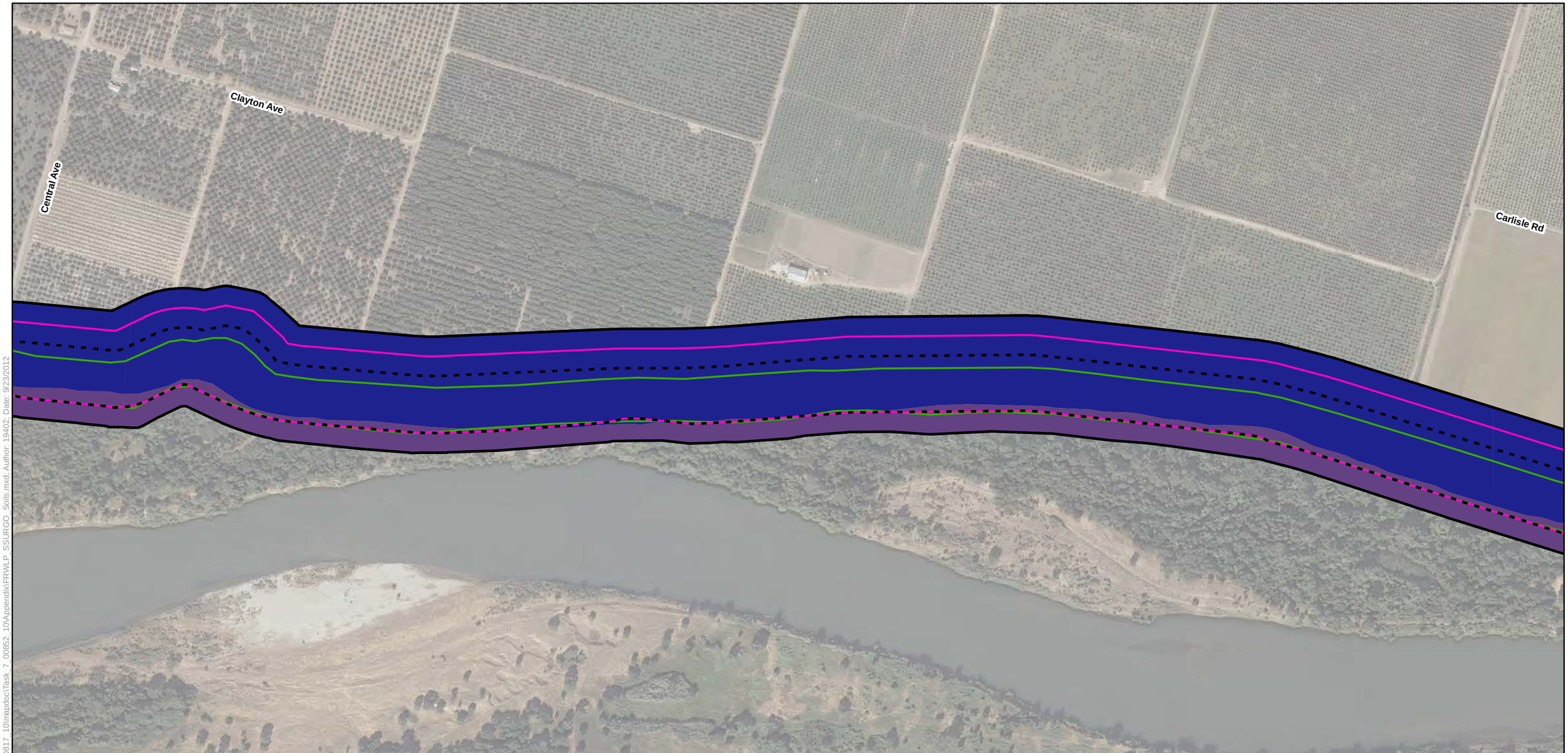
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 2

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/22/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

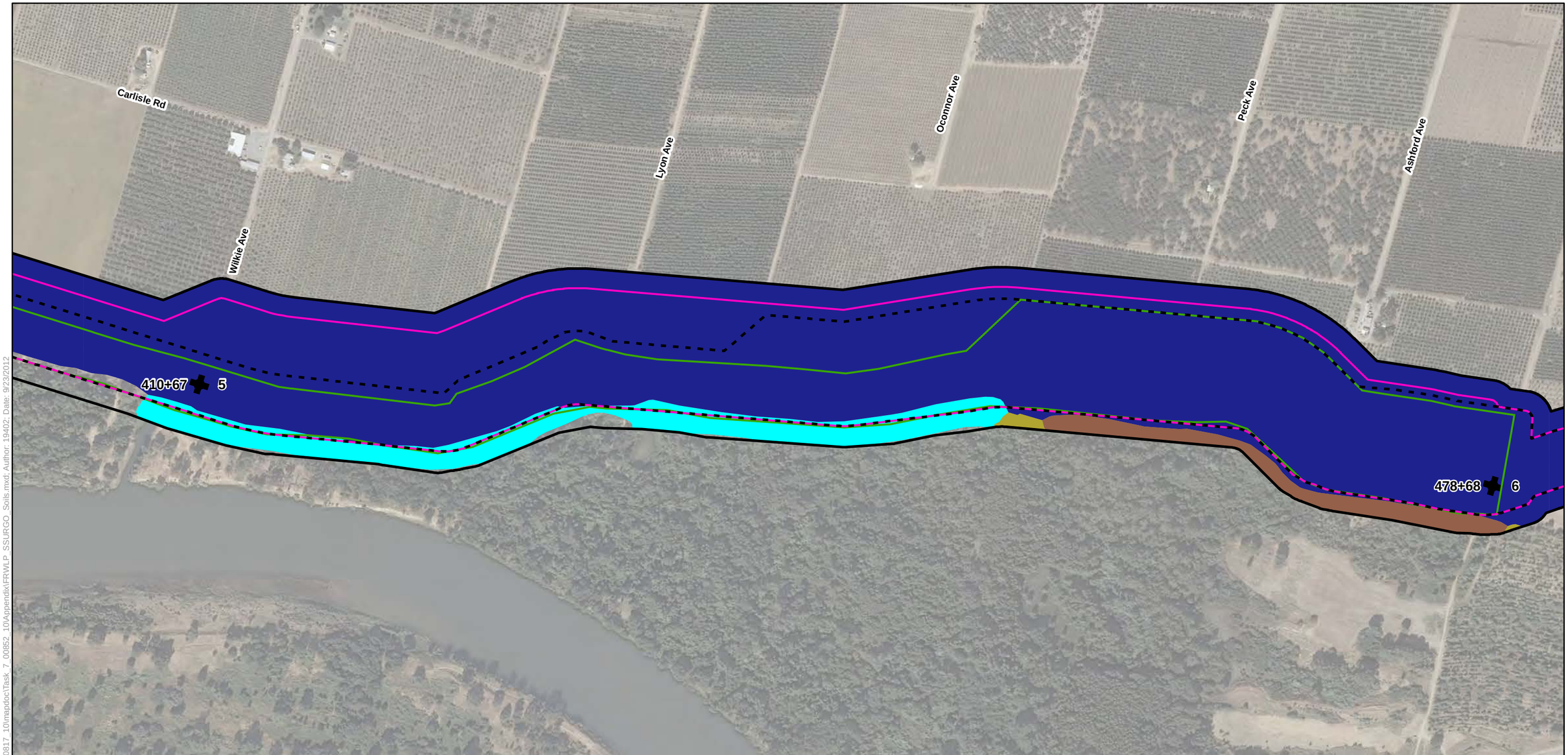
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 3

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

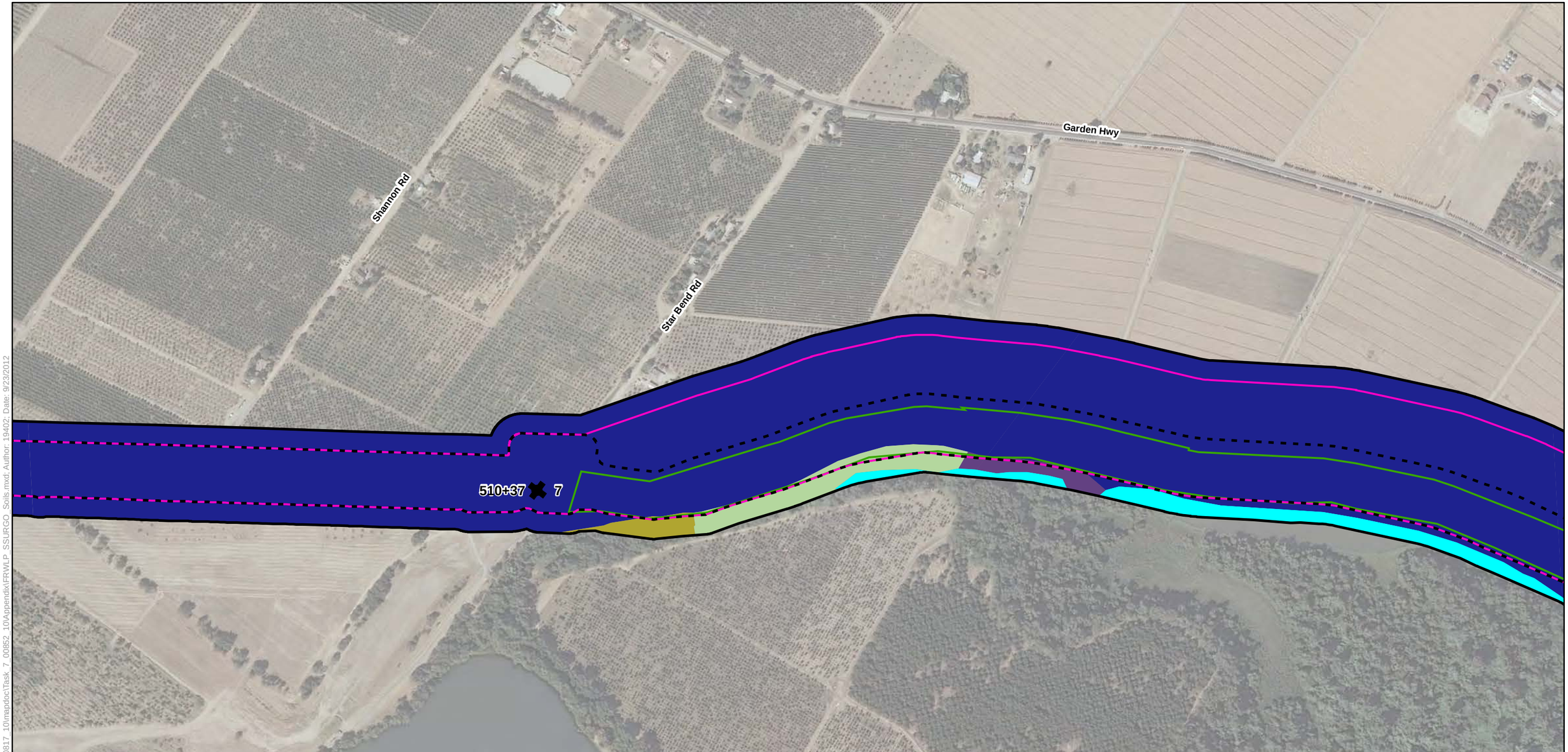
- Columbia Fine Sandy Loam, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Channeled, 0 To 2 Percent Slopes
- Shanghai Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Water

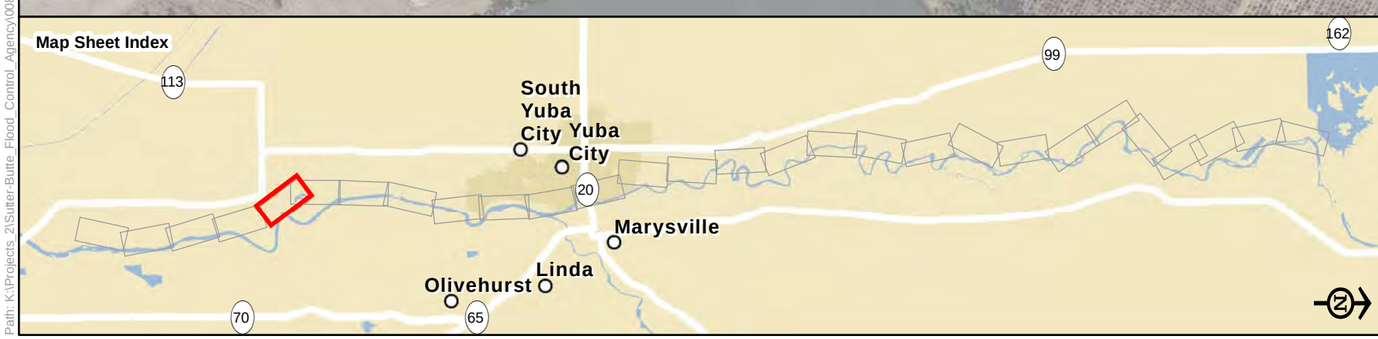
Soil Map Units in the Biological Study Area

Sheet 4

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

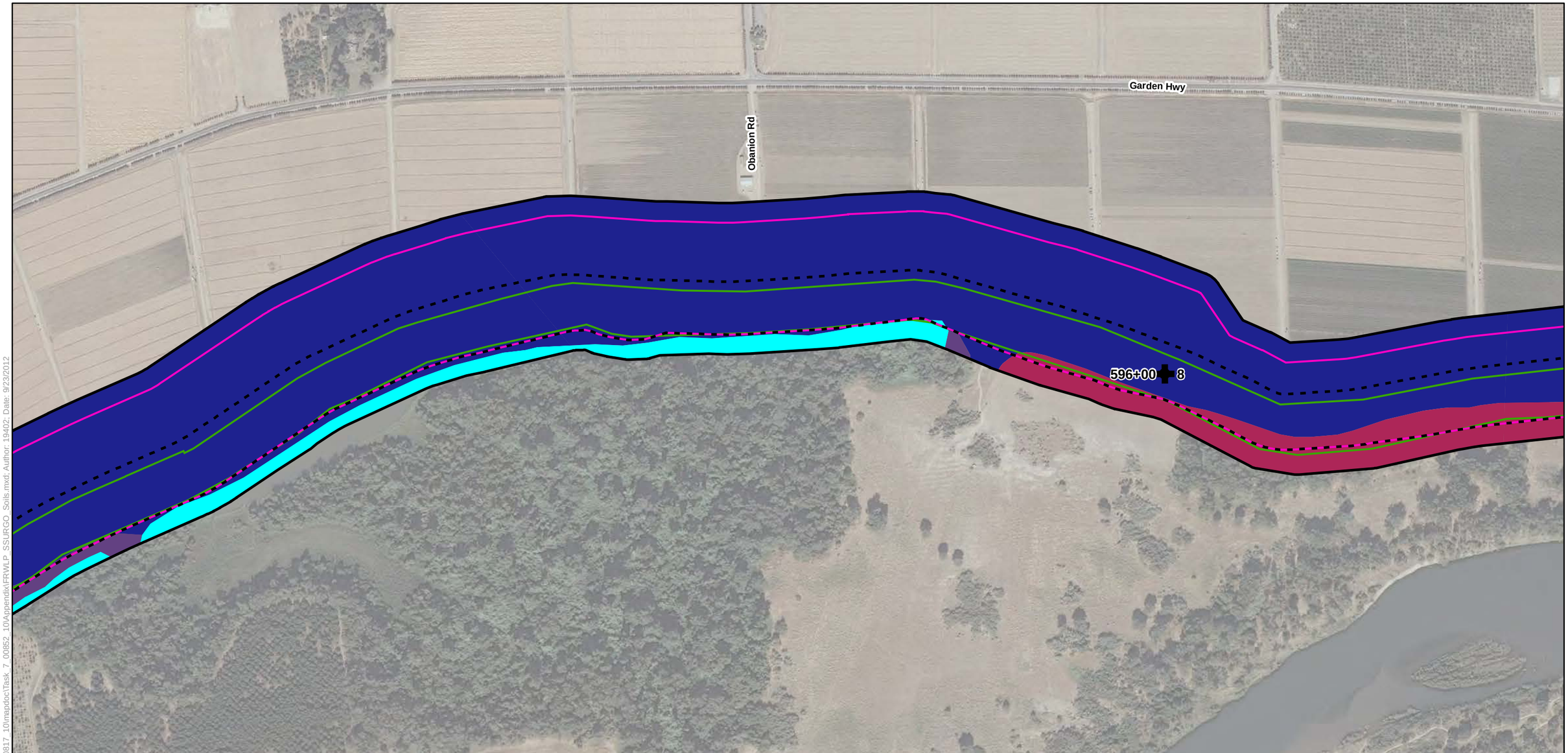
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Channeled, 0 To 2 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 5

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

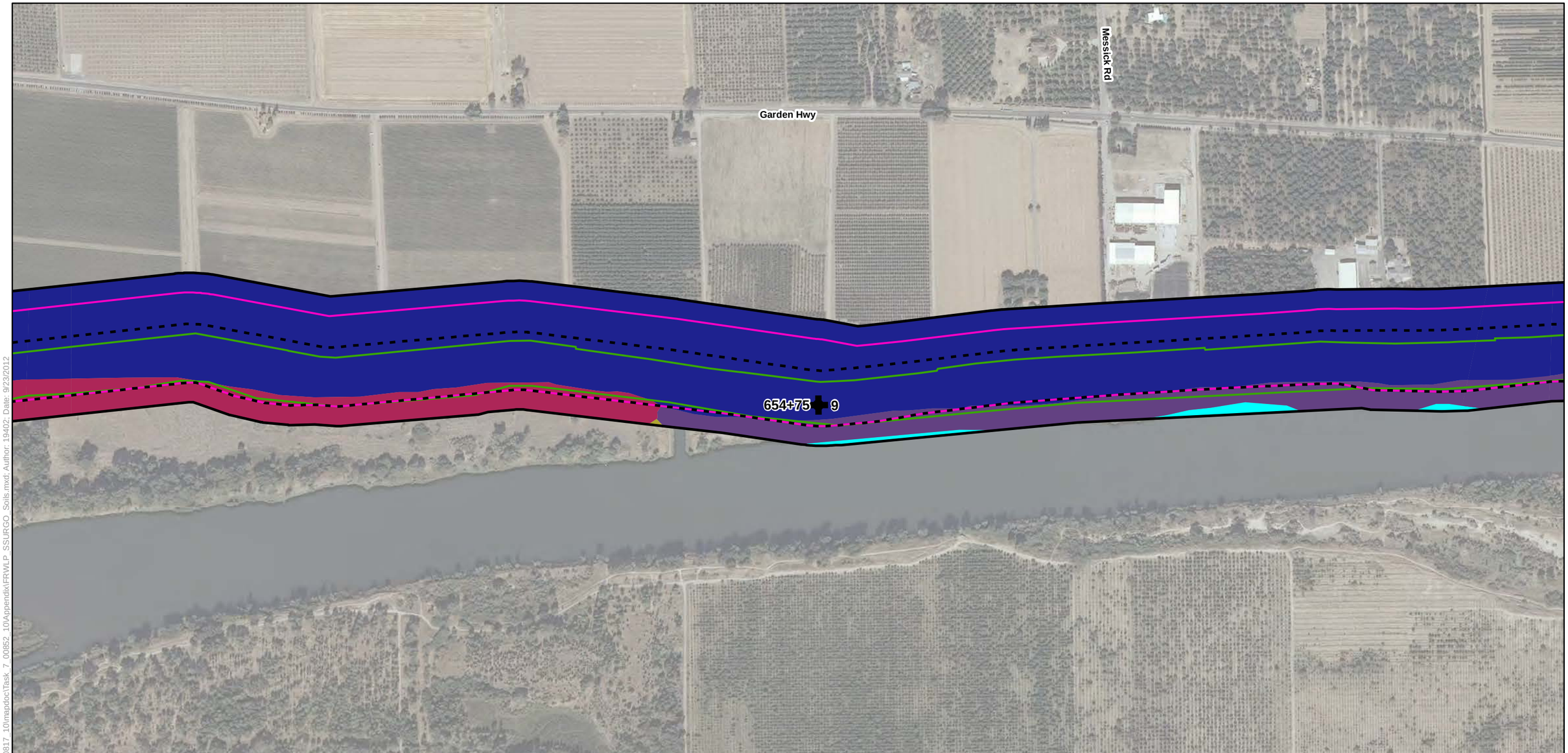
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Frequently Flooded, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 6

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

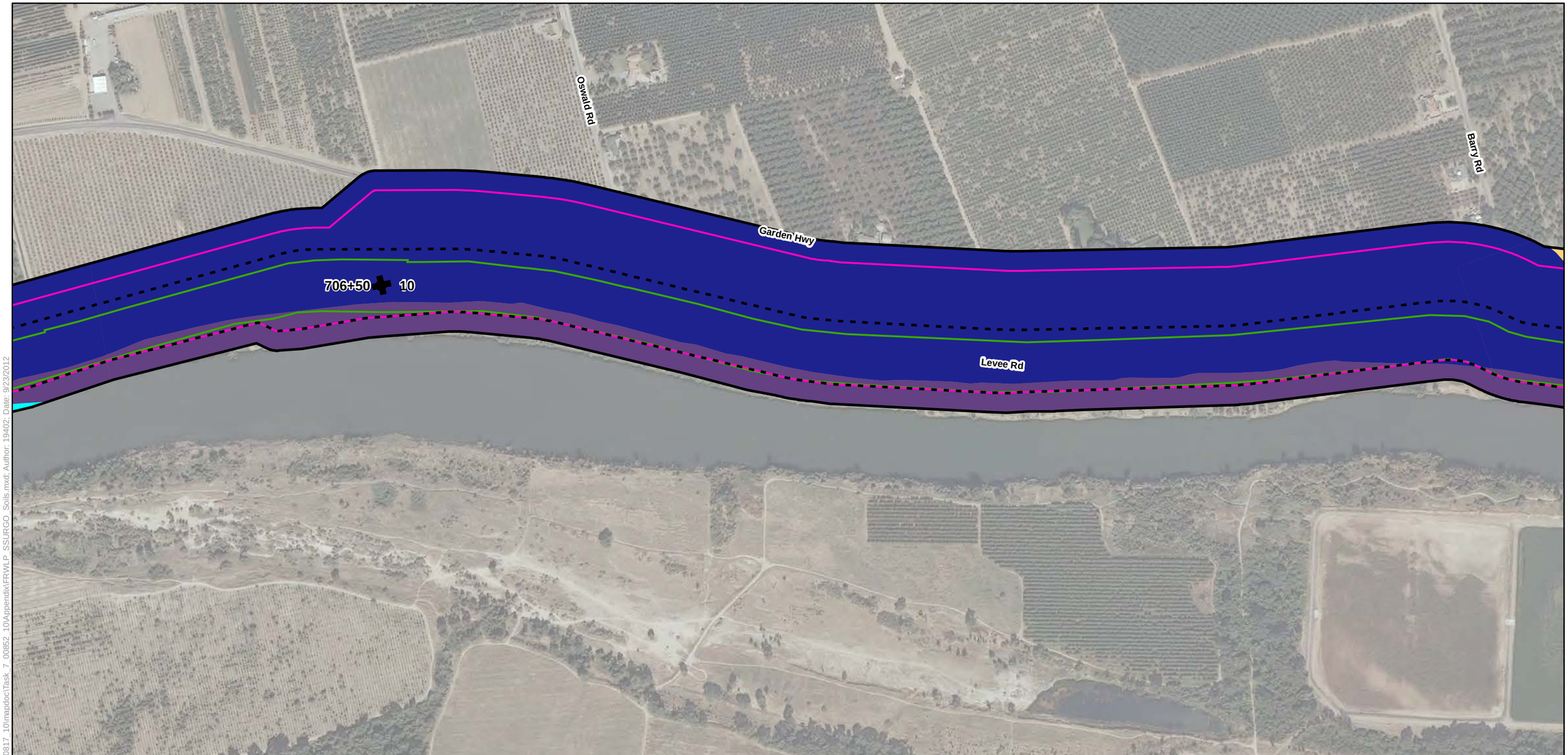
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Channeled, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Frequently Flooded, 0 To 2 Percent Slopes
- Water

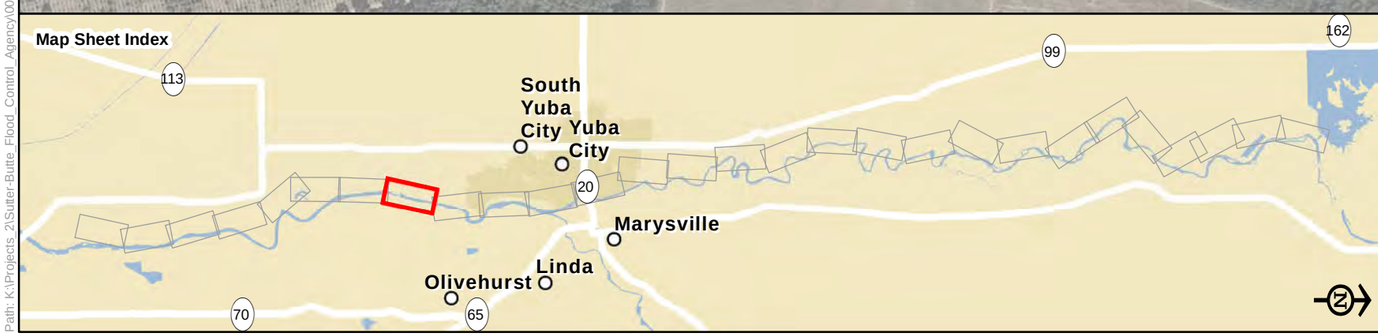
Soil Map Units in the Biological Study Area

Sheet 7

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

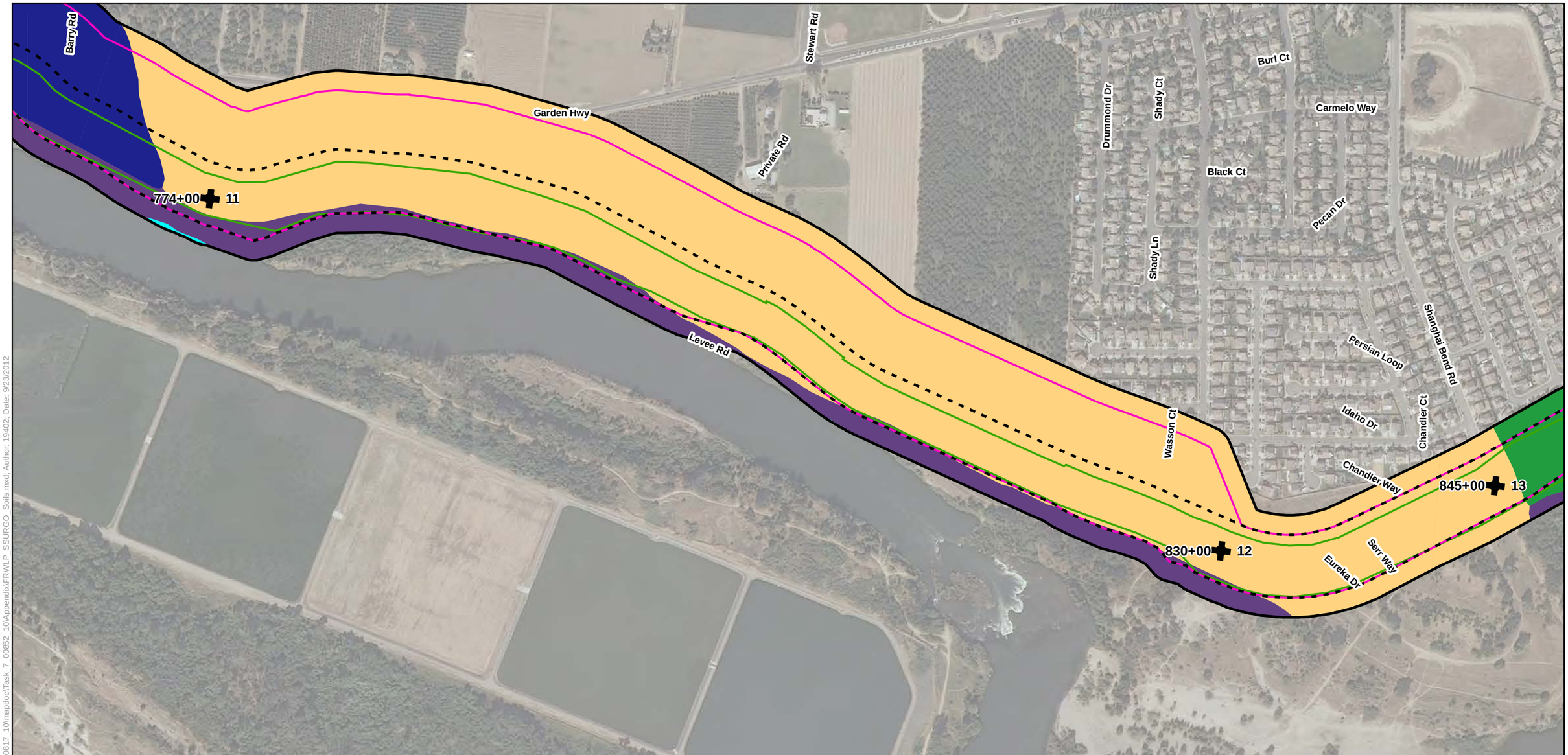
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Water

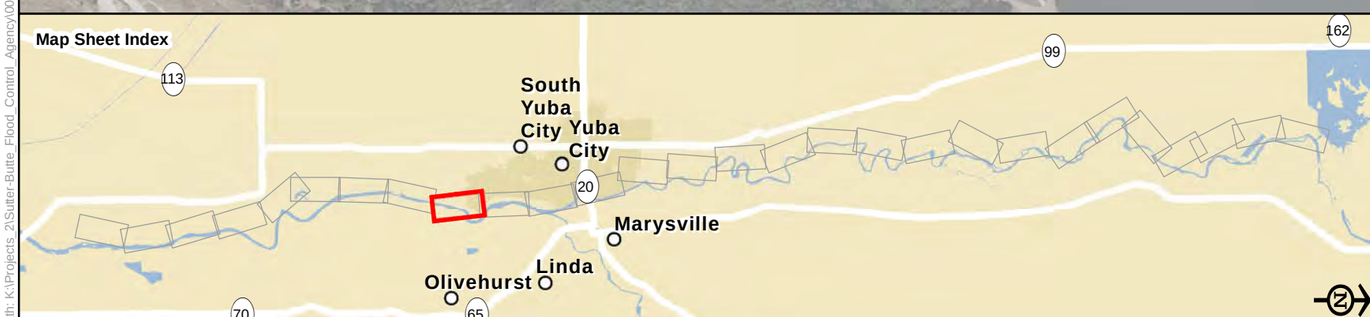
Soil Map Units in the Biological Study Area

Sheet 8

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

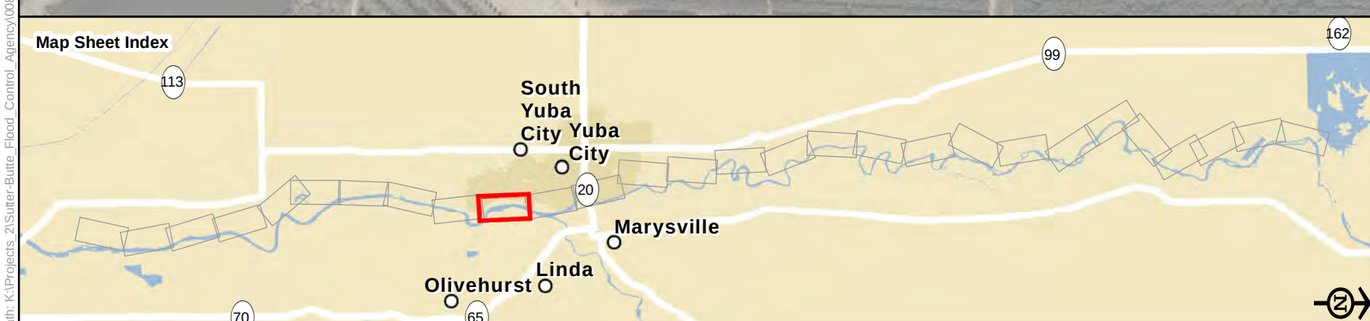
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Shanghai Silt Loam, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 9

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

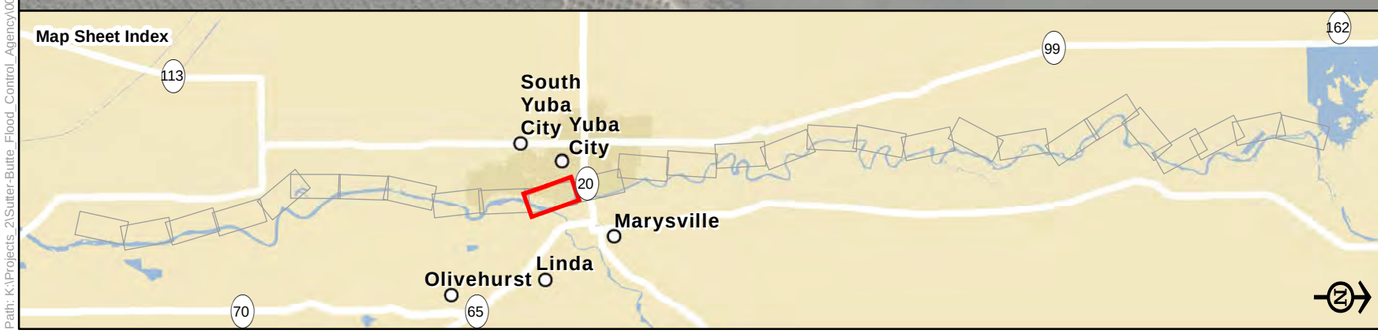
- Columbia Fine Sandy Loam, 0 To 2 Percent Slopes
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Shanghai Silt Loam, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 10

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

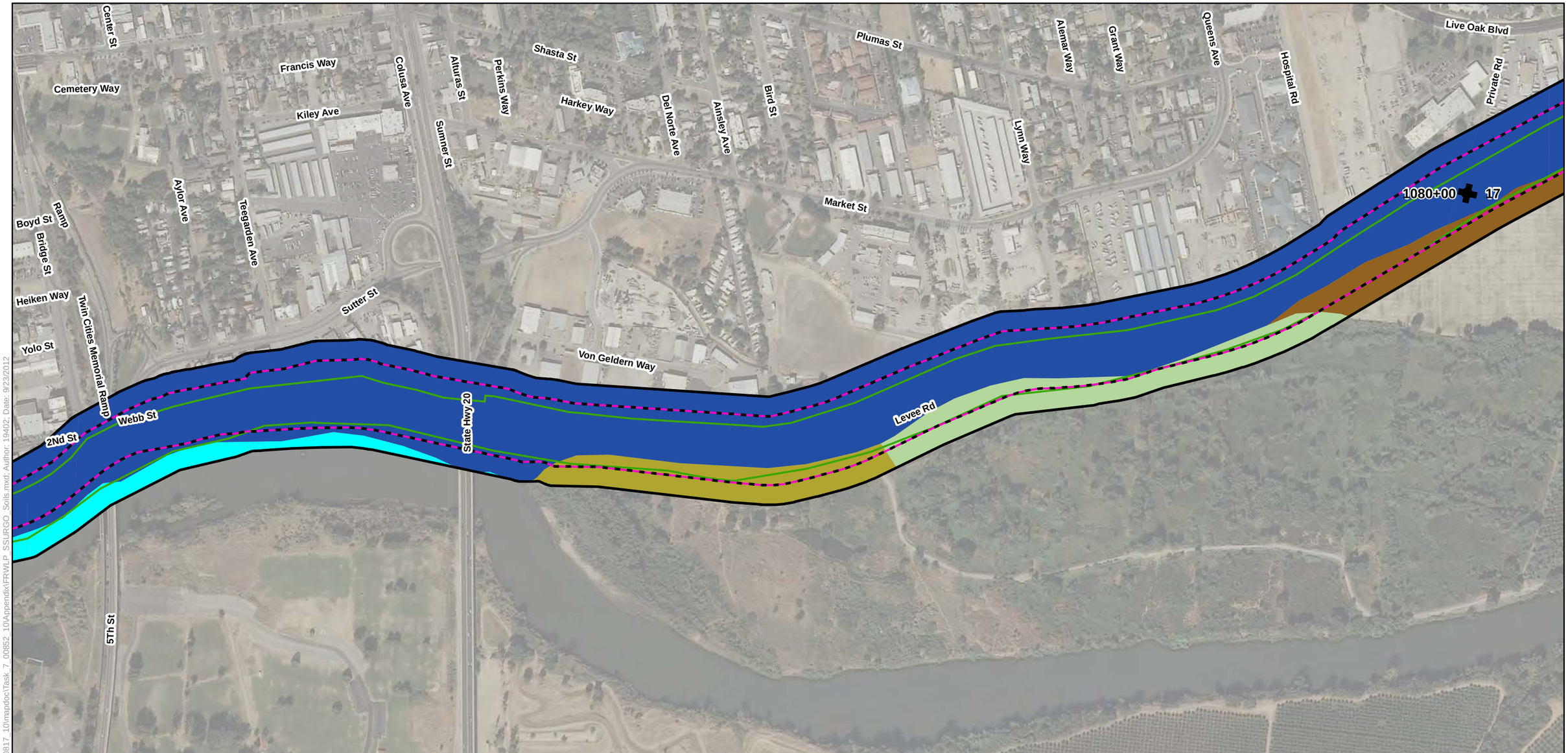
- Columbia Fine Sandy Loam, 0 To 2 Percent Slopes
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo-Urban Land Complex, 0 To 2 Percent Slopes
- Riverwash
- Water

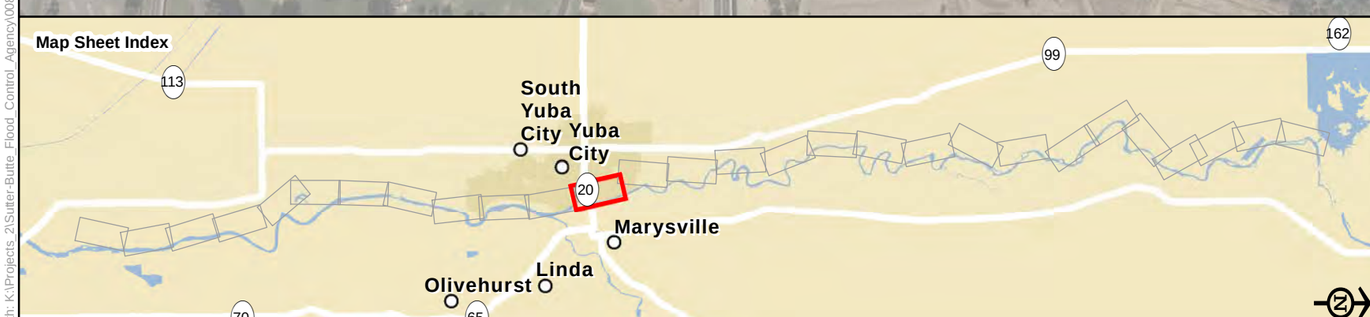
Soil Map Units in the Biological Study Area

Sheet 11

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

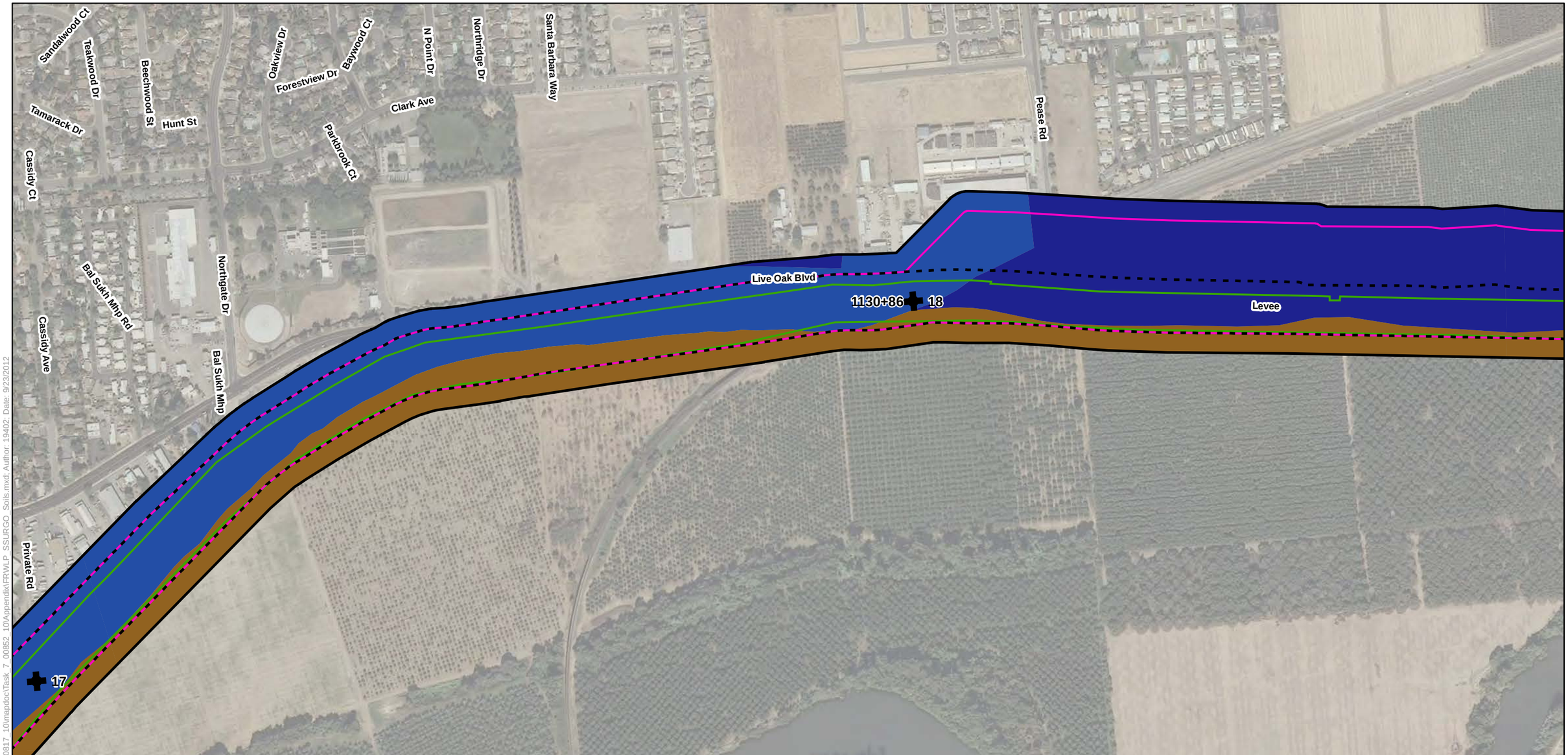
- Conejo-Urban Land Complex, 0 To 2 Percent Slopes
- Holillipah Loamy Sand, Channeled, 0 To 2 Percent Slopes
- Nueva Loam, Occasionally Flooded, 0 To 1 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Water

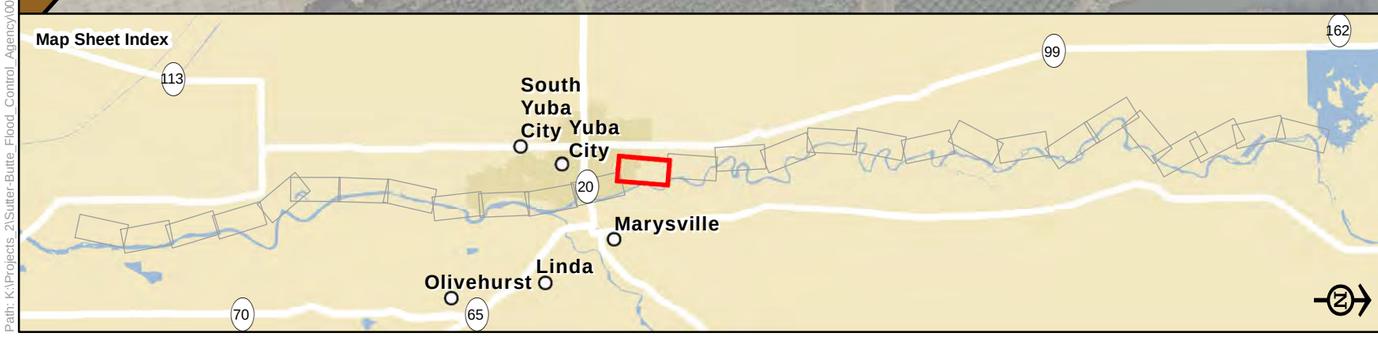
Soil Map Units in the Biological Study Area

Sheet 12

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

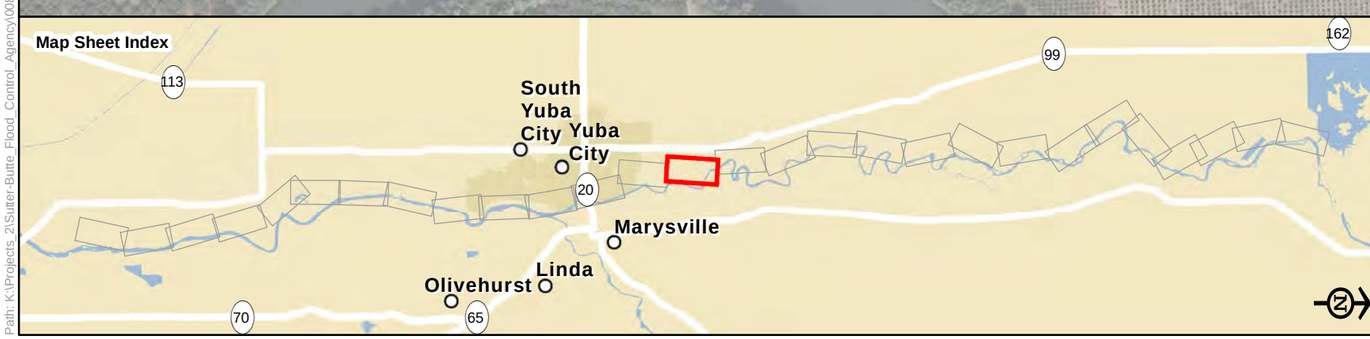
- Conejo Loam, 0 To 2 Percent Slopes
- Conejo-Urban Land Complex, 0 To 2 Percent Slopes
- Nueva Loam, Occasionally Flooded, 0 To 1 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 13

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\maprjoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

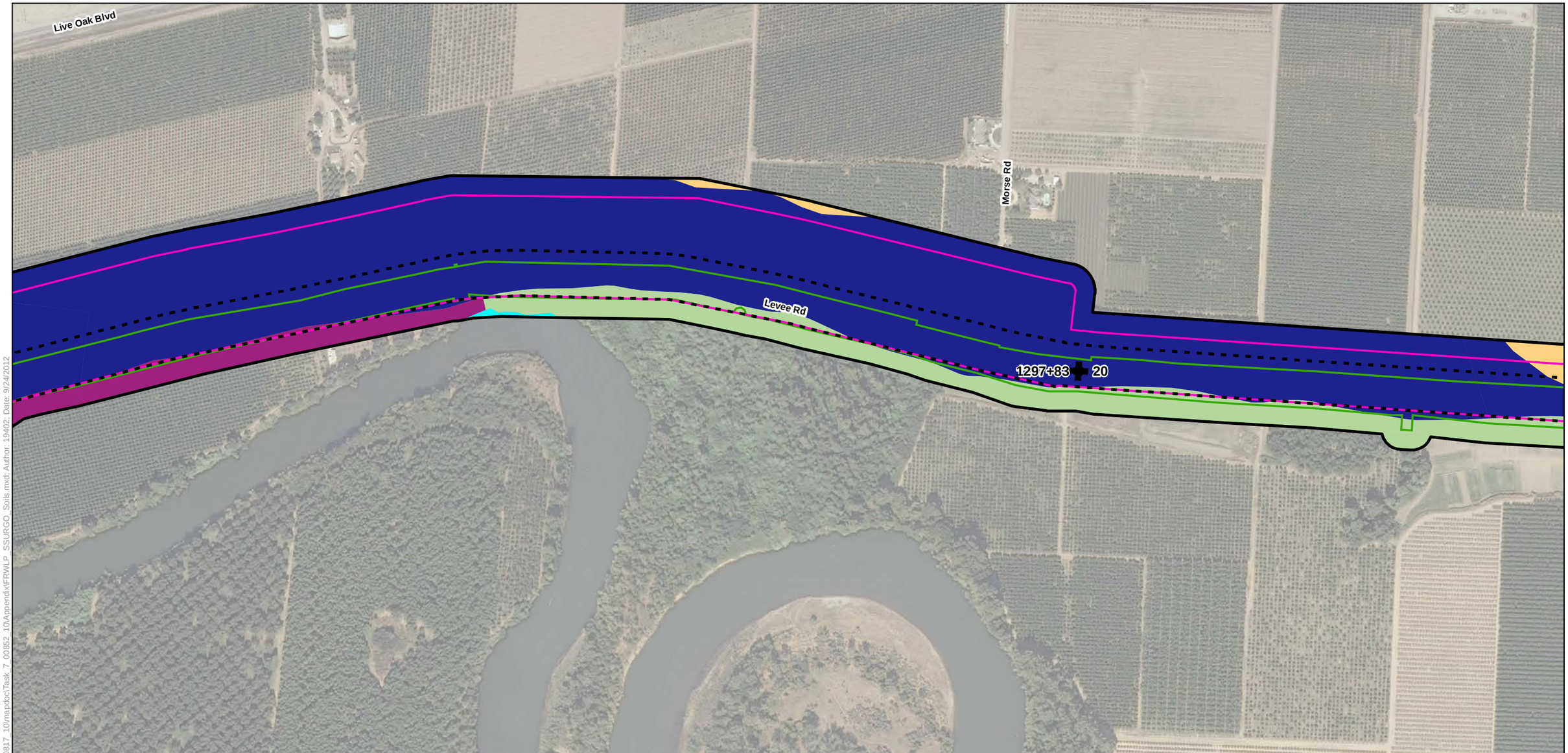
- Columbia Fine Sandy Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Nueva Loam, Occasionally Flooded, 0 To 1 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes

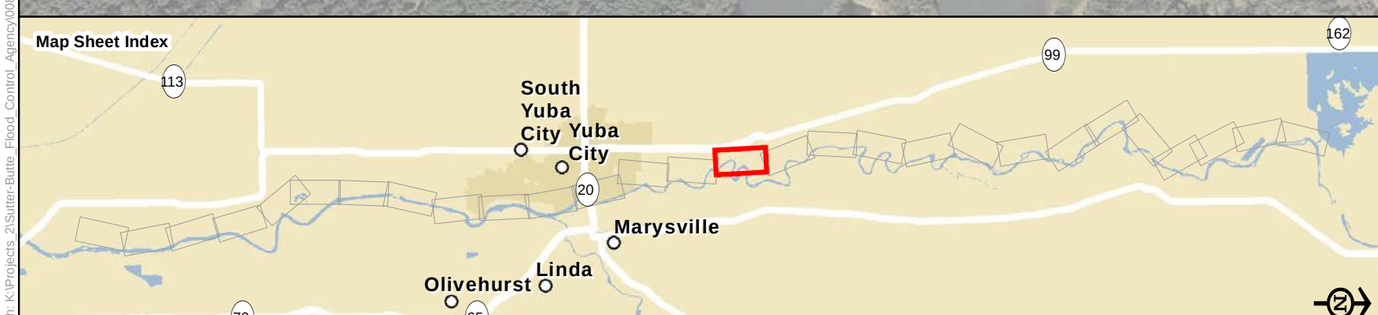
Soil Map Units in the Biological Study Area

Sheet 14

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

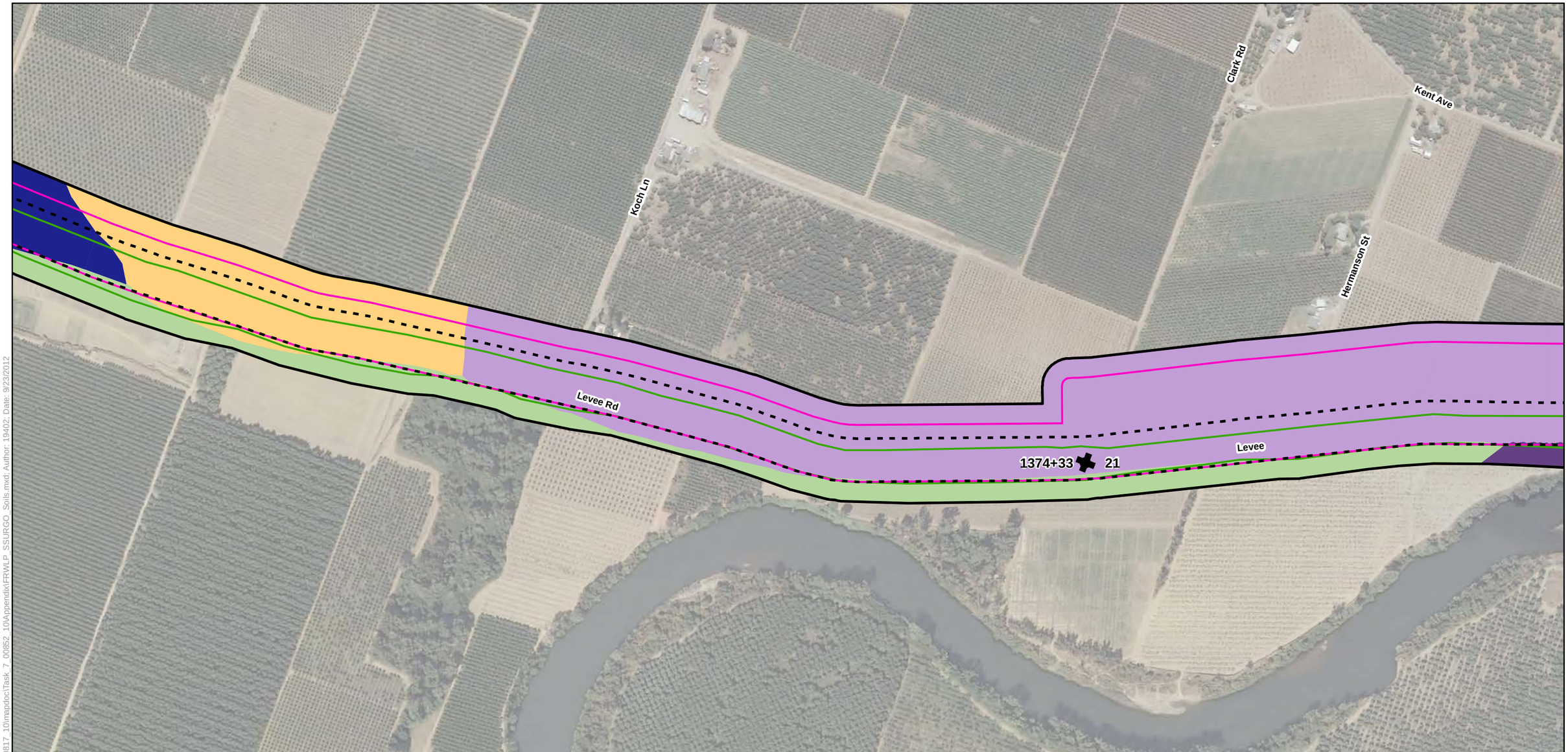
- Columbia Fine Sandy Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Water

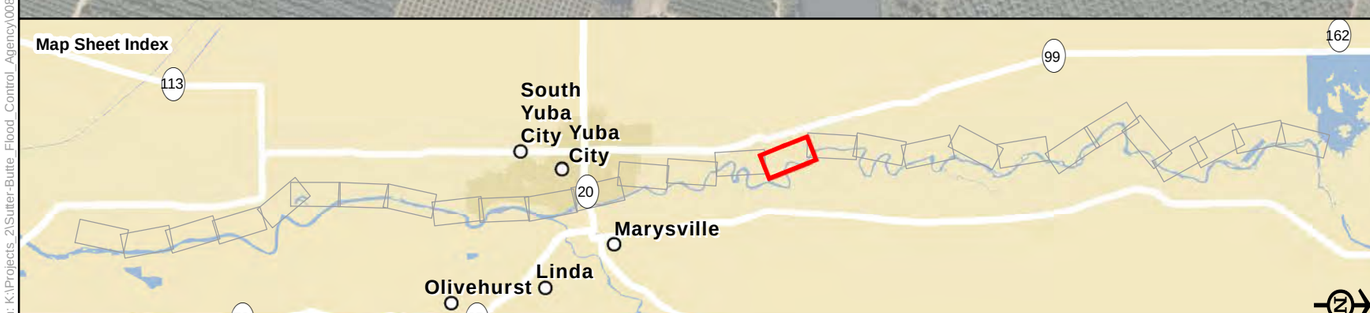
Soil Map Units in the Biological Study Area

Sheet 15

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

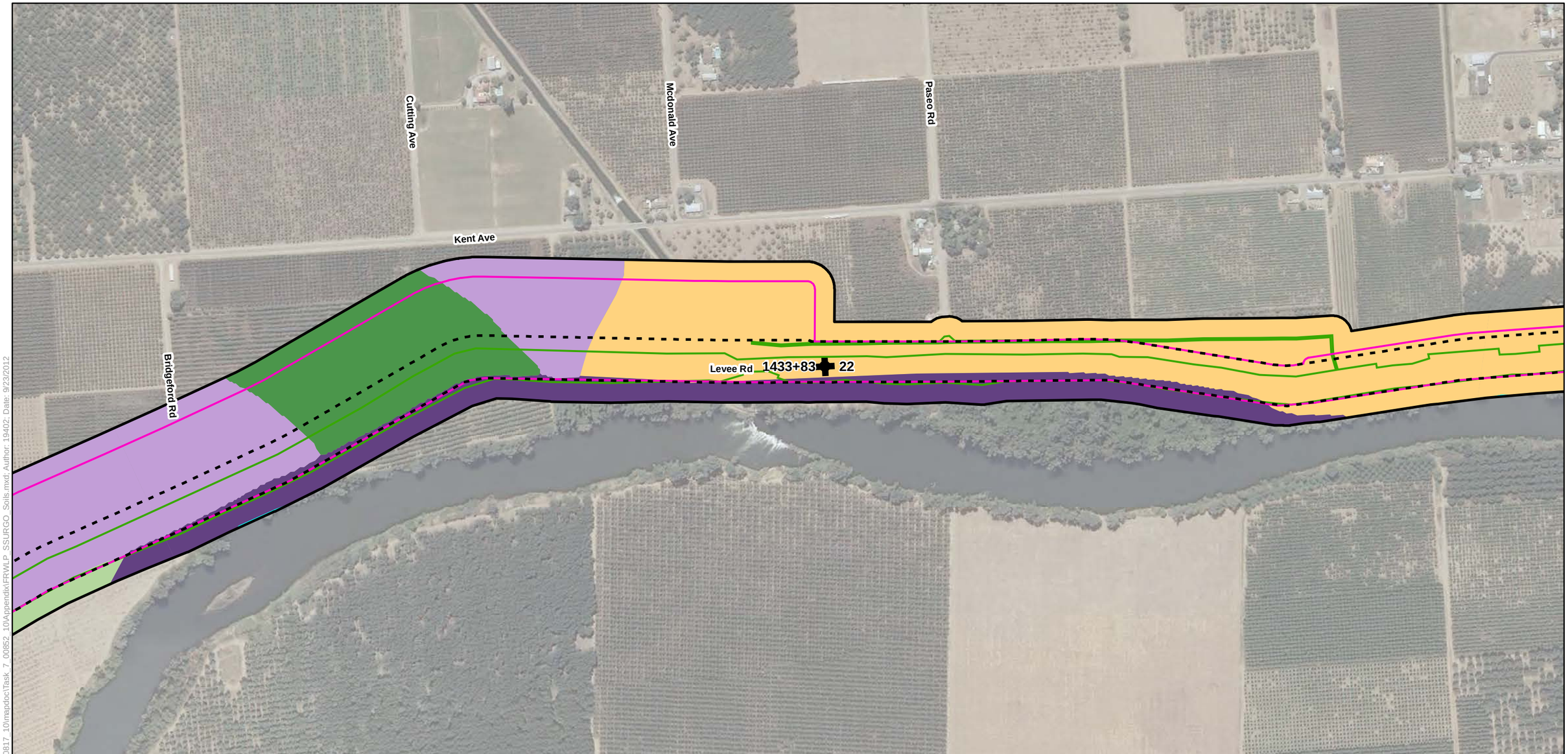
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo Loam, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Marcum-Gridley Clay Loams, 0 To 1 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes

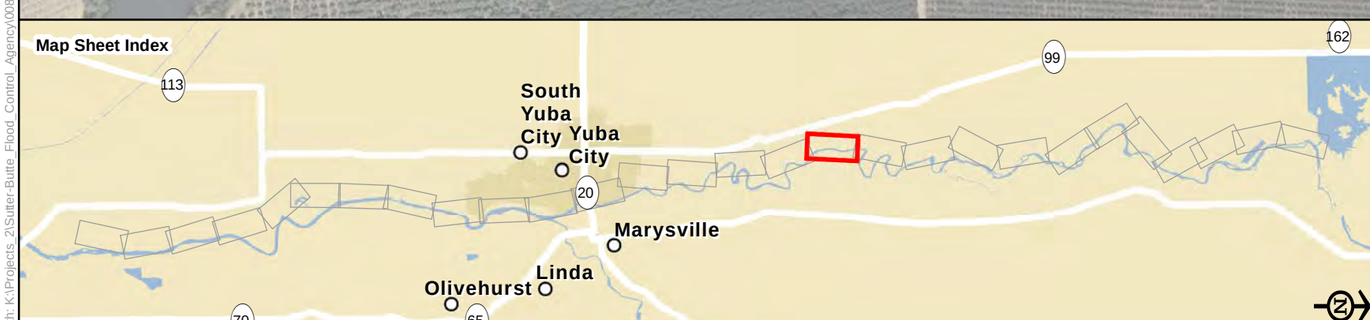
Soil Map Units in the Biological Study Area

Sheet 16

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

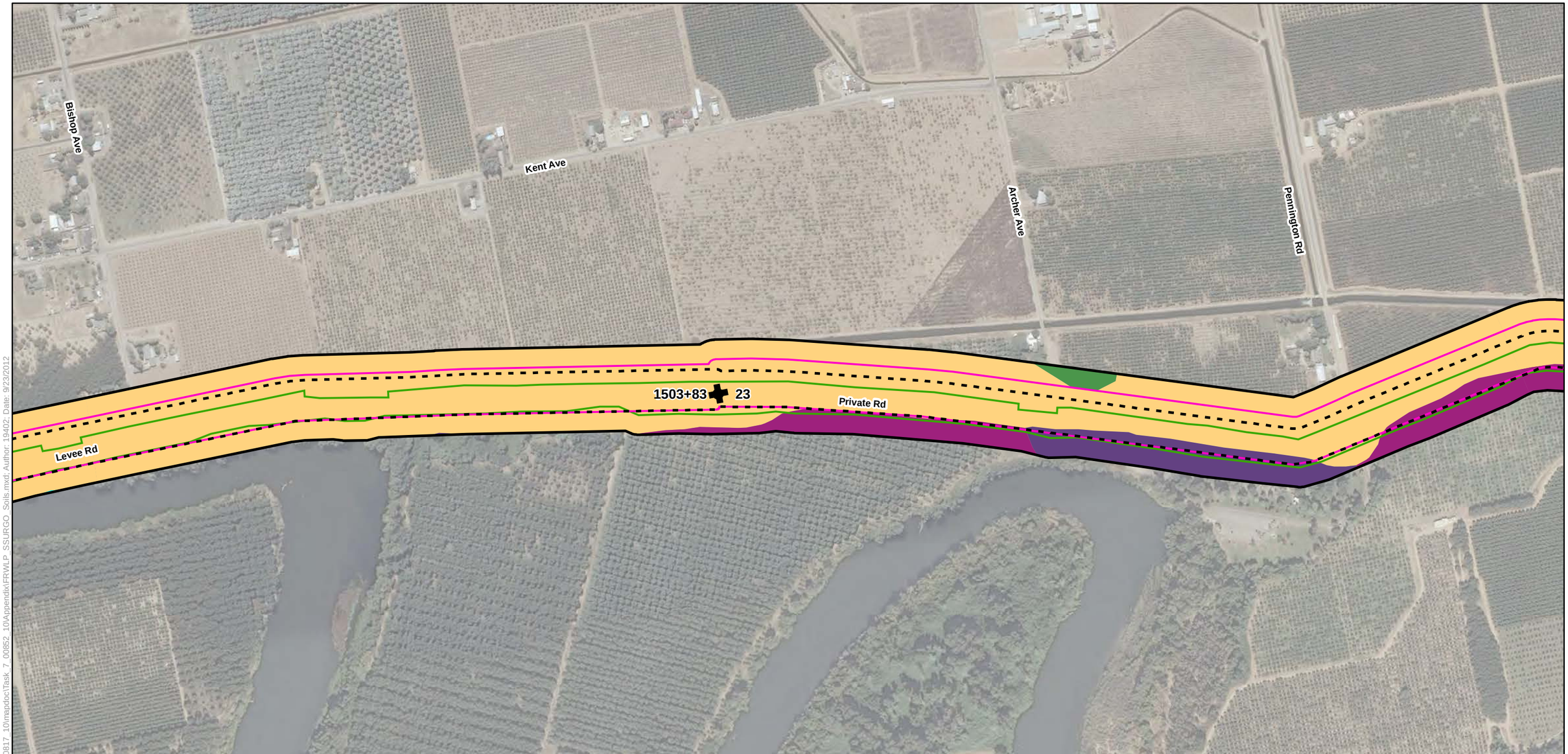
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Liveoak Sandy Clay Loam, 0 To 2 Percent Slopes
- Marcum-Gridley Clay Loams, 0 To 1 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Water

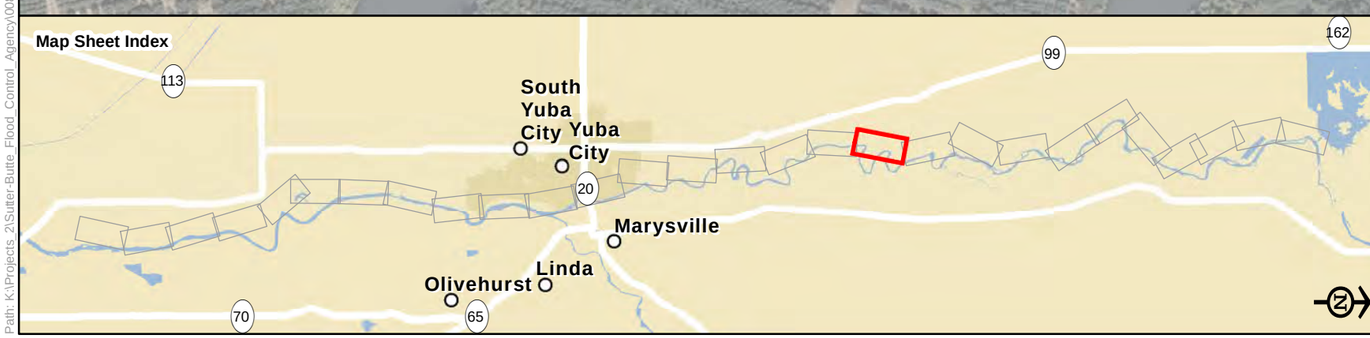
Soil Map Units in the Biological Study Area

Sheet 17

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

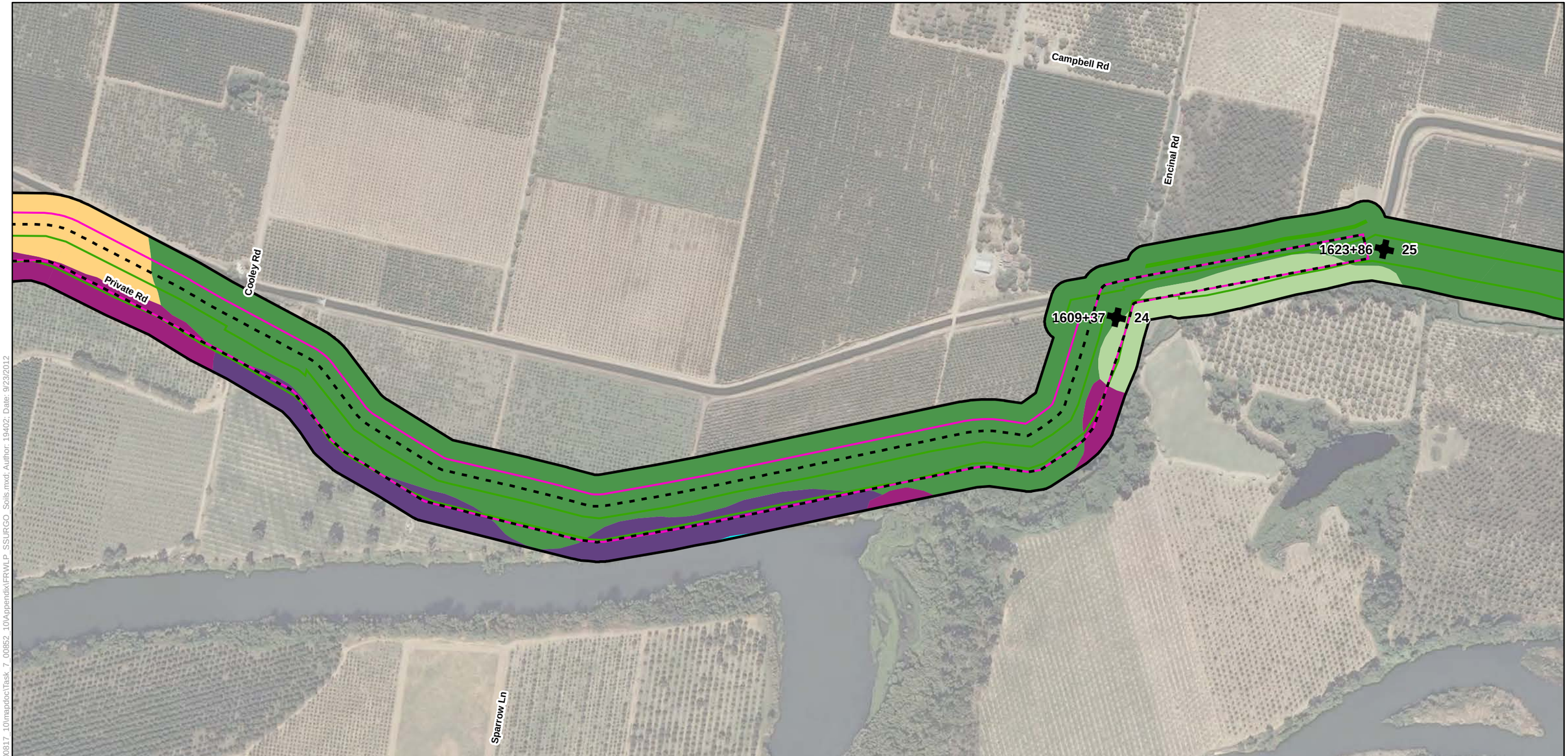
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Columbia Fine Sandy Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Liveoak Sandy Clay Loam, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 18

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

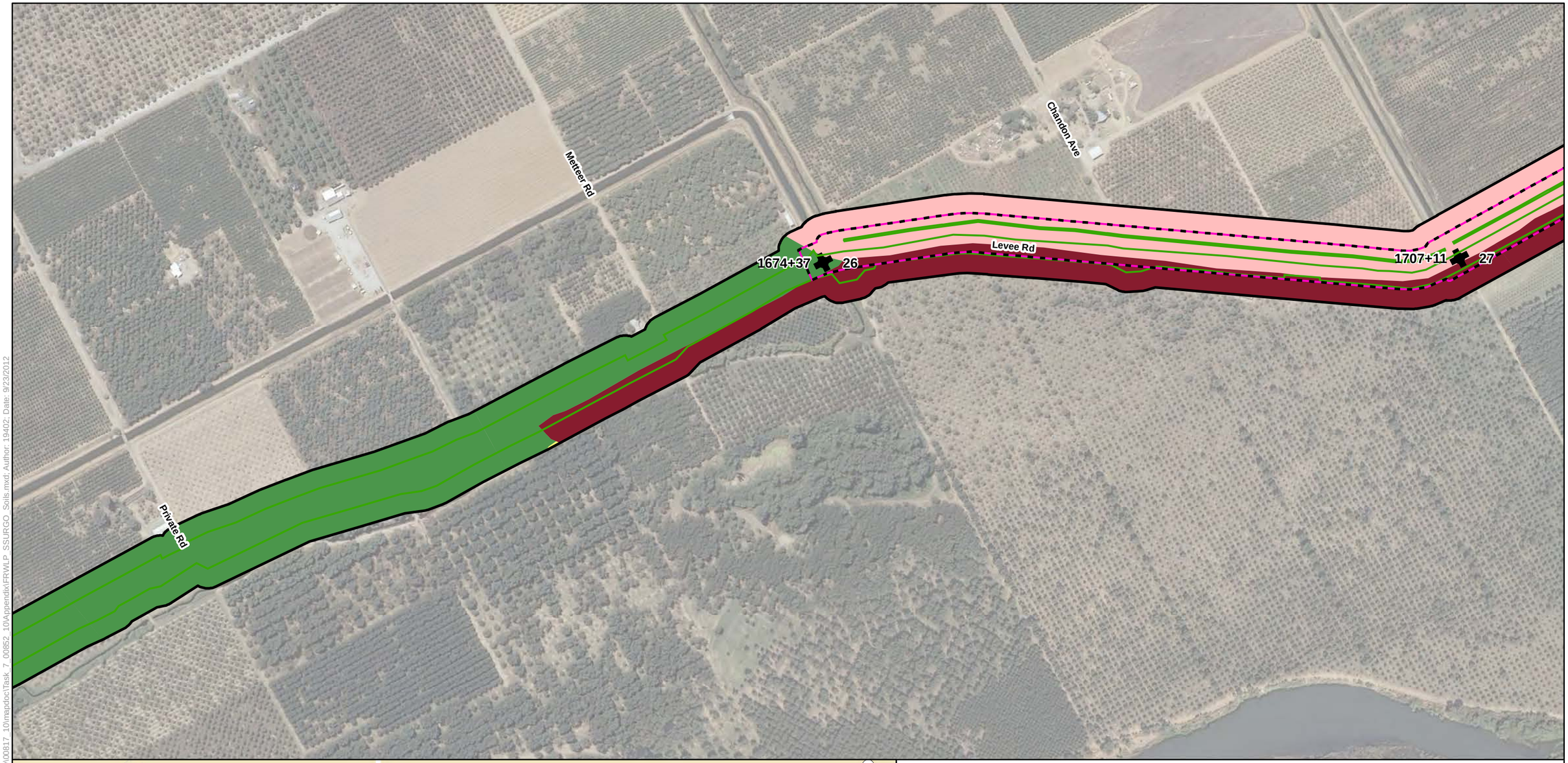
- Columbia Fine Sandy Loam, Channeled, 0 To 2 Percent Slopes
- Columbia Fine Sandy Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Conejo-Tisdale Complex, 0 To 2 Percent Slopes
- Liveoak Sandy Clay Loam, 0 To 2 Percent Slopes
- Shanghai Silt Loam, Frequently Flooded, 0 To 2 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 19

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

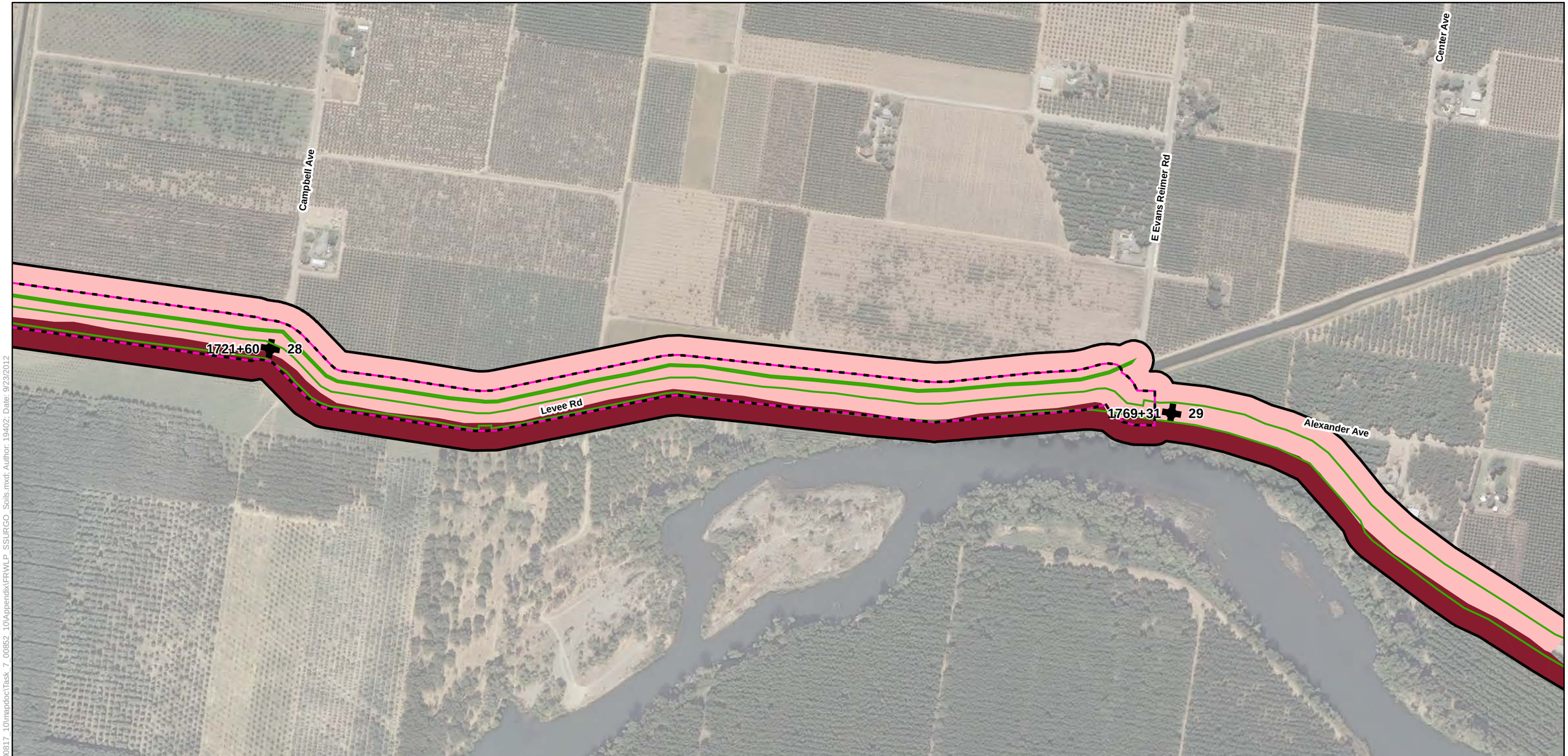
- Boga-Loemstone Complex, 0 To 1 Percent Slopes
- Liveoak Sandy Clay Loam, 0 To 2 Percent Slopes
- Columbia Fine Sandy Loam, 0 To 2 Percent Slopes, Frequently Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Frequently Flooded

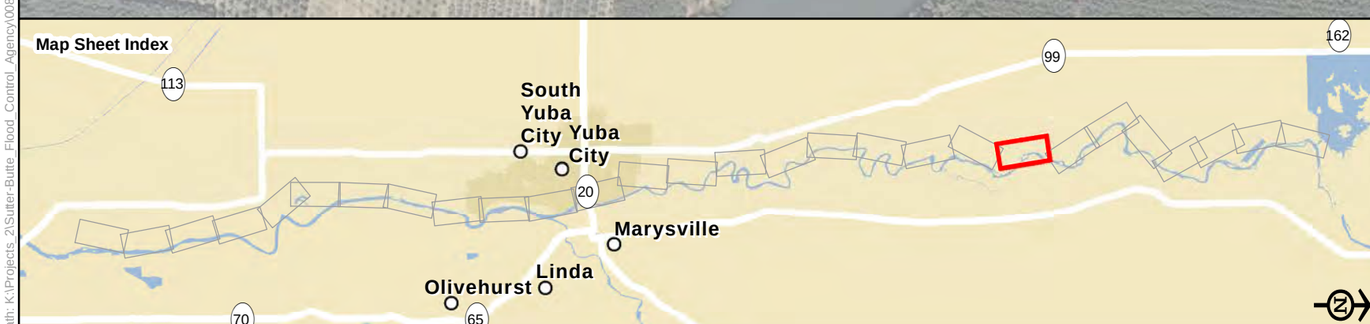
Soil Map Units in the Biological Study Area

Sheet 20

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

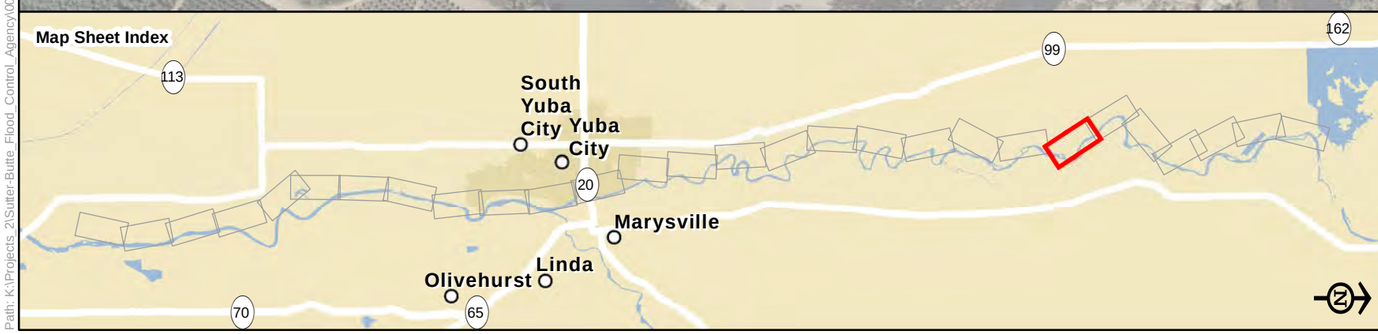
- Boga-Loemstone Complex, 0 To 1 Percent Slopes
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Frequently Flooded
- Water

Soil Map Units in the Biological Study Area

Sheet 21

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

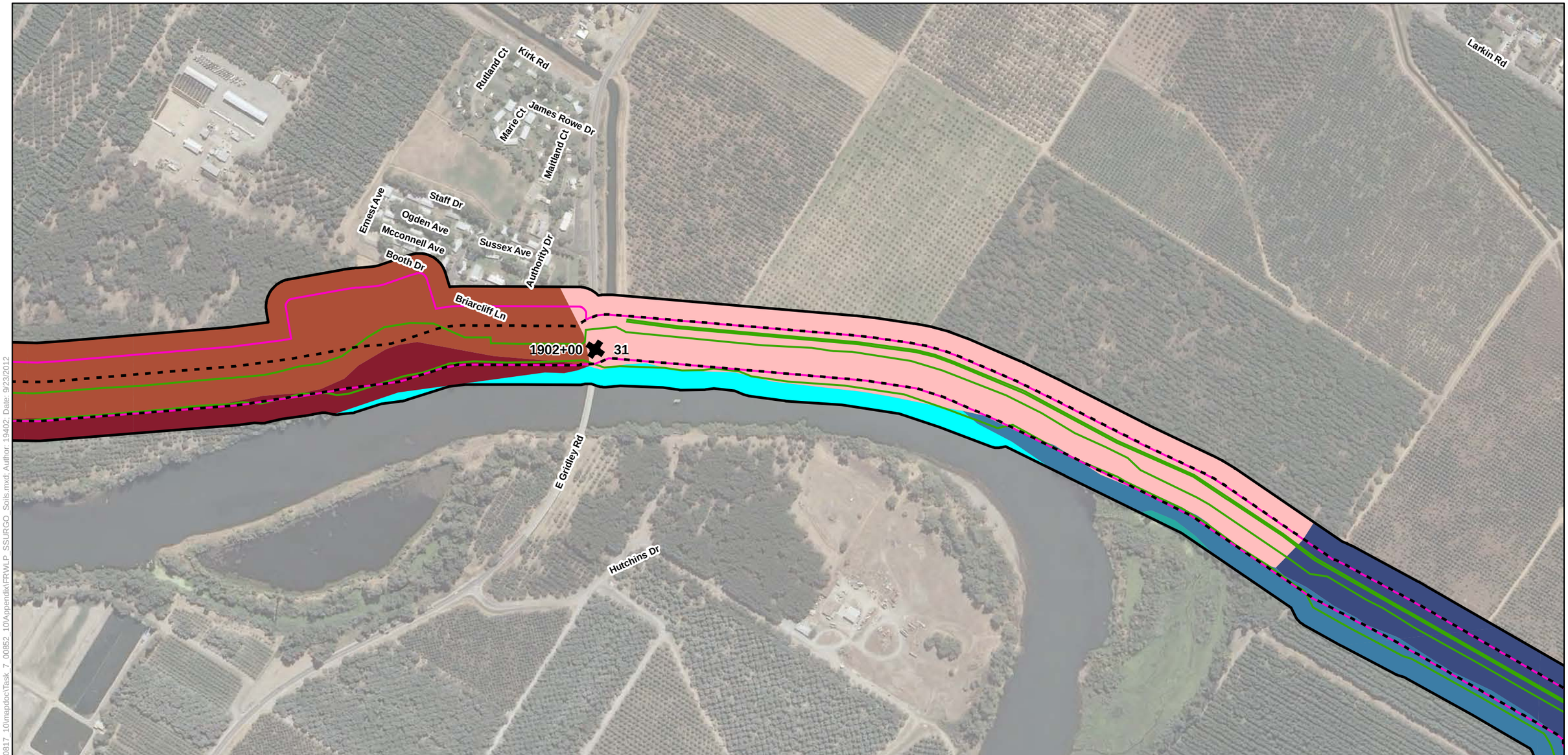
- Boga-Loemstone Complex, 0 To 1 Percent Slopes
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Frequently Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Liveoak Sandy Clay Loam, 0 To 2 Percent Slopes
- Liveoak Sandy Loam, 0 To 2 Percent Slopes
- Water

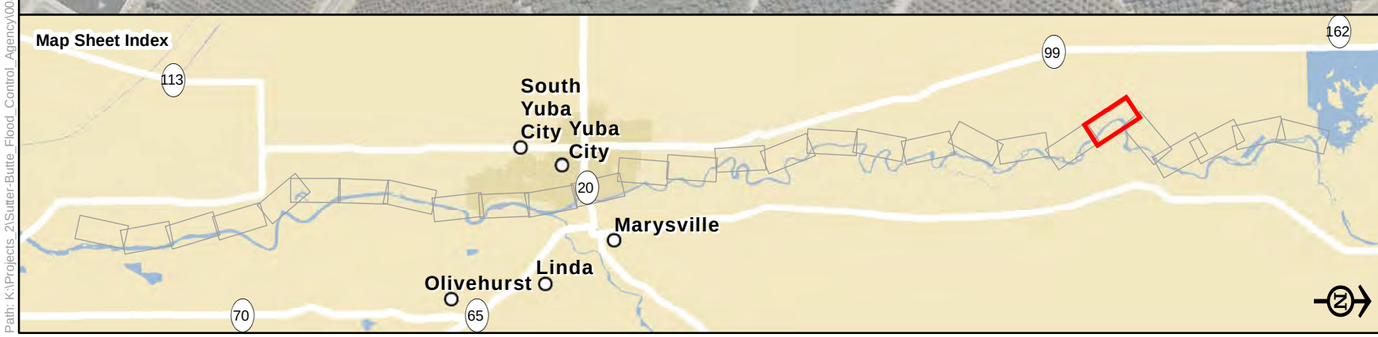
Soil Map Units in the Biological Study Area

Sheet 22

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

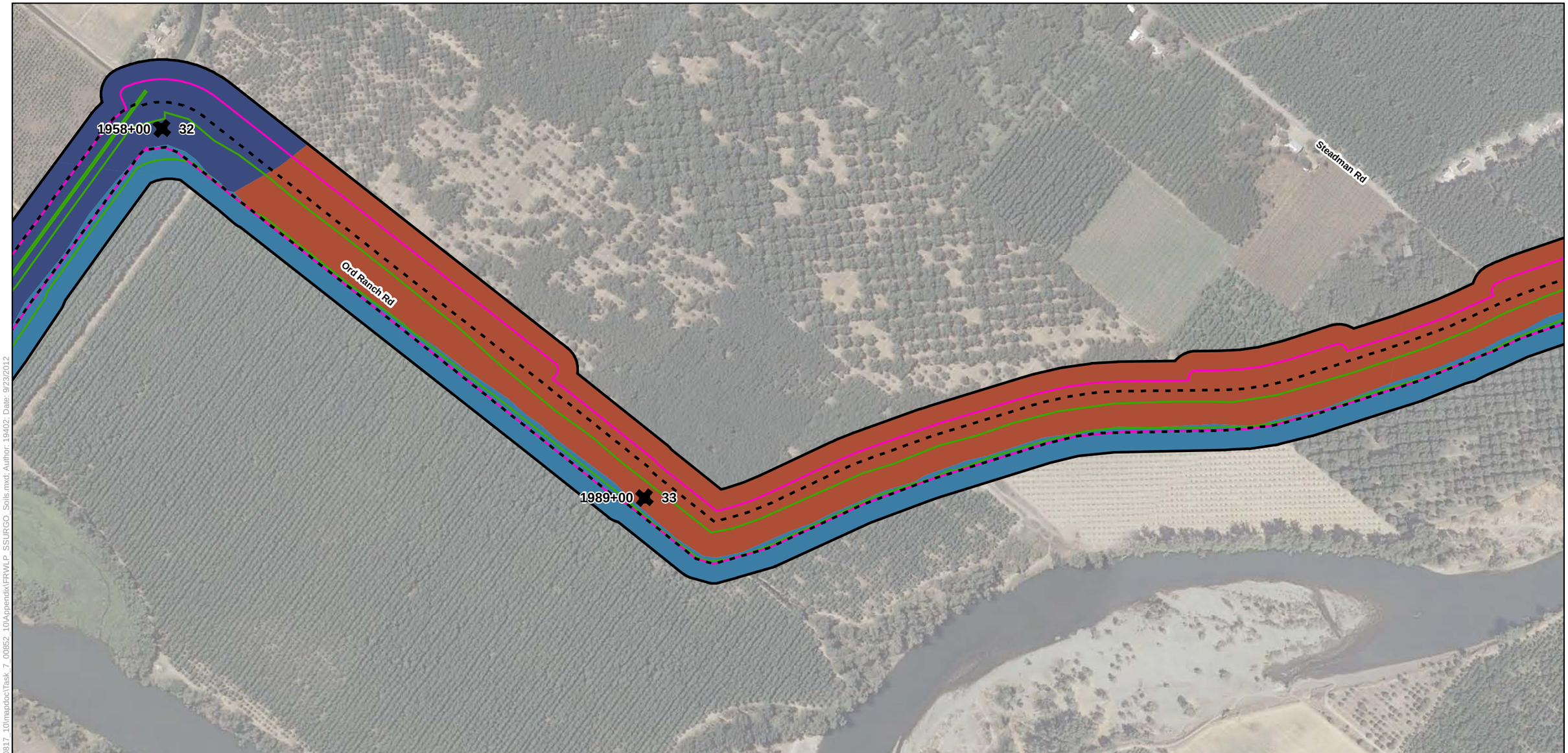
- Boga-Loemstone Complex, 0 To 1 Percent Slopes
- Columbia, 0 To 2 Percent Slopes, Frequently Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Frequently Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Occasionally Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Gianella Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Water

Soil Map Units in the Biological Study Area

Sheet 23

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

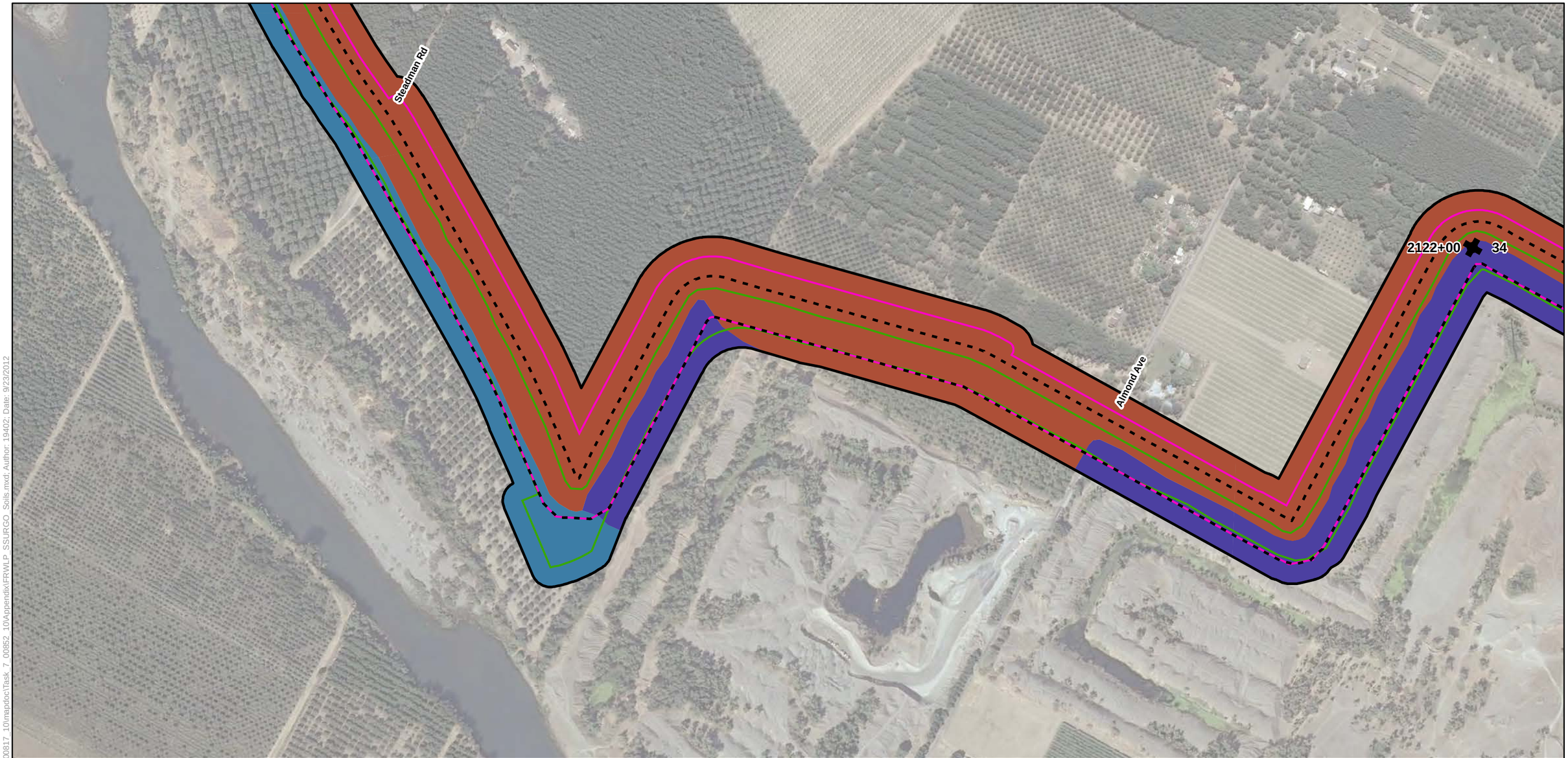
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Occasionally Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Gianella Loam, 0 To 1 Percent Slopes, Rarely Flooded

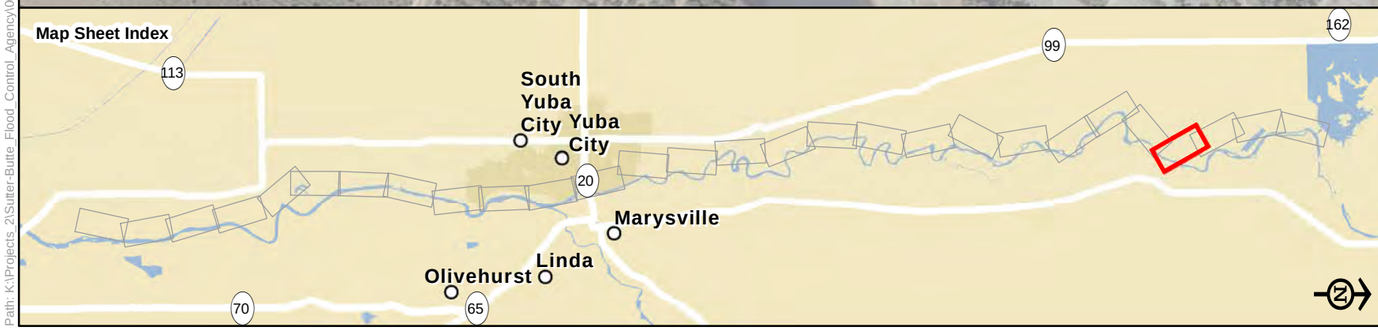
Soil Map Units in the Biological Study Area

Sheet 24

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Occasionally Flooded
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Xerorthents, Tailings, 0 To 50 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 25

0 250 500
Feet

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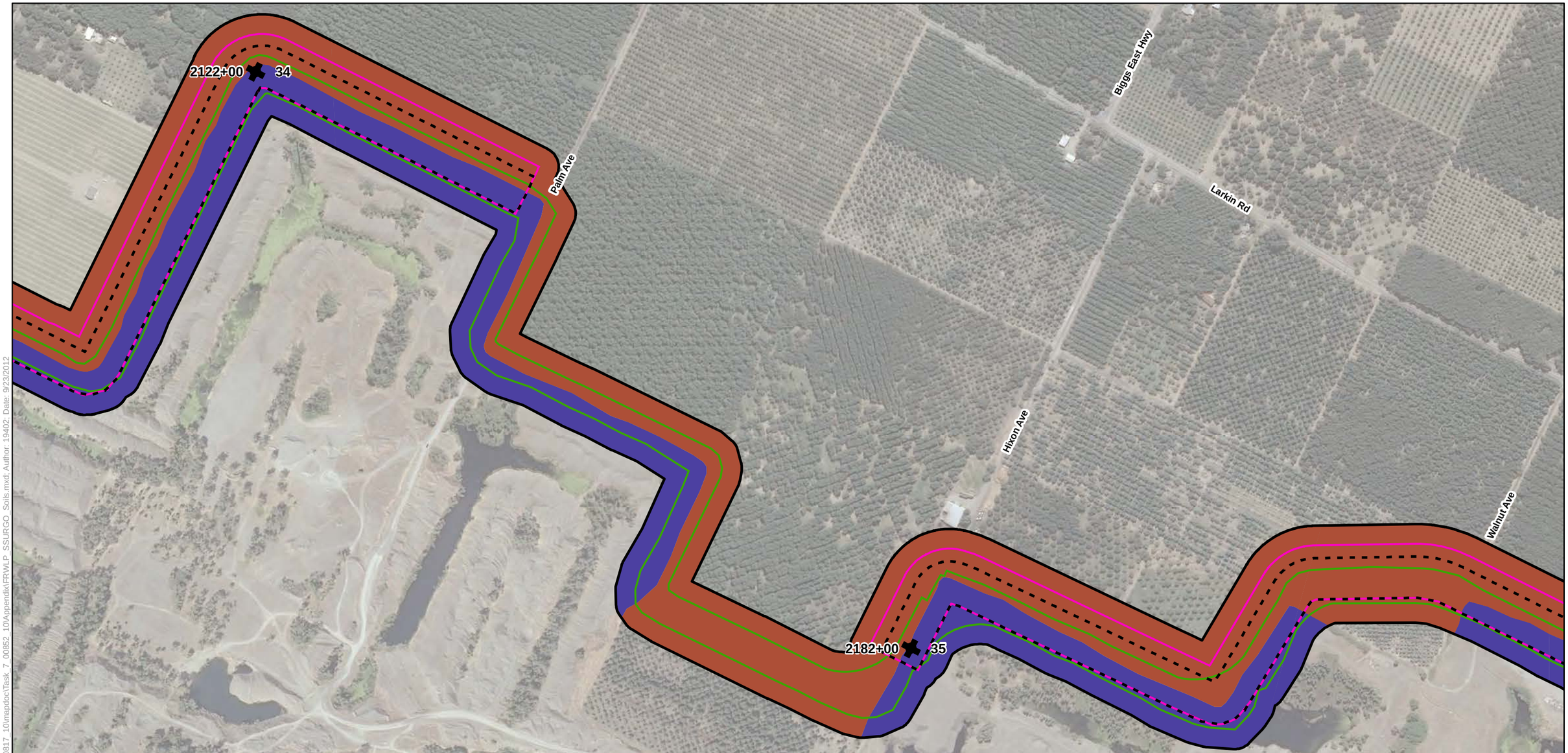
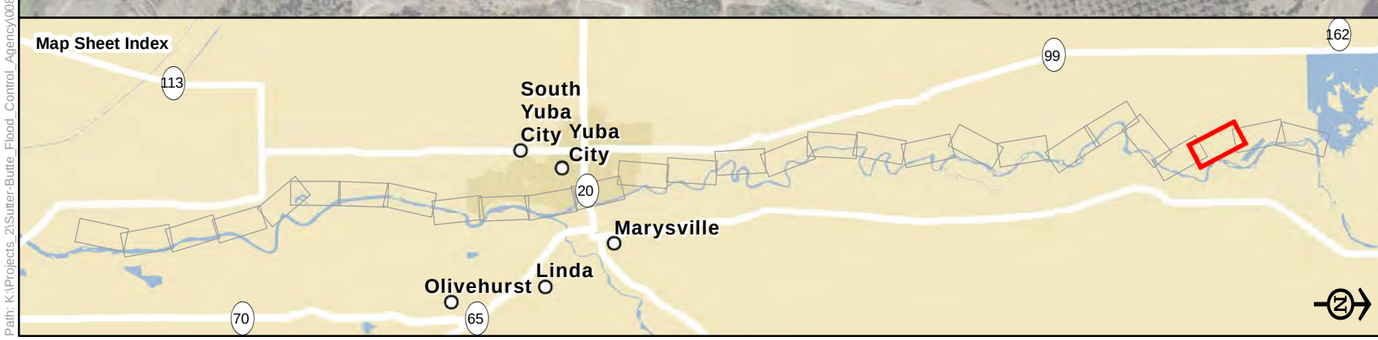




Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

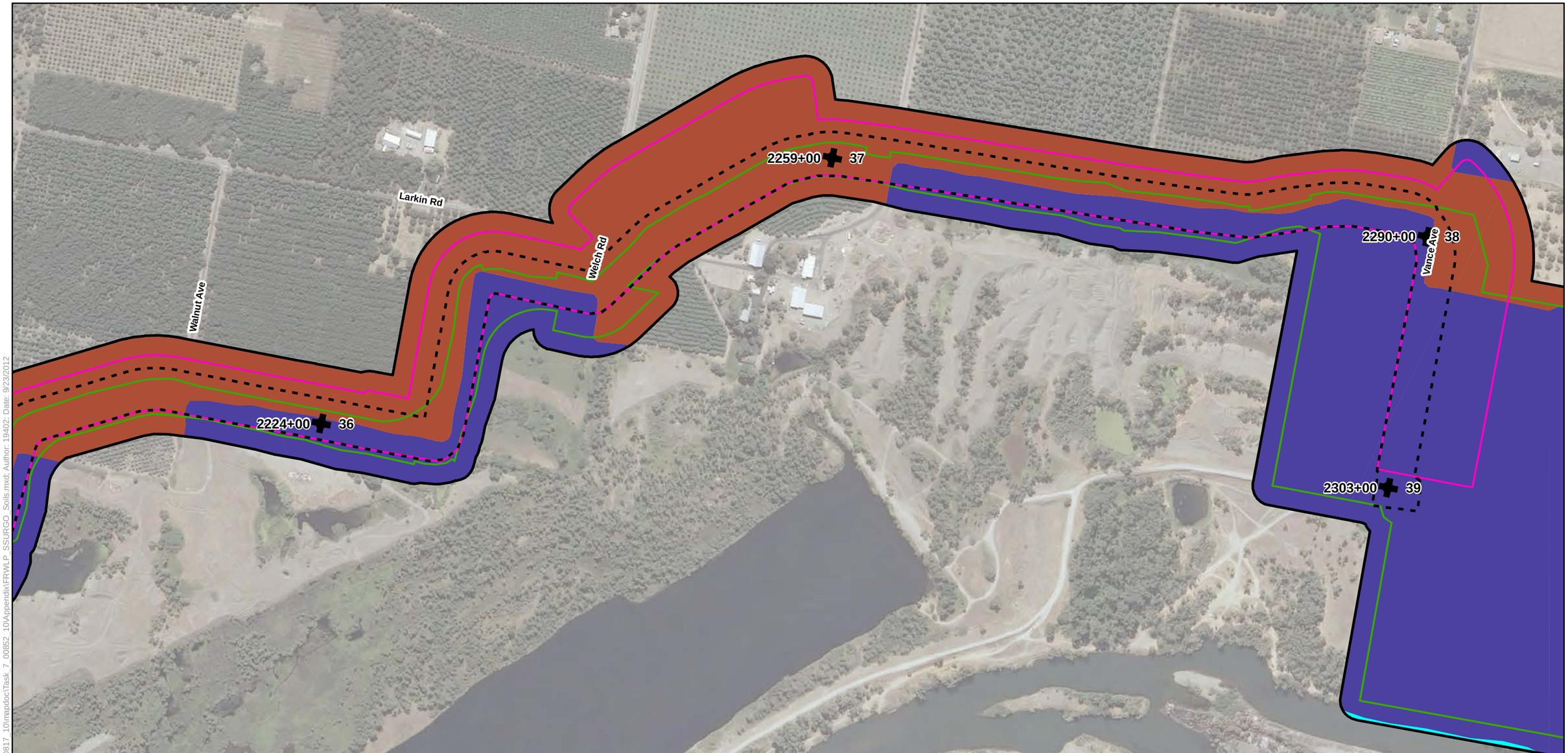
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Xerorthents, Tailings, 0 To 50 Percent Slopes

Soil Map Units in the Biological Study Area

Sheet 26

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

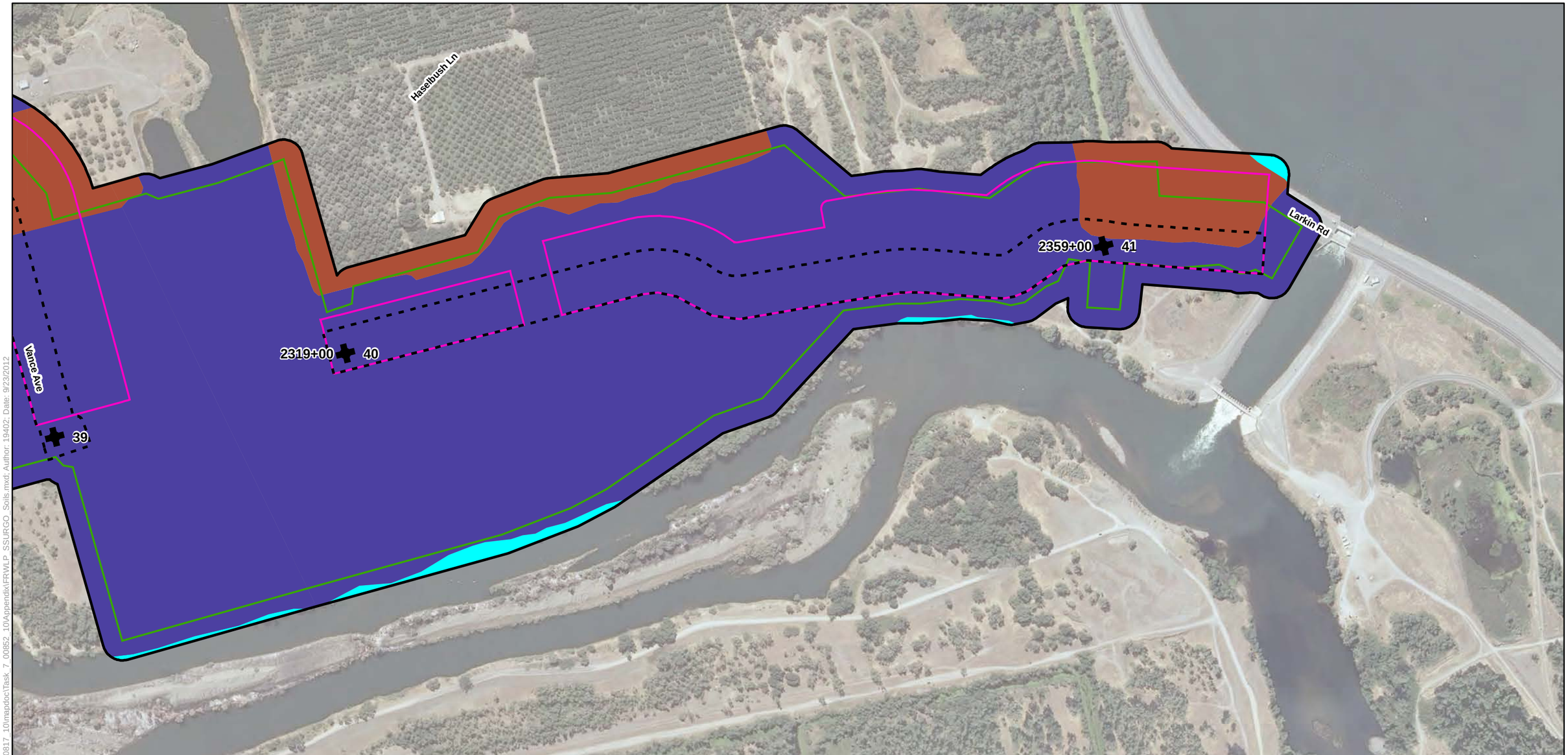
- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Xerorthents, Tailings, 0 To 50 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 27

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_0852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Soil Map Unit

- Gianella Fine Sandy Loam, 0 To 1 Percent Slopes, Rarely Flooded
- Xerorthents, Tailings, 0 To 50 Percent Slopes
- Water

Soil Map Units in the Biological Study Area

Sheet 28

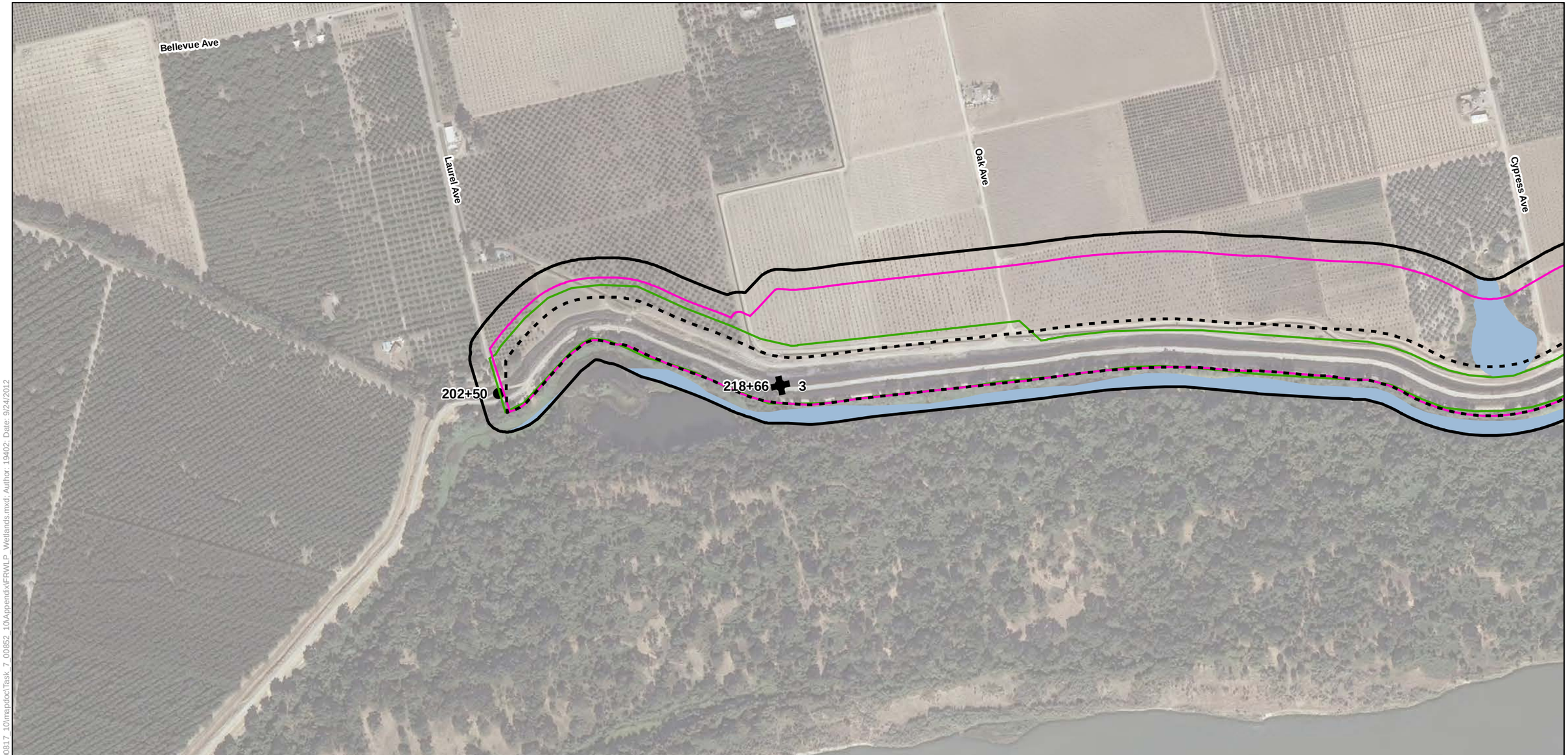
0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_SSURGO_Soils.mxd; Author: 19402; Date: 9/23/2012

Part F.11

National Wetlands Inventory Mapping in the Biological Study Area

[28 Sheets]



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

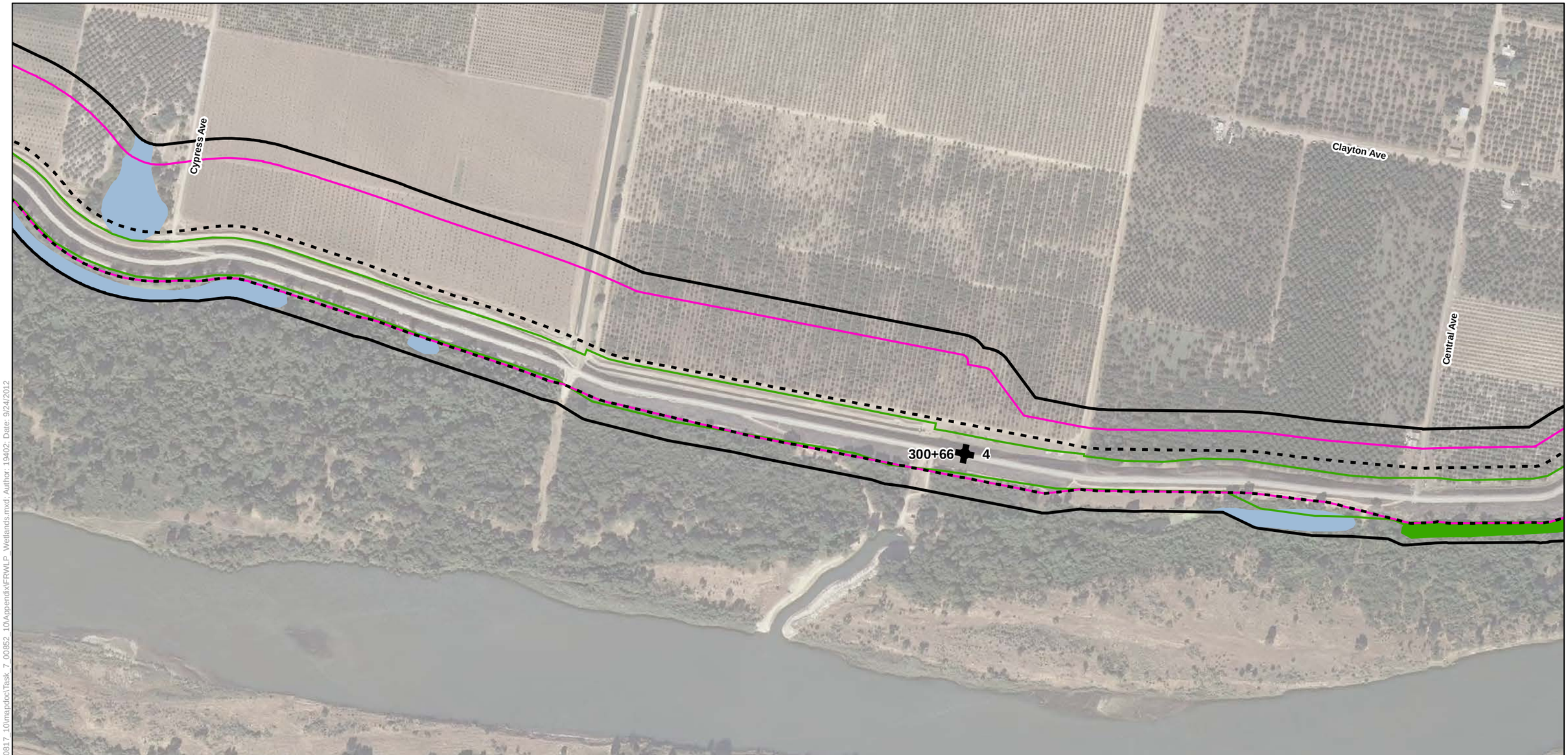
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 1

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

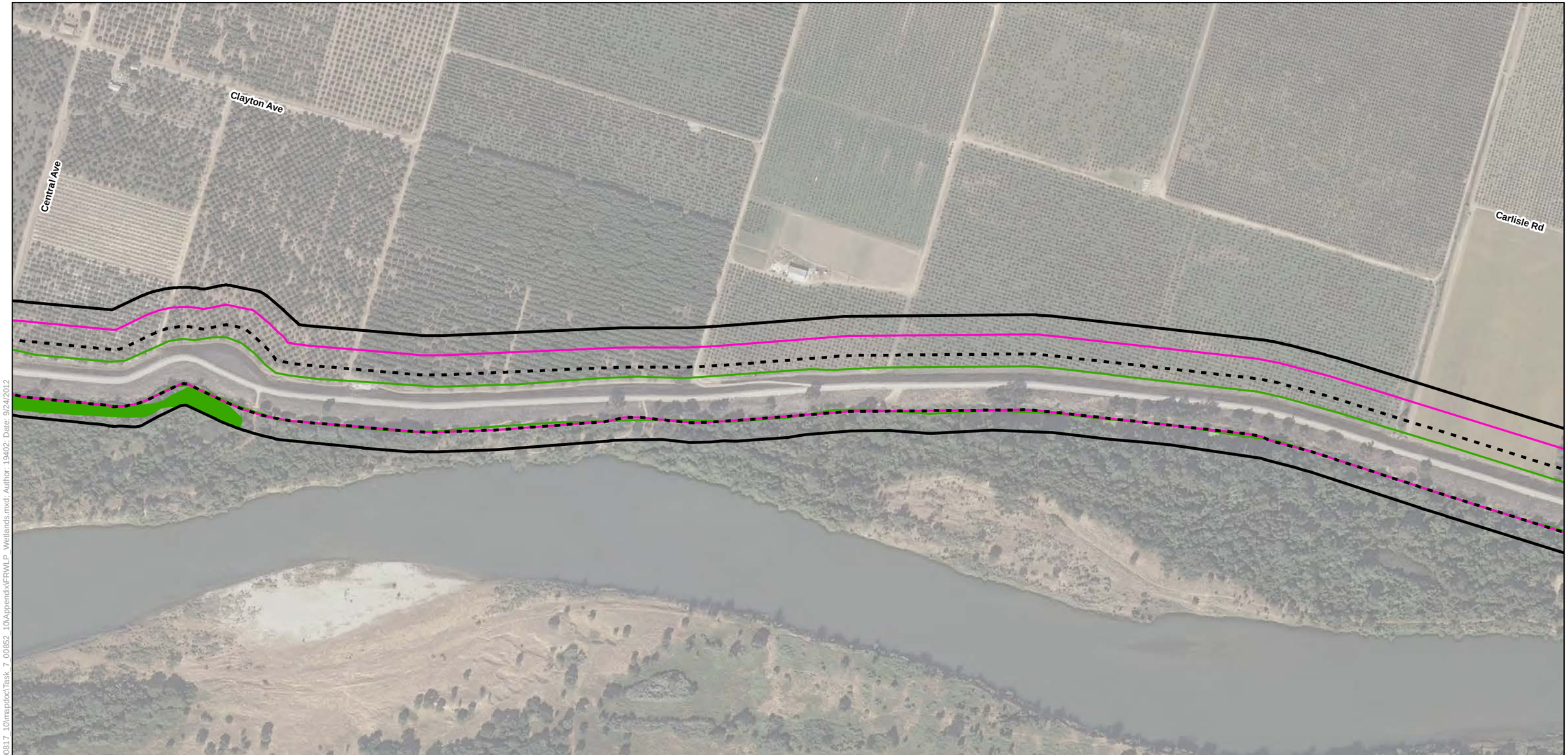
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

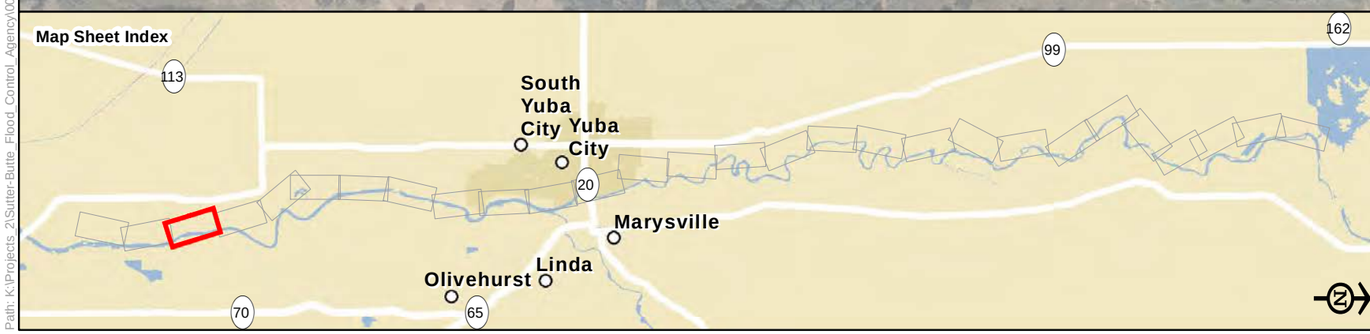
National Wetlands Inventory Mapping in the Biological Study Area

Sheet 2

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 3

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

Carlisle Rd

Wilkie Ave

Lyon Ave

Oconnor Ave

Peck Ave

Ashford Ave

410+67 5

478+68 6

Map Sheet Index

113

South Yuba City

Yuba City

20

Marysville

Linda

Olivehurst

70

65

99

162

Legend

Biological Study Area

Alternative 1

Alternative 2

Alternative 3

Reach

Station 202+50

Wetland Type

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 4

0 250 500

Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

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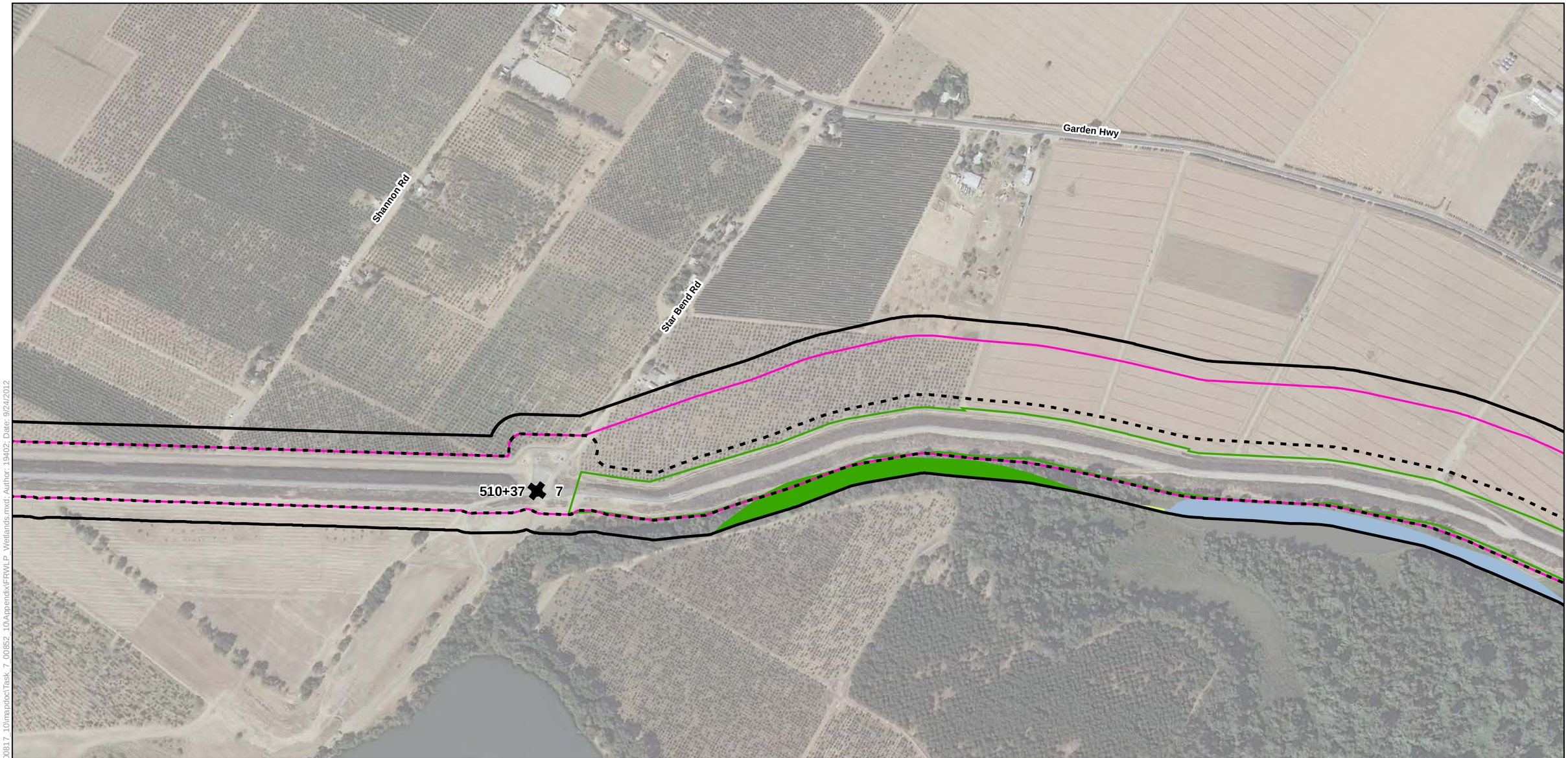

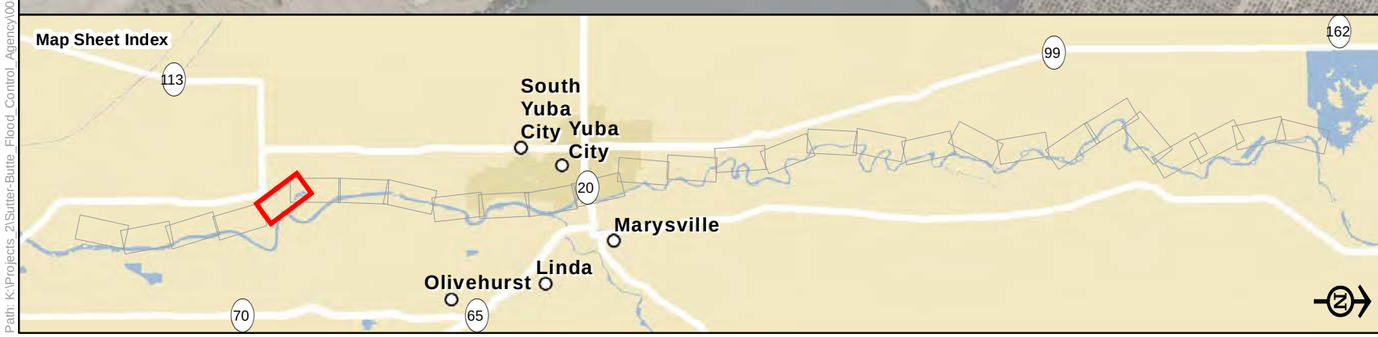

Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 5

0 250 500
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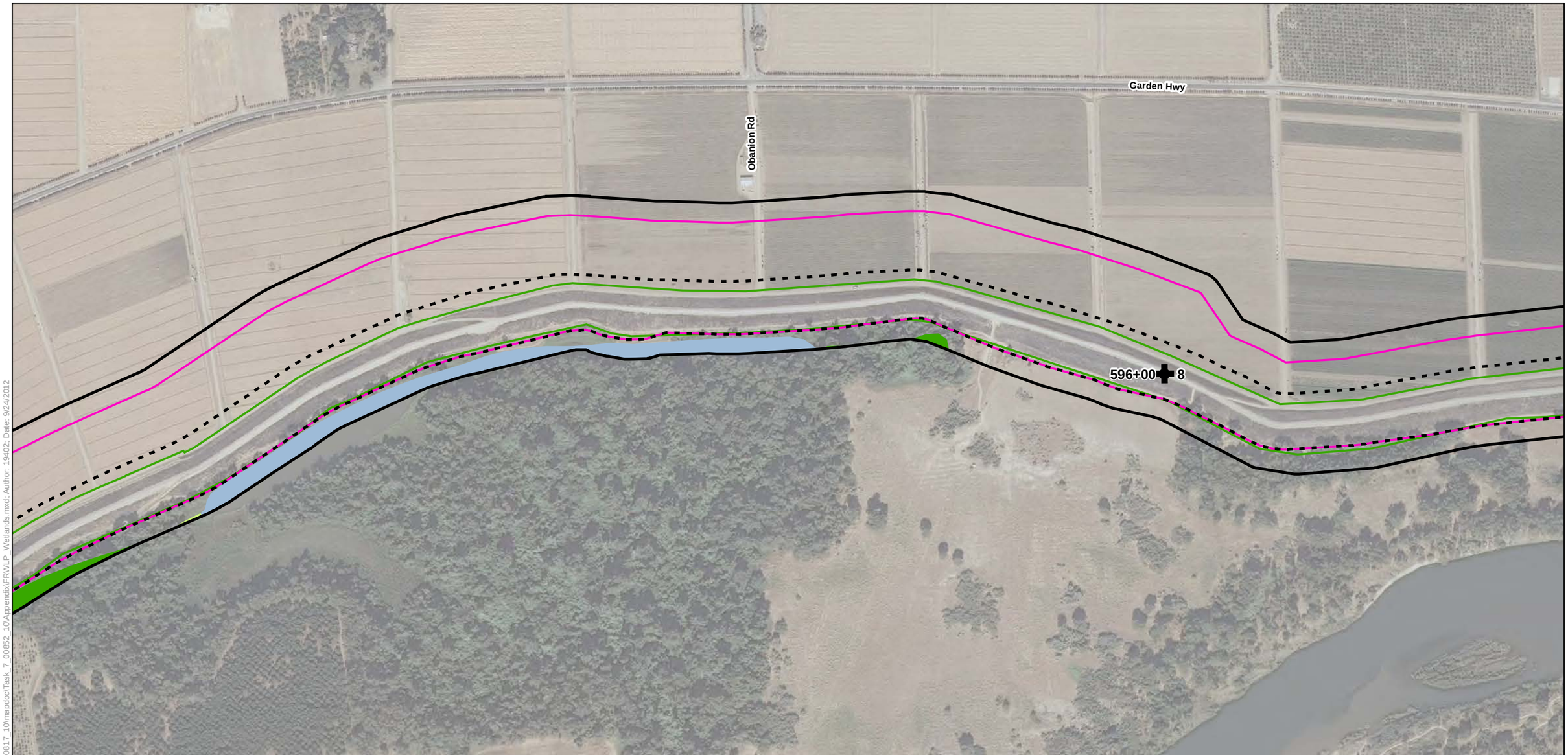


Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

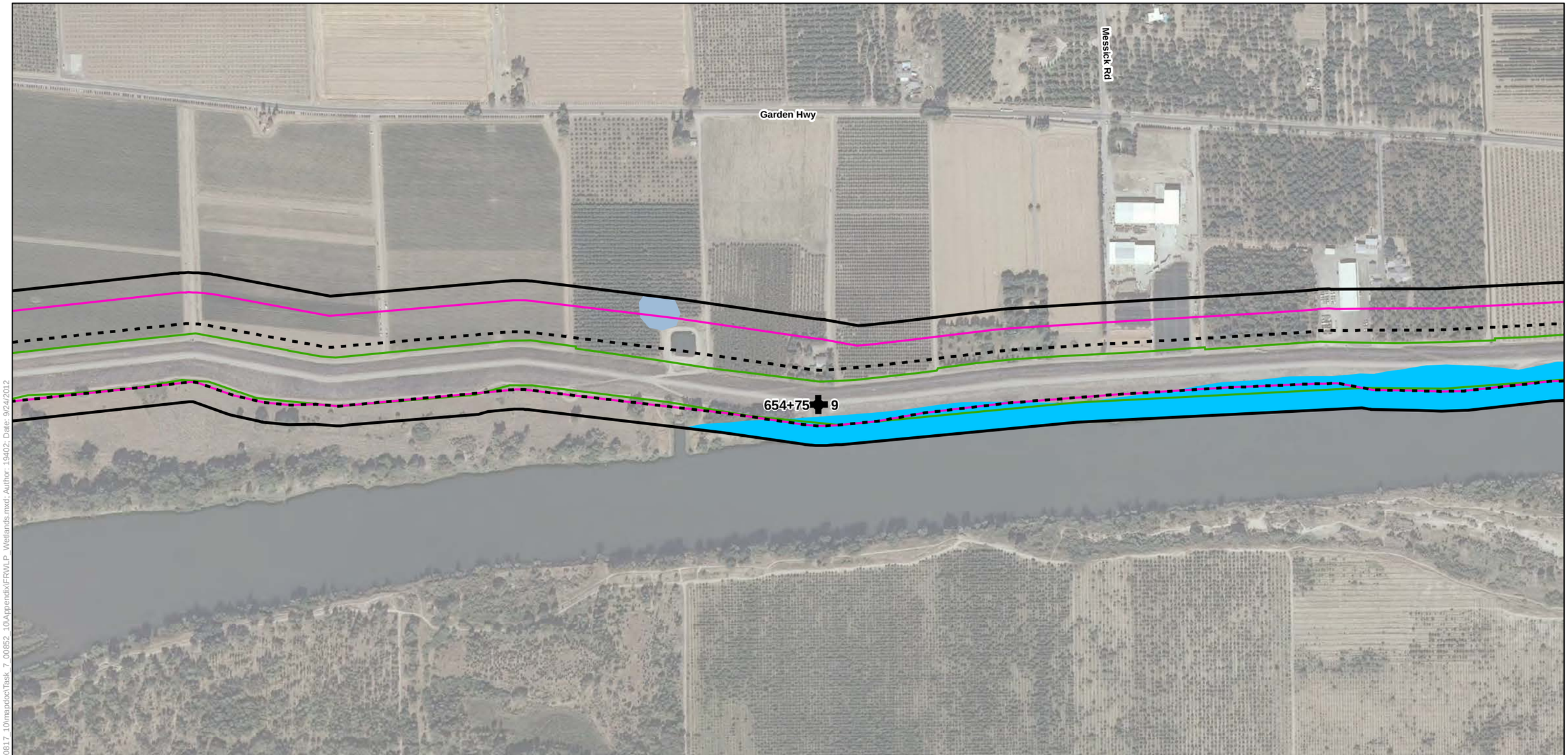
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 6

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

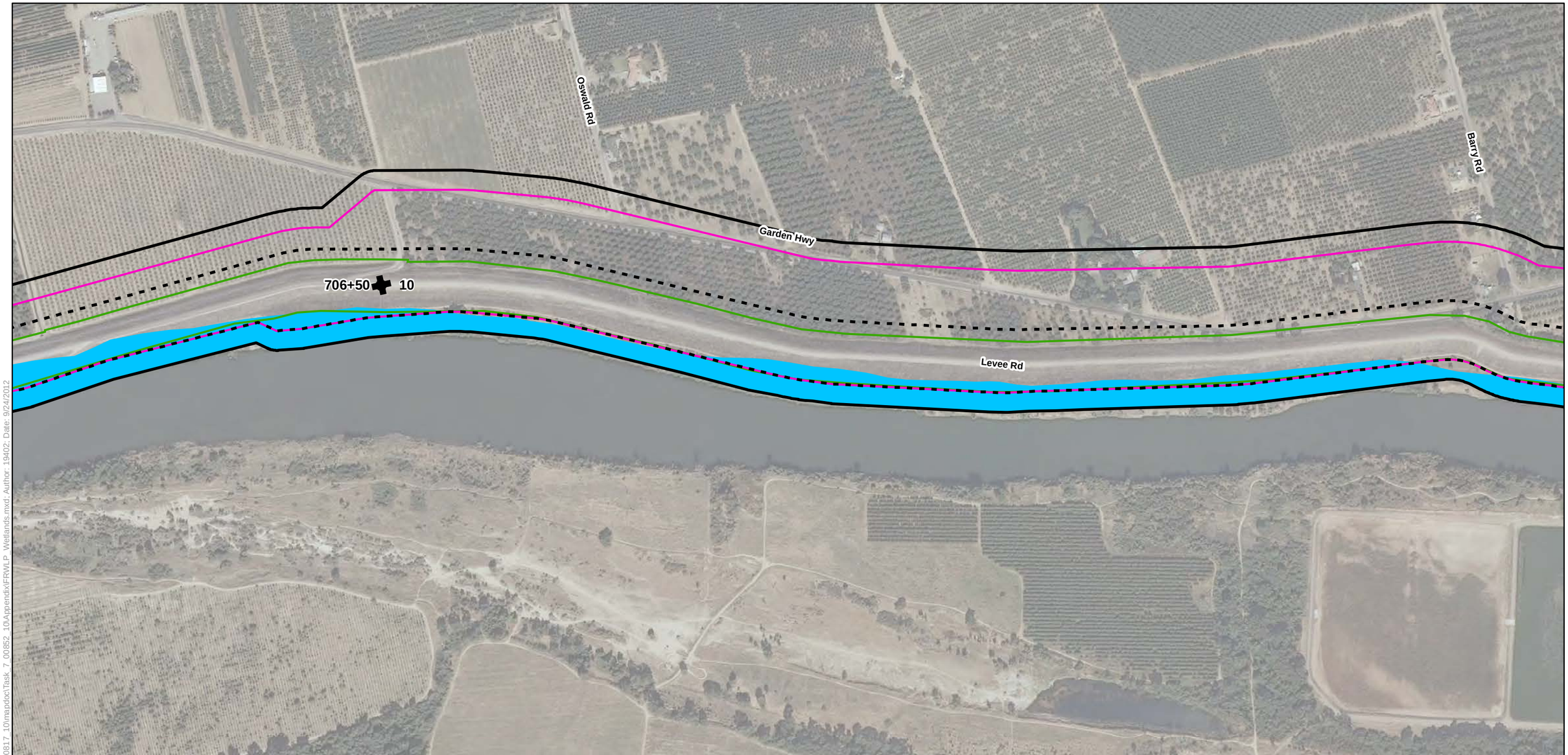
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 7

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 8

0 250 500
Feet

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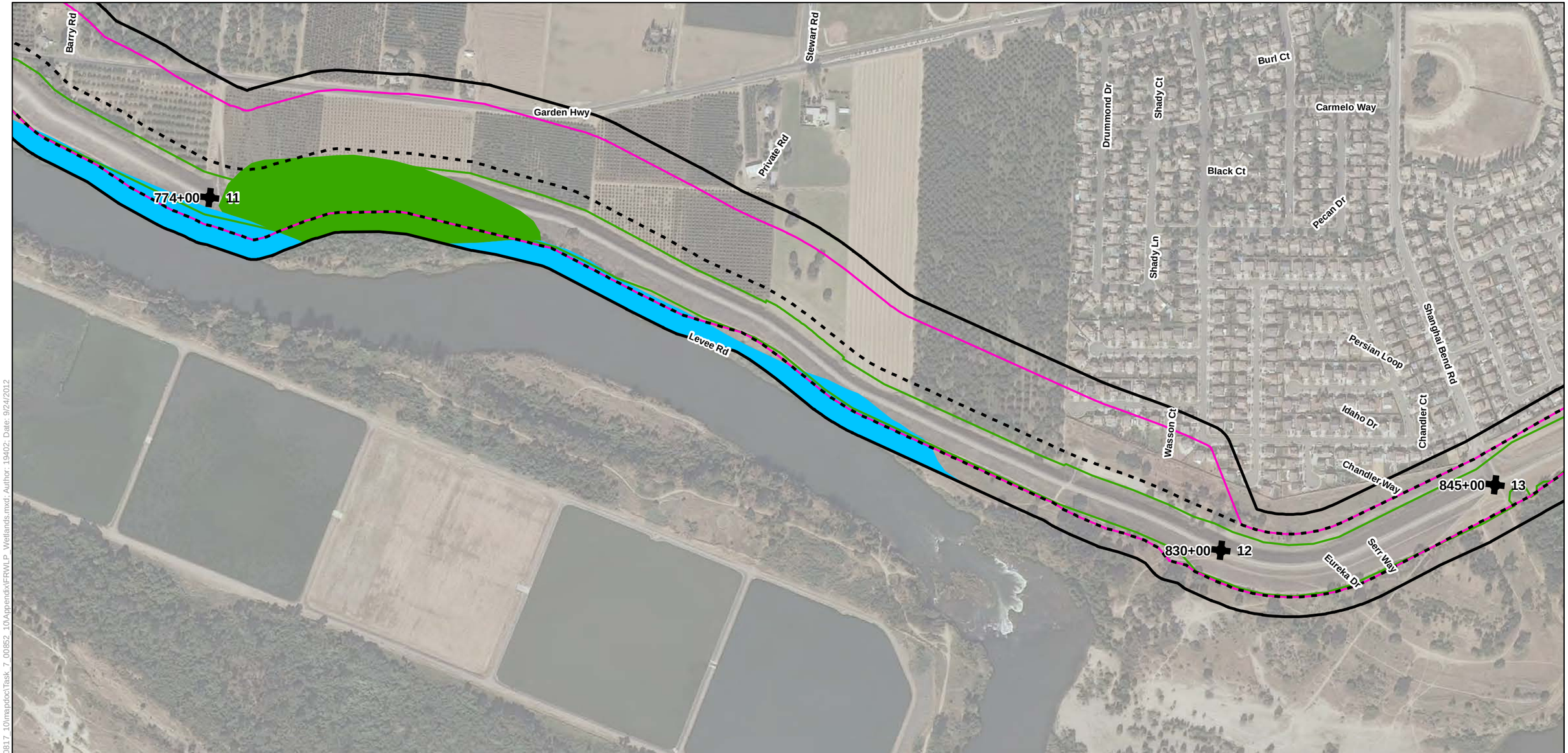

Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 9

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

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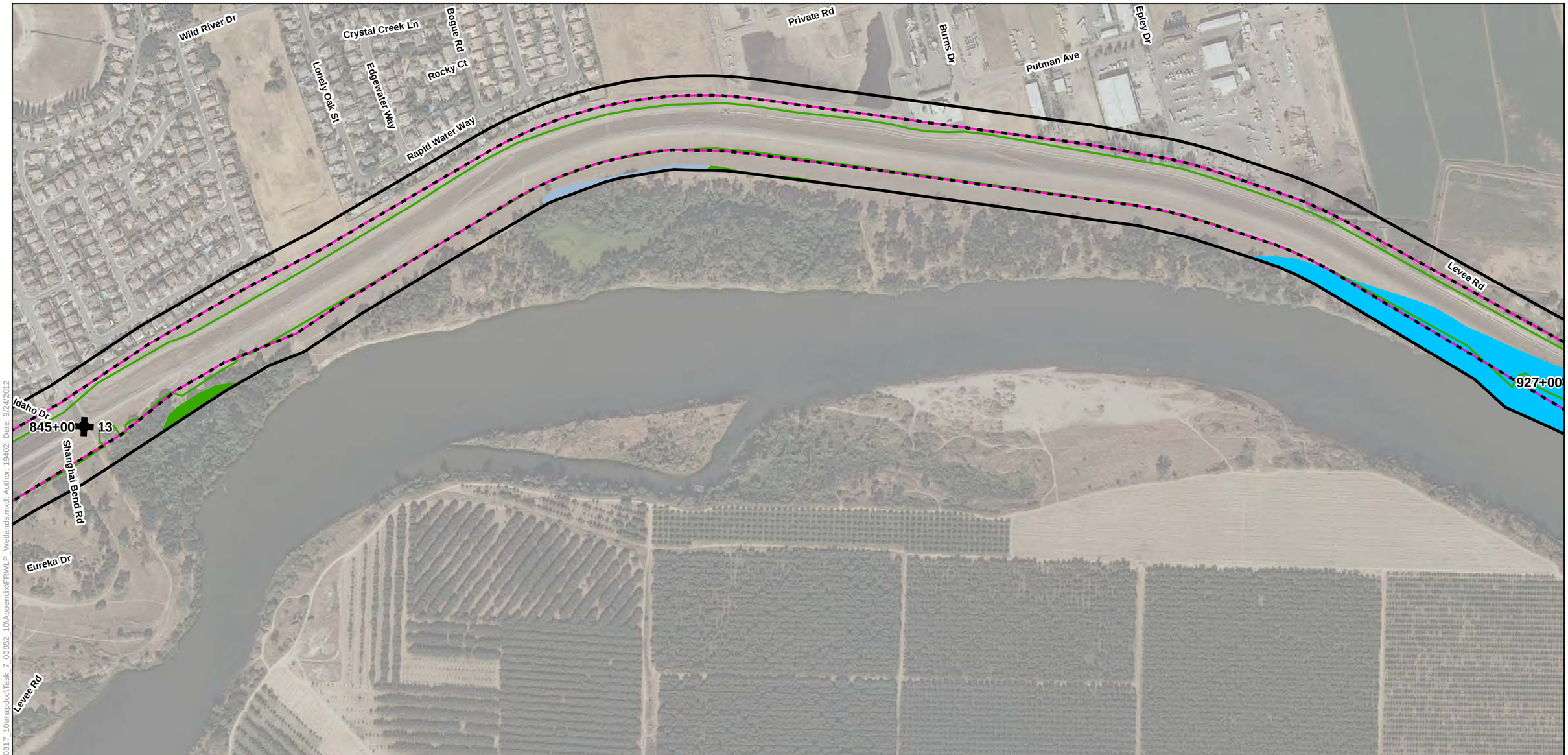


Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

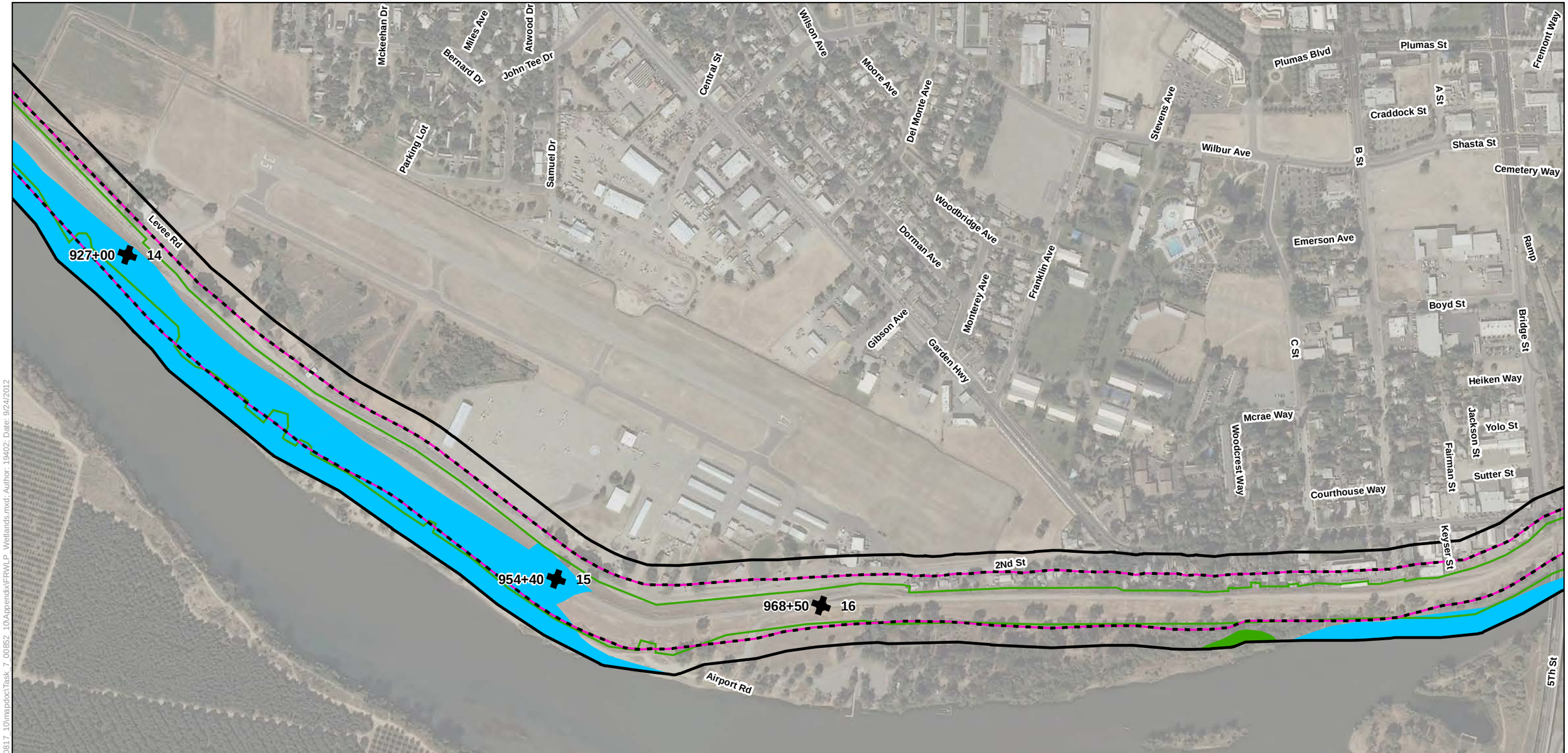
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

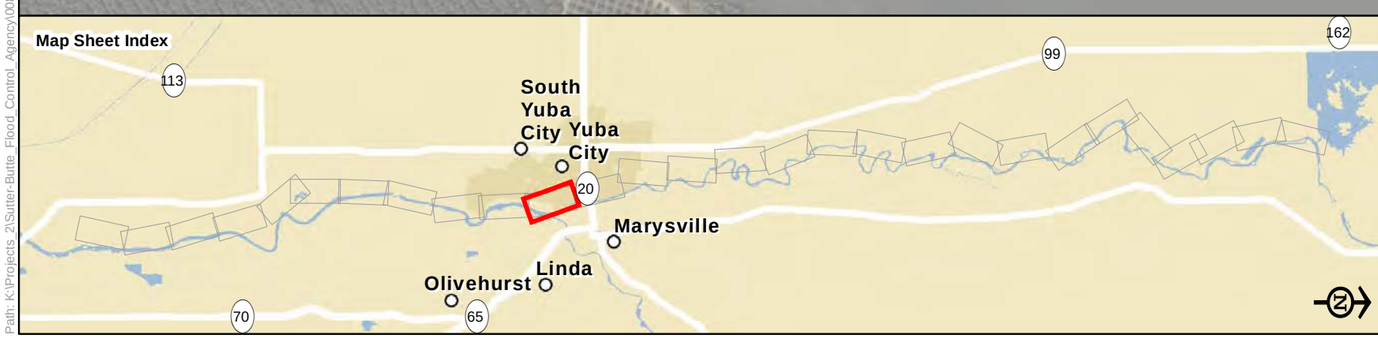
National Wetlands Inventory Mapping in the Biological Study Area

Sheet 10

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 11

0 250 500
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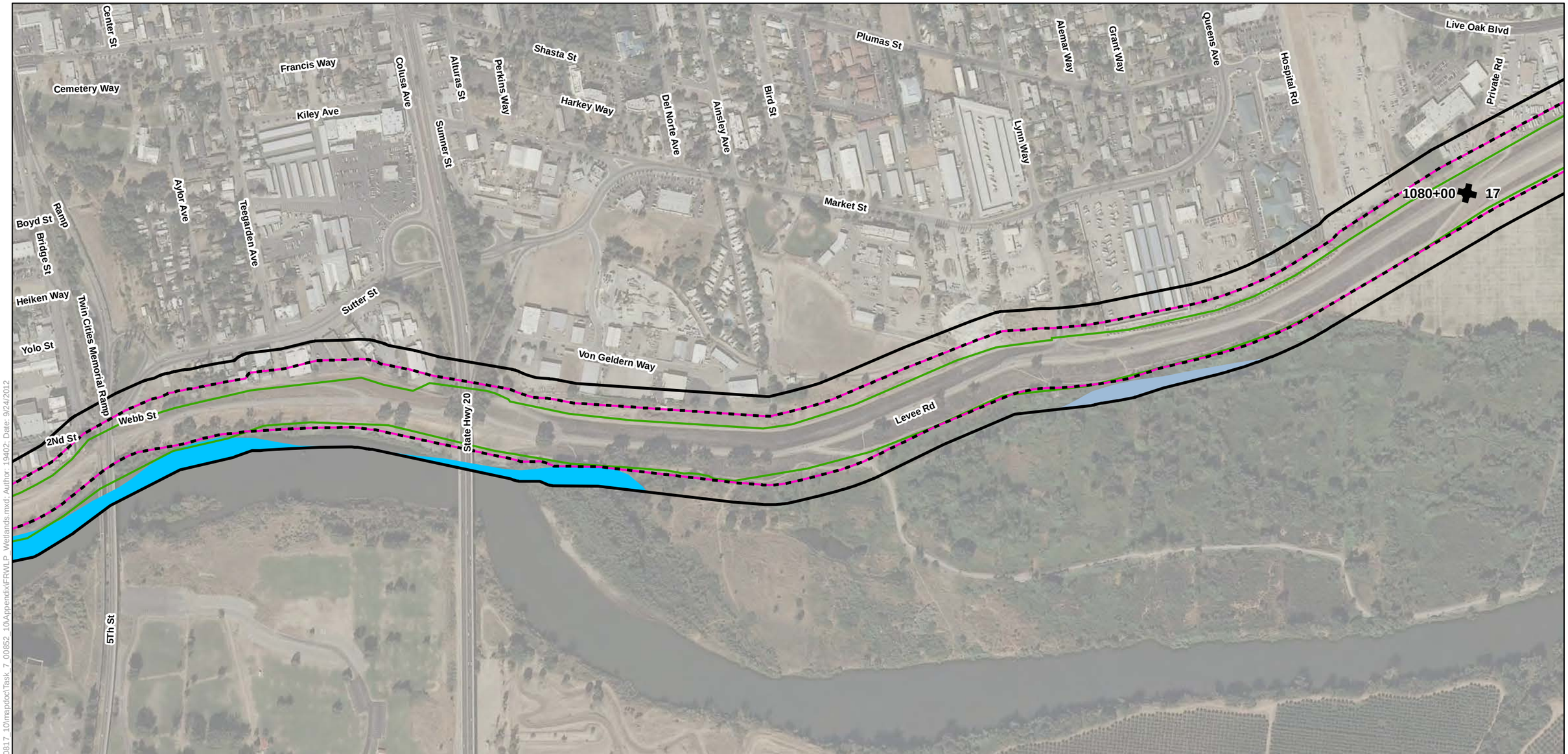
Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

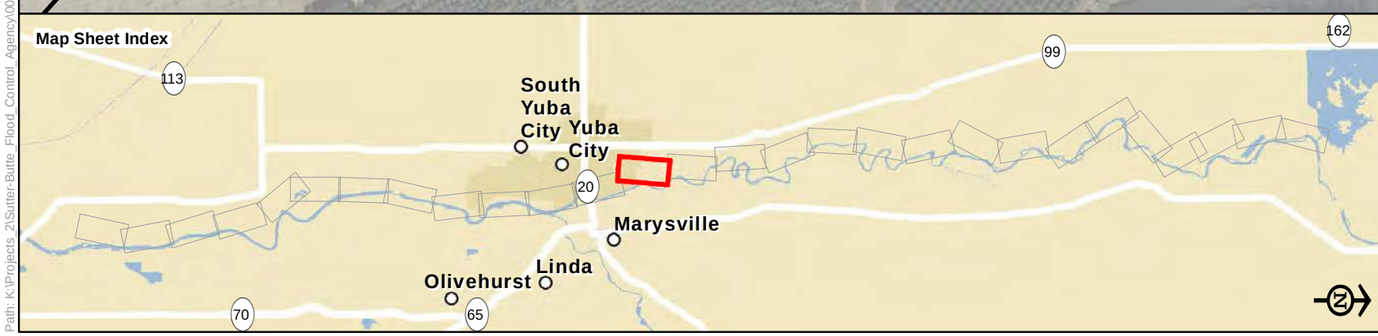
National Wetlands Inventory Mapping in the Biological Study Area

Sheet 12

0 250 500
Feet

Sandalwood Ct
Teakwood Dr
Beechwood St
Oakview Dr
Forestview Dr
Baywood Ct
N Point Dr
Northridge Dr
Santa Barbara Way
Pease Rd
Tamarack Dr
Hunt St
Clark Ave
Parkbrook Ct
Cassidy Ct
Bal Sukh Mhp Rd
Northgate Dr
Cassidy Ave
Bal Sukh Mhp
Live Oak Blvd
1130+86
18
Levee
Private Rd
17

Map Sheet Index



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

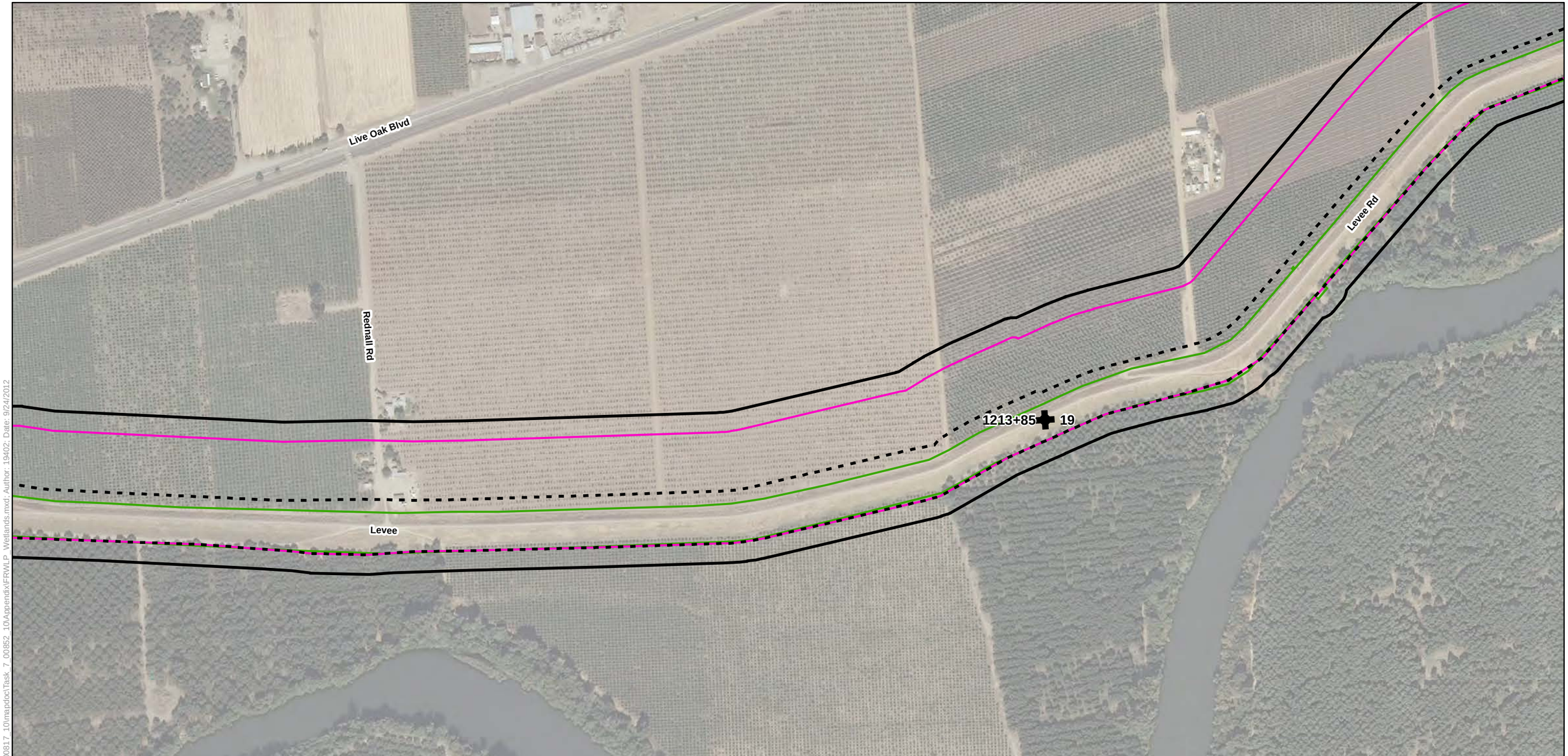
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

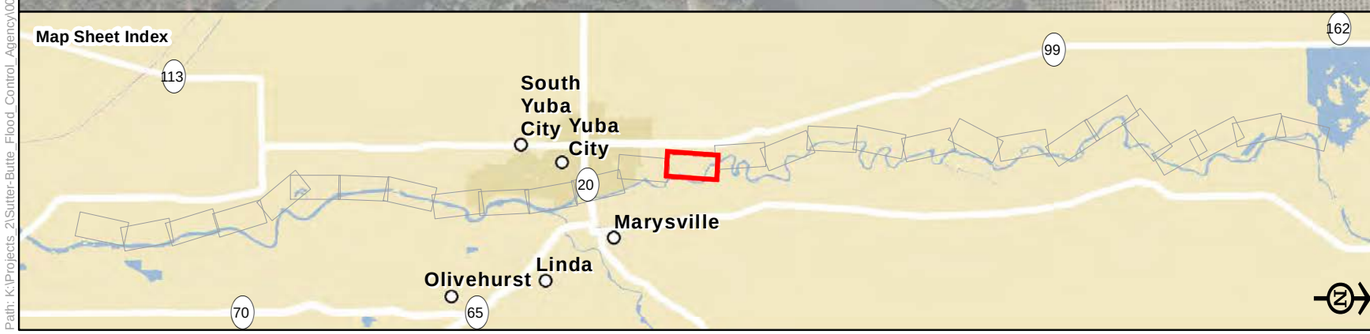
National Wetlands Inventory Mapping in the Biological Study Area

Sheet 13

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 14

0 250 500
Feet

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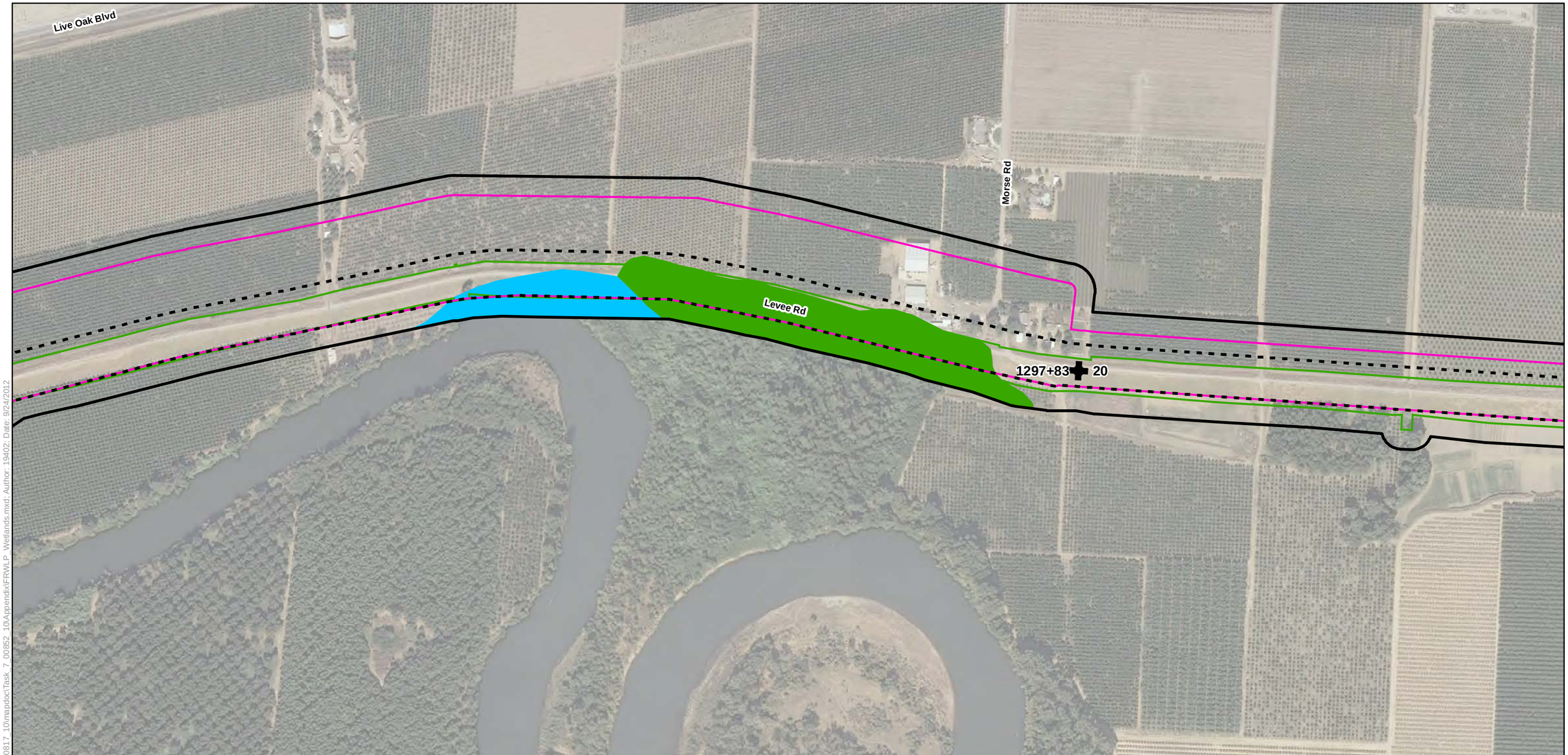

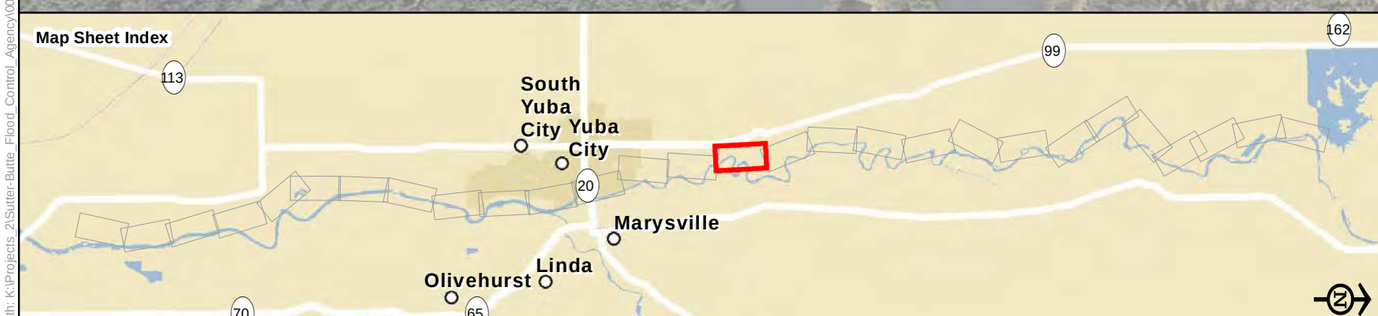

Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 15

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

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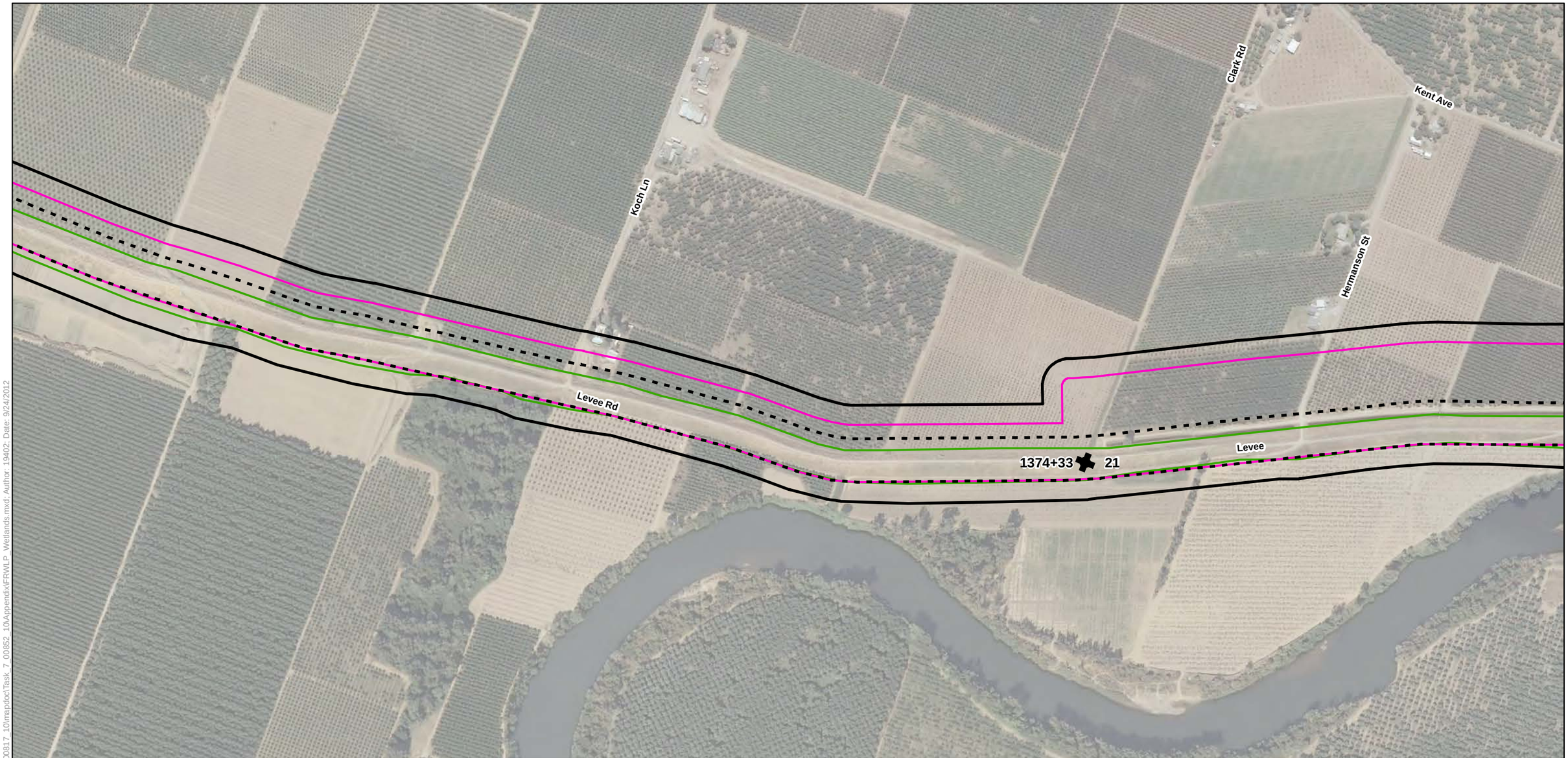
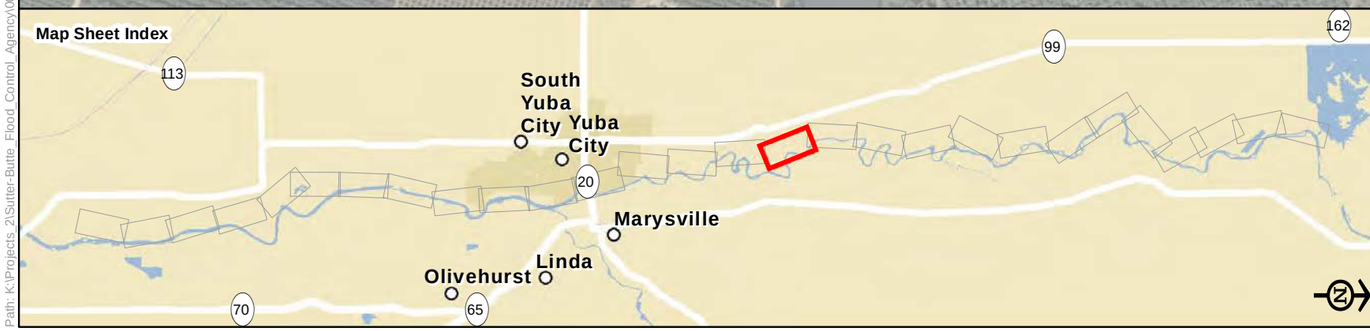




Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

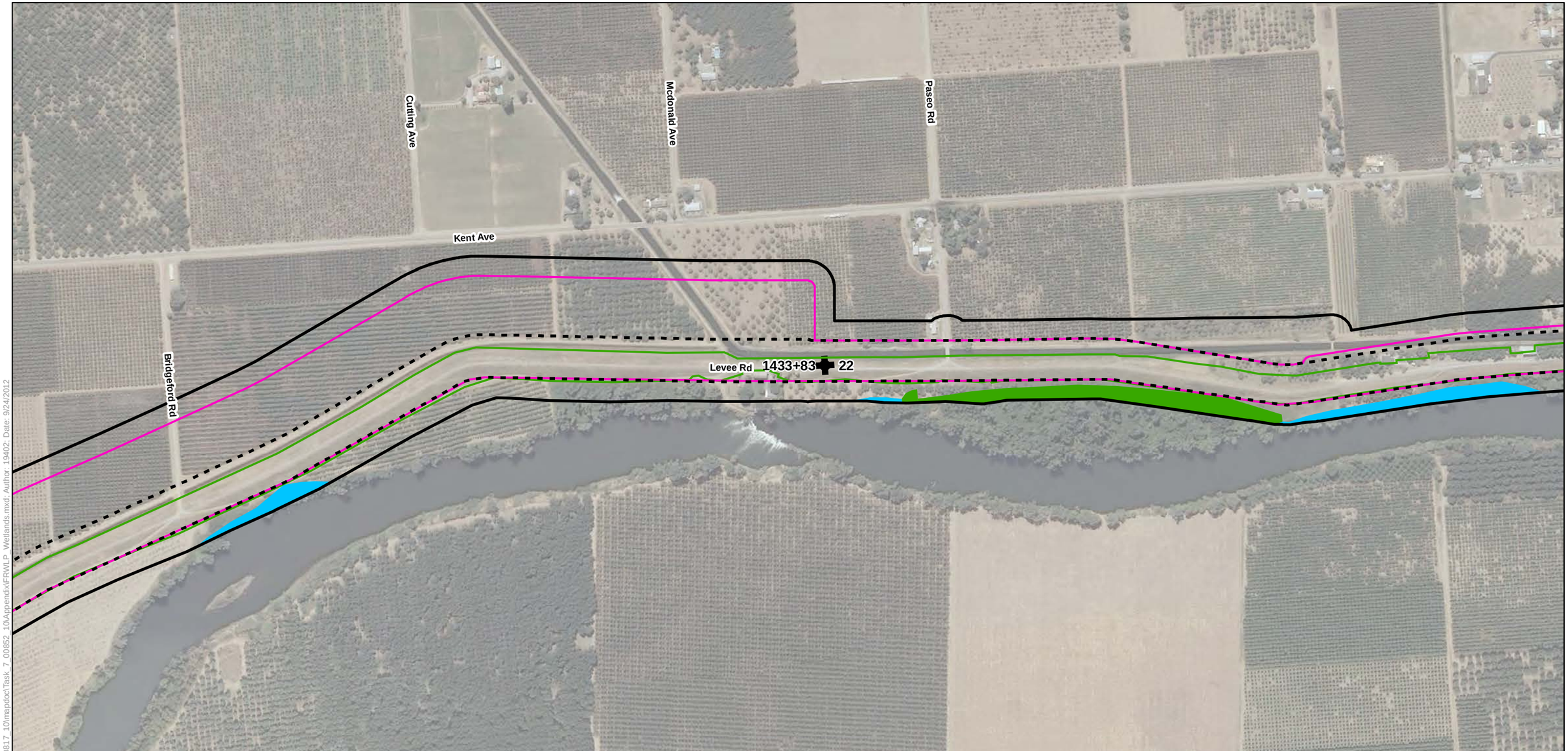
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

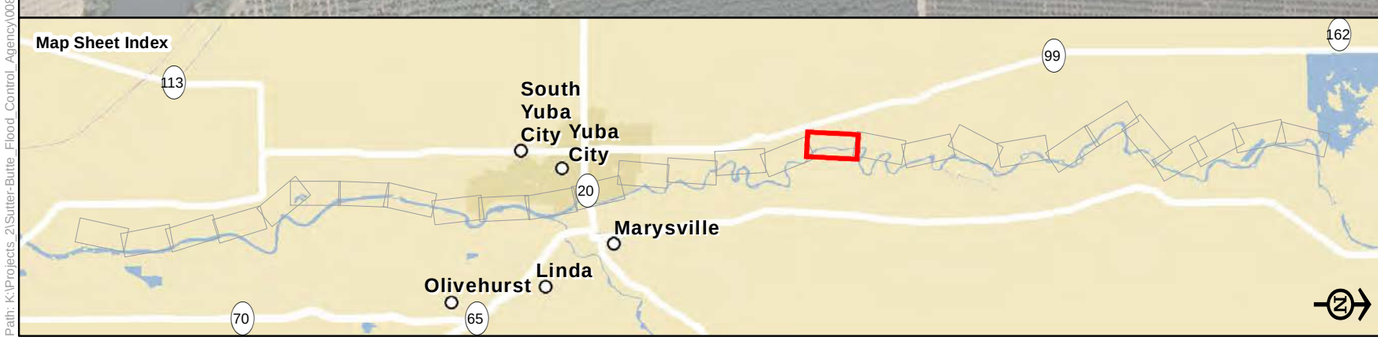
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 16

0 250 500
Feet





Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

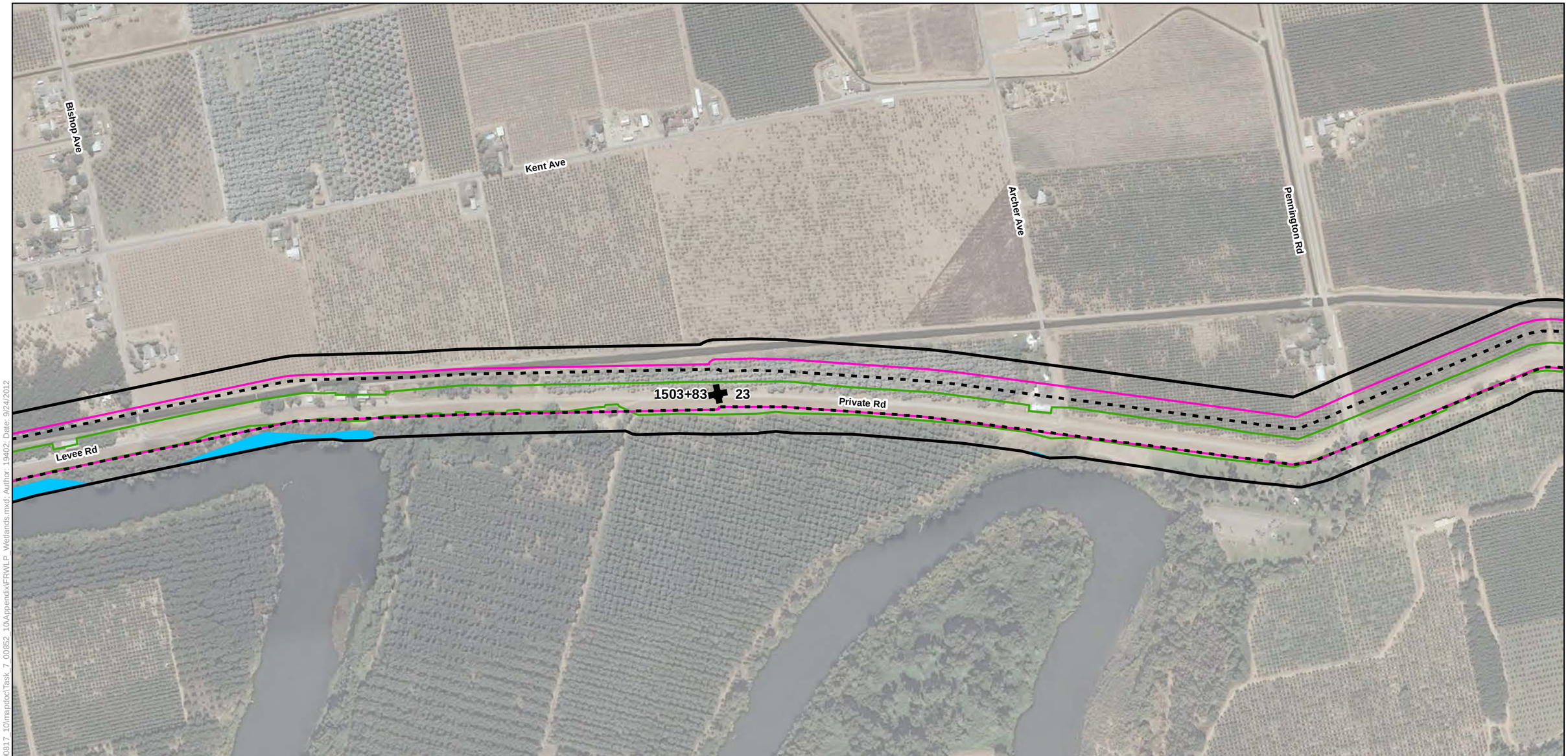
Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 17

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 18

0 250 500
Feet

Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

Campbell Rd

Encinal Rd

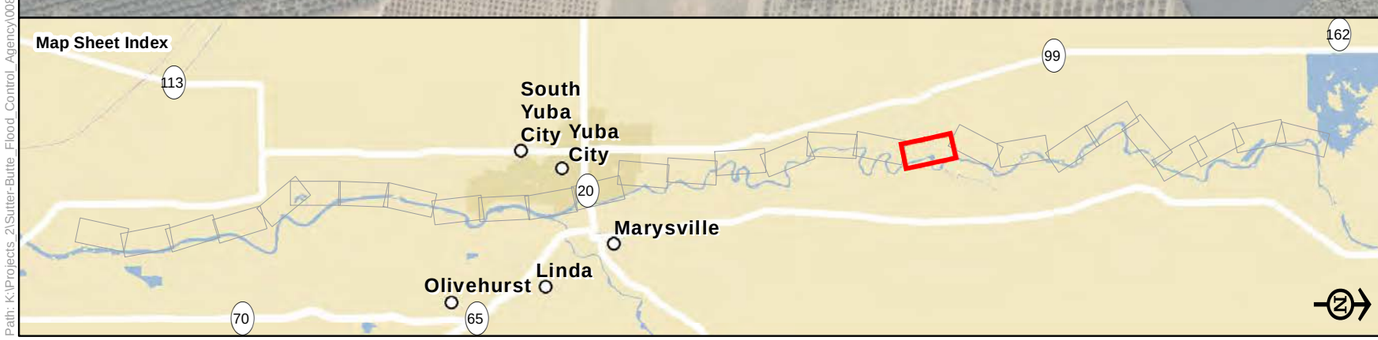
Cooley Rd

Private Rd

1623+86 25

1609+37 24

Sparrow Ln



Legend

- Biological Study Area
- Alternative 1
- Alternative 2
- Alternative 3
- Reach
- Station 202+50

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Source: Wetlands - U.S. Fish and Wildlife Service, Nationional Wetlands Inventory (2012).

National Wetlands Inventory Mapping in the Biological Study Area

Sheet 19

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Path: K:\Projects_2\Sutter-Butte_Flood_Control_Agency\00817_10\mapdoc\Task_7_00852_10\Appendix\FRWLP_Wetlands.mxd; Author: 19402; Date: 9/24/2012

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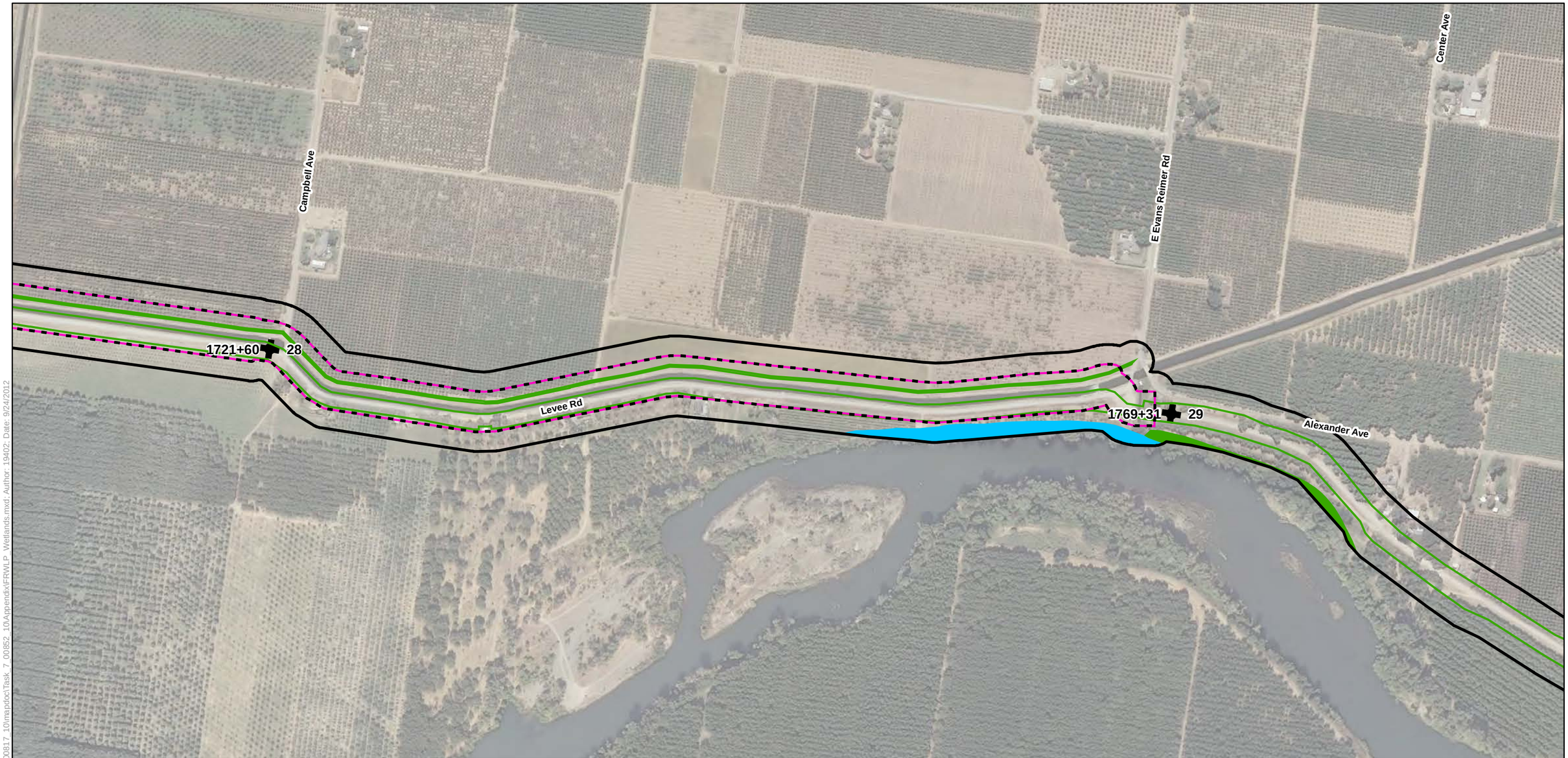

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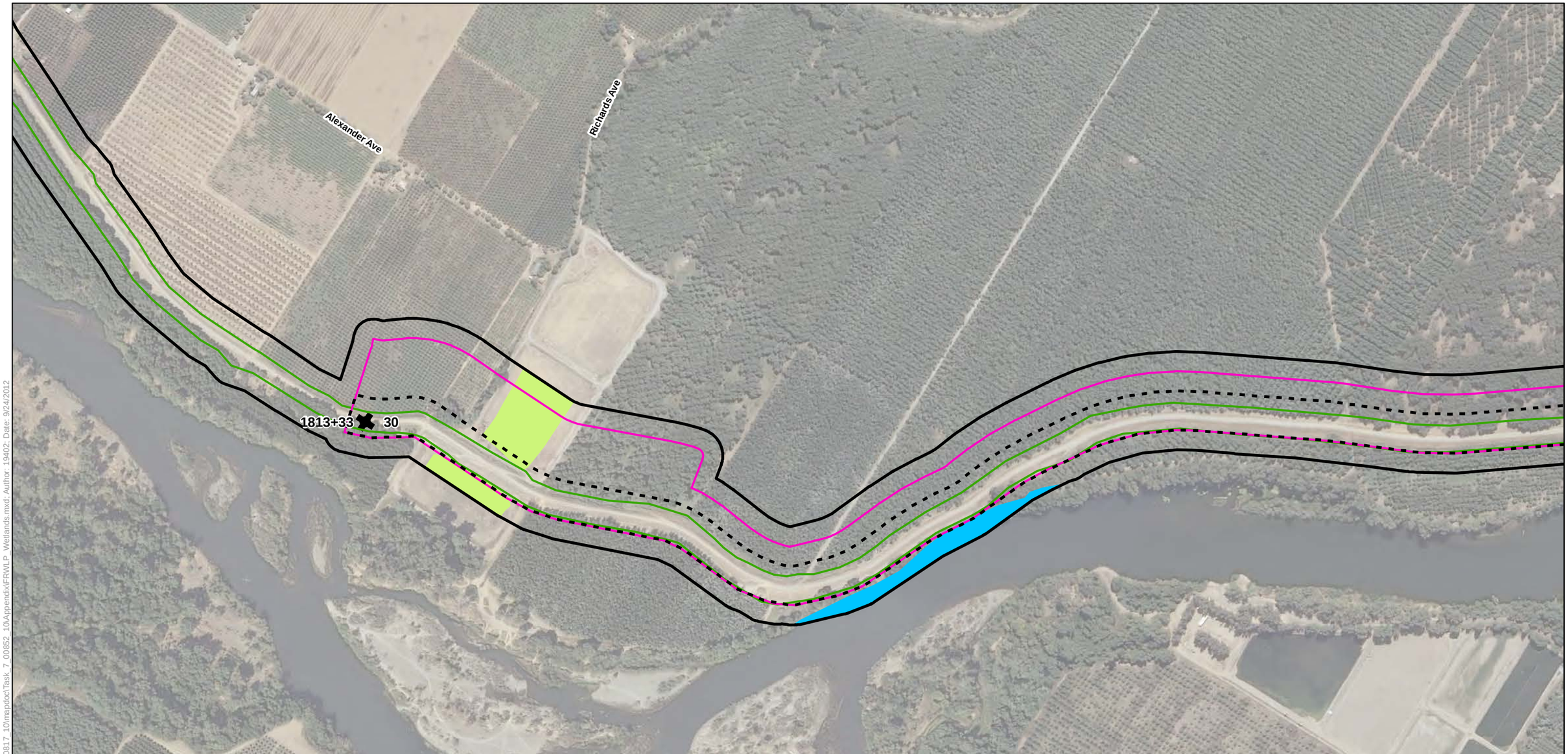

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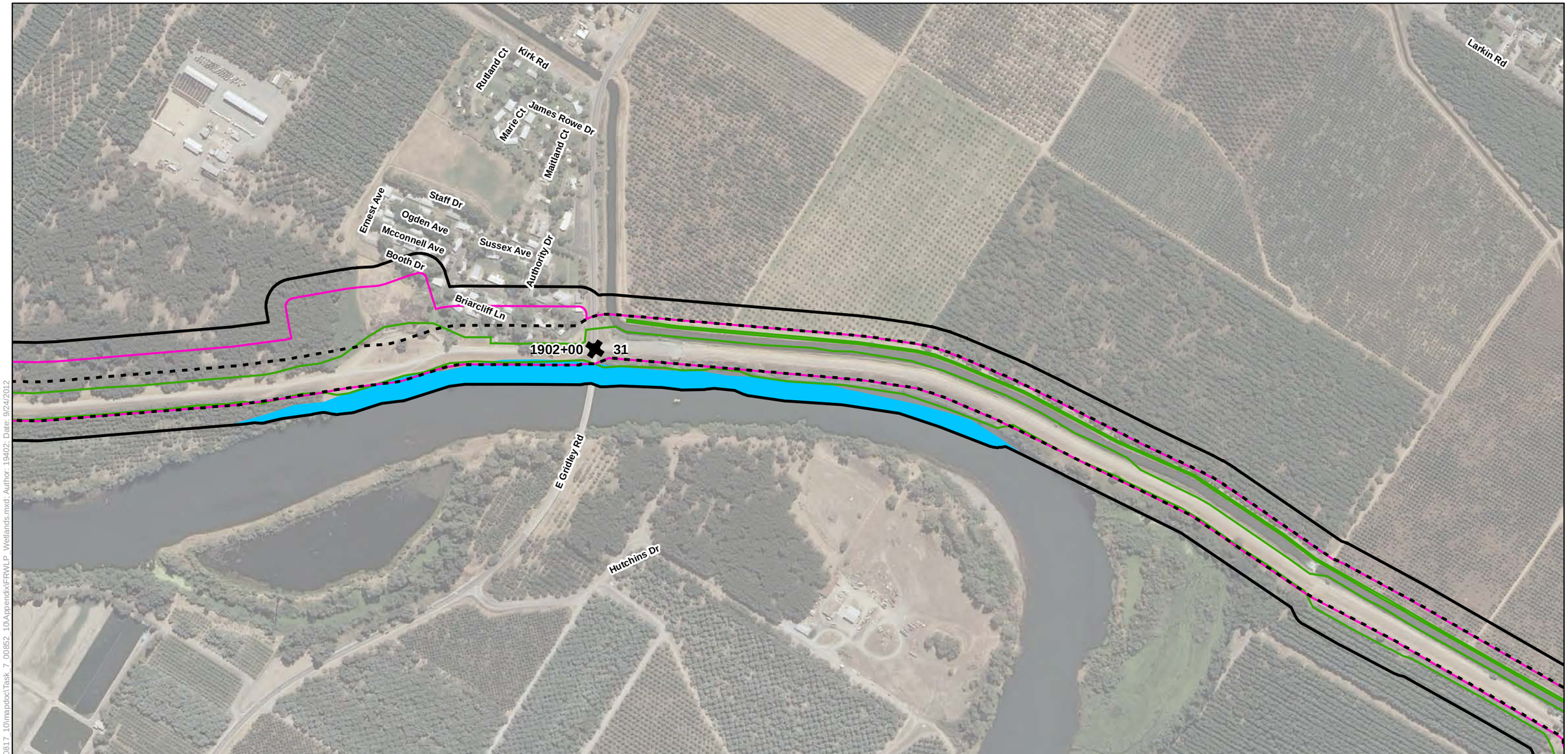

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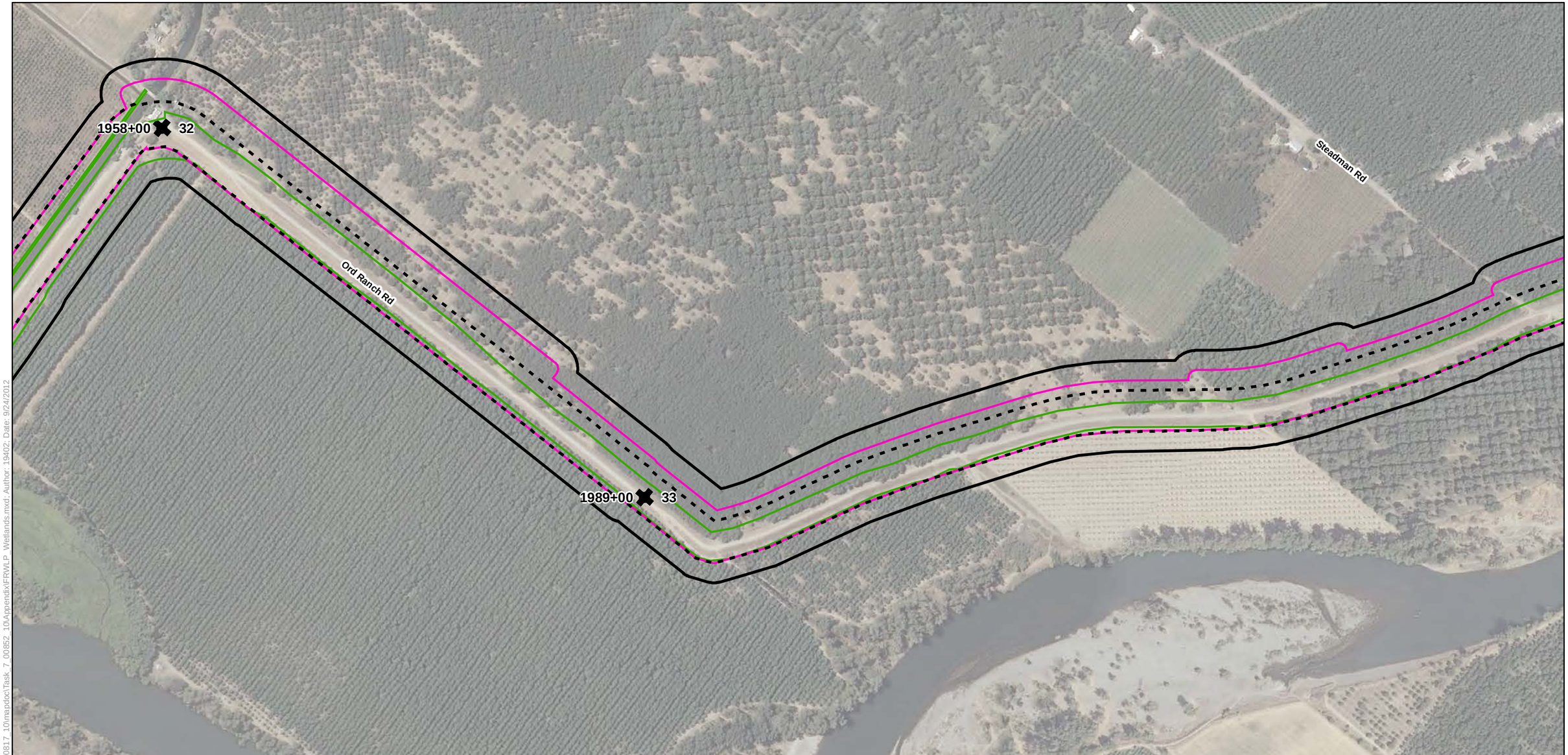

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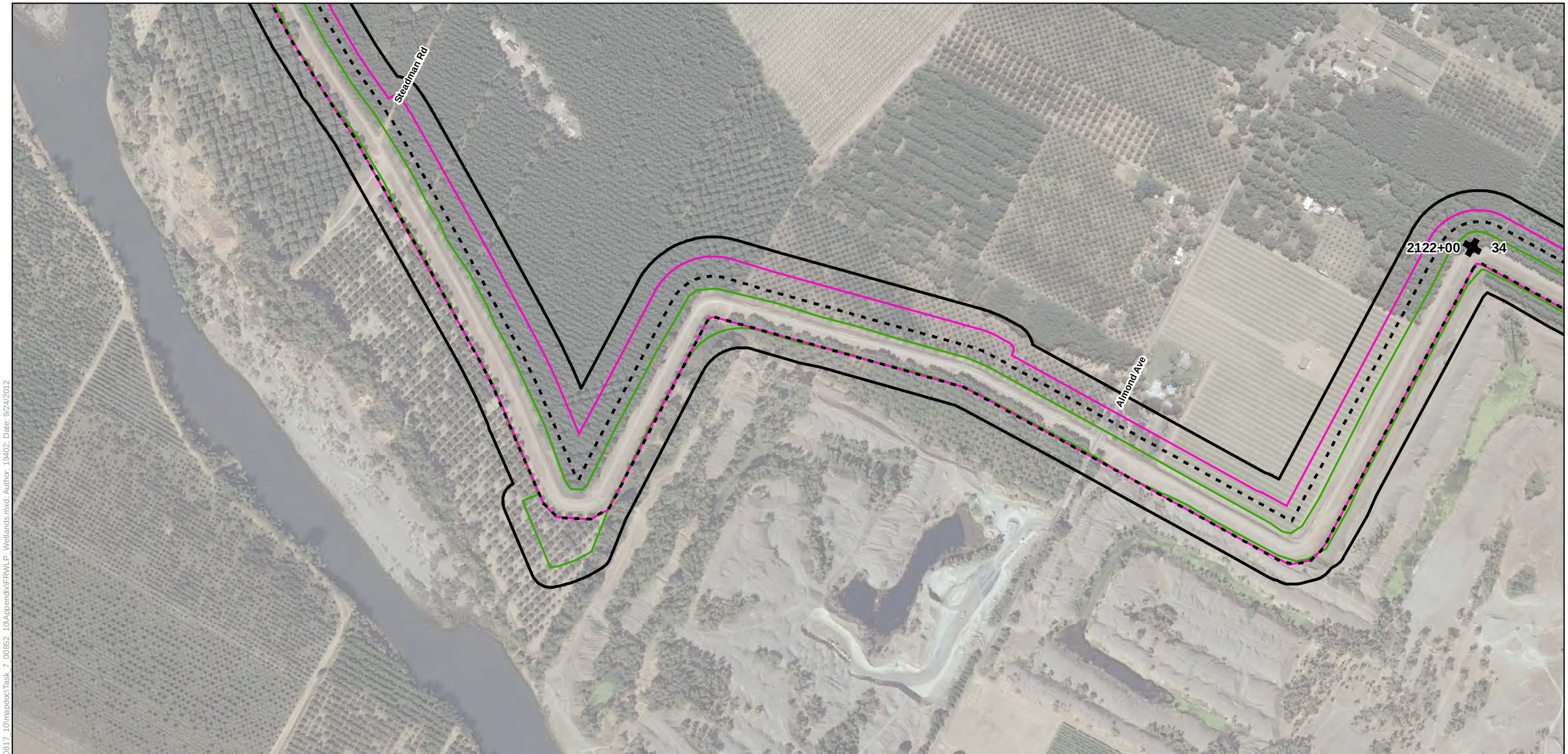

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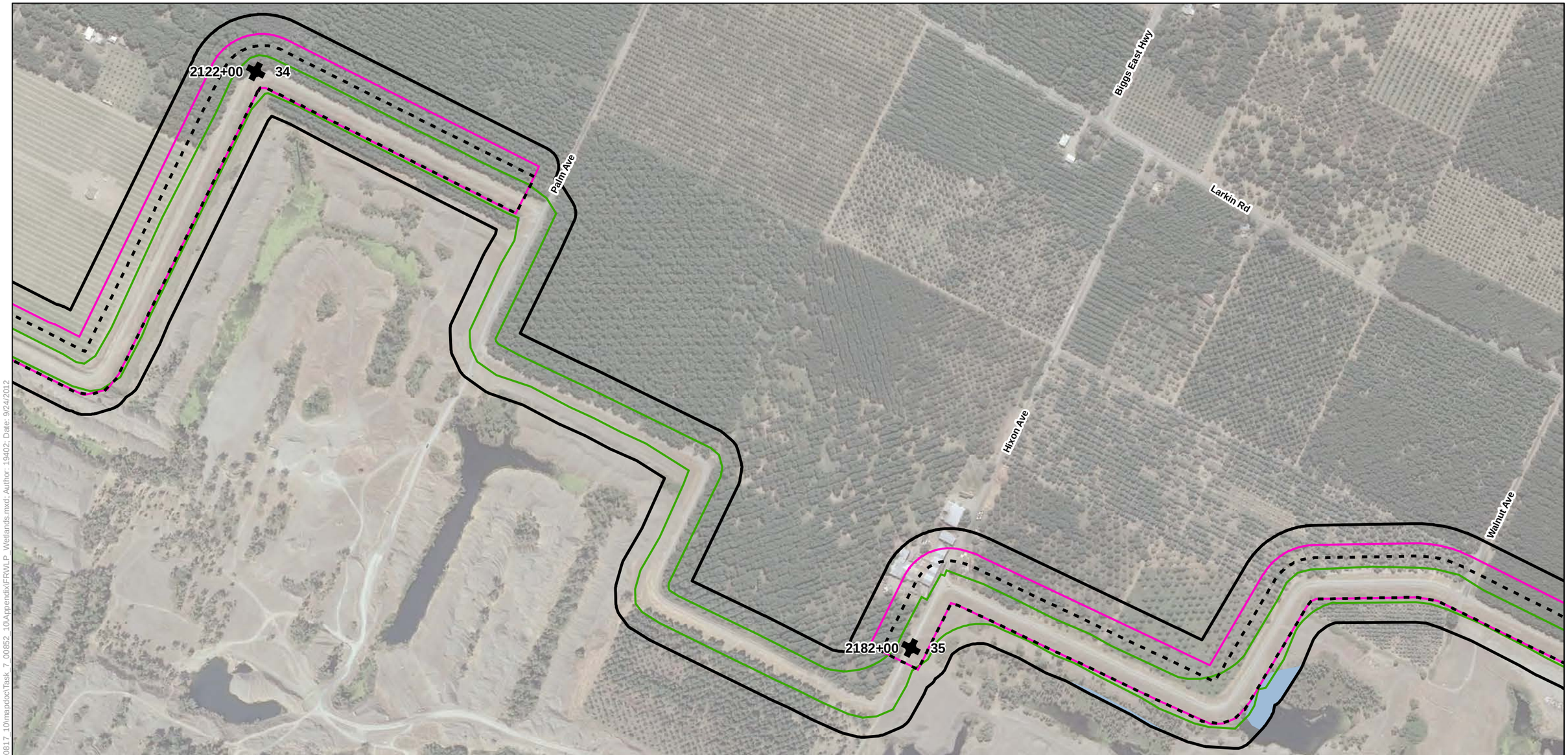

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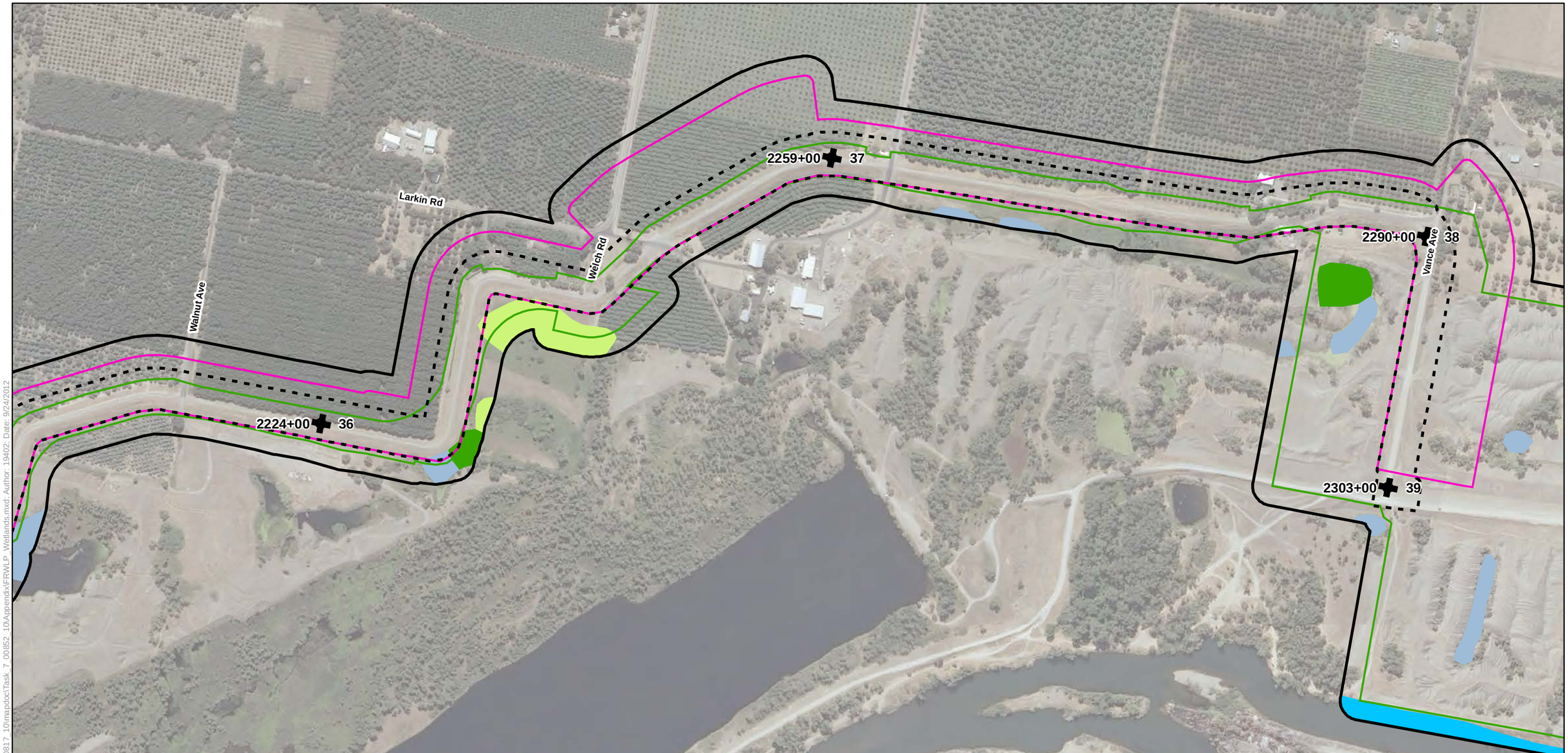

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Haselbush Ln

Vance Ave

Larkin Rd

39

2319+00 40

2359+00 41

Map Sheet Index

113 99 162 20 70 65

South Yuba City

Yuba City

Marysville

Linda

Olivehurst

Legend

Biological Study Area

Alternative 1

Alternative 2

Alternative 3

Reach

Station 202+50

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