Memorandum

Date:	June 2, 2014
To:	Michael Plinski, Todd Jorgenson, Riverside Public Utilities
Cc:	Bob Tincher, San Bernardino Valley Municipal Water District
From:	Scott Fleury, Mike Romich, Erika Eidson; ICF International
Subject:	**Upper SAR HCP Covered Activities Additional Data Request**

During Phase 2 of the HCP preparation, ICF staff are working with each water resource agency to finalize the covered activities. All water resource agencies have provided detailed information about their covered activities, but additional information is still needed. This memo will guide you and your agency to identify and provide additional information and data required for the HCP preparation.

The analysis of the potential impacts of covered activities on the covered species requires descriptive information and data for each covered activity at a level of detail that accomplishes the following:

- Describes in text the type of activity (project or action) so that a reader of the HCP can understand generally what will occur when the covered activity is implemented.
- GIS data showing the footprint of the area affected by the covered activity (project construction footprint or area where operations and maintenance (O&M) will occur). GIS data should be as accurate as possible given what is currently known about the future covered activity.
- What is the timing (season and duration) and frequency of the activity. For new project construction, when is the project construction expected to start, and what portion of the project footprint is a temporary construction impact. For O&M activity, how often does the activity occur, in what time(s) of year, and what is the duration of the activity.
- For covered activities that may affect hydrology, will need to describe how the covered activities will alter the magnitude, frequency, and duration of flow volume (cfs) throughout the year. All available hydrology data describing measured or modeled seasonal daily flows (and peak flows if available), and all information about the operation of the covered activities that can be used to assess how the activities would change daily flows would be

helpful. For example, for recharge and flood control basins, any analyses that have been performed to determine their capacity, infiltration losses, and other factors will assist in determining how much water can be diverted. If data are available about the baseline hydrology at the location of the covered activity, please provide that or the source as well.

- For proposed recycling of water at wastewater treatment plants that would alter effluent releases back to the system, would need a schedule of current daily flow releases and how proposed water recycling will change it.

The section below includes a data needs table indicating which types of data are still missing for each covered activity, a figure depicting the GIS data for the covered activity, and the current text description we have for each of your covered activities. Please review the information below. We will be contacting you soon to review this memo, answer any questions, and schedule a time to meet with you (conference call with online desktop sharing) to assist you in filling the missing data and information.

Covered Activities for Riverside Public Utilities

Stormwater Capture Projects (ID: 19.01) (Riverside Flood Control is a Partner)

Stormwater Capture Projects (ID: 19.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	

Marlborough Basin and Columbia Basin

Kansas Basin

New Facilities

The purpose of this project is to further utilize local stormwater that originates within the RPU service area as a new water supply. Three existing flood control facilities—Columbia Basin, Marlborough Basin, and Kansas Basin—have been identified as potential locations for stormwater capture and recharge. The proposed sites would require minor modifications to the outlet structures of the flood control basins to convert them to dual-use basins (i.e., stormwater attenuation and conservation). These projects do not involve the construction of any new major facilities except for minor outlet structure modifications at each basin. Columbia Basin is a Riverside County Flood Control and Water Conservation District (RCFCWCD) detention basin located in the University Wash drainage system along the Springbrook Channel. Marlborough Basin is also a RCFCWCD detention basin in the University Wash drainage area. This site is also part of the Springbrook Channel. Kansas Basin is an existing detention basin near the intersection of Martin Luther King Boulevard and Kansas Avenue where stormwater from the Box Springs Drain could be captured and recharged. The project is expected to start in 2017 and last for 12 months.

Maintenance

Three basins, totaling 15.8 acres, will be maintained annually by mechanized land clearing or excavation. The outlet structure will be maintained annually [add typical seasonal timing and duration]. The use of herbicide and rodenticide, the frequency of use, and a management plan for use will need to be determined in collaboration with RCFCWCD. This project will require more frequent maintenance (on an annual basis).

Impact Assumption

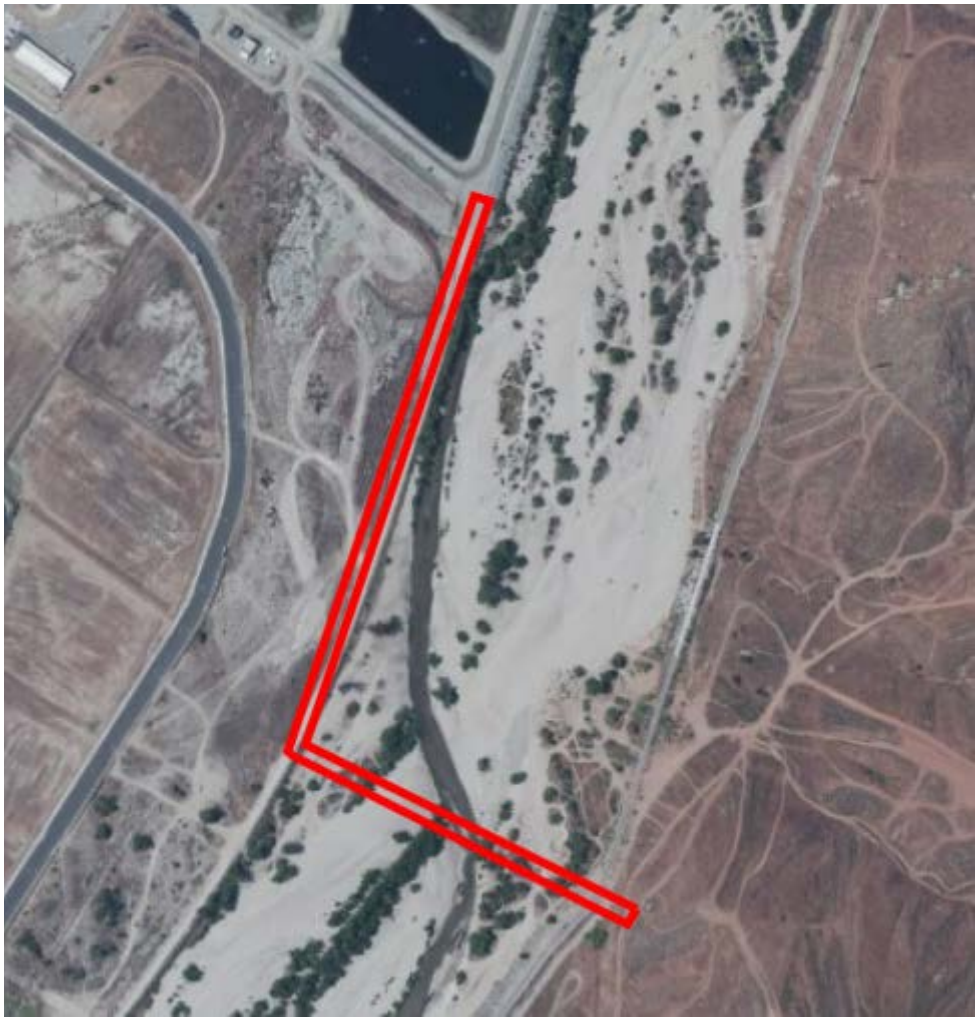
GIS layers indicate basins to be total 15.8 acres. Assume permanent impacts because may be water filled and have intense annual maintenance.

Operations

An RPU hydrologic study estimates the stormwater to be captured at 1,200 AFY [add detail]. Stormwater will be captured by modifying outlet structures. The water will then be used to recharge the Riverside Basin. Water capture will occur throughout the year when storm flows are present [is this information available?].

Pipeline Crossing from RIX (ID: 20.01)

Pipeline Crossing from RIX (ID: 20.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The project objective is to install a 36-inch-diameter pipeline crossing under the Santa Ana River in San Bernardino. The project is located east of Riverside Avenue and south of Agua Mansa Road in the City of Colton. The new pipeline would be constructed at a depth of at least 20 feet below the existing elevation of the river bottom, for a stretch of about 3,000 linear feet. Open-cut trenching construction and jack and bore methods are being evaluated for construction of the pipeline. The estimated construction start date is 2020, and the time period of construction is estimated to be 12 months. Riverside Public Utilities (RPU) typically requires a 50-foot construction easement for pipeline projects.

Impact Assumption

GIS layer indicates pipeline footprint to total 3.25 acres. Assumed 0.2 acres of permanent impacts and 2.05 acres of temporary impacts.

Maintenance

Routine maintenance of pipelines is described in *Routine Operations and Maintenance Activities,* below.

Operations

The estimated reduction in discharge at the RIX facility when the pipeline crossing is complete approximately 10,000 AFY.

Future Gage Canal Transmission Main (ID: 21.01)

Future Gage Canal Transmission Main (ID: 21.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	

New Facilities

The project objective is to install a 24-inch-diameter water transmission main crossing under the Santa Ana River in San Bernardino. The project is located west of Mountain View Avenue and south of East Palm Meadows Drive in the City of San Bernardino. The project proposes a new pipeline be constructed upstream and parallel to the existing Gage Canal Transmission Main at a depth of at least 20 feet below the existing elevation of the river bottom, for a length of 1,200 linear feet. Open-cut trenching construction and jack and bore methods are being evaluated for construction of the Future Gage Transmission Main. The estimated construction start date is 2020, and the time period for construction is estimated to be 12 months. RPU typically requires a 50-foot construction easement for pipeline projects.

Impact Assumption

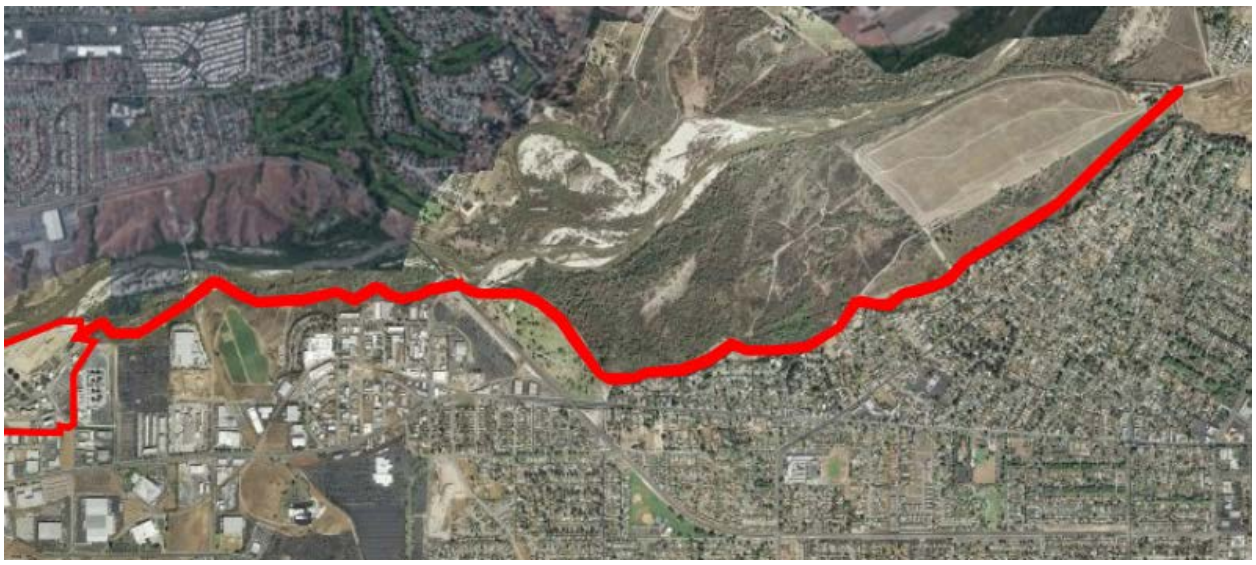
GIS layer indicates pipeline footprint to total 0.9 acre, all of which is temporary impacts.

Maintenance

Routine maintenance of pipelines is described in *Routine Operations and Maintenance Activities,* below.

Recycled Water Transmission Main Project (ID: 22.01)

Recycled Water Transmission Main Project (ID: 22.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The project proposes the alignment of a new recycled water transmission main along the existing 33- to 45-inch Santa Ana Trunk Sewer along the Santa Ana River, which is owned and operated by the City's Public Works Division. The existing trunk sewer is slated for abandonment in 2015, and the existing trunk sewer and the existing sewer easement may be used for installation of the proposed recycled water transmission main. Two alternatives are currently being considered. The pipeline would begin at the west side of the City of Riverside's Regional Water Quality Control Plant (RWQCP) and would extend approximately 4 miles to Tequesquite Avenue. The project is expected to start in 2020. The construction duration for the proposed recycled water line will range from 12 to 16 months. Ten air release/vacuum valves and five blow-off valves are anticipated along the transmission line. Retained water will be used for artificial recharge in the Riverside Groundwater Basin.

Impact Assumption

GIS layer indicates pipeline footprint to total 28.7 acres, of which 1.4 acres are permanent and 27.3 acres are temporary impacts.

Maintenance

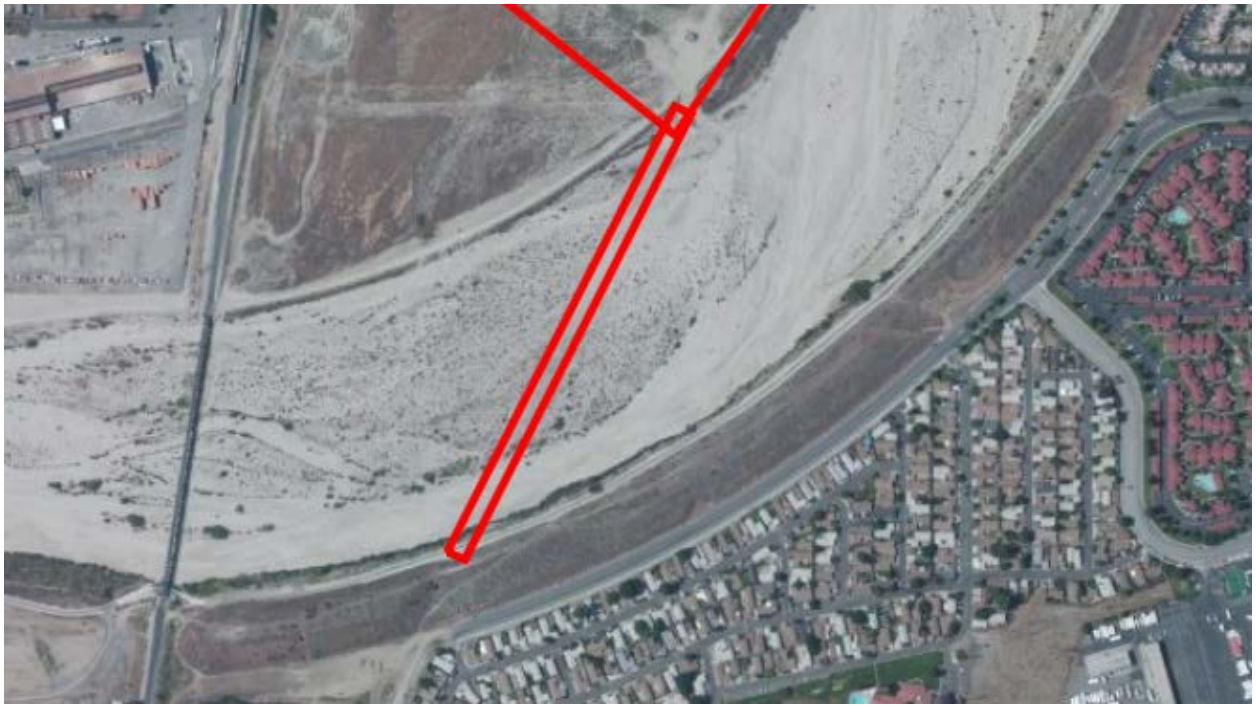
Routine maintenance of pipelines is described in *Routine Operations and Maintenance Activities,* below.

Operations

This project will use up to 8,000 AFY of recycled water from the RWQCP [add detail].

Flume and Riverside Canal Pipeline Replacements (ID: 23.01)

Flume and Riverside Canal Pipeline Replacements (ID: 23.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The Flume and Riverside Canal Pipeline Replacement project objectives are to replace two 42-inch-diameter pipelines crossing under the Santa Ana River in San Bernardino. The project is located east of Union Pacific Railroad and north of Washington Street in the City of Colton. The project proposes that replacement of the two pipelines be constructed parallel to the existing Flume and Riverside Canal pipelines for a length of 2,000 linear feet at a depth of at least 20 feet below the existing elevation of the river bottom. Open-cut trenching construction and jack and bore methods are being evaluated for construction of the pipelines. A 100-foot construction easement is anticipated for these replacements. The estimated construction start date is 2017, and the time period of construction is estimated to be 12 months.

Impact Assumption

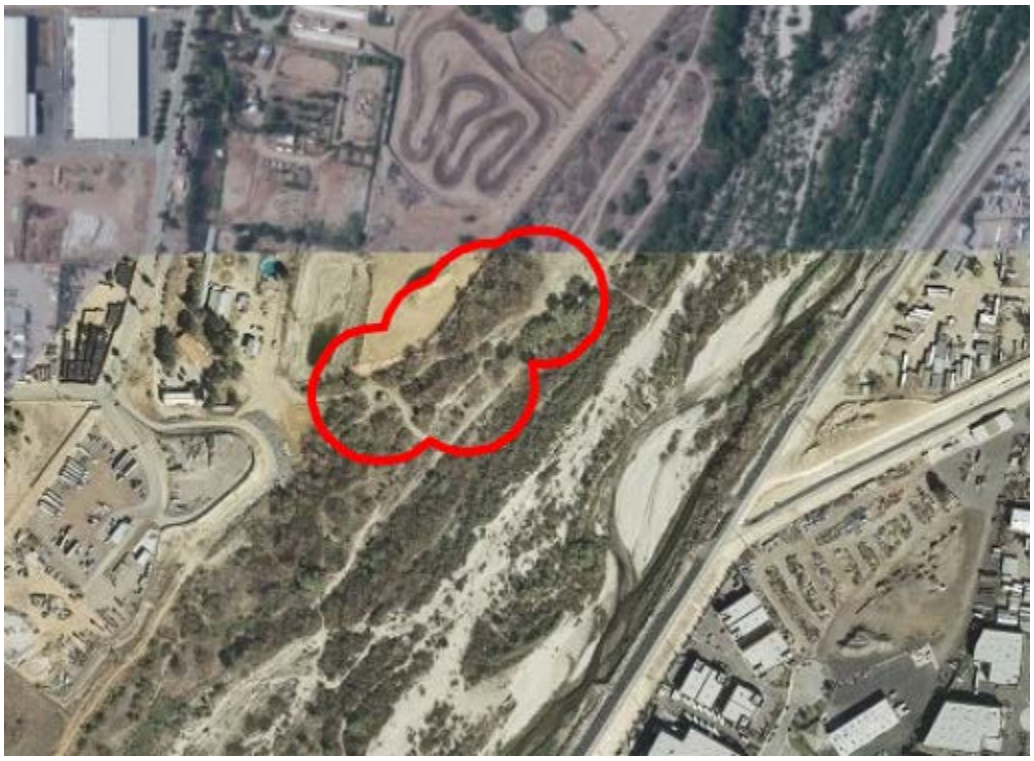
GIS layer indicates pipeline footprint to total 2.05 acres, of which 0.15 acres are permanent and 1.9 acres are temporary impacts.

Maintenance

Routine maintenance of pipelines is described in *Routine Operations and Maintenance Activities,* below.

Jurupa Ditch Company Well Field (ID: 24.01)

Jurupa Ditch Company Well Field (ID: 24.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

To be provided

Impact Assumption

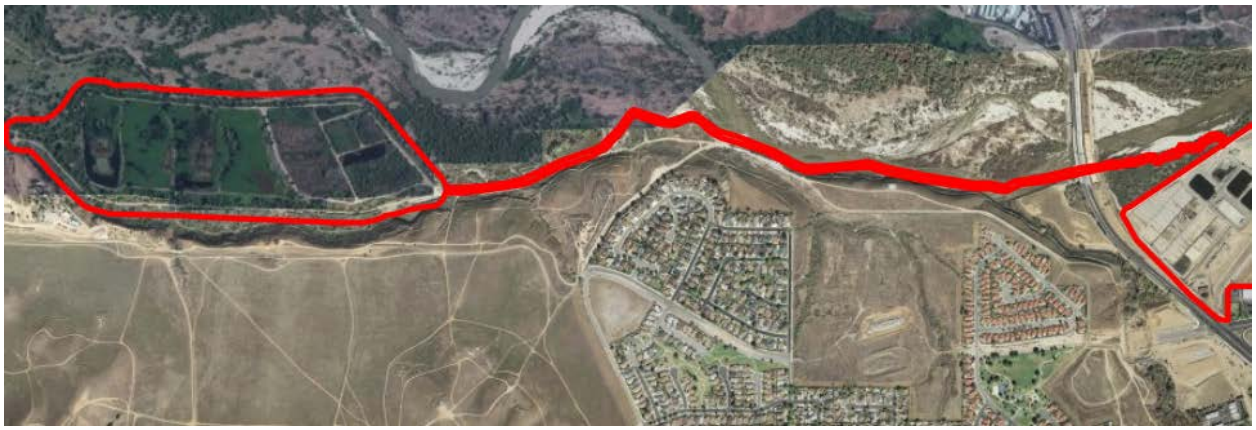
GIS layer indicates footprint to total 8.7 acres, of which 0.9 acre are permanent and 7.8 acres are temporary impacts.

Maintenance

To be provided

Hidden Valley Wetlands Restoration and Conveyance Facilities (ID: 25.01)

Hidden Valley Wetlands Restoration and Conveyance Facilities (ID: 25.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The purpose of this project is to reconstruct the Hidden Valley Wetlands (HVW) and Conveyance Facilities east of the RWQCP. The source water for the HVW would be effluent from the RWQCP. The project is expected to start in 2020, and the construction duration for the restoration is estimated to last between 12 and 18 months. The project proposes the installation of a pump station and a pipeline. Specifics about these installations are still to be determined. RPU typically requires a 50-foot construction easement for pipeline projects. Existing wetland basins will be cleaned and restored. The project may also require levee improvements.

Impact Assumption

GIS layer indicates footprint to total 99.6 acres, of which 10 acres are permanent and 89.6 acres are temporary impacts. There may be beneficial impacts to this project.

Maintenance

A total of nine basins will be maintained annually, totaling 85 acres of basin. The method of maintenance is still to be determined. More information to be provided.

Operations

The project will use up to 1,000 AFY [add detail]. More information to be provided.

Riverside Basin Recharge Projects (ID: 26.01)

Riverside Basin Recharge Projects (ID: 26.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	

New Facilities

RPU plans to construct up to 60 acres of new recharge basins within the northern part of the Riverside Basin. These recharge basins will be used to artificially recharge the Riverside Groundwater Basin and therefore increase the operating yield from the basin. The exact location of these recharge basins are unknown at this time. The project is expected to start in 2020 and will require 24 months to construct.

Impact Assumption

No GIS received. Have assumed 60 acres of permanent impacts.

Maintenance

Routine maintenance will be conducted annually at the new recharge basins [add typical seasonal timing and duration]. Maintenance activities will include maintenance of diversion structures, use of herbicides and rodenticide, vegetation removal, and mechanized land clearing for sediment removal. Maintenance activities will be conducted consistent with the description provided in *Routine Operations and Maintenance Activities,* below.

Operations

RWQCP effluent will be used for recharge. The estimated change in the discharge will be approximately 5,000 AFY [add detail]. The water that is retained will be used to recharge the Riverside Groundwater Basin. These recharge basins are expected to receive up to 2,500 acre-feet of stormwater. Water may be conveyed from existing Flood Control storm drains. The water will be captured within these new recharge basins.

Riverside Basin Wells and Pipelines (ID: 27.01)

Riverside Basin Wells and Pipelines (ID: 27.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	

New Facilities

RPU plans to construct up to seven new wells within the north portion of the Riverside Groundwater Basin. Each well site is typically less than 0.5 acre. Each well will be phased individually. RPU anticipates construction of the seven new wells between 2017 and 2030 during which each well is expected to take up to 1 year to construct. This project will require new pipelines, most of which will be within improved roadways. This project will require fencing, lighting, and a pump house.

Impact Assumption

No GIS received. Have assumed 3.5 acres of permanent impacts.

Maintenance

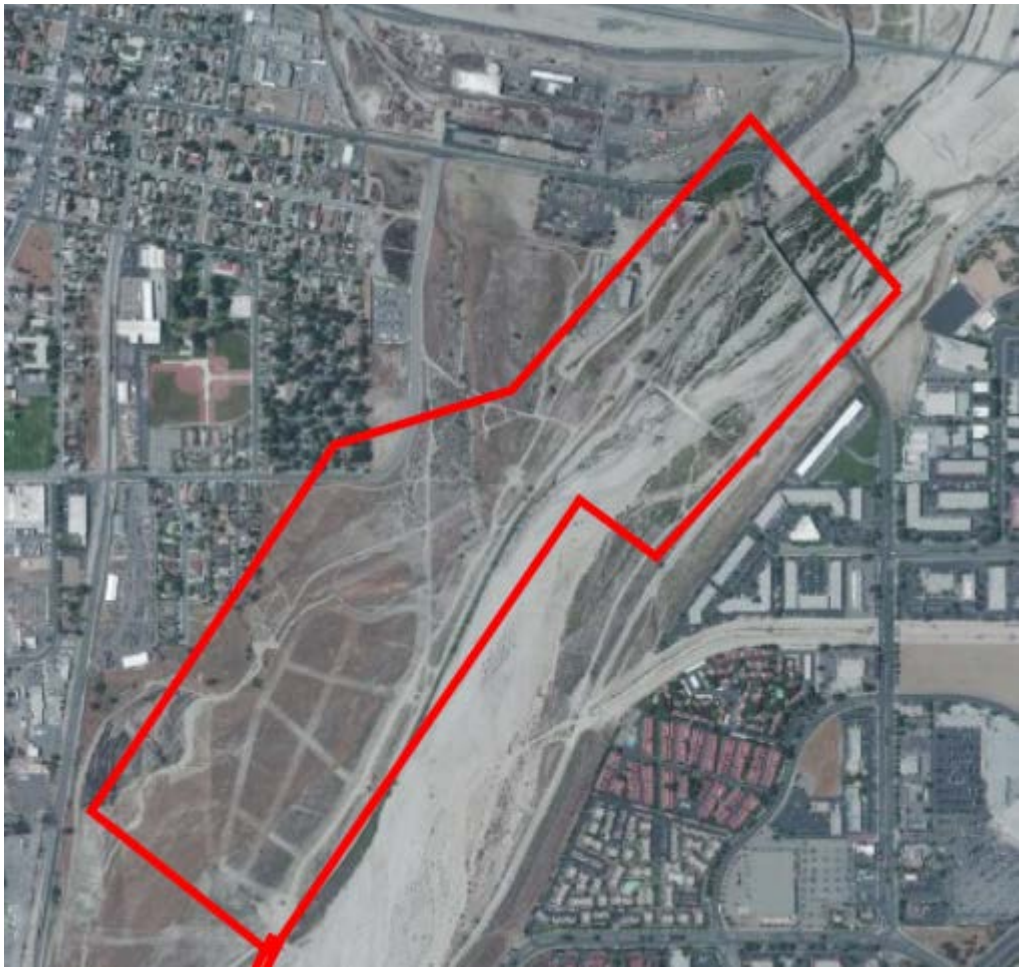
To be provided

Operations

To be provided

Riverside North Aquifer Storage and Recovery Project (ID: 28.01) (shared equally with Western and Valley District)

Riverside North Aquifer Storage and Recovery Project (ID: 28.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The proposed Riverside North Aquifer Storage and Recovery Project is located in the southern portion of the City of Colton and north of the City of Grand Terrace. The project consists of proposed in-channel and off-channel recharge. The proposed off-channel recharge facility location is along the west side of the Santa Ana River. The in-channel recharge basin dam (i.e., rubber dam) alignment is proposed at a location on the Santa Ana River channel about 1.5 mile south of the I-215/I-10 interchange and the confluence of the Santa Ana River and Warm Creek. The proposed project is expected to start in 2016. The dam, SWP pipeline, levee modifications, diversion structure, and in- and off-stream recharge basins are anticipated to be constructed once development of the project commences. Construction is anticipated to last approximately 24 to 36 months. This project will require typical facilities associated with a recharge site, such as fencing, lighting, aboveground utilities, parking, or other supporting infrastructure.

New infrastructure that will be required is described below.

In-Stream Recharge Component

Construction of an inflatable dam across the Santa Ana River channel, which can be raised and lowered depending on the amount of water flowing in the river. The proposed dam would span approximately 810 feet across the Santa Ana River and would be at a height of about 6 feet. The area behind the inflatable dam is approximately 24 acres.

Removal/reconstruction of approximately 100 linear feet of new levees downstream of the proposed dam location.

Potential modification of approximately 2,400 linear feet of U.S. Army Corps of Engineers (ACOE) levees upstream of the proposed dam location.

Construction of a water diversion structure through the west levees north of the proposed recharge basins.

Miscellaneous rip-rap/energy dissipater devices downstream of the proposed dam location to reduce the potential for erosion at the base of the dam structure. For planning purposes, the project assumes approximately 100 feet downstream of the proposed dam structure will be required to accommodate these materials/ devices.

Off-Stream Recharge Component

The project proposes the construction of up to eight individual recharge basins encompassing approximately 25 acres. It is anticipated that the depths of these basins will range from 6 to 11 feet in depth and be connected in series with pipes and gate structures. To ensure that the basins do not overflow and impact adjacent areas, an outlet in the southernmost basin would connect back into the Santa Ana River. Implementation of this component will require the construction of a diversion structure and de-silting basin that connects the recharge basins to the area behind the dam.

Other Project Components

The project proposes the construction of conveyance facilities (24-inch-diameter pipeline, pumps, valves) to connect the proposed groundwater recharge basins to the SWP turnout located on the east bank of the river channel, south of the Union Pacific Railroad right-of-way. It is anticipated that this project component would cross the river adjacent to the inflatable dam location.

The project would include the placement of a 42-inch-diameter steel casing across the Santa Ana River, located adjacent to the inflatable dam. This casing will contain multiple conduits allowing a utility crossing under the Santa Ana River.

The project also proposes the construction of a new passive recreational area in the vicinity of the recharge basins.

Impact Assumption

GIS layer indicates footprint to total 168 acres, all of which would be considered permanent impacts.

Maintenance

Maintenance will be required for access roads, basins, culverts, canals, and diversion structures, and will be conducted annually or as needed. Maintenance actions will include mechanized land clearing for sediment and vegetation removal [add frequency, duration, and timing]. Maintenance activities will be conducted consistent with the activity descriptions in *Routine Operations and Maintenance Activities,* below.

Operations

Evaluation determined the potential capture volumes of the project for a mean dry, average, and wet period to be 6,538, 15,131, and 27,904 AFY respectively. Mean monthly capture volumes available to the project area range from 5,919 acre-feet in the wet period month of March to 113 acre-feet in the dry period month of June [add detail]. The in-channel and off-channel water captured will be recharged at the same site location, and a portion of the retained water will be diverted to the Riverside Canal pipeline.

Bunker Hill Groundwater Basin Wells and Pipelines (ID: 29.01)

Bunker Hill Groundwater Basin Wells and Pipelines (ID: 29.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	

New Facilities

RPU plans to construct three new wells within the southern portion of the Bunker Hill Groundwater Basin. Each well site is typically less than 0.5 acre. Each well will be phased individually. RPU anticipates construction of the three new wells between 2017 and 2030, and each well is expected to take up to 1 year to construct. This project will require new pipelines, most of which will be within improved roadways. This project will require fencing, lighting, and a pump house.

Impact Assumption

No GIS received. Have assumed 1.5 acres of permanent impacts.

Maintenance

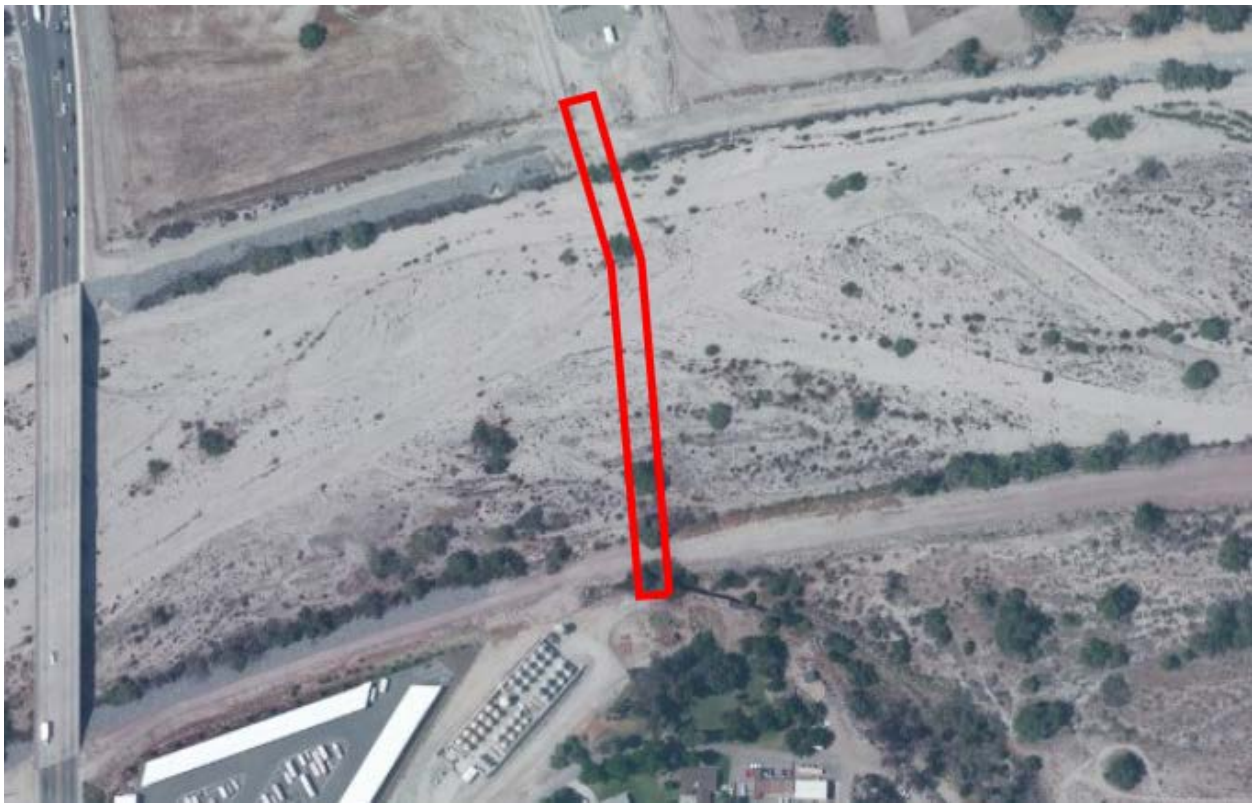
Maintenance activities will include annual maintenance of 1.5 acres of basins using mechanized land clearing or excavation, including sediment management.

Operations

To be provided

Gage Canal Transmission Main Replacement (ID: 30.01)

Gage Canal Transmission Main Replacement (ID: 30.01)	
Information Required	**Complete**
Complete detailed project description	
Detailed GIS information	
Construction/O&M timing (frequency, duration, and seasonal timing)	
Hydrology changes (frequency, duration, and seasonal timing)	



New Facilities

The project objective is to replace a 30 inch-diameter concrete cylinder water transmission main crossing under the Santa Ana River in San Bernardino. The project is located east of Tippecanoe Avenue and south of Central Avenue in the City of San Bernardino. The project proposes that a new pipeline be constructed parallel to the existing main at a depth of at least 20 feet below the existing elevation of the river bottom. To accommodate the flow rate of future wells, it is also proposed that the new transmission main be upsized to a 42-inch-diameter steel cement mortar-lined and coated (CML&C) pipe. Open-cut trenching construction and jack and bore methods are being evaluated for construction of the Gage Transmission Main. The estimated construction start date is 2016, and the time period of construction is estimated to be 12 months. The project proposes an upsize replacement of the current transmission main to a 42-inch-diameter pipe for a length of 1,185 linear feet.

Impact Assumption

GIS layer indicates footprint to total 0.9 acre, all of which would be considered temporary impacts except 0.05 of permanent.

Maintenance

To be provided

Routine Operations and Maintenance Activities

Maintenance activities are actions that occur repeatedly in one location and/or in many locations over a wide area (e.g., bank stabilization, storm-damage repair, maintenance of facilities). Maintenance activities are generally performed periodically and include actions such as minor construction, earth-moving, or vegetation clearing activities that can affect listed species. Below is a list of typical water agency maintenance activities.

Pipelines and Associated Facilities

Areas that may be affected by pipeline maintenance activities include those around water conveyance systems such as pipelines, pump stations, blow-offs, turnouts, and vaults. The following activities may be conducted as part of routine pipeline maintenance.

Leak repair. May require blow-off—dewatering of pipes that typically includes a point source of high velocity flow—to local uplands or streams and/or excavation to access pipelines.

Internal inspection. May require blow-off to local uplands or streams.

Unscheduled releases of water due to a pressure surge in a pipeline that could damage the pipeline. Under such conditions, an automatic turnout valve will open and release the water to prevent the pipe from bursting. Flows from the pipeline may be reduced following such an event. This is a relatively self-contained process, with the valves opening for less than 1 minute and shutting as soon as system pressure drops.

Rehabilitation and/or replacement of pipeline components including, but not limited to, air release valves, piping sections or connections, joints, and appurtenances. Activities may include excavation to access pipelines.

Bank stabilization and erosion control within a creek related to pipeline maintenance. Discharges either come out of pipes within a stream bank and flow down the bank into the channel, or are pumped down or across a stream bank. Bank protection work would occur prior to a planned discharge in areas where banks within 50 feet of the discharge point show signs of erosion or instability. May require excavation.

Replacement/repair of buried service valves (including valves within creek embankments that may require excavation and minor bank stabilization activities).

Maintenance of pipeline turnouts, including access to pipelines.

Replacement/repair of appurtenances, fittings, manholes, and meters.

Vault maintenance. Vaults occur along segments of pipeline. Pipeline components are located within vaults. There are different types of vaults and all are considered confined spaces. Structures other than the pipeline contained within vaults include valves, electrical stations, turnout piping, etc. Telemetry pull boxes, corrosion monitoring stations, and some air release valves are not located within vaults. Vaults are typically made of concrete and may be located immediately below grade (below ground level) or partially or fully above grade.

Telemetry cable/system inspections and repairs. Telemetry systems allow communication of data from the pipeline to the pipeline operator so that the operator can track the operations of the pipeline. Telemetry cables are often sited in the center of roads. May require excavation to access system components.

Meter inspections and repairs. Flow meters measure the rate of flow through a pipeline. Some meters are located in vaults while others are not.

Maintenance of pump stations, operation yards, utility yards, and corporation yards.

Site Inspections and Repairs

Most routine maintenance activities described in this section are initiated based on regular site inspections of facilities. Site inspections are made both by vehicular access and on foot. Access, particularly in areas that are frequently maintained, is provided by paved and dirt maintenance roads. Small-scale repairs (e.g., fences and gate repairs, graffiti removal, trash and small debris removal) may be made as part of regular site inspections, while other maintenance needs are documented and included in annual maintenance planning efforts (e.g., a site that is experiencing erosion may be noted for a future bank stabilization work).

Stockpiling

Maintenance of stockpile locations includes placement of material (i.e., debris and sediment from HCP Team facilities) at specific locations for use in repairs and temporary storage. Stockpiles are often treated to avoid the spread of invasive plants.

Mechanized Land Clearing/Excavation

Mechanized land clearing includes channel centerflow (the establishment and maintenance of a smaller center channel within a channel) to convey low volume flows within the center of an earthen channel to keep flows away from the slopes, and for guiding first-storm flows. A centerflow channel is established by clearing sediment and vegetation within the center of the channel. The centerflow channel generally represents a width of up to 20–50% of the channel, and a depth of approximately 2–3 feet.

Mechanized land clearing also includes grading the basin bottoms to properly convey flows downstream and debris removal for flood control, water quality control, and groundwater recharge. Debris removal includes removal of sediment, dead vegetation such as fallen boughs and leaves, and illegally dumped trash. Material is removed to maintain conveyance capacity of each facility as necessary. Sand and gravel operations may occur. Basin bottom silt and clays are removed and soil is typically broken up and kept free of vegetation to enhance groundwater recharge.

Mechanical vegetation clearing includes the removal of vegetation with equipment such as dozers and graders to allow conveyance of storm flows downstream, to remove large areas of growth from regulated facilities that are certified/inspected by the U.S. Federal Emergency Management Agency (FEMA), ACOE, and California Department of Water Resources Division of Safety of Dams (DSOD). Mechanical vegetation clearing may also be required for fuel modification purposes per state and local fire codes.

Removed sediment, vegetation, and other debris is stockpiled on- or off site prior to final disposal. Clean sediment may be used in bank repairs or as daily cover at local landfills.

Access Roads

Maintenance of access roads includes road grading, surface repair of potholes and wash-outs, and fencing and gate repairs. Activities may also include excavations of various sizes that may be needed to fill pot holes, conduct drainage and erosion control, conduct shoulder and slope repair, or re-gravel existing access roads. Access road excavations could be very small (e.g., to repair a pot hole or shoulder slump) or involve larger, linear excavations (e.g., to install or replace culverts or drainage ditches, repair slope failures for elevated access road fills).

Bank Repair

Bank repairs include filling and compaction of slumped or eroded stream and levee banks. This may also include the removal of excess sediment that has slumped into the channel bed (invert) or basin. Sometimes, additional and incidental rip-rap rock or gabion placement may be required for banks that experience frequent erosion resulting in high frequency of maintenance. Rip-rap repair includes repositioning, replacement, or placement of incidental rip-rap to stabilize the slopes. It also includes the repair of grouted and ungrouted sections of rock. Bank repair can also include the repair or replacement of steel revetment with more revetment or rip-rap rock.

Basins

Basin maintenance includes the clearing of encroaching vegetation and removal of sediment. Removed sediment is typically used for dike, canal, and access road maintenance or is exported off site.

Concrete Structure Repair

Existing concrete structure repair or replacement includes, but is not limited to, maintenance and repair of concrete walls, and appurtenant structures such as inlets, outlets, spillways, down-drains and/or under-drains, bottom controls, and channel invert improvements.

Culverts, Canals, Diversion Structures

This activity includes clearing encroaching vegetation and debris or sediment, filling ruts and potholes, grading, resurfacing (with gravel or compacted soil), and repairing washouts or erosion. Washout and erosion repair is typically accomplished by filling in the eroded area with native material and sometimes grouted rock. It also includes periodic vegetation control.

Dikes

This activity entails occasional excavation and compaction of the dike material at the source of leaks, similar work to replace broken overflow culverts, and repair of washouts. Such repairs occur infrequently.

Fuel Modification

Fuel modification can be in the form of manual, mechanical, or chemical vegetation control for the purposes of wildfire management.

Herbicide and Rodenticide Use

Herbicide application, sometimes referred to as chemical vegetation clearing, is accomplished by trained applicators to manage vegetation. Herbicides are used for fuel modification purposes, to allow for proper conveyance of flows, and to prevent the spread of invasive species and aquatic weeds, such as algae and grasses considered detrimental to public recreational facilities. Aquatic herbicides applied include glyphosate, copper, triclopyr, and diquat. Equipment used includes sprayers pulled by a service truck, or backpack sprayers.

Rodenticide is applied by a licensed applicator to control burrowing rodents from destabilizing banks and levees. California ground squirrels (*Spermophilus beecheyi*) are generally the targeted species.

Vegetation Removal

Mechanical and manual vegetation management activities—including mowing, disking, and manual pruning—remove vegetation within facilities that prevent the proper conveyance of storm flows downstream. Equipment used includes, but is not limited to, tractor mowers, tractor and disc trailer, and boom mowers. Manual removal includes using power trimmers, weed eaters, and tools such as

pruning loppers, saws, and clippers to trim and thin vegetation so it does not clog downstream facilities or reduce water quality.

Vector Control

Vector control primarily involves mosquito control to reduce the spread of disease, including West Nile Virus. Vector control is conducted by the County Environmental Health Department – Mosquito/Vector Control office and includes biopesticides and the introduction of mosquito-larvae eating fish.