APPENDIX A
ROUTINE OPERATION AND MAINTENANCE ACTIVITIES

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TABLE OF CONTENTS

FIGURES

TABLES

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APPENDIX A:
ROUTINE OPERATIONS AND MAINTENANCE ACTIVITIES

A.1 INTRODUCTION

Maintenance of the existing facilities within the Plan Participants' contract service areas (Figures A-1 and A-2) is needed to protect the integrity of existing infrastructure such as roads, parks and trails, water control structures (pipes, culverts, etc.), pump stations, water storage tanks/reservoirs, ditches, and distribution systems. Routine maintenance activities are required so that existing facilities/structures may operate efficiently and safely. Examples of such routine activities include: removal of sediment, vegetation, and debris from culverts, drains, irrigation ditches, drainage ditches, and detention basins; replacement of utilities; backfilling of gullies and holes caused by soil erosion; and trimming of overgrown or overhanging vegetation on maintenance roads or embankments to prevent excess growth of weeds and for fire control. The extent of existing facilities within the contract service areas that are maintained by each Plan Participant is detailed in the sections below.

The Solano Habitat Conservation Plan (HCP) addresses compliance with the terms and conditions of the Solano Project Biological Opinion for the following Plan Participants:

- Solano County Water Agency (SCWA)
- City of Vacaville
- City of Fairfield
- City of Suisun City
- City of Vallejo
- Solano Irrigation District (SID)
- Maine Prairie Water District (MPWD)

In addition to these required agencies, the following agencies have chosen voluntarily to participate in the HCP:

- Reclamation District No. 2068 (RD 2068)
- Vallejo Sanitation and Flood Control District (VSFCD)
- Fairfield-Suisun Sewer District (FSSD)
- City of Rio Vista
- City of Dixon
- Dixon Resource Conservation District (Dixon RCD)
- Dixon Regional Watershed Joint Powers Authority (DRW JPA)

Section A.2 of this appendix provides a general description of the typical operation and maintenance activities conducted by Plan Participants. Section A.3 provides general descriptions of the types of facilities owned by the Plan Participants. The descriptions of the types of facilities are followed by more detailed descriptions of the types of maintenance activities typically conducted within each facility type. Section A.4 provides detailed information about the types, location, and amount of facilities owned and maintained by each Plan Participant, followed by detailed information on the type, amount, and frequency of each maintenance activity within each facility type.

A.2 ROUTINE OPERATIONS AND MAINTENANCE ACTIVITIES

The main types of routine operations and maintenance activities performed by the Plan Participants include:

- General operation and maintenance activities (for existing facilities)
- Erosion control activities
- Vegetation management
- Flood control channel maintenance

Brief descriptions of these routine activities are provided below. These descriptions are intended to be categorical representatives rather than exhaustively detailed discussions of all possible activities and related impacts. A more detailed discussion of specific maintenance activities is provided with the descriptions of facility types.

A.2.1 Flood Control Channel Maintenance

Several agencies in Solano County perform channel[1] maintenance activities either for irrigation or flood control. Regular maintenance of flood control channels is critical for the channels to convey floodwaters as designed. This involves numerous activities for maintaining the channel's integrity, controlling vegetation, removing debris, and maintaining access roads.

A.2.1.1 Bank Maintenance

Regular maintenance of the channel banks and levees involves controlling vegetation growth mechanically[2], controlling erosion through backfilling or installing riprap, installing culverts and pipes to facilitate drainage, removing debris, maintaining access roads, and replacing existing bank protection materials with clean quarry rock, broken concrete free of rebar, and gabions, and replacing concrete slope paving and channel lining, pipe and weir revetments, articulated concrete mats, and similar materials.

A.2.1.2 Diversion Dam Construction

Summer or seasonal diversion dams are constructed in various waterways as part of the irrigation flows for agricultural production. Temporary diversion dams may also be used.

A.2.2 Sediment Removal

Dredging the bottoms of ditches is generally done when silt and debris deposits impede the flow of water (although work must be performed without disturbance to channel slopes). The priorities for this work are based on an analysis of channel capacities. Spoils are usually deposited adjacent to

[1] There are several types of linear aquatic facilities maintained by the Plan Participants. The term "channel" in this document is used as a general term to refer to work conducted in all linear aquatic facility types.

[2] Chemical methods (i.e., herbicides) is an important tool for controlling vegetation growth; however, the use of herbicides is not a Covered Activity under the Solano HCP.

the ditch, and then either removed later when dry or spread evenly in the area adjacent to the ditch. Sediment is also removed, as needed, from culverts, outfalls, and detention basins.

A.2.3 Bank Reconstruction, Protection, and Erosion Control Activities

Activities in this category include bank reconstruction and/or placement of bank protection materials to stabilize minor head-cuts or slipouts; blading of rills and gullies; stabilizing head-cuts or slumps; replacement of existing bank protection materials with clean quarry rock, broken concrete free of rebar, and gabions; and replacement of concrete slope paving, channel lining, pipe and weir revetments, and articulated concrete mats. These activities typically occur during the low-flow season (between April and October).

A.2.4 Grading Access Roads

Ditch patrol and access roads are graded as needed to remove vegetation and to fill ruts, cracks, and holes.

A.2.5 Fence and Access Gate Repair

Fences and access gates occasionally require repair or replacement. Repair activities include realigning or replacing loose or damaged posts, attaching wire or fabric to posts, replacing chains or locks, repairing or replacing signs and other accessories, removing graffiti and vandalism, and monitoring the conditions of private structures (i.e., bridges).

A.2.6 Trash and Debris Removal

Removal of debris (i.e., trash, fallen trees) is done as needed in channels and along access roads. If rootballs are present around fallen trees, they shall be left in place to prevent further erosion.

A.2.7 Vegetation Management

Vegetation management activities covered under the Solano HCP include mowing, grading, fire, and other manual methods of reducing the amount of cover of terrestrial weeds or other vegetation that may interfere with the operation of facilities or to limit the spread of undesirable plants. It also includes methods of controlling aquatic weeds. Herbicides are an important component of vegetation management and are discussed in this document for information purposes only. The use of herbicides is not a Covered Activity under the Solano HCP.

A.2.7.1 Control of Terrestrial Weeds

Terrestrial vegetation control is important for the removal of exotic, or noxious, undesirable plants as well as native plants that may interfere with facility operations. Typical manual methods of control include mowing or hand removal with power tools (e.g., chain saw, string trimmer or brush cutter), burning, blading, excavating, and discing. The most effective method of eliminating undesirable or hazardous plants is through the use of herbicides. The use of herbicides and pesticides is not a Solano HCP Covered Activity. All herbicide use will be done according to label

directions and United States Environmental Protection Agency (EPA) guidance to minimize impacts to Covered Species.

The elimination of weeds on ditch banks has been a common practice because it facilitates the early detection of leaks and structural damage and in maintaining channel capacity. Extensive weed control occurs along maintenance roads, road shoulders, and unpaved roads mostly as a means of reducing fire hazard, reducing the spread of noxious weeds into agricultural fields, and maintaining the integrity of the roads (plant growth tends to crack and destroy pavement and compacted road shoulders).

A.2.7.2 Control of Aquatic Weeds

Vegetation growing in a ditch can decrease its volume of flow or storage capacity and make it difficult to calculate water availability and flow for deliveries. In lined ditches, vegetation growing from panel seams can cause damage to the integrity of the lining. Large blooms of algae can clog drains and at times substantially reduce water quality when large-scale die-offs occur. Prevention of aquatic weed buildup is an important consideration of a weed control and management program, and early detection and eradication is a prime objective. Prevention and removal of sediment deposits within ditches reduces suitable rooting substrate and deters the establishment of aquatic plants.

Mechanical removal of stands of aquatic plants is an effective control for aquatic weeds such as cattails and water hyacinth. A mechanical technique known as chaining has been used in small ditches to pull plants loose from the bottom.

A.2.7.3 Brush Removal and Pruning

Most trees and shrubs are removed at the seedling stage to prevent overgrowth that could collect debris, restrict flow, or otherwise interfere with the functioning of or access to applicant facilities.

A.2.7.4 Mowing

Mowing includes the use of power mowers or hand-operated string trimmers to reduce vegetation from access roads, trails, and ditches.

A.2.8 Fire Break Construction and Maintenance

Firebreaks around existing structures and properties are essential to safeguard existing structures/ properties and associated personnel from fires. The vegetation must be reduced or removed from a minimum 30-foot (ft) zone around the perimeter of a site. Discing is the most common method of firebreak construction. Discing buries all of the vegetation growing on the surface and leaves an area of bare soil; consequently, there is little-to-no fuel in the break to sustain or propagate a fire. Other methods, such as mowing, can be used to construct firebreaks depending on the situation.

A.3 FACILITY TYPES

The following section provides a brief description of the main facility types owned or maintained by the Plan Participants and the types of operations and maintenance activities associated with each facility type. For aquatic features, LSA conducted a separate assessment (LSA 2011) of the facilities maintained by the Plan Participants to identify which facilities may be regulated by the United States Army Corps of Engineers (Corps) pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The results of this assessment are discussed under the descriptions of facility types below and are also depicted on the maps of Plan Participant facilities (Figures A-3 through A-15). Tables A.1 and A.2 (all tables appear at the end of this appendix) list the facilities associated with urban development and agricultural activities, respectively, that are maintained by each Plan Participant .

A.3.1 Aquatic Linear Facilities

For the purpose of the Solano HCP, the aquatic linear facilities were divided into six categories: unmodified streams, channelized streams, irrigation ditches (drainage, combined supply and drainage, and supply), and drainage ditches. The definitions of “drainage ditch” and “irrigation ditch” are those specified in Corps Regulatory Guidance Letter (RGL) No. 07-02.

A.3.1.1 Unmodified Streams

Streams with natural origins that traverse the service areas of Plan Participants are often integrated into their drainage networks. Such streams are not just locations for the ultimate outfall, but are subsumed as integral components of the drainage network. They receive and convey drainage from numerous sources and contain structures such as bridges, culverts, and outfalls that are subject to regular maintenance activities.

Unmodified streams are usually relatively large watercourses with numerous tributary streams and drainage channels. Average channel widths generally range from 3 to 10 feet, and flows are at least intermittent, if not perennial. Perennial flow in some streams is maintained by summer irrigation runoff, both urban and agricultural. There are few smaller streams in this category, probably because smaller tributaries have largely been eliminated by urban and agricultural development and replaced with wholly artificial ditches.

Unmodified stream channels are mostly composed of non-wetland waters due to factors such as volume and depth of streamflow, shading from riparian canopy cover, and maintenance activities. Wetlands are not uncommon, however. At a minimum, wetland plant cover often occurs as a narrow band at the high-water elevation. Larger expanses of seasonal wetland and emergent marsh cover are common on narrow floodplains or flood terraces adjacent to the low-flow channel, or along low-gradient stream segments that retain standing water after high-water flows have subsided.

Riparian tree and shrub cover is common along unmodified streams, but pristine woodlands or shrub communities are rare.

Alamo Creek, City of Vacaville Facility VI
(IMG_1648.JPG)

Gibson Canyon Creek South, City of Vacaville Facility V17
(IMG_1677.JPG)

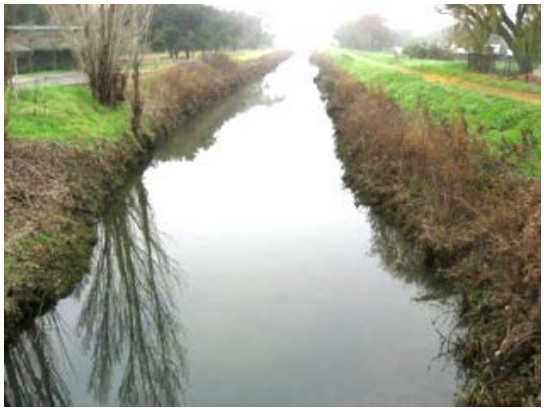
A.3.1.2 Channelized Streams

This category includes formerly natural streams that have been channelized, straightened, or relocated to increase their flood conveyance capacity or allow them to better serve in an irrigation or storm water drainage capacity. Channelized stream segments are generally distinguished from normal ditches through the fact that they retain their historic stream designations and are still connected in sequence with unimproved reaches of the original stream. Channelized stream segments often occur in sequence with unmodified stream segments, though there are occasions where entire streams have been channelized within the bounds of a particular Plan Participant.

In a few cases, streams have been culverted. Culverted streams, regardless of the length of the culvert, are not categorized as underground storm drains. Culverted stream segments have the same jurisdictional status as the un-culverted stream.

While channelized stream segments have been straightened and excavated to a trapezoidal cross-section, they are otherwise similar in size and character to unmodified stream segments. Size, flow regime, and frequency of wetland cover are consistent with unmodified segments, which is unsurprising due to the fact that most channelized segments are continuous with upstream or downstream segments of unmodified streams. Channelized stream segments differ most markedly from unmodified streams in that mature, woody riparian cover is uncommon.

New Ulatis Creek East of Leisure Town Road, Ulatis Creek Flood Control Project (IMG_1658.JPG)



Green Valley Creek North of Cordelia Road, Green Valley Flood Control Project (IMG_1717.JPG)

A.3.1.3 Ditches

Ditches fall into two categories: irrigation ditches and drainage ditches. The definitions of "drainage ditch" and "irrigation ditch" are those specified in Corps RGL No. 07-02:

> ***Definition of "Irrigation Ditch:"*** *For purposes of this RGL, an irrigation ditch is a man-made feature and/or an upland swale that either conveys water to an ultimate irrigation use or place of use, or that moves and/or conveys irrigation water (e.g., "run-off" from irrigation) away from irrigated lands. Irrigation ditches may include the distribution system or parts thereof, consisting of manmade canals, laterals, ditches, siphons, and/or pipes, or pump systems. If a ditch carries only irrigation water, irrigation return flows, and overland flow (precipitation and/or snowmelt) that moves from an irrigated field either to or away from an area subject to irrigated agriculture (e.g., an irrigated field), that ditch would be considered an irrigation ditch, not a drainage ditch.*
>
> *Where a natural or man-altered water body is used as part of an irrigation ditch system, such as where the water body is used to transport irrigation water between manmade ditches, that segment generally is not considered an irrigation ditch for purposes of this exemption, except where the Section 404(f)(1) exemption has been determined to apply based on a case-by-case evaluation. Following a case-by-case evaluation, such a natural or man-altered water body may be considered an irrigation ditch eligible for this exemption if it has characteristics suggesting a limited functional role in the broader aquatic ecosystem, such as infrequent or low volume flow, minimal habitat value, or small channel size.*
>
> ***Definition of "Drainage Ditch:"*** *For purposes of this RGL, a drainage ditch is a ditch that conveys water (other than irrigation related flows) from one place to another. Where a ditch would have the effect of more than minor drainage of wetlands (other than wetlands established due to the presence of irrigation water), the ditch would be considered a drainage ditch, not an irrigation ditch, even if used for irrigation. However, a ditch that diverts water from an open body of water (e.g., stream, lake, or reservoir) for irrigation purposes is an irrigation ditch, even if a substantial portion of the flow or volume is diverted.*

Irrigation Ditches. Irrigation ditches were further subdivided into three categories: drainage, combined supply and drainage, and supply.

1. **Irrigation Ditches – Drainage:** Most of the drainage-only irrigation ditches are irrigation tailwater ditches that are located in the irrigation district service areas. The ditches mapped for each Plan Participant in this category are all larger collector ditches. The smaller ditches that drain fields and farms are generally privately owned and maintained, and thus outside the scope of the HCP. Most of the drainage-only irrigation ditches are unlined, earthen ditches.

Unlined Irrigation Ditch - Drainage, Solano Irrigation District Facility 34929 (IMG_1711.JPG)

Unlined Irrigation Ditch - Drainage, Solano Irrigation District Facility 1816 (IMG_1726.JPG)

2. **Irrigation Ditch – Combined Supply and Drainage:** The Dixon RCD, MPWD, and RD 2068 are composed of ditches that mingle supply and drainage waters. These ditches serve both to convey water to users from upstream sources and also receive drainage water back from those users. There are no distinct channel segments that serve one or another purpose. The ditches are not composed of dedicated supply and drainage segments in sequence; rather, each segment usually serves both as a source and destination for irrigation water. LSA did not observe any channels in this category that were lined with concrete or other materials; they all appear to be earthen ditches (LSA 2011).

Irrigation Ditch - Combined Supply and Drainage near Dam 2, Maine Prairie Water District (IMG_1773.JPG)

Irrigation Ditch - Combined Supply and Drainage, Lateral 1 North of Hawkins, Dixon Resource Conservation District (IMG_1778.JPG)

3. **Irrigation Ditch – Supply (Including Unlined and Concrete-Lined):** Supply-only irrigation ditches are used only for conveying water to users from an upstream source. Upstream sources are generally larger supply canals either owned or operated by non-Plan Participants, groundwater wells, or ordinary waterways like the Sacramento River and its tributaries.

   Supply-only irrigation ditches discharge to cultivated fields and not to other waters. Dedicated supply-only irrigation ditches occur only in the SID and RD 2068. These ditches are mostly unlined, but the SID includes several concrete-lined ditches and has plans for lining additional unlined features.

Concrete-lined Irrigation Ditch - Supply, Solano Irrigation District Facility 25292, North Side McCrory Road (IMG_1747.JPG)

Concrete-lined Irrigation Ditch - Supply, Solano Irrigation District, Facility 30462, East Side Leisure Town Road (IMG_1656.JPG)

Unlined Irrigation Ditch - Supply, Solano Irrigation District Facility 35042, East of Leisure Town Road (IMG_1707.JPG)

Unlined Irrigation Ditch - Supply, Solano Irrigation District, Facility 30269, East of Meridian Road (IMG_1767.JPG)

Drainage Ditches. Drainage ditches convey non-irrigation-related water such as storm water drainage for the cities and flood control districts. The majority of the drainage ditches within urban areas are smaller, first-order ditches that drain particular neighborhoods and streets; however, there are also several larger ditches. To more accurately assess impacts to potential habitat for Covered Species, a distinction was made between larger drainage ditches and smaller roadside drainage ditches.

Unlined Storm Water Drainage Ditch, City of Suisun Facility S14 (IMG_1739.JPG)

Concrete-lined Storm Water Drainage Ditch, City of Vallejo Sanitation and Flood Control District Facility (P1280370.JPG)

Roadside drainage ditches are similar to normal drainage ditches but are smaller and tend to receive runoff from watersheds that are composed largely of developed or paved acreage. They are generally tributary either to larger drainage ditches or to streams.

These smaller ditches convey ephemeral stormflow, and rarely support wetland plant cover. Many are barren, either because they experience only infrequent stormflow or dry rapidly, or because they are treated with herbicides. Jurisdictional widths are generally based on evidence of high water flow, and range from 1 to 5 ft. In some instances, LSA found these channels to be no more than ill-defined swales that may not meet either the wetland or ordinary high water mark jurisdictional criteria (LSA 2011).

Roadside Drainage Ditch, City of Vacaville Facility V, East Side of Leisure Town Road (IMG_1665.JPG)

Roadside Drainage Ditch, City of Fairfield, Facility F24, East of Lopes Road (IMG_1721.JPG)

Maintenance Activities.

- **Ditch Bank Reconstruction (head-cuts, slipouts, etc.):** The conditions of earth-lined ditches are monitored and repaired as necessary. Slipouts are filled with soil and reinforced with riprap if necessary. The conditions of roadside ditches are monitored and repaired as necessary, which may include replacing riprap and repairing dirt bank washouts.
- **Placement of Bank Protection:** Straw blankets or jute may be used on channel banks to reduce erosion.
- **Replacement of Existing Bank Protection (with quarry rock, etc.):** Riprap may be replaced when needed.
- **Replacement of Concrete Paving on the Inside of Lined Irrigation Supply Ditches (as needed):** Panel section replacement of concrete-lined irrigation supply ditches may occur by dewatering, demolition, and repair by application of new concrete or other lining material.
- **Paving Unlined Irrigation Supply Ditches with Concrete:** Earth-lined irrigation supply ditches may be lined with concrete for water conservation purposes to minimize water loss through the porous soil lining. The lining of supply ditches with concrete requires preparation of the ditch surface by grading it to initial design specifications, then applying the concrete by appropriate methods.
- **Repair Leaks, Soil-Lined Facilities:** Sections of a ditch may need to be repaired if it is found to contain a leak. The damaged area is repaired by fill, recompaction, and regrading

to original design specifications. Sectionalizing may be required to isolate areas for dewatering to allow for access.

- **Raising Channel Banks:** Occasionally channel banks may need to be raised in order to increase capacity or for stabilization. This may require the compaction or partial removal of existing bank material, the placement and compaction of new bank material, and regrading of the new bank.
- **Sediment Removal:** Dredging the bottoms of ditches is generally done when silt and debris deposits impede the flow of water (although work must be performed without disturbance to slopes). Priorities for this work are based on an analysis of channel capacities. Spoils are usually deposited adjacent to the ditch, and then either removed later when dry or spread evenly in the area adjacent to the ditch. Sediment is also removed, as needed, from culverts, outfalls, and detention basins (see basins and appurtenant facilities below).
- **Cleaning of Silt Buildup from Concrete-Lined Irrigation Supply Ditches:** Concrete-lined irrigation supply ditches are inspected yearly for silt and algae, which are removed if present.
- **Spoil Pile Removal:** If spoils from sediment removal are removed, they will be removed to a local landfill or other appropriate storage facility for reuse in the future if material is clean as determined by testing.
- **Vegetation Removal:** Vegetation removal methods covered under the Solano HCP include mowing, hand removal with power tools (e.g., chain saw, string trimmer or brush cutter), burning, blading, excavating, and discing. Mechanical removal of stands of aquatic plants is an effective control for aquatic weeds such as cattails and water hyacinth. Another mechanical technique for the removal of stands of aquatic plants is chaining, which has been used in small ditches to pull plants loose from the bottom.

  The most effective method of eliminating undesirable or hazardous plants is through the use of herbicides. The use of herbicides is not a Covered Activity under the HCP. All herbicide use will be done according to label directions and EPA guidance to minimize impacts to Covered Species.

A.3.2 Basins

A.3.2.1 Storm Water Detention Basins

Storm water detention basins are typically shallow basins constructed to temporarily store storm water or creek floodwaters. They can be located on creek channels, adjacent to creek channels, or where storm water drainage ditches or underground storm water pipes converge. They are typically constructed to be able to quickly receive high flows during a storm or high water event and to then slowly return the water to the source creek or ditches when the water level has dropped. Water detention usually only occurs for a maximum of 72 hours.

Storm water detention basins adjacent to streams typically only receive water during large storm events and drain relatively quickly back into the source, thus having ephemeral hydrology and no-to-minimal wetland characteristics. Many on-channel storm water detention basins hold water for longer periods, thus having intermittent to long-season intermittent hydrology, hydrophytic freshwater marsh vegetation, and jurisdictional wetland characteristics. Some storm water

detention basins contain areas of seasonally deep, open water that are jurisdictional as other waters of the United States.

Storm water detention basins are operated and maintained by city storm, sewer, and flood control entities.

Storm Water Detention Basin, City of Vacaville Facility V66, Ulatis Creek Detention Basin #2 (IMG_1652.JPG)

Storm Water Detention Basin, City of Vacaville Facility V63, Southtown Detention Basin (IMG_1642.JPG)

Storm Water Detention Basin, City of Vacaville Facility V54, Regency/Stonegate Detention Basin (IMG_1659.JPG)

Storm Water Detention Basin, City of Vacaville Facility V45, North Village Detention Basin #1 (IMG_1673.JPG)

Maintenance Activities. Sediment and vegetation is periodically removed from detention basins, mainly at the inlet/outlet locations.

A.3.2.2 Irrigation Supply Pump Station Afterbay

RD 2068 pumps water from a ditch off Hass Slough, elevating it so that it flows northward by gravity in another ditch to two additional sequential pumping stations that further elevate the water so it can be gravity-fed into adjacent irrigation supply ditches. The two additional pump stations discharge into “afterbay” ponds that help stabilize the water elevation in the connecting supply ditches supplied by the afterbay. The afterbays have earthen berms armored with concrete riprap.

Irrigation Supply Pump Station Afterbay near Midway Road, Reclamation District No. 2068 (P1270355.JPG)

Irrigation Supply Pump Station Afterbay near Delhi Road, Reclamation District No. 2068 (P1270331.JPG)

Maintenance Activities. Maintenance of the afterbays includes debris and silt removal as needed to maintain capacities and other mechanical repairs as needed.

A.3.2.3 Sewer Treatment Ponds and Sprayfields

There are two sewer treatment plants covered under the Solano HCP that contain sewer treatment ponds. These are Dixon and Rio Vista, and only Dixon's plant contains sprayfields. Sewer treatment ponds or stabilization ponds consist of shallow man-made basins comprising a single or several series of anaerobic, facultative or maturation ponds. Sprayfields are fields of hay that are sprayed with treated wastewater as a means of disposing of the effluent in uplands rather than discharging it to regulated waters. Sprayfields usually are not sprayed so persistently that the entire field takes on wetland characteristics, but wetland characteristics do tend to develop in concave areas where runoff concentrates.

Maintenance Activities. Maintenance of the sewer treatment ponds and sprayfields includes periodic mowing and discing for vegetation management.

A.3.3 Underground Facilities

A.3.3.1 Underground Irrigation Supply Piping

In the SID, some irrigation supply ditches have been piped underground. As with aboveground supply ditches, underground irrigation supply piping is nonjurisdictional as long as it does not connect directly to a jurisdictional water or jurisdictional irrigation ditches for drainage.

A.3.3.2 Underground Storm Drains

In general, underground storm drains are typically nonjurisdictional and as such were not extensively mapped. There are some circumstances, however, where underground storm drains maintained by Plan Participants are potentially jurisdictional. These cases are primarily instances where CWA-jurisdictional drainage ditches have been culverted.

A.3.3.3 Underground Sanitary Sewers

These sewers are artificial features constructed in uplands that outfall to a treatment plant. Sewers are only mapped when they have been installed in open space where potential impacts may occur during maintenance activities (i.e., repair or replacement of an existing facility).

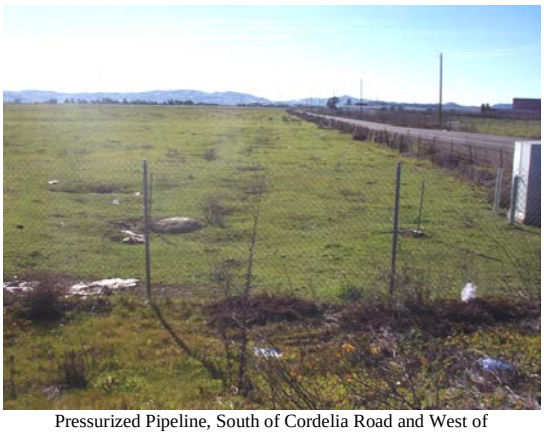
A.3.3.4 Underground Sanitary Sewers – Treated Discharge

These underground sanitary sewer facilities are distinguished from the main body of sanitary sewers because they discharge to Suisun Marsh or San Pablo Bay, are located in rural areas outside of the Fairfield and Suisun City limits, and have different maintenance requirements than the other sanitary sewer lines.

A.3.3.5 Pressurized Pipelines

Pressure can be used to force the movement of material through a pipeline. Using a pump or the gravitational weight of water, a pipeline is completely filled with liquid and the pressure pushes the liquid from one end toward the other.

The ***force main*** is the main pipeline that brings untreated sewage to the treatment plant. All sewer lines lead to the inlet of the main pipe. The underground pipe fills and pressure is used to force the untreated water through the main line and into the plant for treatment. The Plan Participants must maintain the force main and be able to initiate repairs if necessary.



Pressurized Pipeline, South of Cordelia Road and West of Pennsylvania Avenue

Pressurized Pipeline, South of Cordelia Road and West of Pennsylvania Avenue

A.3.3.6 Air Vacuum Relief Valves

The pressure used to force water through a pipeline (a forced system) can be altered if material moves too quickly or if the pipeline becomes blocked. When material moves too quickly through the pipeline, a vacuum can form that threatens the integrity of the pipe. Conversely, a blockage can cause a rapid increase in pressure that may burst the pipe. Air vacuum relief valves are used to protect the pipe from unintended pressure changes by allowing the pipeline pressure to equalize with the outside air.

Air Vacuum Relief Valve, North of Cordelia Road on the West Side of Ledgewood Creek

Relief Valve, South Side of Cordelia Road and East of Chadbourne Road

A.3.3.7 Sewer Force Main Valves

Valves are used to control and direct the flow of sewage carried by the main line.

A.3.3.8 Cathodic Protection Systems

Material moving rapidly through an insulated metal pipeline can build up a static electricity charge within the pipe metal. With time and distance, this charge can become large enough to cause injury. To disperse the static electricity, wires are attached to the inside of the metal pipe and run to the outside where they can be grounded. The ground consists of a metal bar attached to the other end of the wire. Depending on the soil type, the bar is either driven into the ground or placed in a bed of material that attracts electrons (an anode bed). The wires are often outfitted with leads to enable testing that ensures the integrity of the wire.

Cathodic Protection Station, South of Cordelia Road and West of Pennsylvania Avenue

Cathodic Protection Station, South Side of Cordelia Road and East of Chadbourne Road

A.3.3.9 Maintenance Activities

- **Old Pipeline Replacement:** Replacements of old pipeline occur as needed for aging infrastructure. Old pipelines are excavated, deconstructed, and replaced or "slip-lined" (placing of a liner within an existing pipe) if feasible.

- **Sewer Force Main Maintenance:** Sewer force mains require periodic inspection (semi-annual to annual) of pipeline right-of-way and will require maintenance on a very rare (tens of years) basis.
- **Effluent Outfall Line Maintenance:** The effluent outfall lines require annual inspection of the outfall structure at Boynton Slough and Ledgewood Creek and internal inspection of the pipeline (every 5 years). The internal inspection does not require disturbance of wetlands.
- **Air/Vacuum Relief Valve Maintenance:** The integrity of air/vacuum relief valves are inspected monthly, and the valves are disassembled and cleaned annually and repaired or replaced as need (every 5 years).
- **Cathodic Protection System Maintenance:** Maintenance of the cathodic protection system includes monthly system and operation checks, annual minor repairs to the test stations, and the rare replacement or repair of an anode bed.

A.3.4 Facilities Appurtenant to Linear Features and Basins

There are several types of facilities that are appurtenant to and functionally related to linear aquatic features and basins. These facilities are also maintained by the Plan Participants as part of the maintenance of the larger facility. These facilities include pumps, headgates, wingwalls, weirs, diversion structures, and other structures.

Examples of Facilities Appurtenant to an RD 2068 Irrigation Supply Ditch

A.3.4.1 Pipe Outfalls

These installations include outfalls to facilities from either jurisdictional or nonjurisdictional sources. Periodic repair, modification, or clearance of blockage at these locations may lead to temporary impacts.

Storm Water Pipe Outfall into Lynch Canyon Creek, City of Fairfield (IMG_1719.JPG)

Treated Wastewater Outfall into Ledgewood Creek, Fairfield-Suisun Sewer District (IMG_1733.JPG)

Maintenance Activities. The main maintenance activities associated with outfalls are sediment and vegetation removal.

A.3.4.2 Culvert, Bridge Crossings, or Undercrossings

The linear channel systems must cross existing roadways without interfering with traffic or water flow. This is achieved through the installation of culverts. Materials used to construct culverts include cement, metal, and plastic. In pipe culvert systems, the pipe is placed into the channel and fill material (either soil or concrete) is placed on top of the pipe. A roadway is then constructed on the fill material. Box culverts are typically cement tubes poured on the bottom, sides, and across the top of a channel, and then backfilled. The districts are responsible for making sure flows through culverts continue unimpeded and that the fill material does not wash away.

These are locations where a jurisdictional stream or ditch facility crosses under a roadway or other feature via a culvert or a bridge. Periodic repair, modification, or clearance of debris or sediment blockages at these locations may lead to temporary impacts.

Bridge Crossing Over Laurel Creek Channel (Facility S-12) at Lawler Ranch Parkway, City of Suisun City (IMG_1736.JPG)

Box Culvert Crossing, North Side of Scandia Road, East of Walters Road

Culvert Crossing Over Lateral 1 at Hawkins Road and Hwy 113, Dixon Resource Conservation District (IMG_1774.JPG)

Series of Culverts Entering Channel, NE Corner of Hay Road and Meridian Road Intersection

Maintenance Activities. Roadway culverts are inspected each year and replaced if necessary. Corroded steel culvert pipe may be replaced with plastic pipe. Sediment, vegetation, and debris are removed from areas in and adjacent to the culvert that might be impeding flows.

A.3.4.3 Seasonal Dams

Seasonal dams impound stream and irrigation runoff water for pumping into irrigation supply ditches. These dams contain both permanent and moveable structural components. A permanent structure is a framework built into the stream channel bed and banks that presents little restriction to the flow in the channel during winter rainy season runoff. Temporary structures are modular panels that are placed in the stream channel during the summer to impound water.

Seasonal Dam 2 Permanent Structure During Winter, Maine Prairie Water District, on Sweeney Creek (IMG_1771.JPG)

Seasonal Dam 2 Moveable Structure Components Stored During Winter, Maine Prairie Water District (IMG_1772.JPG)

Maintenance Activities. Maintenance activities include insertion and removal of the modular panels and the removal of sediment on and around the permanent structures in the channels.

A.3.4.4 Irrigation Supply Check Structures

Checks are water control valves on irrigation supply ditches or underground irrigation supply piping that transfer irrigation water from a main supply to a branch supply ditch or pipe. The checks are typically hand-operated sliding gate valves that are opened only when the branch supply

is being used. The ditch checks are concrete structures with metal gate valves. The underground pipe checks are metal valves that are usually contained within a concrete riser.

Check on Underground Irrigation Supply Piping, Solano Irrigation District Facility 856 on Cordelia Road (IMG_1722.JPG)

Check on Irrigation Supply Ditch, Solano Irrigation District Facility 25288 (IMG_1756.JPG)

Maintenance Activities. Maintenance activities for check structures consist of reviewing key components of the structure for integrity and functionality, dewatering as needed, and checking for lighting, power, leakage, frayed cables, vandalism/graffiti, debris, etc. The structure is repaired and replaced as needed.

A.3.4.5 Headwalls

Headwalls are frequently constructed at undercrossings and the end of ditch segments to prevent the erosion of soils or fill material. In many segment ends, water becomes constricted as it enters culverts for undercrossings or for distribution. The change in water velocity can cause water to back up or increase flow speed. Headwalls are constructed out of cement and occasionally riprap to protect the soils from the erosive effects of the water. Headwalls also provide ideal locations for valves and other water flow control and monitoring devices. Plan Participants are responsible for protecting the integrity of the concrete or riprap at these locations.

Looking South at the Headwall of a Box Culvert Along Swan Road

The Headwall of a Set of Culverts Under an Access Road Crossing Located on the West Side of Hwy 113, North of Fry Road

Maintenance Activities. The concrete is repaired and replaced where it is cracked, scaling, chipped or broken, or where the general structural integrity has been compromised. Headwalls are

checked for creeping, slipping, or leaning and repaired as needed. Headwalls are repaired by dewatering, demolition as needed, and subsequent repair.

A.3.4.6 Valves and Water Gates

Valves and water gates are door-like devices used to control, prevent, or direct the flow of water in, out, or through a ditch system. These mechanisms can be opened, allowing water to flow into or through an irrigation ditch or irrigation ditch segment. They can also be closed to restrict and even prevent flows. Closing valves and water gates is one method of backing water up within a ditch to form a small reservoir for pumps or other distribution purposes.

The most commonly used control device is a gated valve called a turnout water gate. Turnout water gates are metal doors set into guides on either side of the ditch so they can be moved up or down (opened or shut) by way of a metal screw. The screw is turned with a circular shaped key that pushes the door into the ditch to restrict flow or pulls the door out of the ditch to release flow. Turnout water gates are used to control ditch flows and must be kept functioning freely.

Exposed Watergates Along Robben Road, North of Binghamton Road

Set of Watergates in a Vault South of Swan Road

Maintenance Activities.

- **Canal Turn-Out Water Gate Replacements:** Repairs/replacements may require dewatering, isolation, and excavation of the immediate vicinity. Repairs are usually done during the off-season (i.e., during low flows).
- **Pipeline Turn-Out Water Gate Replacements:** Repairs/replacements of valves/gates to service connections off the main ditch or pipeline require the dewatering of the facility as needed. Repairs are usually done during the off season.
- **Sectionalizing Valve Replacements:** All main water gate valves are tested every 5 years, and critical valves are tested every other year. These valves are replaced as necessary.

A.3.4.7 Pumps

Pumps are used to transport irrigation water traveling through irrigation ditches into fields where it can be used to irrigate crops. The pumps themselves are typically small electrical pumps that force water through a pipe. The pump creates a vacuum on the intake side of the pipe and the excess pressure generated to the outflow side expels the water. When an intake is placed into an irrigation ditch, the water from the canal system is drawn into the pipe. The outflow end of the pipe system is

placed into a field or small reservoir to capture the pumped water. Pumps can also be used to redirect water into other canal systems.

Pumps are typically simple pipelines running from the canal system into the fields. However, some pumps consist of larger, more complex setups that move larger volumes of water and require several square feet of area. An area housing a larger pump system is usually classified as a pumping station. Plan Participants maintain pumps and pumping stations to enable the movement of water and to determine water usage.

Pump 61A, East Side of Hwy 113, North of Fry Road


Pump PV29, South of McCrory Road and West of Meridian Road

Maintenance Activities. Pumps are inspected and maintained regularly and replaced as needed.

A.3.4.8 Flashboard Risers

The water level in supply ditches must occasionally be raised to distribute the water to pump intakes. Water levels in ditch sections can be raised by backing water up behind a flashboard riser to form a small reservoir. A flashboard riser consists of a set of grooves on either side of the ditch. Wooden boards are fitted into the guides and slid into the ditch to block the flow of water starting from the bottom of the ditch. Additional boards are added, backing the water up until the water level reaches the required depth for the pump intake or can spill where it is needed.


Flashboard Risers in a Box Culvert at the Southwestern Corner of the Fry Road and Meridian Road Intersection


Flashboard Risers, South of McCrory Road, West of Meridian Road

Maintenance Activities. Flashboard risers need to be installed when needed and replaced or repaired as needed. For installation of the wooden boards, the foundation of each flashboard riser needs to be prepared to ensure the boards properly fit into the guides and slide into the ditch properly. This may require dewatering of the area with coffer dams.

A.3.4.9 Water Gages

Water gages of various kinds are used to determine the depth and/or flow of water in ditches and pipes.

Spill meters are pipes attached to the vertical side of a channel, usually along a head wall. A device such as a tape measure can be used to ascertain the overall depth of the water or the amount of freeboard between the water level and the spill point of the channel system.

Spill Meter, North of the Meridian Road and Hay Road Intersection, East Side of Road

Spill Meter D5, Southeast Corner of the Intersection of Fry Road and Daily Road

Water meters are placed on distribution pipes and pumps to record water usage. The amount of water that passes through the meter is measured on a gage. The gage can be periodically checked and the amount of water that passed through can be recorded. The districts must access the meters to determine the number of acre-feet (af) used by a client.

Water Meter in an Upright Culvert Vault on the East Side of Hwy 113 North of Fry Road

Water Meter on Pump Station 75A, Along Robben Road, North of Binghamton Road

Maintenance Activities.

- **Meter Replacements and Maintenance (in agricultural areas):** Most municipal water meters have a maximum life span of 10 years, and agricultural water meters have a lifespan of about 5 to 8 years. Therefore, all water meters will be replaced at least once every 10 years. This will include water meters to cattle troughs, irrigation lines, etc. that lie within open space areas.
- **Spill Recorder Installation and Removal:** Installation and removal of gauging and recording devices as needed. This may require engineering evaluations, demolition of the existing structure, and construction of new structures. Generally, construction is related to the attachment of a new feature to an existing facility.

A.3.4.10 Screens

Screens are used to block undesired material that could block the flow of water from entering culverts or pipes. Screens typically consist of upright bars or metal nettings with apertures of a size to capture undesirable materials and prevent them from passing through. The screens can also serve to protect users from falling into machinery or ditches. The district is responsible for placing, replacing, and maintaining these screens.

Screens Covering an Inlet at the Northwest Corner of the Intersection of Northgate Road and McCrory Road

Screens Covering an Outlet Located Along the East Side of Hwy 113, North of Fry Road

Maintenance Activities. The main maintenance activity involves the removal of vegetation and debris from the screen. Vegetation and debris are manually removed with rakes and hooks, placed into a bin or on the side of the ditch for dewatering, and hauled off for composting. Some intakes have automated screen cleaning mechanisms. Screens are also periodically repaired or replaced as needed.

A.3.4.11 Weirs

Weirs are used to control flows in channels. A weir is a small dam or other blockage that will back water up behind it. Weirs can also be constructed of large rock and designed as grade control structures or energy dissipaters.

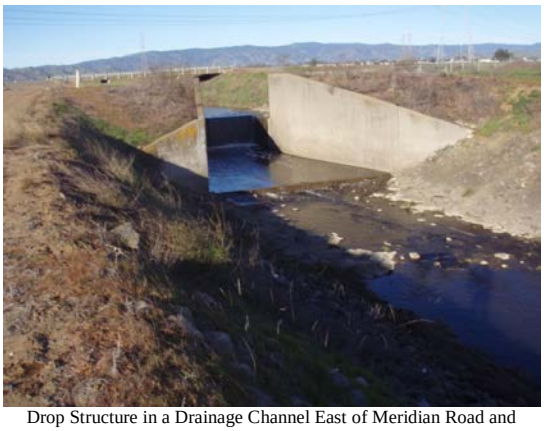
W-weir on Ulatis Channel at Hawkins Road

Rock Weir on Ulatis Channel at Leisure Town Road

Maintenance Activities. Weirs are repaired and replaced as needed.

A.3.4.12 Drop Structures

Drop structures are used to control the flow of channels where elevational changes would increase flow speeds and prevent the ability to backup water to pumps. The channels used to supply or drain irrigation water were constructed with a slight incline to keep water flows at a manageable speed. If the incline is too great, water can move too fast to control. In these situations the water cannot be backed up by valves and/or flashboard risers. To compensate for natural changes in the topography, drop structures have been erected that allow the channel to change elevation over a small distance (i.e., a drop). This ensures that the rest of the channel can remain at the desired incline. Drop structures are also useful to minimize erosion.



Drop Structure in a Drainage Channel East of Meridian Road and South Of Fry Road

Drop Structure to a Culvert under Meridian Road Just South of Fry Road

Maintenance Activities. Drop structures need to be checked for structural integrity. Sediment and vegetation must be periodically removed at the base of the drop structure.

A.3.4.13 Gangways

Gangways are metal or wooden planks that are laid over ditches to allow a person to cross or work over a channel. They are typically used to access valves and flashboard risers.

Gangway Across a Channel South of McCrory Road and West of Meridian Road

Gangway at a Pump Station on the West Side of Chadbourne Road, South of Cordelia Road

Maintenance Activities. Temporary gangways are installed and removed as needed. Permanent structures are repaired or replaced as needed.

A.3.5 Other Maintained Facilities

A.3.5.1 Roadways (Canal Roads, Drainage Roads, Right-of-Way Roads, and Access Roads)

Access to ditches and other facilities is made by way of either existing County-maintained roads or roads constructed specifically for facility access purposes. Non-County roads are maintained by the Plan Participants to ensure unimpeded access for maintenance vehicles. Roadways used for access consist of leveled right-of-way sections, approximately 12 to 20 ft wide, that either lead to or are parallel to facilities. The roadways may be graded soils or topped with gravel or asphalt.

Roadway Between a Drainage Channel and an Irrigation Supply Ditch, East of Meridian Road and South of Fry Road

Roadway Between Channels, South of McCrory Road and West of Meridian Road

Maintenance Activities.

- **Blading and Grading:** Maintenance of unpaved roadways roads includes regrading and resurfacing. Regrading may require consulting the engineering designs as needed, the use of grader equipped with wide blades, the application of A/B grade gravel or soil as needed, and resurfacing as need. If a roadway contains a berm, the berms are checked and repaired as needed.

- **Vegetation Removal:** Vegetation is controlled along all access roads. Vegetation removal methods covered under the HCP include mowing, hand removal with power tools (e.g., chain saw, string trimmer or brush cutter), burning, blading, excavating, and discing. All access roads are either mowed or disced to abate weeds. Vegetation is trimmed and fallen trees are removed from roadways.
- **Rodent Burrow Removal:** Rodent burrows can affect the structural integrity of canal roadways. Rodent burrows will be filled with dirt and the sides of the bank will be restored to grade.

A.3.5.2 Fences and Gates

Fences are erected along and around ditches and other facilities to protect the general public from entering potentially dangerous areas. They also protect the equipment and facilities from vandalism.

Fences Along a Headwall for a Culvert under an Access Road Crossing Located on the West Side of Hwy 113, North of Fry Road

Fence Surrounding a Channel South of Scandia Road

Maintenance Activities. Fences and access gates occasionally require repair or replacement. Repair activities include realigning or replacing loose or damaged posts, attaching wire or fabric to posts, replacing chains or locks, repairing or replacing signs and other accessories, removing graffiti and vandalism, and monitoring conditions of private structures (i.e., bridges).

A.3.5.3 Municipal Groundwater Wells

The City of Vacaville owns and operates 12 municipal groundwater wells with very high quality groundwater. Of the 12 wells, 11 withdraw water from the deep aquifer in the basal zone of the Tehama Formation. Most of Vacaville's wells are located in the Elmira well field. However, new wells are being sited farther north, near Interstate 80 (I-80).

Maintenance Activities. Wells are periodically inspected and maintained as needed. Parts are replaced as needed.

A.3.5.4 Water Storage Tanks/ Reservoirs

Potable water and irrigation water are stored by the cities and irrigation districts in various elevated storage reservoirs that maintain acceptable levels of service (pressure) in the system. The majority of these reservoirs are closed storage tanks; however, there is at least one open water reservoir, the Vine Street Reservoir, maintained by SID. This open water reservoir is a lined non-jurisdictional feature: water is pumped into the reservoir and gravity fed into irrigation supply piping.

Maintenance Activities. The pressure needs to be maintained at adequate levels to appropriately discharge water. Periodically, they need to be drained for inspection and maintenance. Access roads need to be maintained to the reservoirs and vegetation needs to be cleared around the tanks usually by mowing.

A.4 PLAN PARTICIPANT FACILITIES AND SPECIFIC OPERATIONS AND MAINTENANCE ACTIVITIES

The following is a description of each Plan Participant's service area, facilities, and maintenance activities. In general, routine maintenance activities are conducted by the Plan Participants themselves, unless specifically noted.

A.4.1 City of Fairfield

The Operations Division of the City of Fairfield Public Works Department maintains the storm drainage system composed of approximately 21 miles (mi) of streams, 11 mi of drainage ditches, 147 mi of underground storm drain pipeline (12 inches to 102 inches in diameter), and 130 acres (ac) of detention basins (Table A.1). Maintenance activities, such as debris removal, ensure the system will function to capacity during a storm event. The Operations Division utilizes a three-person, full-time crew supplemented by the California Conservation Corps and volunteer organizations to complete maintenance tasks. Figure A-3 provides details of the locations of their facilities.

Routine water channel maintenance activities include vegetation control (mowing, discing, pruning, and hand removal) along drainage ditches and access roads, debris removal, and erosion repair. Maintenance activities occur annually between March 15th and November 30th and are performed systemwide. Table A.3 provides details for maintenance activities for their facilities.

A.4.1.1 New Facilities

The Operations Division of the City of Fairfield Public Works Department will be responsible for maintaining new facilities as they are built as a result of the expansion of urban areas. There is approximately 367 ac of additional development proposed under the Solano HCP within Fairfield. The Operations Division will incorporate the maintenance of new facilities into their overall operation and maintenance activities as they are constructed. The construction of new facilities, such as detention basins and drainage ditches, will be mitigated for as part of the new development covered under the HCP.

A.4.2 City of Suisun City

The storm drainage system maintained by the City of Suisun City includes approximately 3.3 mi of channelized streams, 2 mi of drainage ditches, and 1.9 mi of roadside drainage ditches (Table A.1). Figure A-3 provides details of the locations of their facilities.

Operation and maintenance activities associated with these facilities include protection and repair of channel banks, mechanical control of weeds along rights-of-ways and within channels, and removal of silt from channels and detention basins. Table A.4 provides details for maintenance activities for the City of Suisun City facilities.

A.4.2.1 New Facilities

Suisun City's Public Works Department will be responsible for maintaining new facilities as they are built as a result of the expansion of urban areas. There are approximately 33 ac proposed for development under the Solano HCP within Suisun City. The Public Works Department will incorporate the maintenance of new facilities into their overall operations and maintenance activities as they are constructed. The construction of new facilities, such as detention basins and drainage ditches, will be mitigated for as part of the new development.

A.4.3 City of Vacaville

The City of Vacaville encompasses 18,000 ac located between the Cities of Dixon and Fairfield. Their service area includes over 33 mi of streams, 44 mi of drainage ditches, and 124 ac of storm water detention basins (Table A.1). Figure A-5 provides details of the locations of their facilities. Operation and maintenance activities associated with these facilities include protection and repair of channel banks, mechanical and chemical control of weeds along rights-of-way and within channels, and removal of silt from channels and detention basins. Table A.5 provides details for maintenance activities for their facilities.

The City is also responsible for maintaining its existing water treatment and distribution system. The existing water treatment and distribution system consists of two treatment facilities, 292 mi of distribution pipelines, nine water storage tanks, three booster pump stations, and 14 groundwater wells. The two treatment plants operated by the City of Vacaville are: (1) a treatment plant located on Elmira Road, designated as the Diatomaceous Earth Water Treatment Plant (DE Plant), which is owned by the City; and (2) the North Bay Regional Water Treatment Plant (NBR Plant), which is jointly owned by the Cities of Vacaville and Fairfield.

A.4.3.1 New Facilities

Vacaville's Public Works Department will be responsible for maintaining new facilities as they are built as a result of the expansion of urban areas. There is approximately 479 ac of proposed development within the Vacaville Urban Growth Boundary (UGB). The Public Works Department will incorporate the maintenance of new facilities into their overall operation and maintenance activities as they are constructed. The construction of new facilities, such as detention basins and drainage ditches, will be mitigated for as part of the new development, with a few exceptions to improve the Ulatis drainage system and expand the existing water treatment and distribution system.

During December 2002 (13th through the 16th) and December 2005 (30th and 31st), large storms over the Ulatis Creek watershed caused widespread flooding of roads, farms, houses, and other structures. A study of the Ulatis Drainage System was conducted to identify potential flood control improvements (West Yost Associates 2007) and resulted in the development of a two-phase flood control project.

Under Phase 1, a 540 af upstream regional detention basin will be constructed along Ulatis Creek east of Bucktown Lane and north of Vaca Valley Road, and the following detention basins will be constructed along Alamo Creek (Figure A-5):

- **Alamo Creek Regional Detention Basin:** 970 af of detention storage located on Alamo Creek east of Pleasants Valley Road.
- **Encinosa Creek Regional Detention Basins:** Three detention basins totaling about 200 af located on Encinosa Creek east of Pleasants Valley Road and north of Foothill Drive.
- **Laguna Creek:** 440 af of detention storage located on Laguna Creek east of Pleasants Valley Road and west and north of Cherry Glen Road.

Under Phase 2, wing walls on the drop structure downstream of Nut Tree Road will be removed and a 3 ft tall levee (approximately 2,000 ft long) will be constructed downstream of I-80 along Ulatis Creek. Along Alamo Creek, an additional 25 ft wide by 10 ft high reinforced concrete box culvert will be installed at Peabody Road, and sediment will be removed upstream and downstream of Peabody Road. Improvements in Ulatis Creek would provide a 100-year level of flood protection upstream of I-80 and about a 25-year level of flood protection along the remainder of Ulatis Creek. Improvements to Alamo Creek would provide about a 100-year level of flood protection downstream to the abandoned railroad/bike path and a 10- to 25-year level of flood protection along the remainder of Alamo Creek.

The City of Vacaville is currently finalizing a Water Development Impact Fee Update (DIF Update). This document formulates the City's intent on how to generate the necessary revenue and other funding to provide adequate financing for the City's water utility system. The DIF Update identifies a series of planned water distribution system improvements. The planned improvements to be developed by the City[1] include: 68,400 ft of transmission water lines potentially under natural vegetation, four water storage tanks, one booster pump station, and nine groundwater wells (replacement and expansion) (Figure A-5).

A.4.4 City of Vallejo

The majority of the flood control facilities within the City of Vallejo are maintained by the VSFCD; however, Vallejo Public Works does operate and maintain a few facilities. These include three detention ponds, one sediment basin, two lakes (Lake Chabot and Lake Dalwigk) and a portion of Sulphur Springs Creek and tributaries running through the Hiddenbrooke housing development.

[1] Additional improvements are planned by developers and will be mitigated for as part of specific development projects.

The three detention ponds adjacent to the eastern edge of the Hiddenbrooke housing development receive runoff from small drainages in the hills and eventually drain to the main stem of Sulphur Springs Creek within the Hiddenbrooke development. The sediment basin/small detention pond, which is located at the western edge of the development, also receives runoff from the adjacent hills and drains to Sulphur Springs Creek within the Hiddenbrooke development (Figure A-6).

The Vallejo Public Works department maintains the streams within the Hiddenbrooke housing development that are not part of the golf course, all of which are tributary to Sulphur Springs Creek. Most of the streams are ephemeral to seasonal-intermittent, with the exception of a small portion of the main stem of Sulphur Springs Creek, which is south and downstream of the Hiddenbrooke development (Figure A-6).

The dam at Lake Chabot is also maintained by the City of Vallejo Public Works department (Figure A-6).

Operations and maintenance activities associated with these facilities include removal of silt and sediment from channels and basins, repair of channel banks, trash and debris removal, and vegetation removal. Table A.6 provides details for maintenance activities for the City of Vallejo facilities.

A.4.5 City of Dixon

The City of Dixon is located in the northeast portion of Solano County near Davis. Facilities under their jurisdiction include 182 ac of detention ponds, 2.4 mi of drainage ditches, and approximately 12 mi of access roads (Table A.1 and Figure A-7). The largest feature maintained by the City is Pond A, which is a 640 af detention pond situated on a 112 ac site located just east of the intersection of Pitt School Road and Porter Road. Pond A will detain storm water runoff from areas within Basin A of the City of Dixon and decrease flooding in downstream channels by providing a regulated release of storm water.

Operation and maintenance activities associated with these facilities include grading of access roads, mowing of weed growth along access roads and rights-of-way, trash removal, removal of silt from channels and basins, and repair of channel banks. Table A.7 provides details for maintenance activities for the City of Dixon facilities.

A.4.5.1 New Facilities

One new facility is currently proposed by the City of Dixon. It is an approximately 147 ac proposed storm water detention basin (Figure A-7).

A.4.6 City of Rio Vista

The City of Rio Vista currently maintains 4.2 mi of streams, 1.7 mi of drainage ditches, 18 ac of storm water detention basins, nine wells, two water storage tanks, and two sewer treatment plants (Table A.1 and Figure A-8). Operation and maintenance activities associated with these facilities include mowing, discing, and chemical treatment of weeds along rights-of-way, trash removal, removal of silt and placement of bank protection in open channels, and upkeep of pumping stations. Table A.8 provides details for maintenance activities for the City of Rio Vista facilities.

A.4.6.1 New Facilities

Rio Vista's Public Works Department will be responsible for maintaining new facilities as they are built as a result of the expansion of urban areas. There is approximately 109 ac proposed for development under the Solano HCP for Rio Vista. The Public Works Department will incorporate the maintenance of new facilities into their overall operation and maintenance activities as they are constructed. The construction of new facilities, such as detention basins and drainage ditches, will be mitigated for as part of the new development.

A.4.7 Solano County Water Agency (SCWA)

The SCWA is responsible for the operation and maintenance of the Ulatis and Green Valley Flood Control Projects (Figure A-9) and has the authority to manage all flood control matters within the boundaries of the SCWA. The SCWA has prepared a Flood Control Master Plan to address countywide flooding and drainage problems. A primary recommendation of the Flood Control Master Plan is to develop watershed studies that address flooding problems on a watershed basis. Several watershed studies have been completed, and projects are being considered for implementation. The SCWA also funds localized flood control projects and drainage projects that meet specified criteria.

The Ulatis Flood Control Project is located in the Vacaville-Elmira drainage basin and extends from the hills northwest of Vacaville to the Delta (Figure A-9). Upon completion in 1972, the Federal Soil Conservation Service turned the project over to the SCWA for operation and maintenance. The Ulatis Flood Control Project was designed to prevent flooding of agricultural lands south of Vacaville and areas in the City of Vacaville. The Ulatis Flood Control Project consists of 52 mi of facilities located on private property with access easements granted to the SCWA for operation and maintenance. The Natural Resources Conservation Service (NRCS) reviews any plans for major modifications or improvements to the Ulatis Flood Control Project, but the SCWA is responsible for all maintenance activities and capital improvements. The SCWA contracts with the Solano County Resource Management Department for maintenance of the Ulatis Flood Control Project, including annual removal of trees and woody vegetation and channel dredging (as needed) to maintain adequate flood capacity (see Table A.9). The SID and MPWD use some of the channels of the Ulatis Flood Control Project to convey agricultural irrigation water during the irrigation season. The SCWA works closely with the City of Vacaville to ensure that development projects adequately mitigate impacts associated with storm water runoff. As part of long-term maintenance of the Ulatis Flood Control Project, channels are monitored to ensure that they retain adequate flood control capacity to meet increasing demand.

The Green Valley Flood Control Project is located in the Cordelia area and extends from the hills between Vallejo and Fairfield to the Suisun Marsh (Figure A-9). Upon completion in 1962, the Corps turned the project over to the SCWA for operation and maintenance. The Green Valley Flood Control Project was designed to prevent flooding of unincorporated land around the City of Fairfield and areas in the City of Fairfield. The Green Valley Flood Control Project consists of 6 mi of facilities located on private property with access easements granted to the SCWA for operation and maintenance. The Corps conducts annual inspections of the Green Valley Flood Control Project and reviews any plans for major modifications or improvements to the it, but the SCWA is responsible for all maintenance and capital improvements. The SCWA contracts with the Solano County Resource Management Department for maintenance of the Green Valley Flood Control Project, including annual removal of trees and woody vegetation and channel dredging (as needed)

to maintain adequate flood capacity (see Table A.9). The SCWA works closely with the City of Fairfield to ensure that development projects adequately mitigate impacts associated with storm water runoff. As part of long-term maintenance of the Green Valley Flood Control Project, channels are monitored to ensure they retain the adequate flood control capacity to meet increasing demand.

The SCWA conducts operation and maintenance activities related to the approximately 58 mi of facilities associated with the Ulatis and Green Valley Flood Control Projects. These are primarily unlined earth irrigation ditches that require periodic dredging and bank stabilization (Table A.9). Other operation and maintenance activities include trash removal, grading of access roads, and fence and gate repair along facility rights-of-way. Table A.9 provides details for maintenance activities for their facilities.

A.4.8 Solano Irrigation District (SID)

The SID distribution system consists of approximately 200 mi of underground pipeline, 182 mi of irrigation ditches, six pump station afterbays, and numerous wells and water storage tanks located throughout the distribution service area (Figures A-10a and A-10b). Most of the diversions are gravity fed or pumped to service areas upslope. SID farmers discharge their excess tailwater into irrigation ditches that are also operated and maintained by the SID.

Maintenance and repair of pipelines and irrigation ditches are the primary SID operation and maintenance activities. These include reconstruction of earthen or concrete-lined banks, replacement of old pipelines, sediment removal from ditches and afterbays, debris removal from intake structures, and grading channel access roads. Other operation and maintenance activities include repair and replacement of the numerous pumping stations, meters, valves, and check structures that control water distribution throughout the system. Planned modifications to existing SID facilities include: lining existing unlined supply ditches, piping existing supply ditches, or replacing deteriorating pipelines. Table A.10 provides details for maintenance activities for their facilities.

A.4.9 Maine Prairie Water District (MPWD)

Facilities within the MPWD service area are limited to approximately 11.4 mi of streams, 26.7 mi of irrigation ditches, and five seasonal dams. The MPWD receives water through Sweeney Creek, Gibson Creek, Horse Creek, Ulatis Creek, Sawtelle Drain, and Alamo Creek (Figure A-11). There is a seasonal dam (Dam 1) located in Sweeney Creek, two seasonal dams (Dams 2 and 3) located in Ulatis Creek, one seasonal dam (Dam 5) located in Horse Creek, and one seasonal dam (Dam 4) located in Alamo Creek. The main dam (Dam 1) holds a 1- to 2-day supply of water for the MPWD (Figure A-11). Dam 1, Dam 5, and Sawtelle Drain feed Dam 2. Dam 2 and Alamo Creek feed Dam 3. All of the dams are constantly fed by drain water from the SID and are supplemented by Solano Project water when needed. None of these dams are permanent and must be removed prior to the commencement of winter rains. Although the MPWD does not own the field pumps or the meters, it does own and maintain a number of weirs that aid in the distribution of water throughout the system.

Regular operation and maintenance activities include reconstruction of earthen or concrete-lined channel banks, sediment removal, grading of channel access roads, and the mechanical removal of

weeds. Other operation and maintenance activities include repair and replacement of pumping stations, meters, valves, and check structures. Table A.11 provides details for maintenance activities for the MPWD facilities.

A.4.10 Dixon Regional Watershed Joint Powers Authority (DRW JPA)

The DRW JPA currently manages two drainage facilities comprising approximately 9.3 mi of irrigation ditches: the Lateral 1 drain and the New South Channel (Figure A-12). The Lateral 1 drain is located on the west side of State Route 113 (SR-113). The New South Channel is located near Pedrick Road and I-80 and terminates near Hass Slough at RD 2068's intake channel (Figure A-12).

Annual maintenance activities include bank maintenance and reconstruction; flashboard riser installation, replacement, and maintenance; culvert repair and replacement; drainage pipe repair and replacements; weed control; silt and trash removal; erosion repair; and roadway grading and repair. All maintenance activities are currently conducted by the Dixon RCD; therefore, the summary of the maintenance activities for these facilities is included in the Dixon RCD table (Table A.12).

A.4.10.1 New Facilities

An additional 15 mi of new and enhanced drainage facilities are planned to be constructed and added to the DRW JPA facilities. Future projects include enhancements to Tremont #3 and connections to the City of Dixon. These improvements will enhance existing facilities and result in the construction of 2 mi of additional ditches to improve drainage in the area south and east of Dixon.

A.4.11 Dixon Resource Conservation District (Dixon RCD)

The Dixon RCD was originally formed to construct, operate, and maintain the Dixon Drain, which is a system of ditches designed to provide winter drainage, reduce duration of flooding, and diminish ponding of winter water on agricultural lands. It is also used to collect irrigation tailwater in the spring and summer. Currently, the Dixon Drain is 74 mi long and is accessed by private properties via flashboard risers (Figure A-13).

The Dixon Drain is composed of four segments (Tremont #1, Tremont #2, Tremont #3, and the Dixon Main Drain) and is located within three distinct watersheds (Putah Creek Watershed, Yolo Bypass Watershed, and Dickson-Dudley Creek Watershed). Tremont #1, within the Putah Creek Watershed, begins approximately 0.5 mi east of I-80, just north of Tremont Road and drains into Putah Creek, east of Mace Boulevard. Tremont #2, located in the Yolo Bypass Watershed, begins at Sikes Road just south of Tremont Road and drains east into the Yolo Bypass. Tremont #3, located in the Dickson-Dudley Creek Watershed, begins at Robben Road just south of Tremont Road and drains southeast into RD 2068 ditches. The Dixon Main Drain is a network of irrigation ditches that drain the land within the Dixon RCD south of Dixon and empty into the RD 2068 ditch on Swan Road near Sikes Road. Winter runoff from the City of Dixon is also collected by the Dixon Main Drain system.

The Dixon RCD oversees the operation and maintenance of the Dixon Drain, including those facilities managed by the DRW JPA. Annual maintenance activities include bank maintenance and reconstruction; flashboard riser installation, replacement, and maintenance; culvert repair and replacement; drainage pipe repair and replacement; weed control; silt and trash removal; erosion repair; and roadway grading and repair. Table A.12 provides details for maintenance activities for their facilities.

A.4.11.1 Expansion Area and Proposed New Facilities

The potential Drainage Service Expansion Area consists of an approximately 8,930 ac area north of I-80 and northeast of the City of Dixon. During the life of the Solano HCP, the Dixon RCD may expand its drainage services to include this area; however, no formal plans have been established at this time. Because there are currently no proposed expansion plans, the expansion of facilities within this area to be covered under the HCP would be limited to approximately 5 mi of new and enhanced drainage facilities. These facilities would be constructed under the authority of the DRW JPA.

A.4.12 Reclamation District No. 2068 (RD 2068)

The primary responsibility of RD 2068 is the delivery of irrigation water within its 12,000 ac boundary (Figure A-2). RD 2068 also supplies supplemental water, as needed, to an additional 3,000 ac beyond their service area boundary. Existing RD 2068 facilities include levees, drains, and an irrigation system of pumping plants, ditches, and distribution system components. The delivery system contains four primary pumping plants, approximately 45 mi of irrigation supply ditches and approximately 59 mi of irrigation drainage ditches (Figure A-14). These facilities are capable of delivering in excess of 255 cubic feet per second (cfs) to the irrigation system.

Annual maintenance activities include bank maintenance and reconstruction; flashboard riser installation, replacement, and maintenance; pump, motor, and electrical equipment repair and replacement; customer turnout pipe and gate installation and replacement; siphon and culvert repair and replacement; ditch gate repair and replacement; drainage pipe repair and replacement; ditch control structure repair and replacement; weed control; silt and trash removal; erosion repair; and roadway grading and repair. Table A.13 provides details for maintenance activities for the RD 2068 facilities.

A.4.13 Vallejo Sanitation and Flood Control District (VSFCD)

The VSFCD is responsible for approximately 17,000 ac located in the southwest portion of Solano County and includes the City of Vallejo. This jurisdiction contains approximately 8.5 mi of streams, 2 mi of drainage ditches, and 80 ac of storm water detention basins (Figure A-14). Operation and maintenance activities are generally limited to repair and replacement of valves and pumps, vegetation control along open channels, and sediment removal. Inspection of these facilities is usually performed annually, with repairs made as needed. Table A.14 provides details for maintenance activities for their facilities.

A.4.14 Fairfield-Suisun Sewer District (FSSD)

The FSSD is responsible for waste and storm water management for approximately 32,000 ac of Solano County, that include Travis Air Force Base (AFB) and the Cities of Fairfield and Suisun City. Facilities include approximately 90 mi of pipeline, 10 mi of sewer force mains, one sewage treatment plant, and two outfalls (Table A.1 and Figure A-15). Operation and maintenance activities include pipeline and pump repair, weed control along rights-of-way and sediment removal in reservoirs. The FSSD maintains sanitary sewer force mains that parallel Cordelia Road from Pitman Road to the treatment plant and from old town Suisun to the treatment plant (Table A.15). The FSSD also maintains an approximately 1.25 mi long, treated effluent outfall line to Boynton Slough that passes through Suisun Marsh. A new 1.2 mi outfall was constructed within the Cordelia Road right-of-way on land generally owned by the FSSD. This outfall discharges treated effluent to Ledgewood Creek.

The FSSD sanitary sewer force mains require periodic inspection (semi-annual to annual) of pipeline right-of-way and will require maintenance on a very rare (tens of years) basis. The effluent outfall lines require annual inspection of the outfall structure at Boynton Slough and Ledgewood Creek and internal inspection of the pipeline (once every 5 years). The internal inspection does not require disturbance of wetlands.

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Figure A-1: Cities and Flood Control and Sewer Districts

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Figure A-2: Irrigation and Reclamation Districts

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Figure A-3: City of Fairfield Facilities

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Figure A-4: City of Suisun City Facilities

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Figure A-5: City of Vacaville Facilities

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Figure A-6: City of Vallejo and Vallejo Sanitation and Flood Control Facilities

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Figure A-7: City of Dixon Facilities

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Figure A-8: City of Rio Vista Facilities

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Figure A-9: Solano County Water Agency Facilities

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Figure A-10a: Solano Irrigation District Facilities – Sacramento River/Delta Drainage Province

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Figure A-10b: Solano Irrigation District Facilities – San Francisco Bay Drainage Province

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Figure A-11: Maine Prairie Water District Facilities

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Figure A-12: Dixon Regional Watershed Joint Powers Authority (JPA) Facilities

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Figure A-13: Dixon Resource Conservation District Facilities

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Figure A-14: Reclamation District No. 2068 Facilities

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Figure A-15: Fairfield-Suisun Sewer District Facilities

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Table A.1: Summary of Facilities Associated with Urban Development Maintained by Plan Participants

Facility Type	City of Fairfield	City of Suisun City	City of Vacaville	City of Vallejo	City of Dixon	City of Rio Vista	VSFCD	FSSD
Service Area	All of Fairfield	All of Suisun City	All of Vacaville	All of Vallejo	All of Dixon	All of Rio Vista	17,000 ac	32,000 ac
Stream, Unmodified	61,900 ft	N/A	105,000 ft	21,400 ft	N/A	8,200 ft	12,500 ft	–
Stream, Channelized for Flood Control	51,000 f.	17,400 ft	69,100 ft	–	–	14,400 ft	32,500 ft	–
Drainage ditch	31,500 ft	11,100 ft	30,100 ft	–	5,000 ft	9,000 ft	6,700 ft	–
Roadside Drainage Ditch	26,000 ft	9,800 ft	200,700 ft	–	7,500 ft	–	3,900 ft	–
Storm Water Detention Basin	130 ac	–	126.8 ac	1.3 ac, 1.4 ac Dam	182.4 ac	17.95 ac	80.4 ac	–
Sewer Treatment Plant/Pond/Sprayfield	N/A	N/A	2 plants	–	422 ac	24.22 ac	1	–
Underground Storm Drain	778,720 ft	–	–	–	N/A	–	–	–
Underground Sanitary Sewer	N/A	N/A	–	–	39,600 ft	–	–	454,700 ft
Underground Sanitary Sewer – Treated Discharge	N/A	N/A	–	–	N/A	–	–	25,100 ft
Pressurized Pipeline (force mains)	–	–	–	–	1,000 ft	–	10	52,800 ft
Air Vacuum Relief Valves	–	–	–	–	214	–	–	30
Sewer Force Main Valves	–	–	–	–	3	–	–	–
Cathodic Protection System	–	–	–	–	1	–	–	1 system
Pipe Outfall	214	80	122	–	3		70	2
Culvert, Bridge, or Undercrossings	100+	20+	57+	–	N/A	10+	40+	–
Other Appurtenant Facilities	250+	100+	60+	–	1,500+	10+	5+	20+
Roadways (Flood Control Channel Rights-of-Ways, and Other Access Roads)	17 mi	–	–	–	62,600 ft	–	–	–
Fences and Gates	80 mi	1,630 ft	180,000 ft	–	60 mi	100 mi	–	–
Wells	–	–	14 (4 new planned)	–	5	9	–	–
Water Storage Tanks	–	–	9 (4 new planned)	–	4	2	–	–

ac = acres
FSSD = Fairfield-Suisun Sewer District
ft = feet
mi = miles
N/A = not applicable
VSFCD = Vallejo Sanitation and Flood Control District

Table A.2: Summary of Facilities Associated with Agricultural Activities Maintained by Plan Participants

Facility Type	SCWA	SID	MPWD	DRW JPA	Dixon RCD	RD 2068
Service Area	Solano County	76,000 ac	12,000 ac	115,000 ac	43,300 ac	9,000 ac
Stream, Unmodified	23,300 ft	–	12,800 ft	–	–	–
Stream, Channelized for Flood Control	516,100 ft	80,600 ft	47,200 ft	–	15,000 ft	–
Irrigation Ditch – Drainage Only	–	446,100 ft	–	15,500 ft	–	250,000 ft
Irrigation Ditch – Combined Supply and Drainage	–	–	140,800 ft	33,800 ft	375,600 ft	59,000 ft
Irrigation Ditch – Supply	–	515,500 ft	–	–	–	238,000 ft
Irrigation Supply Pump Station Afterbay	–	6	–	–	–	1.7 ac
Underground Irrigation Supply Piping	–	1,061,300 ft	–	–	–	–
Pressurized Pipeline (force mains)	–	150,000 ft	–	–	–	–
Air Vacuum Relief Valves	–	1,000 ft	–	–	–	–
Cathodic Protection System	–	3	–	–	–	–
Pipe Outfall	–	3	–	–	–	–
Culvert, Bridge, or Undercrossings	100+	350+	80+	20+	250+	175+
Seasonal Dams	–	1	5	–	–	–
Roadways (Canal, Channel, Rights-of-Way, and Other Access Roads)	280 mi	150 mi	75 mi	–	190 mi	120 mi
Other Appurtenant Facilities	30+	65,250+	50+	10+	75+	100+
Fences and Gates	560 mi	500 ft	–	–	–	–
Wells	4	36	–	–	–	–
Water Storage Tanks	–	24	–	–	–	–

ac = acres
Dixon RCD = Dixon Resource Conservation District
DRW JPA = Dixon Regional Watershed Joint Powers Authority
ft = feet
mi = miles
MPWD = Maine Prairie Water District
RD 2068 = Reclamation District No. 2068
SCWA = Solano County Water Agency
SID = Solano Irrigation District

Table A.3: Routine Operation and Maintenance Activities for the City of Fairfield

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (61,900 ft)	Bank Reconstruction	0.4 mi		0.7	Yearly
	Placement of Temporary Bank Protection	0.2 mi		0.4	Yearly
	Silt and Sediment Removal	1.3 mi		10	Yearly
	Vegetation Removal	7 mi		60	Yearly
	Debris and Trash Removal	2 mi		14	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Channelized Streams (51,000 ft)	Bank Reconstruction	0.3 mi		0.6	Yearly
	Placement of Temporary Bank Protection	0.1 mi		0.3	Yearly
	Sediment and Silt Removal	0.9 mi		7.2	Yearly
	Vegetation Removal	6 mi		48	Yearly
	Debris and Trash Removal	1 mi		10	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Drainage Ditch (31,500 ft)	Bank Reconstruction	0.2 mi		0.13	Yearly
	Placement of Temporary Bank Protection	0.1 mi		0.06	Yearly
	Sediment and Silt Removal	0.6 mi		1.7	Yearly
	Vegetation Removal	4 mi		11	Yearly
	Debris and Trash Removal	1 mi		3	Yearly
	Beaver Dam Removal	1 mi	1	0.1	Yearly
Roadside Drainage Ditch (26,800 ft. mapped)	Bank Reconstruction	0.2 mi		0.08	Yearly
	Placement of Temporary Bank Protection	0.08 mi		0.04	Yearly
	Sediment and Silt Removal	0.5 mi		0.9	Yearly
	Vegetation Removal	3.1 mi		6	Yearly
	Debris and Trash Removal	0.8 mi		1.5	Yearly
	Mowing (for fire preventions)	8 mi		23	Yearly
Storm Water Detention Basins (130 ac)	Sediment and Silt Removal		1	0.5	Yearly
	Vegetation Removal		1	0.5	Yearly
	Debris and Trash Removal		All	48.8	Yearly
Underground Storm Drain (778,720 ft not mapped)	Repair/Replacement	1 mi		0.1	Yearly
Pipe Outfalls (214)	Sediment and Silt Removal		2	0.2	Yearly
Culvert, Bridge Crossings, or Undercrossings (100+)	Replacement	60 ft		0.2	5 Years
	Sediment and Silt Removal		3	0.3	Yearly
Other Appurtenant Facilities (approx. 250)	Repair/Replacement		2	0.2	Yearly
Roadways (17 mi)	Vegetation Removal	17 mi		48	Yearly
	Blading and Grading	17 mi		48	Yearly
	Mowing (for fire preventions)	17 mi		48	Yearly
Fences and Gates (80 mi)	Repair and Replace	1 mi		0.1	Yearly

ac = acres
ft = feet
mi = miles

Table A.4: Routine Operation and Maintenance Activities for the City of Suisun City

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Channelized Streams (17,400 ft)	Bank Reconstruction	0.1 mi		0.2	5 Years
	Replacement of Existing Bank Protection	23 mi		0.01	5 Years
	Sediment and Silt Removal	0.8 mi		6.6	4 Years
	Vegetation Removal	1.4 mi		11	Yearly
	Beaver Dam Removal		1	0.1	5 Years
	Mechanical Removal of Submerged Weeds with Excavator	0.1 mi		0.1	2 Years
Drainage Ditch (11,100 ft)	Bank Reconstruction	0.5 mi		0.4	5 Years
	Replacement of Existing Bank Protection	15 mi		0.01	5 Years
	Sediment and Silt Removal	0.5 mi		1.4	4 Years
	Vegetation Removal	0.9 mi		2.4	Yearly
	Beaver Dam Removal		1	0.1	5 Years
Roadside Drainage Ditch (9,800 ft not mapped)	Bank Reconstruction	0.5 mi		0.2	5 Years
	Replacement of Existing Bank Protection	13 ft		0.01	5 Years
	Sediment and Silt Removal	0.5 mi		0.9	4 Years
	Vegetation Removal	0.8 mi		1.5	Yearly
	Beaver Dam Removal		1	0.1	5 Years
Pipe Outfalls (80)	Sediment and Silt Removal		1	0.1	Yearly
Culvert, Bridge Crossings, or Undercrossings (17)	Sediment and Silt Removal		1	0.1	Yearly
Other Appurtenant Facilities (100+)	Repair/Replacement		1	0.1	Yearly
Maintenance Roads (20 mi)	Vegetation Removal (Mowing, etc.)	20 mi		57	Yearly
Fences and Gates (1,630 ft)	Repair/Replacement		80	0.04	Yearly

ac = acres
ft = feet
mi = miles

Table A.5: Routine Operation and Maintenance Activities for the City of Vacaville

Facility Type	Operation and Maintenance Activity	Average Length (mi)	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (105,000 ft)	Bank Reconstruction	0.4		0.8	Yearly
	Replacement of Existing Bank Protection	0.3		0.5	Yearly
	Vegetation Removal	8		62	Yearly
Channelized Streams (69,100 ft)	Bank Reconstruction	0.3		2.1	Yearly
	Replacement of Existing Bank Protection	0.2		1.4	Yearly
	Sediment and Silt Removal	0.9		7.6	Yearly
	Vegetation Removal	5		41	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Drainage Ditch (30,100 ft)	Bank Reconstruction	0.1		0.08	Yearly
	Replacement of Existing Bank Protection	0.1		0.05	Yearly
	Sediment and Silt Removal	0.4		1.1	Yearly
	Vegetation Removal	2		6	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Roadside Drainage Ditch (200,700 ft)	Bank Reconstruction	0.7		0.4	Yearly
	Replacement of Existing Bank Protection	0.5		0.2	Yearly
	Sediment and Silt Removal	3		5.4	Yearly
	Vegetation Removal	14.9		29	Yearly
Storm Water Detention Basins (126.8 ac)	Sediment and Silt Removal		2	0.3	Yearly
	Vegetation Removal		2	0.5	Yearly
	Debris and Trash Removal		All	124.5	Yearly
Waterlines under Natural Vegetation (45,320 ft)	Repair and Replace	0.5		1.4	10 Years
Pipe Outfalls (122)	Sediment and Silt Removal		4	0.4	Yearly
Culvert, Bridge Crossings, or Undercrossings (57)	Sediment and Silt Removal		5	0.5	Yearly
Other Appurtenant Facilities (60+)	Repair/Replacement		2	0.2	Yearly
Maintenance Roads (30 mi)	Vegetation Removal (mowing, etc.)	30		85	Yearly
	Blading and Grading	12		34	Yearly
Fences and Gates (180,000 ft)	Repair/Replacement	0.5		0.5	Yearly
Municipal Groundwater Wells (14 existing, 4 new planned)	Repair/Replacement		1	0.1	Yearly
	Mowing		12–19	1.5–2	Yearly
Water Storage Tanks (9, 4 new planned)	Repair/Replacement		1	0.1	Yearly
	Mowing		9–4	1–1.5	Yearly

ac = acres
ft = feet
mi = miles

Table A.6: Routine Operation and Maintenance Activities for the City of Vallejo

Facility Type	Operation and Maintenance Activity	Average Length (ft)	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity (frequency/year)
Unmodified Streams (Sulphur Springs Creek [3,600 ft] plus Tributaries [17,800 ft] = 21,400 ft total)	Bank Reconstruction	1,070		0.06	Every 5 Years
	Placement of Bank Protection	1,070		0.06	Every 5 Years
	Replacement of Existing Bank Protection	2,140		0.12	Every 5 Years
	Vegetation Removal	428		0.02	Every 5 Years
Storm Water Detention Basins (4 totaling 1.3 ac)	Sediment and Silt Removal		3 of 4 1 of 4	1.2 0.2	Every 5 Years Every 2 Years
	Debris and Trash Removal		4 of 4	0.2	Every Year
Lake Chabot Dam (1.4 ac)	Vegetation Removal		1	1.4	Every Year
	Debris and Trash Removal		1	1.4	Every Year
Culvert, Bridge Crossings, or Undercrossings (2)	Sediment and Silt Removal		1	0.1	Every 5 Years
	Debris and Trash Removal		2 of 2	0.02	Every Year

ac = acres
ft = feet

Table A.7: Routine Operation and Maintenance Activities for the City of Dixon

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Drainage Ditch (5,000 ft not mapped)	Bank Reconstruction	0.04 mi		0.03	Yearly
	Placement of Bank Protection	0.01 mi		0.01	Yearly
	Replacement of Existing Bank Protection	0.2 mi		0.14	Yearly
	Sediment and Silt Removal	0.5 mi		1.4	Yearly
	Raising Banks	0.25 mi		0.7	Yearly
	Vegetation Removal	0.2 mi		0.5	Yearly
	Debris and Trash Removal	All		2.6	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Roadside Drainage Ditch (7,500 ft not mapped)	Bank Reconstruction	0.06 mi		0.03	Yearly
	Placement of Bank Protection	0.01 mi		0.01	Yearly
	Replacement of Existing Bank Protection	0.3 mi		0.15	Yearly
	Sediment and Silt Removal	0.5 mi		1.0	Yearly
	Vegetation Removal	0.5 mi		1.0	Yearly
	Debris and Trash Removal	All		2.8	Yearly
Storm Water Detention Basins (182.4 ac)	Sediment and Silt Removal		8	100	1–2 Times/Year
	Hand Removal of Weeds (mainly with a string trimmer)		All	182.2	Yearly
	Debris and Trash Removal		All	182.2	4 Times/Year
Underground Sanitary Sewer (39,600 ft not mapped)	Repair/Replacement	0.05 mi		0.14	Yearly
Pressurized Pipeline (force mains) (1,000 ft not mapped)	Repair/Replacement	0.05 mi		0.14	Yearly
Sewer Treatment Sprayfields (1 facility; 422 ac)	Mowing and Discing	All		422	Yearly
Pipe Outfalls (24 ac)	Sediment and Silt Removal		3	0.3	Yearly
Culvert, Bridge Crossings, or Undercrossings	Replacement/Repair		1	0.1	Yearly
Other Appurtenant Facilities (approx. 1,500)	Repair/Replacement		3	0.3	Yearly
Maintenance Roads (62,600 ft)	Mowing (for fire prevention)	1.19 mi		3.4	Yearly
	Blading and Grading	1.19 mi		3.4	Yearly
Fences and Gates (60 ft)	Repair/Replacement	20 ft		0.01	Yearly
Municipal Groundwater Wells (5)	Repair/Replacement		1	0.1	Yearly
	Mowing		5	0.5	Yearly
Water Storage Tanks (4)	Maintenance and Repair		1	0.1	Yearly
	Mowing and Discing (for fire prevention)		4	0.4	Yearly

ac = acres
ft = feet
mi = miles

Table A.8: Routine Operation and Maintenance Activities for the City of Rio Vista

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (8,200 ft)	Bank Reconstruction	0.4 mi		0.9	Yearly
	Placement of Bank Protection	0.01 mi		0.02	Yearly
	Replacement of Existing Bank Protection	0.02 mi		0.05	Yearly
	Vegetation Removal	0.2 mi		1.6	Yearly
	Trash and Debris Removal	1.6 mi		12	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Channelized Streams (14,400 ft)	Bank Reconstruction	1.2 mi		2.4	Yearly
	Placement of Bank Protection	0.03 mi		0.06	Yearly
	Replacement of Existing Bank Protection	0.06 mi		0.12	Yearly
	Sediment and Silt Removal	1 mi		11.8	Yearly
	Vegetation Removal	1 mi		8	Yearly
	Trash and Debris Removal	2.7 mi		22	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Drainage Ditch (9,000 ft)	Bank Reconstruction	0.5 mi		0.3	Yearly
	Placement of Bank Protection	0.05 mi		0.03	Yearly
	Replacement of Existing Bank Protection	0.01 mi		0.01	Yearly
	Sediment and Silt Removal	0.3 mi		0.8	Yearly
	Vegetation Removal	1.7 mi		4.6	Yearly
Storm Water Detention Basins (18 ac)	Sediment and Silt Removal		2	0.5	Yearly
	Vegetation Removal		2	1	Yearly
	Debris and Trash Removal		All	18	Yearly
Sewer Treatment Ponds and Sprayfields (24 ac)	Mowing and Discing		All	24	Yearly
Pipe Outfalls	Sediment and Silt Removal		2	0.2	Yearly
Culvert, Bridge Crossings, or Undercrossings (10)	Sediment and Silt Removal		2	0.2	Yearly
Other Appurtenant Facilities (10)	Repair/Replacement		1	0.1	Yearly
Maintenance Roads (23,000 ft)	Vegetation Removal (mowing, etc.)	4.4 mi		12	Yearly
	Blading and Grading	4.4 mi		12	Yearly
Fences and Gates (100 ft)	Repair/Replacement	5–10 ft		0.1	Yearly
Municipal Groundwater Wells (9)	Repair/Replacement		1	0.1	Yearly
	Mowing and Discing		9	0.9	Yearly
Water Storage Tanks (2)	Mowing and Discing		2	0.2	Yearly
	Maintenance and Repair		1	0.1	Yearly

ac = acres
mi = miles

Table A.9: Routine Operation and Maintenance Activities for the Solano County Water Agency

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (23,300 ft)	Bank Reconstruction	10 ft		0.02	5 Years
	Placement of Bank Protection	25 ft		0.04	5 Years
	Replacement of Existing Bank Protection	50 ft		0.08	5 Years
Stream, Channelized for Flood Control (516,100 ft)	Bank Reconstruction	50 ft		0.08	Yearly
	Placement of Bank Protection	100 ft		0.15	Yearly
	Replacement of Existing Bank Protection	400 ft		0.6	Yearly
	Sediment and Silt Removal	8 mi		65	Yearly
	Vegetation Removal – mechanical	All		434	Yearly
	Removal of Beaver Dams		2 dams	0.2	Yearly
Culvert, Bridge Crossings, or Undercrossings (Over 100)	Sediment and Silt Removal		3–4 structures	0.3–0.4	Yearly
	Replacement/Repair		2–3 structures	0.2–0.3	Yearly
Other Appurtenant Facilities (approx. 32)	Replacement/Repair		4–5 facilities	0.4–0.5	Yearly
Fences and Gates (approx. 560 mi)	Replacement/Repair	6 mi		0.6	Yearly
Roadways (approx. 280 mi)	Vegetation Removal/Mowing	280 mi		810	Yearly
	Blading and Grading	280 mi		810	Yearly
Wells (4)	Maintenance and Repairs		1 well	0.1	Yearly

ac = acres
ft = feet
mi = miles

Table A.10: Routine Operation and Maintenance Activities for the Solano Irrigation District

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Stream, Channelized for Flood Control (80,600 ft)	Bank Reconstruction	0.25 mi		0.5	Yearly
	Placement of Bank Protection	0.1 mi		0.2	Yearly
	Replacement of Existing Bank Protection	10 ft		0.01	Yearly
	Sediment and Silt Removal	5 mi		37	Yearly
	Vegetation Removal – mechanical	1 mi		6	Yearly
	Removal of Beaver Dams		1	0.1	Yearly
Irrigation Ditches – Drainage (446,100 ft)	Bank Reconstruction	9 mi		6	Yearly
	Placement of Bank Protection	4 mi		3	Yearly
	Replacement of Existing Bank Protection	60 ft		0.03	Yearly
	Sediment and Silt Removal	30 mi		82	Yearly
	Spoil Pile Removal		2	30 ft^2	Yearly
	Vegetation Removal (excavator)	5 mi		14	Yearly
	Removal of Beaver Dams		1	0.1	Yearly
Irrigation Ditches – Supply (515,500 ft)	Bank Reconstruction	10 mi		7	Yearly
	Placement of Bank Protection	2–3 mi		2	Yearly
	Replacement of Existing Bank Protection	40 ft		0.02	Yearly
	Replacement of Concrete Paving	220–320 ft		0.2	Yearly
	Paving with Concrete	0.5 mi		1.4	Every 15 years
	Repair Leaks		3	0.3	Yearly
	Raising Banks	1 mi		3	Yearly
	Sediment and Silt Removal	15 mi		45	Yearly
	Spoil Pile Removal		2	20 ft^2	Yearly
	Vegetation Removal	1,050 ft		0.6	Yearly
	Removal of Beaver Dams*		1 dam	0.1	Yearly
Underground Irrigation Supply Piping (1,061,300 ft)	Repair/Replacement	1 mi		3	Yearly
Irrigation Supply Pump Station Afterbay (6)	Sediment and Silt Removal		1–2 facilities	0.2	Every 10 years
	Vegetation Removal		6 facilities	5	Yearly
Pipe Outfalls (3+)	Sediment and Silt Removal		1 outfall	0.1	Yearly
Culvert, Bridge Crossings, or Undercrossings (174 mapped, estimating 350+)	Sediment and Silt Removal		8–9 structures	0.9	Yearly
	Replacement/Repair	260 ft	12–14 structures	1.4	Yearly
Other Appurtenant Facilities (65,250+)	Repair/Replacement		350 facilities	35	Yearly
Roadways (150 mi)	Vegetation Removal	150 mi		430	Yearly
	Blading and Grading	150 mi		430	Yearly

Table A.10: Routine Operation and Maintenance Activities for the Solano Irrigation District

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Fences and Gates (500 ft)	Repair/Replacement	10 ft		0.1	Yearly
Groundwater Wells (36)	Vegetation Removal (mowing for fire prevention)		36 wells	3.6	Yearly
	Maintenance/Repair/Replacement		2 wells	0.2	Yearly
Water Storage Tanks/Reservoirs (25)	Vegetation Removal (mowing for fire prevention)		24 storage tanks	0.25	Yearly
	Maintenance and Repair		1 storage tank	0.1	Yearly

ac = acres
ft = feet
ft^2 = square feet
mi = miles

Table A.11: Routine Operation and Maintenance Activities for the Maine Prairie Water District

Facility Type	Operation and Maintenance Activity	Average Length (mi)/	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (12,800 ft)	Bank Reconstruction	0.1		0.2	Yearly
	Placement of Bank Protection		1–2 facilities	0.03	Yearly
	Replacement of Existing Bank Protection		1–2 facilities	0.2	Yearly
Stream, Channelized for Flood Control (47,200 ft)	Bank Reconstruction	0.3		0.6	Yearly
	Placement of Bank Protection	1–2		0.13	Yearly
	Replacement of Existing Bank Protection		1–2 facilities	0.2	Yearly
	Sediment and Silt Removal	0.5		4	Yearly
	Vegetation Removal – mechanical	6		48	Yearly
Irrigation Ditches - Combined Supply and Drainage (140,800 ft)	Bank Reconstruction	0.5		0.3	Yearly
	Placement of Bank Protection		2–3 facilities	0.25	Yearly
	Replacement of Existing Bank Protection		2–3 facilities	0.5	Yearly
	Sediment and Silt Removal	4		11	Yearly
	Spoil Pile Removal	No removal: spoils spread on right-of-way to dry			Yearly
	Vegetation Removal	10		27	Yearly
	Removal of Beaver Dams		1 dam	0.2	Yearly
Culvert, Bridge Crossings, or Undercrossings (80+)	Sediment and Silt Removal		1–2 structures	0.1–0.2	Yearly
	Replacement/Repair		2–3 structures	0.2–0.3	Yearly
Other Appurtenant Facilities (approx.50+)	Replacement/Repair		4–5 facilities	0.4–0.5	Yearly
Roadways (approx. 75 mi)	Vegetation Removal	75		220	Yearly
	Blading and Grading	75		220	Yearly

ac = acres
ft = feet
mi = miles

Table A.12: Routine Operation and Maintenance Activities for the Dixon Resource Conservation District

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Channelized Streams (15,500 ft total)	Bank Reconstruction	0.02 mi		0.04	Yearly
	Placement of Bank Protection	0.02 mi		0.04	Yearly
	Replacement of Existing Bank Protection	5-10 ft		0.01	Yearly
	Sediment and Silt Removal	0.1 mi		0.8	Yearly
	Mechanical Removal of Submerged Weeds (excavator)	0.05 mi		0.4	Yearly
	Vegetation Removal	All		23	Yearly
	Removal of Beaver Dams		1 dam	0.1	Yearly
Irrigation Ditches - Combined Supply and Drainage (375,600 ft)	Bank Reconstruction	1 mi		1	Yearly
	Placement of Bank Protection	1 mi		1	Yearly
	Replacement of Existing Bank Protection	50–100 ft		0.02	Yearly
	Sediment and Silt Removal	15 mi		60	Yearly
	Spoil Pile Removal	99 yd^3		0.5	Yearly
	Mechanical Removal of Submerged Weeds (excavator)	2 mi		8	Yearly
	Vegetation Removal	All		262	Yearly
	Removal of Beaver Dams		1 dam	0.1	Yearly
Culvert, Bridge Crossings, or Undercrossings (approx. 250)	Sediment and Silt Removal		5–6 structures	0.5–0.6	Yearly
	Repair/Replace	250 ft		0.25	Yearly
Other Appurtenant Facilities (approx. 75)	Replacement/Repair		8 facilities	0.8	Yearly
Roadways (approx. 190 mi)	Vegetation Removal	All		550	Yearly
	Blading and Grading	All		550	Yearly

ac = acres
ft = feet
mi = miles
yd^3 = cubic yards

Table A.13: Routine Operation and Maintenance Activities for Reclamation District No. 2068

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Irrigation Ditches - Drainage (250,200 ft)	Bank Reconstruction	0.1 mi		0.07	Yearly
	Placement of Bank Protection	5 ft		0.01	Yearly
	Replacement of Existing Bank Protection	10 ft		0.01	Yearly
	Sediment and Silt Removal	0.2 mi		0.5	Yearly
	Spoil Pile Removal	25 yd^3		0.1	Yearly
	Vegetation Removal (excavator)	0.05 mi		0.14	Yearly
	Removal of Beaver Dams		1 dam	0.1	Yearly
Irrigation Ditch - Combined Supply and Drainage (59,000 ft mapped)	Bank Reconstruction	0.4 mi		0.4	Yearly
	Placement of Bank Protection	5 ft		0.01	Yearly
	Replacement of Existing Bank Protection	10 ft		0.01	Yearly
	Sediment and Silt Removal	0.5 mi		2	Yearly
	Spoil Pile Removal	90 yd^3		0.5	Yearly
	Vegetation Removal (excavator)	0.2 mi		0.8	Yearly
	Removal of Beaver Dams		1 dam	0.1	Yearly
Irrigation Ditches – Supply Only (238,000 ft)	Bank Reconstruction	0.5 mi		0.4	Yearly
	Placement of Bank Protection	50 ft		0.01	Yearly
	Replacement of Existing Bank Protection	100 ft		0.06	Yearly
	Repair Leaks	3–4 holes		0.3–0.4	Yearly
	Raising Banks	0.5 mi		1.5	Yearly
	Sediment and Silt Removal	5.3 mi		16	Yearly
	Spoil Pile Removal	900 yd^3		5	Yearly
	Vegetation Removal (excavator)	1.75 mi		3	Yearly
	Removal of Beaver Dams		1 dam	0.1	Yearly
Irrigation Supply Pump Station Afterbay (2, 1.73 ac)	Sediment and Silt Removal		2 facilities	0.1	Every 10 years
	Vegetation Removal (excavator or hand removal)		2 facilities	0.2	Yearly
Culvert, Bridge Crossings, or Undercrossings (approx. 175)	Sediment and Silt Removal		4–5 structures	0.4–0.5	Yearly
	Replacement/Repair	100 ft		0.06	Yearly
Other Appurtenant Facilities (approx. 100+)	Repair/Replacement		13 facilities	1.3	Yearly
	Hand Removal of Weed Growth		30 pumps and many wood poles	1000 ft^2	Yearly
Roadways (approx. 120 mi)	Vegetation Removal	120 mi		347	Yearly
	Blading and Grading	60 mi		173	Yearly
Fences and Gates	Repair/Replacement	0.25 mi		0.1	Yearly

ac = acres
ft = feet
mi = miles
yd^3 = cubic yards

Table A.14: Routine Operation and Maintenance Activities for the Vallejo Sanitation and Flood Control District

Facility Type	Operation and Maintenance Activity	Average Length	No. of Facilities Worked On	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Unmodified Streams (12,500 ft)	Bank Reconstruction	15 ft		0.01	Once Every 5 Years
	Placement of Bank Protection	0.02 mi		0.04	Once Every 5 Years
	Vegetation Removal	0.1 mi		0.9	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Channelized Streams (32,500 ft)	Bank Reconstruction	40 ft		0.02	Once Every 5 Years
	Placement of Bank Protection	0.06 mi		0.12	Once Every 5 Years
	Sediment and Silt Removal	0.3 mi		2.4	Every Other Year
	Replacement of Concrete Lining	15 ft		0.02	Once Every 5 Years
	Vegetation Removal	0.3 mi		2.4	Yearly
	Beaver Dam Removal		1	0.1	Yearly
Drainage – Ditch (6,700 ft)	Bank Reconstruction	35 ft		0.01	Once Every 5 Years
	Placement of Bank Protection	0.01 mi		0.01	Once Every 5 Years
	Sediment and Silt Removal	0.5 mi		1.36	Yearly
	Vegetation Removal	0.06 mi		0.16	Yearly
	Replacement of Concrete Lining	35 ft		0.02	Once Every 5 Years
	Beaver Dam Removal		1	0.1	Yearly
Roadside Drainage Ditch (3,900 ft mapped)	Bank Reconstruction	20 ft		0.01	Once Every 5 Years
	Placement of Bank Protection	0.01 mi		0.01	Once Every 5 Years
	Sediment and Silt Removal	0.5 mi		1	Yearly
	Vegetation Removal	0.04 mi		0.08	Yearly
Storm Water Detention Basins (80 ac)	Sediment and Silt Removal		5	0.5	Yearly
	Debris and Trash Removal		All	80	Yearly
Underground Storm Drains	Repair/Replacement	25 ft		0.01	As Needed
Underground Sanitary Sewer	Repair/Replacement	30 ft		0.02	As Needed
Pipe Outfalls (70 mapped)	Sediment and Silt Removal		1	0.1	Yearly
Culvert, Bridge Crossings, or Undercrossings (39 mapped)	Sediment and Silt Removal		1	0.1	Yearly
	Debris Removal		30	3	Yearly
Other Appurtenant Facilities (approx. 500)	Repair/Replacement		2	0.2	Yearly
Maintenance Roads (approximately 40,000 ft)	Mowing for Fire Prevention	8 mi		21	Yearly
	Blading and Grading	3 mi		8.5	Yearly
Fences and Gates	Repair/Replacement	0.01 mi		0.03	Yearly

ac = acres
ft = feet
mi = miles

Table A.15: Routine Operation and Maintenance Activities for the Fairfield-Suisun Sewer District (in urban and non-urban areas)

Facility Type	Operation and Maintenance Activity	Length Maintained	Average Number of Facilities	Estimated Impact Area (ac)	Approximate Frequency of Said Activity
Sewage Force Mains	Inspect-Maintain Air/Vacuum Relief Valves		30 valves	N/A	Monthly
	Disassemble and Clean Air/Vacuum Relief Valves		30 valves	N/A	Annually
	Repair/Replace Air/Vacuum Relief Valve Piping		1 valve	0.1	Every 5 Years
	Test Cathodic Protection System		20 test stations	N/A	Monthly
	Cathodic Protection System Operation Check		20 test stations	N/A	Monthly
	Annual Minor Repair on Cathodic Protection Test Stations		4 test stations	N/A	Annually
	Repair/Replace Cathodic Protection Anode Beds		1 system	0.1	Every 20 Years
	Repair/Replace Force Main Segment (52,800 ft)		1 force main	0.1	Every 20 Years
	Valve Exercising		8 valves	N/A	2 Times/Year
Flood Control Pump Stations	Vegetation Control		7 pump stations	0.7	4 Times/Year
	Bar Rack Cleaning		7 pump stations	0.7	Weekly During Wet Season
	Minor Erosion Repairs (<2 yd^3)		1 pump station	0.1	Annually
Wastewater Treatment Plant	Pipe Repair/Replacement	100 ft		0.05	Annually
	Vegetation Control	25,100 ft		120	6 Times/Year

ac = acres
ft = feet
N/A = Not Applicable
yd^3 = cubic yards