APPENDIX F

Terrestrial Special-status Plant and Wildlife Species Considered

TABLE F-1
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Distribution	Potential for Occurrence Within Project Area
FEDERAL OR STATE LISTED SPECIES				
Plants				
Coastal dunes milk-vetch (*Astragalus tener* var. *titi*)	FE/SE/ CRPR 1B.1	Coastal dunes, sandy areas in coastal bluff scrub, and mesic areas in coastal prairie habitats. Often associated with vernally mesic areas.	Known regional distribution is restricted to a single population on the Monterey Peninsula along 17-Mile Drive near Pebble Beach. Otherwise known from southern California.	Low. Species not identified to date during appropriately timed surveys within project area. Known population is over 7 miles from the project area.
marsh sandwort (*Arenaria paludicola*)	FE/SE/ CRPR 1B.1	Freshwater wetlands and wetland riparian habitats.	Known remaining distribution limited to San Luis Obispo County and reintroduction sites in Santa Cruz, Nipomo, and Los Osos.	Absent. Species not identified to date during appropriately timed surveys within project area. Project area is outside known range of the species.
San Benito evening-primrose (*Camissonia benitensis*)	FT/--/CRPR 1B.1	Serpentinite alluvium, clay or gravelly soils in chaparral, woodland, and valley and foothill grassland habitats.	Known distribution is restricted to the New Idria area of San Benito County. Seriously threatened by vehicles. Nearest CNDDB documented location is about 50 miles southeast of the project area.	Absent. Species not identified to date during appropriately timed surveys within project area. Project area is outside known range of the species.
California jewel-flower (*Caulanthus californicus*)	FE/SE/ CRPR 1B.1	Sandy soils in chenopod scrub in pinyon and juniper woodland and valley and foothill grassland.	Not known from Monterey County. Nearest CNDDB documented location is about 90 miles southeast of the project area in Fresno County.	Absent. Species not identified to date during appropriately timed surveys within project area. Project area is outside known range of the species.
Monterey spineflower (*Chorizanthe pungens* var. *pungens*) Critical Habitat	FT/--/CRPR 1B.2	Sandy soils in maritime chaparral, woodland, coastal dunes, coastal scrub, and valley and foothill grassland habitats.	Documented on former Fort Ord lands and within sandy dunes west of Highway 1 in northern Monterey County. Occurs on sandy soils in grasslands inland from Elkhorn Slough.	Present. CNDDB identified occurrences throughout the project area; observed during botanical surveys at the subsurface slantwell site and along the proposed Source Water Pipeline, new Desalinated Water Pipeline, and new Transmission Main alignments. High potential to occur where there is suitable habitat in the vicinity of all project components.
Robust spineflower (*Chorizanthe robusta* var. *robusta*)	FE/CRPR 1B.1	Sandy or gravelly soils in coastal dunes, coastal scrub, and openings in woodland habitats.	The species is primarily limited to Santa Cruz County. Also reported from Fort Ord lands in 2006.	Low to Moderate. May occur in suitable habitat throughout the project area. However, not observed to date in project-related botanical surveys.
Seaside bird's-beak (*Cordylanthus rigidus* ssp. *littoralis*)	SE/CRPR 1B.1	In areas with sandy soils and often in disturbed sites within closed-cone coniferous forest, maritime chaparral, woodland, coastal dunes, and coastal scrub habitats.	Endemic to northwestern Monterey and Santa Barbara Counties. CNDDB documented occurrences in central and eastern portions of former Fort Ord lands and on sandy dunes west of Highway 1 near Seaside, Sand City, Marina, and Monterey.	Moderate. May occur in suitable habitat, especially along the proposed Source Water Pipeline, new Desalinated Water Pipeline, new Transmission Main, and ASR Facilities.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Plants (cont.)				
Menzies' wallflower (*Erysimum menziesii*) Includes the formerly recognized subspecies *E. menziesii* ssp. *yadonii and ssp. menziesii*	FE/SE/ CRPR 1B.1	Coastal dune habitat.	Known from Pacific Grove and Asilomar State Beach area as well as the dunes west of Highway 1 and Marina and Fort Ord National Monument.	Moderate. Observed during 2012 project-related botanical surveys in dune habitat in the vicinity of the subsurface slant wells. Observed within the new Transmission Main alignment. May occur in central dune scrub within the proposed Source Water Pipeline and new Desalinated Water Pipeline alignments.
sand gilia (*Gilia tenuiflora* ssp. *arenaria*)	FE/ST/ CRPR 1B.2	Sandy soils and openings in maritime chaparral, woodland, coastal dunes, and coastal scrub habitats.	Central dune scrub (stabilized) west of Highway 1, Asilomar State Beach area, and maritime chaparral on former Fort Ord.	Present. Moderate to High. Has been documented in the CEMEX mining facility and along the new Transmission Main alignment. May occur in suitable habitat throughout the project area. Numerous documented locations in the vicinity of project components from the 1990's.
Gowen cypress (*Hesperocyparis goveniana*)	FT/CRPR 1B.2	In closed-cone coniferous forest and maritime chaparral habitat.	Known from only three native occurrences in the Monterey area including Del Monte Forest and Point Lobos south of the project area.	Low. Species has not been identified within the project area. Not observed to date during project-related botanical surveys.
Santa Cruz tarplant (*Holocarpha macradenia*)	FT/SE/ CRPR 1B.1	In sandy and often clayey soils in coastal prairie, coastal scrub, and valley and foothill grassland.	North of project area on coastal terraces in Watsonville and Santa Cruz. Nearest documented occurrence is about 10 miles north of the project area.	Low. Species not identified by CNDDB within project area. Southern limit of known species range is north of project area. Not observed to date during project-related botanical surveys.
Contra Costa goldfields (*Lasthenia conjugens*)	FE/CRPR 1B.1	Mesic areas in woodland, alkaline playas, valley/foothill grassland, and vernal pools.	Documented from vernal pools and wet depressions on eastern portion of former Fort Ord lands.	Low. Species not identified by CNDDB or observed in project-related botanical surveys within project area. Nearest documented locations are 3.5 miles east of project area.
beach layia (*Layia carnosa*)	FE/SE/ CRPR 1B.1	Coastal dune and sandy coastal scrub habitats.	Partially stabilized dunes along the Monterey peninsula (Pacific Grove to Carmel).	Low. Species not identified by CNDDB or observed to date during project-related botanical surveys within project area.
Tidestrom's lupine (*Lupinus tidestromii*)	FE/SE/ CRPR 1B.1	Coastal dune habitat.	Partially stabilized dunes along the Monterey peninsula (Pacific Grove to Carmel)	Low. Species not identified by CNDDB or observed to date during project-related botanical surveys within project area.
San Joaquin woollythreads (*Monolopia congdonii*)	FE/CRPR 1B.2	In chenopod scrub in sandy valley/foothill grassland	Known from the south Central Valley and San Luis Obispo and Santa Barbara Counties. Not known from Monterey County.	Absent. Species not documented from Monterey County. Nearest recent CNDDB location is 60 miles east in San Benito County. No suitable habitat present.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Plants (cont.)				
Yadon's rein orchid (*Piperia yadonii*)	FE/CRPR 1B.1	In sandy coastal bluff scrub, closed-coned coniferous forest and maritime chaparral habitats.	Known from multiple locations on the Monterey peninsula and in the Prunedale area north east of the project area.	High. May occur in suitable habitat within the project area at the ASR Facilities and Main System-Hidden Hills Interconnection Improvements site. Observed during project-related botanical surveys within the Presidio of Monterey in the understory of Monterey Pine forest.
Hickman's cinquefoil (*Potentilla hickmanii*)	FE/SE, CRPR 1B.1	Coastal bluff scrub, closed-cone coniferous forest, vernally mesic meadows and seeps, and freshwater marshes and swamps.	Known from understory of Monterey Pine forest on the Monterey peninsula.	Low. CNDDB documented locations, located approximately 2.8 miles from the project area, are historical and/or inexact as to location.
Monterey clover (*Trifolium trichocalyx*)	FE/SE/ CRPR 1B.1	Openings or burned areas in closed-cone coniferous forest habitat with sandy soils.	Known from understory of Monterey pine forest on the Monterey peninsula in Morse Botanical Preserve south of Pacific Grove	Low. Species not identified by CNDDB within project area.
Invertebrates				
vernal pool fairy shrimp (*Branchinecta lynchi*)	FT/--	Ephemeral freshwater vernal pools.	Documented from Fort Hunter Ligget and Camp Roberts in southeastern Monterey County. Not recorded in northern Monterey County. Nearest CNDDB records are 50 miles east of project area.	Absent. Species not identified by CNDDB within project area. No vernal pool habitat within project footprint. Project is outside known range for the species.
Smith's blue butterfly (*Euphilotes enoptes smithi*)	FE/--	Coastal dunes and inland in coastal scrub, grassland, and chamise chaparral where host plants are present. Requires *Eriogonum parvifolium* and *E. latifolium* to complete its life cycle.	Primarily occurs in dune habitat along coast. Also occurs inland along and south of the Carmel River valley. Could occur elsewhere if host plant is present.	High. CNDDB documented occurrences in coastal dunes west of Highway 1 from Salinas to Monterey. Host plants observed within central dune scrub habitat within the subsurface slant wells, Source Water Pipeline, and new Transmission Main during project-related botanical surveys. Observed during surveys of the proposed slant well sites.
Fish				
tidewater goby (*Eucyclogobius newberryi*)	FE/CSSC	Shallow lagoons and lower stream reaches with fairly still, but not stagnant water.	Known to occur in Moro Cojo Slough, Pajaro River, and Elkhorn/Bennett Slough (possibly extirpated). Documented from the Salinas River Lagoon but thought to be extirpated from that location.	Low. Based on documented occurrences species' distribution is primarily north of the project area. Species is not expected to occur within the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Fish (cont.)				
steelhead, south-central California coast DPS (*Onchorhynchus mykiss irideus*)	FT/--	Free-flowing coastal rivers and streams. Spawning habitat: clear, cool streams with overhanging vegetation.	Occurs in coastal watersheds from the Pajaro River south to, but not including, the Santa Maria River. Salinas and Carmel Rivers are designated Critical Habitat for the species.	Moderate. Known to occur within the Salinas River and Carmel River watersheds. Salinas River population abundance is poorly documented. May occur within the Castroville Pipeline alignment at the Salinas River during seasonal migration.
longfin smelt (*Spirinchus thaleichthys*)	FC/ST	Anadromous smelt found in nearshore marine, estuary, and bay habitats.	Generally known from San Francisco Bay north to Humboldt Bay. One CNDDB occurrence at Moss Landing harbor which is not a known breeding site. Individuals may have been pushed south by ocean currents.	Low. Based on known distribution the species is not expected to occur within the project area.
Amphibians				
California tiger salamander (*Ambystoma californiense*)	FT/ST	Vernal or temporary pools in annual grasslands, or open stages of woodlands. Typically aestivates in ground squirrel burrows.	Scattered distribution throughout Monterey County. Found in grasslands and aquatic habitats on eastern former Fort Ord and in Elkhorn Slough and Moro Cojo Slough areas north of the project area.	Low to Moderate. No CNDDB occurrences identified within project footprint. Nearest documented locations are about 1 mile south of the Ryan Ranch–Bishop Interconnection site, 1.5 miles northeast of the Castroville Pipeline terminus, and 2 miles east of ASR Conveyance Pipeline. Could occur where habitat is suitable in seasonal wetlands where suitable upland habitat is also present.
Santa Cruz long-toed Salamander (*Ambystoma macrodactylum croceum*)	FE/SE/FP	Freshwater wetlands with surrounding dense riparian vegetation in the Pajaro Valley and Moss Landing areas.	Monterey County records are north and east of Moss Landing, in upper Moro Cojo Slough, Bennett Slough, Struve Slough, Elkhorn Slough, and McCluskey Slough.	Low. Based on known distribution the species is not expected to occur within the project area.
California red-legged frog (*Rana draytonii*)	FT/CSSC	Slow water in streams, freshwater pools and ponds with overhanging or emergent vegetation. Requires pools of >0.5 m depth for breeding.	Known from scattered locations throughout Monterey County. In the vicinity of the project area observations are concentrated to the north in upper Moro Cojo Slough, Elkhorn Slough, and McCluskey Slough and to the south in the Carmel River and its tributaries.	Moderate. Breeding population documented on the Carmel River adjacent to the Carmel Valley Pump Station site. Other nearby occurrences are located about 1 mile northeast from the CISP pond, 1.5 miles northeast of the Castroville Pipeline terminus, and 1.5 miles south east of the Ryan Ranch–Bishop Interconnection site. Could occur where suitable upland habitat is present in the vicinity of suitable wetland habitat.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Birds				
Marbled murrelet (*Brachyramphus marmoratus*)	FT/SE	Nests up to 45 miles inland on the ground or a mossy tree branch. Requires old growth or mature redwood or fir for nesting. Feeds on small fish and plankton.	No documented nesting occurrences in Monterey County. However, the species is known from the waters of Monterey Bay.	Low. No suitable nesting habitat and no known documented locations within the project area. Nearest documented nesting location is within Henry Cowell Redwoods State Park in Santa Cruz County.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT/CSSC	Resident on coastal beaches and salt panne habitat.	The species is known from the dunes and beaches throughout the project area, which comprise designated Critical Habitat.	Present. Snowy plover are known to nest and winter on the beaches, dunes, and back-dunes in the vicinity of the subsurface slant wells and Source Water Pipeline alignment.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE/SE	Breeds in mature riparian habitat along rivers, streams, or other wetlands.	No recent records of breeding birds west of the San Joaquin Valley.	Absent. Considered extirpated from coastal California. Migrant willow flycatchers in Monterey County would almost certainly be northern-breeding, unlisted, subspecies.
California condor (*Gymnogyps californianus*)	FE/SE	Forages for carrion over a variety of open habitats. Inhabits rugged canyons, gorges, and forested mountains. Nests by steep, rugged terrain with dense brush.	Regional reintroduction programs focused in Big Sur and at Pinnacles National Monument and Monterey County sightings are primarily restricted to the coastal mountains south of Carmel. No records of individuals in the project area.	Low. The project area does not include suitable nesting habitat and the project would not have a substantial impact on foraging habitat.
Bald Eagle (*Haliaeetus leucocephalus*)	FD/SE	Forages in rivers and lakes for large fish. Does not breed locally.	Two CNDDB occurrences in southern Monterey County. Occasional sightings in the project vicinity.	Low. Low potential for occurrence of foraging individuals. Wintering birds could occur as occasional foragers, e.g., at the Salinas or Carmel Rivers. The project would not impact substantial foraging habitat.
California clapper rail (*Rallus longirostris obsoletus*)	FE/SE and FP	Inhabits multiple elevational tidal marsh zones and uses taller vegetation for protection.	A single historical CNNDB occurrence in Monterey County at Elkhorn Slough. One observation at Moss Landing harbor in 1980. No recent records.	Absent. Given the sparse records for Monterey County the species is not expected to occur within the project area.
bank swallow (*Riparia riparia*)	--/ST	Nests in colonies in sandy banks along riparian habitat.	The single recent nesting record in northern Monterey County is located in a coastal sandbank north of Seaside from 2012. Observations within the project area include at Fort Ord Dunes State Park and Laguna Grande Park.	Low. Nearest nesting colony documented in CNDDB is located south of the new Transmission Main alignment as it heads east along Lightfighter Drive. Last documented in use in 2012. No suitable nesting habitat occurs within the project area. Could forage in project area, particularly along rivers and sloughs, during migration.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Birds (cont.)				
California least tern (*Sternula antillarum browni*)	FE/SE and FP	Nests in colonies on relatively open beaches kept free of vegetation by natural scouring from tidal action.	No CNDDB records for Monterey County. A single sighting from the Moss Landing State Wildlife Area from 2000.	Absent. Given the sparse records for Monterey County the species is not expected to occur within the project area.
Least Bell's Vireo (*Vireo bellii pusillus*)	FE/SE	Breeds in thick willow riparian groves. Range, once thought to be limited to southern California, is expanding.	Closest occurrence is located approximately 10 miles northeast of the project area on the Pajaro River where it is presumed to be extant. Three sightings at Andrew Molera State Park in 1995, 2003, and 2013, 20 miles south of the project area.	Low. Given the lack of records for the species in the project area the species is not expected to occur. May occasionally occur where there is well developed willow riparian habitat along the Carmel or Salinas Rivers.
Mammals				
Townsend's big-eared bat (*Corynorhinus townsendii*)	--/CT	Roosts in caves and abandoned buildings. Very sensitive to human disturbance.	Throughout the western U.S.	Low. The project site is within the range of this species. However, no potential roosting structures (abandoned or isolated, undisturbed structures or caves) are present within the project boundary.
OTHER SPECIAL-STATUS SPECIES				
Plants				
vernal pool bent grass (*Agrostis lacuna-vernalis*)	CRPR 1B.1	Occurs in mima mound areas within or on the margins of vernal pools.	CNDDB records in eastern portion of former Fort Ord lands.	Absent. No suitable habitat within the project footprint.
Hickman's onion (*Allium hickmanii*)	CRPR 1B.2	Closed-cone coniferous forest, maritime chaparral, coastal prairie, coastal scrub, and valley and foothill grassland habitats.	Scattered locations from southern Monterey Peninsula to eastern portion of former Fort Ord.	Low to Moderate. CNDDB records west of the proposed Ryan Ranch–Bishop Interconnection. Not observed to date in project-related botanical surveys, but potential to occur in grassland or grassland understory of coast live oak woodland at the Interconnection Improvements sites.
Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri*)	CRPR 1B.2	Sandy areas in closed-cone coniferous forest, chaparral, woodland, and coastal scrub habitats.	Known from eastern portion of former Fort Ord lands and the Monterey peninsula.	Present. Potential to occur in suitable habitat in the vicinity of the subsurface slant wells, Source Water Pipeline, new Desalinated Water Pipeline, and new Transmission Main alignments, Interconnection Improvement sites, and the ASR facilities.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
Toro manzanita (*Arctostaphylos montereyensis*)	CRPR 1B.2	Sandy areas in maritime chaparral, woodland, and coastal scrub habitats.	Known from eastern portion of former Fort Ord lands, Toro Regional Park, and the Monterey airport.	Moderate. Potential to occur in suitable habitat at the new Transmission Main alignment, Interconnection Improvement sites, and the ASR facilities. CNDDB occurrence in vicinity of Hidden Hills Interconnection. Not observed to date in project-related botanical surveys.
Pajaro manzanita (*Arctostaphylos pajaroensis*)	CRPR 1B.1	Sandy soils in chaparral habitat.	CNDDB records from uplands above Elkhorn Slough, along General Jim Moore Boulevard, near the Monterey airport, on former Fort Ord lands, and near Highway 1 at Lightfighter Drive.	Low to Moderate. CNDDB records in vicinity of the southern portion of the new Transmission Main and the Ryan Ranch– Bishop Interconnection site. Not observed to date in project-related botanical surveys.
sandmat manzanita (*Arctostaphylos pumila*)	CRPR 1B.2	Opening with sandy soils in closed-cone coniferous forest, maritime chaparral, woodland, coastal dunes, and coastal scrub habitats.	Throughout former Fort Ord lands, including along General Jim Moore Boulevard and coastal dunes, and near the Monterey peninsula airport.	Present. Observed during project-related botanical surveys on Lapis Road and in central dune scrub habitat within the new Transmission Main alignment between Marina and Lightfighter Dr. Also observed along General Jim Moore near the ASR Facilities.
ocean bluff milkvetch (*Astragalus nuttallii* var. *nuttallii)*	CRPR 4.2	Sandy soils in coastal habitat of central coast California	Endemic to central coast California and documented throughout Monterey County where habitat is present.	Present. Observed during project-related botanical surveys of the CEMEX active mining area in the vicinity of the proposed subsurface slantwells. Could occur throughout the project area in suitable habitat.
alkali milk-vetch (*Astragalus tener* var. *tener*)	CRPR 1B.2	Alkaline playas, valley and foothill grassland (adobe clay), and vernal pools.	Known from only two historical (late 1800’s) locations in Monterey and San Benito Counties about 6 miles east and 22 miles northeast of the project area.	Low. Regional occurrences are historical only and both are presumed extirpated. No alkaline playas or vernal pools occur within the project footprint. Not observed to date in project-related botanical surveys.
pink Johnny-nip (*Castilleja ambigua* var. *insalutata*)	CRPR 1B.1	Coastal prairie and scrub.	CNNDB records from Monterey peninsula, south of Carmel, and the central portion of Ford Ord National Monument	Low. Species documented historically at Deer Flat Park and Monterey Veterans Memorial Park approximately 3 miles from the project area However, species not observed to date in project-related botanical surveys and pipeline is in city streets.
Monterey Coast paintbrush (*Castilleja latifolia*)	CRPR 4.3	Sandy soils in closed-cone coniferous forest, coastal dunes, coastal scrub, and openings in cismontane woodland.	Occurs in Monterey and Santa Cruz Counties.	Present. Observed at the subsurface slant wells and long the proposed new Transmission Main pipeline alignment. May occur in suitable habitat throughout the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
Monterey ceanothus (*Ceanothus rigidus*)	CRPR 4.2	Closed-cone coniferous forest, chaparral, coastal scrub.	Known from throughout the Monterey Bay region.	Present. Observed along the new Transmission Main alignment and ASR Pipeline alignments.
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	CRPR 1B.1	Valley & foothill grassland habitat, particularly in areas with alkaline substrates and in sumps or disturbed areas where water collects; ephemeral drainages.	Known from multiple locations primarily east and north of project area. Also known from Moss Landing area.	Low to moderate. Recent documented occurrences along Highway 68 in vicinity of Ryan Ranch-Bishop and Hidden Hills Interconnections. Not observed to date in project-related botanical surveys. Potential to occur at sites with suitable habitat.
Jolon clarkia (*Clarkia jolonensis*)	CRPR 1B.2	Edges or recently burned areas of chaparral, coastal scrub, oak woodland or riparian woodland.	Historical records in coastal areas from Moss Landing to Monterey peninsula. Extant populations in Monterey County south of peninsula.	Low. CNDDB non-specific historical record noted "along railway, near Del Monte, Seaside." No recent observations in the region. Not observed to date in project-related botanical surveys.
San Francisco collinsia (*Collinsia multicolor*)	CRPR 1B.2	Sometimes occurs in serpentine habitats. Closed-cone coniferous forest and coastal scrub.	One collection on the Monterey peninsula from 1903. Another historical occurrence west of King City, about 40 miles southeast of the project area.	Low. No recent observations in the region. Not observed to date in project-related botanical surveys.
Branching beach aster (*Corethrogyne filaginifolia* [formerly *leucophylla*])	CRPR 3.2	Closed –cone coniferous forest, coastal dunes	Known from throughout the Monterey Bay region.	Present. Observed at many locations along the Source Water Pipeline, new Desalinated Water Pipeline, and new Transmission Main alignments.
Hospital Canyon larkspur (*Delphinium californicum* ssp. *interius*)	CRPR 1B.2	Occurs in chaparral openings, woodland (mesic) and coastal scrub.	A single documented occurrence from the Santa Lucia mountains south of Carmel Valley. Two other occurrences from San Benito County about 40 miles east of the project area.	Low. Given the sparse records for Monterey County the species is not expected to occur within the project area. Not observed to date in project-related botanical surveys.
Hutchinson's larkspur (*Delphinium hutchinsoniae*)	CRPR 1B.2	Broadleaved upland forest, chaparral, coastal prairie, and coastal scrub habitats.	Extreme eastern portion of former Fort Ord lands and areas south of Carmel Valley. A single historical non-specific occurrence from the Monterey peninsula.	Low. No CNDDB occurrences within the project area. Not observed to date in project-related botanical surveys.
umbrella larkspur (*Delphinium umbraculorum*)	CRPR 1B.3	Woodland	Although there is a non-specific occurrence recorded for the species "in the Monterey quad" the species range encompasses the Santa Lucia mountains south of the project area, as well as San Luis Obispo, Santa Barbara, and Ventura Counties.	Low. The project area is outside the known range of the species. Not observed to date in project-related botanical surveys.

TABLE F-1 (Continued) TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
Eastwood's goldenbush (*Ericameria fasciculata*)	CRPR 1B.1	Openings with sandy soils in closed-cone coniferous forest, maritime chaparral, coastal dunes, and coastal scrub habitats.	Endemic to Monterey County. CNDDB records from dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard, Monterey peninsula and Carmel River valley.	Moderate. May occur in suitable habitat throughout the project area.
Pinnacles buckwheat (*Eriogonum nortonii*)	CRPR 1B.3	Sandy soil in chaparral and valley and foothill grasslands. Often found on recent burns.	Endemic to Monterey and San Benito Counties. Known from Pinnacles National Monument, the mountains west of Hollister and several locations south of the Carmel River valley.	Low. No occurrences identified within project area, most of which is below the known elevation range for the species. Not observed to date in project-related botanical surveys.
sand-loving wallflower (*Erysimum ammophilum*)	CRPR 1B.2	Sandy areas and openings in maritime chaparral, coastal dunes, and coastal scrub habitats.	Although known from several other coastal counties, center of distribution is Monterey County. Known from dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard and east.	Present. Observed at the proposed subsurface slant wells site. May occur in suitable habitat throughout the project area.
fragrant fritillary (*Fritillaria liliacea*)	CRPR 1B.2	Often found in serpentine soils in woodland, coastal prairie, coastal scrub, and valley and foothill grassland.	Confined to four known occurrences in Monterey County. Most recent are at Prunedale and Aromas. Historical records from Pebble Beach area and south of Big Sur.	Low. No occurrences identified within project area. Not observed to date in project-related botanical surveys.
Santa Lucia bedstraw (*Galium clementis*)	CRPR 1B.3	Occurs in granitic or serpentine, rocky soils in lower and upper montane coniferous (red fir/yellow fir) forest.	Endemic to Santa Lucia mountains of Monterey County.	Absent. No suitable habitat occurs within the project area. Project area outside known species' range.
San Francisco gumplant (*Grindelia hirsutula* var. *maritima*)	CRPR 3.2	Occurs in sandy or serpentinite soils in coastal bluff scrub, coastal scrub, and valley and foothill grassland	Occurs in coastal California from Marin to San Luis Obispo Counties.	Low. No recent occurrences identified within the project area. Not observed to date in project-related botanical surveys.
Monterey cypress (*Hesperocyparis macrocarpa*)	CRPR 1B.2	Typically grows in pure stands with an understory of scattered dwarf shrubs and perennial herbs. Forms closed-cone coniferous woodland and forest.	Two natural populations endemic to Monterey county and located between Point Cypress and Pescadero Point and at Point Lobos, south of the project area. Also widely planted along the California coast.	Absent. Species may occur within project area but trees would be planted and not protected as special-status.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
Kellogg's horkelia (*Horkelia cuneata* ssp. *sericea*)	CRPR 1B.1	In openings with sandy or gravelly substrates within closed-cone coniferous forest, maritime chaparral, and coastal scrub habitats.	Occurrences in Monterey County are concentrated in the Monterey Bay area. CNDDB records throughout the project area. Known from the dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard and east.	Present. Observed within the proposed new Desalination Water Pipeline and new Transmission Main Pipeline alignments and at the ASR Facilities. Potential to occur in suitable habitat throughout the project area.
Point Reyes horkelia (*Horkelia marinensis*)	CRPR 1B.2	Coastal strand, coastal prairie, northern coastal scrub and dune habitats.	Coastal areas from Mendocino to San Luis Obispo counties. One historical CNDDB occurrence documented in the project vicinity in Marina.	Low. Based on known distribution the species is not expected to occur within the project area.
Legenere (*Legenere limosa*)	CRPR 1B.1	Occurs in vernal pools, and floodplains of intermittent streams surrounded by grassland, open woodland, or hardwood forest.	A single CNDDB record on the eastern portion of former Fort Ord.	Low. Lack of suitable habitat and sightings within the project area. Not observed to date in project-related botanical surveys.
coast yellow leptosiphon (*Leptosiphon croceus*)	CRPR 1B.1	Occurs in coastal bluff scrub and prairie.	A single literature reference places this species in the Monterey quad. Otherwise no recorded observations in Monterey County.	Absent. Lack of suitable habitat within the project footprint and lack of recorded observations. Not observed to date in project-related botanical surveys.
Carmel Valley bush-mallow (*Malacothamnus palmeri* var. *involucratus*)	CRPR 1B.2	A fire-dependent species found on talus hilltops and slopes in chaparral, woodland, and coastal scrub. Sometimes on serpentine substrates.	Endemic to Monterey and San Luis Obispo Counties. One historical observation "near Pacific Grove". More recent observations in Carmel Valley and hills to north. Also occurs in the Santa Lucia Mountains south of the project area.	Moderate to High potential to occur within coastal scrub in the vicinity of the proposed Interconnection Improvements sites in the southeast portion of the project area.
Santa Lucia bush-mallow (*Malacothamnus palmeri* var. *palmeri*)	CRPR 1B.2	Rocky chaparral.	Endemic to Monterey and San Luis Obispo Counties. Distribution is poorly understood, with few documented occurrences.	Low. A single historical (1985) observation from the vicinity of Carmel. Not observed to date in project-related botanical surveys.
Carmel Valley malacothrix (*Malacothrix saxatilis* var. *arachnoidea*)	CRPR 1B.2	Occurs in meadows of foothill woodland and chaparral communities. Almost always under natural conditions in non-wetlands in California	Endemic to Monterey and Santa Barbara Counties. Known primarily from the Carmel River valley.	Low. No records within the project area. Not observed to date in project-related botanical surveys.
Oregon meconella (*Meconella oregana*)	CRPR 1B.1	Open, moist places in coastal prairie, coastal scrub.	Documented from Fort Ord National Monument and in the vicinity of the Carmel River above the San Clemente Dam.	Low. No occurrences within the immediate project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	**Status* (USFWS/ CDFW/CRPR)**	**Habitat**	**Regional Occurrence**	**Potential for Occurrence Within Project Area**
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
marsh microseris (*Microseris paludosa*)	CRPR 1B.2	Closed-cone coniferous forest, woodland, coastal scrub, and valley and foothill grassland. Reports in project region from vernally wet areas.	Documented from the Del Monte Forest, vernal pools in east former Fort Ord lands, and Monterey County Veteran's Park, as well as locations near Carmel and in hills east of Carmel.	Moderate. May occur in seasonally wet areas in suitable habitat in the vicinity of the Interconnection Improvements sites in the southeastern portion of the project area.
Mt. Diablo cottonweed (*Micropus amphibolus*)	CRPR 3.2	Broadleafed upland forest, chaparral, cismontane woodland, valley and foothill grassland	Known from Santa Lucia Mountains in Monterey and Santa Cruz Mountains	Low. No occurrences identified within the project area.
Northern curly-leaved monardella (*Monardella sinuata* ssp. *nigrescens*)	CRPR 1B.2	Coastal dunes, coastal scrub, chaparral, lower montane coniferous forest.	Known from coastal Monterey Bay. Documented on inland ranges of former Fort Ord lands.	High. May occur in central dune scrub and chaparral habitat within the project area.
woodland woollythreads (*Monolopia gracilens*)	CRPR 1B.2	Serpentine soils in broadleafed upland forest, chaparral, woodland, and North Coast coniferous forest openings, and valley and foothill grasslands.	A single historical collection from the Monterey area, exact location unknown. A single collection from Santa Lucia mountains to the southeast of the project area.	Low. No occurrences identified within project area. Not observed to date in project-related botanical surveys.
South coast branching phacelia (*Phacelia ramosissima* var. *austrolitoralis*)	CRPR 3.2	Sandy, sometimes rocky, soils in chaparral, coastal dunes, coastal scrub, and coastal salt marshes and swamps.	Coastal areas from Monterey to southern California	High. Potential to occur in suitable habitat within the project area.
Monterey pine (*Pinus radiata*)	CRPR 1B.1	Closed-cone coniferous forest and woodland habitats.	Three natural populations remain on California coast at Ano Nuevo to the north, Monterey area, and Cambria to the south. Widely used in landscaping and other plantings.	Moderate. Extant natural populations restricted to Monterey peninsula west and south of the project area. CNDDB reports historical range of Monterey pine in southern portion of project area.
Michael's rein orchid (*Piperia michaelii*)	CRPR 4.2	Coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest.	Known from southern Monterey Bay.	Present. Observed at the proposed new Transmission Main alignment. Potential to occur in suitable habitat at other facility sites.
Choris's popcorn flower (*Plagiobothrys chorisianus* var. *chorisianus*)	CRPR 1B.2	Vernal pools or vernally wet swales in chaparral, coastal prairie, and coastal scrub.	Known from Monterey County.	Low. No vernal pools or vernally wet swales observed within the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Plants (cont.)				
hooked popcornflower (*Plagiobothrys uncinatus*)	CRPR 1B.2	Sandy chaparral in woodland and valley and foothill grassland.	Endemic to San Benito, Monterey and San Luis Obispo Counties. All documented occurrences in Monterey County are from the Santa Lucia Range south of the project area.	Absent. Project area is not within the known range of the species.
Pine rose (*Rosa pinetorum*)	CRPR 1B.2	Closed-cone coniferous forest habitat.	Manzanita County Park and vicinity of Edward Morse botanical preserve; Monterey Peninsula.	Absent. No suitable habitat and no occurrences identified within project area.
Maple-leaved checkerbloom (*Sidalcea malachroides*)	CRPR 4.2	Broadleafed upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, riparian woodland	Known from Monterey and Santa Cruz Counties and northern California coastal areas.	Low. No occurrences within the project area and no suitable forest habitat within the project area. Closest record is historical and from the Carmel/Pacific Grove area.
Santa Cruz microseris (*Stebbinsoseris decipiens*)	CRPR 1B.2	Open areas, sometimes in serpentine soils within broadleaf upland forest, chaparral, coastal prairie and scrub, and valley and foothill grassland.	Known from Monterey, Santa Cruz, and Marin Counties. Three CNDDB occurrences in Monterey County, including two in the project vicinity near Ryan Ranch–Bishop Interconnection site and east of the Main System–Hidden Hills Interconnection site on Laurel's Grade Road, and one at Camp Roberts to the southeast.	Low to Moderate. Potential to occur in the vicinity of the Interconnection Improvements sites in the southeast portion of the project area.
Santa Cruz clover (*Trifolium buckwestiorum*)	CRPR 1B.1	On margins of broadleaved upland forest, woodland, and coastal prairie.	Known from Santa Cruz and Monterey Counties. Records in the project vicinity are from the eastern portion of former Fort Ord lands and from Highway 68.	Low to Moderate. Potential to occur in suitable habitat the vicinity of the Interconnection Improvements sites in the southeastern part of the project area.
saline clover (*Trifolium hydrophilum = depauperatum* var. *hydrophilum*)	CRPR 1B.2	Marshes and swamps, vernal pools, and alkaline, mesic areas in valley and foothill grassland.	Large populations documented in vicinity of Moss Landing; historical collection in vicinity of Pacific Grove.	Low. No occurrences identified within project area. Not observed to date in project-related botanical surveys.
Pacific Grove clover (*Trifolium polyodon*)	--/SR/CRPR 1B.1	Along small springs and seeps in grassy openings of closed-coned coniferous forest, coastal prairie, meadows and seeps, and valley and foothill grassland	Coast of Monterey Peninsula to hills in area of Segunda Reservoir.	Low to Moderate. Several CNDDB records in vicinity of proposed Interconnection Improvements sites in southeast part of the project area. May occur adjacent to those sites if spring/seep conditions are present.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Invertebrates				
Globose dune beetle *(Coelus globosus)*	--/**	Loose sandy areas in foredunes and sand hummocks	Sand dunes from Bodega Bay to Ensenada, Baja California	Moderate to High. Known from coastal foredunes and sand dunes within the Monterey Bay. Potential to occur at the subsurface slant well site and within the proposed Source Water Pipeline alignment.
Monarch butterfly (*Danaus plexippus*)	--/**	Caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adults can be found in areas abundant with wildflowers. Autumnal and winter roosts in eucalyptus and conifers.	Known from numerous locations along the Santa Cruz and Monterey County coast. Overwintering sites in Pacific Grove.	Low. Autumnal and overwintering roosts are known primarily from native Monterey pine forest stands on the Monterey peninsula. One CNDDB location in eucalyptus stand along Del Monte Road over 2 miles from the project area.
Reptiles and Amphibians				
Western pond turtle (*Actinemys marmorata*)	CSSC	Permanent or nearly permanent water in a variety of habitats.	One CNDDB record in Marina, one in Pacific Grove, and multiple records along the Carmel River.	Low to Moderate. CNDDB occurrences are located in aquatic habitat along the New Desalinated Water Pipeline near Beach Road. Could occur where habitat is suitable at ponds or freshwater wetlands.
black legless lizard (*Anniella pulchra nigra*)	CSSC	Sandy or loose, loamy soils, including stream terraces and coastal dunes. Dune scrub, maritime chaparral, oak woodland.	Endemic to the Monterey Bay area. Occurs in sandy soils throughout the project area. Specific locations not given but CNDDB records occurrences in the Marina, Seaside, Monterey, Moss Landing, and Watsonville West topo quads. Species is currently undergoing taxonomic revision.	High. May occur in suitable habitat throughout the project area.
silvery legless lizard *(Anniella pulchra pulchra*)	CSSC	Occurs in moist warm loose soil with plant cover. Occurs in sparsely vegetated areas of beach dunes, maritime chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with tree cover.	Two CNDDB records in northwestern Monterey County. Otherwise general distribution is east of the project area. Species is currently undergoing taxonomic revision.	High. May occur in suitable habitat within the project area. Local records are from dunes at Moss Landing and maritime chaparral near Highway 1 and Reservation Road.
coast horned lizard (*Phrynosoma blainvillii*)	CSSC	Exposed, gravely-sandy substrates, usually containing scattered shrubs, clearings in riparian woodlands.	Multiple records from west former Fort Ord lands. Also known from Camp Roberts in southern Monterey County.	Moderate to High. Likely to occur in sandy soils in the project area.
Coast Range newt (*Taricha torosa*)	CSSC	Wet forests, oak forests, chaparral, and rolling grasslands, breed in ponds, reservoirs, and streams	Records from south of the Carmel River and over 10 miles northeast of the survey.	Low to Moderate. Potential to occur in aquatic habitat (ponds and streams) and in adjacent upland areas such as woodland or grassland habitat.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Reptiles and Amphibians (cont.)				
two-striped garter snake (*Thamnophis hammondii*)	CSSC	Found around water sources such as creeks often in rocky areas in oak woodland, chaparral, brushland, and coniferous forest. Marshes and swamps, riparian.	A single CNDDB record in Monterey County, otherwise known from San Benito and Fresno Counties.	Low. CNDDB occurrence is 9.5 miles east of the proposed Main System-Hidden Hills Interconnection Improvements site.
Birds				
Cooper's hawk (*Accipiter cooperii*)	3503.5	Breeds in riparian woodlands and wooded canyons. Also known to breed in urban neighborhoods where mature trees are present.	Observed throughout the project area, almost exclusively in the winter months. Nearest CNDDB documented nesting sites are located in the Natividad Creek riparian corridor northeast of Salinas and in Pinnacles National Monument.	Low. May forage in riparian or wooded habitat throughout the project area.
Sharp-shinned hawk (*Accipiter striatus*)	3503.5	Nests in woodlands, forages in many habitats in winter and migration.	Winter visitor to the Monterey area. Does not nest in the region.	Low. May forage in riparian or wooded habitat throughout the project area.
tricolored blackbird (*Agelaius tricolor*)	CSSC (nesting)	Breeds near freshwater in dense emergent vegetation.	Uncommon breeder in Monterey County. Several CNNDB records in the Monterey area. Known from Laguna Seca Recreation Area and eastern Fort Ord.	Present. Observed at Locke-Paddon Park, which is within the proposed new Desalinated Water Pipeline alignment. Potential for nesting at that park and at Laguna del Rey Park.
Golden eagle (*Aquila chrysaetos*)	FP (nesting and wintering)	Breeds on cliffs or in large trees or structures.	Does not breed locally. Regular sightings throughout the region, most commonly in winter and along the Carmel River and in the vicinity of Moro Cojo and Elkhorn Sloughs. Nearest nest site documented in CNDDB is located 10 miles northeast of the Castroville Pipeline alignment terminus.	Low. May forage over grasslands, open scrub, and riparian corridors throughout the project area. However, the project would not result in major impacts to foraging or wintering habitat.
short-eared owl (*Asio flammeus*)	CSSC (nesting)	Coastal grasslands, marshes, dunes and agricultural areas. Nests are scraped out of the ground in dry areas among grasses and low forbs.	One nesting occurrence documented in CNDDB near the mouth of the Salinas River.	Low to Moderate. May forage over scrublands near the coast throughout the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	**Status* (USFWS/ CDFW/CRPR)**	**Habitat**	**Regional Occurrence**	**Potential for Occurrence Within Project Area**
OTHER SPECIAL-STATUS SPECIES (cont.)				
Birds (cont.)				
Burrowing owl (*Athene cunicularia*)	CSSC (nesting and wintering)	Grassland habitat with ground squirrel burrows (used for nesting and wintering).	Three CNDDB records from the project area and two to the north in the vicinity of Moss Landing and Elkhorn Ranch. Otherwise more numerous inland from the coast. Local records are for wintering owls. Numerous and consistent additional sightings on Armstrong Ranch in vicinity of Lapis Road and Del Monte Road.	High. CNNDB records include a location along the proposed new Desalination Pipeline alignment. Potential to occur in suitable habitat within the project area.
Red-tailed hawk (*Buteo jamaicensis*)	3503.5 (nesting)	Almost any open habitat, including grassland and urbanized areas. Typically nests in mature trees. Sometimes also nests on structures.	Ubiquitous throughout the region and California.	High. Numerous sightings throughout the project vicinity. Most likely to be found foraging over grasslands and open scrub habitats. Could nest anywhere within the project area where mature trees or suitable structures are present.
Red-shouldered hawk (*Buteo lineatus*)	3503.5 (nesting)	Usually nests in large trees, often in woodland or riparian deciduous habitats. Forages over open grasslands and woodlands.	Ubiquitous throughout the region and California. More common in riparian areas or near waterbodies.	High. Numerous sightings throughout the project vicinity. Most common in riparian areas and around waterbodies, such as Laguna Grande Park. Could nest anywhere within the project area where mature trees are present, most likely in riparian corridors.
Ferruginous hawk (*Buteo regalis*)	WL (wintering)	Grasslands, sagebrush scrub, and conifer forest edges at low to moderate elevations.	One CNDDB occurrence documented four wintering adults from 2004 in grasslands of southern Armstrong Ranch.	Low to Moderate. The proposed new Desalination Pipeline alignment traverses the grassland along Del Monte Blvd. where previously documented. Project would not have a substantial impact on (wintering) foraging habitat.
Vaux's swift (*Chaetura vauxi*)	CSSC (nesting)	Nests in snags in coastal coniferous forests or, occasionally, in chimneys; forages aerially.	No CNDDB records in the region. Relatively uncommon sightings, primarily centered in Pacific Grove area. Likely to be present only during migration (spring and fall).	Low. Could occur within the project area though Project would not have a substantial impact on foraging habitat.
Mountain plover (*Charadrius montanus*)	CSSC	Breeds in great plains, winters in Central Valley and other flat open habitats in California.	Rare winter visitor to Monterey County. No CNDDB records from the region. Several other sightings from Moro Cojo Slough to north of project area.	Low. Could occur on agricultural fields and other open habitats on a transient basis only.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Birds (cont.)				
Northern harrier (*Circus cyaneus*)	3503.5 (nesting)	Forages in open grasslands, marshes, floodplains, and shrub lands. In western states, nests on the ground in dry uplands.	A single CNDDB record from Monterey County at Fort Hunter Liggett. Numerous additional sightings throughout the region. Likely to forage over a variety of open habitats, could breed in undisturbed marshy habitats or grasslands in the project area.	Low to Moderate. May forage over agricultural fields, grasslands, marshlands, and sloughs throughout the project area. May nest in open grassland, marshes, or wetlands in the project vicinity.
Black swift (*Cypseloides niger*)	CSSC (nesting)	Nests on wet cliffs, often behind waterfalls. Forages aerially.	Rare and local breeding resident at Point Lobos. Otherwise only rarely documented in the region. Could forage near the southern pipeline alignments.	Low potential for occurrence in project area.
White-tailed kite (*Elanus leucurus*)	FP (nesting)	Resident of river valleys, riparian woodlands, and adjacent fields.	The species' range includes the western U.S. and the species can be found throughout California. White-tailed kite observations are numerous throughout Monterey County.	Moderate to High. Potential to occur in agricultural areas and grasslands, especially near the Salinas and Carmel rivers. Could breed locally, and forage over a variety of habitats.
California horned lark (*Eremophila alpestris actia*)	WL	Bare dry ground and areas of short, sparse vegetation where grasses are stunted such as dunes, beaches, or grazed grasslands.	CNDDB documents three occurrences in the Marina and Salinas areas. Numerous more occurrences in grasslands throughout the Monterey peninsula. Could breed in the project area.	Moderate. Potential to occur in grasslands and dune scrub of the project area, especially in the northern pipeline alignments. Nesting previously documented in grasslands of southern Armstrong Ranch.
Prairie falcon (*Falco mexicanus*)	WL/3503.5 (nesting)	Resident in dry open country, additional migrants in winter.	Does not breed locally. One non-specific CNDDB record within the Spreckels topo quadrangle east of the project area. Sighted only uncommonly in the region.	Low. May forage in riparian or wooded habitat throughout the project area. However, the project would not result in conversion of substantial amounts of foraging habitat.
American peregrine falcon (*Falco peregrinus*)	FD/SD/FP	Forages for other birds over a variety of habitats. Nests primarily on rocky cliffs.	Numerous sighting throughout the project area. One nest record from the Moss Landing quadrangle, although the exact location is suppressed by the CNDDB.	High potential for occurrence of foraging individuals throughout the project area. However, the project would not have a substantial impact on foraging habitat.
American kestrel (*Falco sparverius*)	3503.5 (nesting)	Frequents generally open grasslands, pastures, and fields; primarily a cavity nester.	Common visitor throughout the region, primarily in winter. Could forage over a variety of open habitats throughout project area.	High. May nest or forage throughout the project area. Regularly observed at Armstrong Ranch and Laguna Grande Park. The project would not result in major impacts to foraging or wintering habitat.
loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Resident in dry open grasslands and scrub dominated habitats.	Observed at Armstrong Ranch, Fort Ord Dunes State Park, and Ryan Ranch in Del Rey Oaks.	High. May occur in grassland, scrub, or oak woodland habitat throughout the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Birds (cont.)				
Osprey (*Pandion haliaetus*)	3503.5 (nesting)	Forages and breeds near rivers and lakes.	Many observations, primarily along the coastline. Not known to breed locally. Could forage at local rivers, lakes, reservoirs, and shallow marine waters.	Low. May forage in marine and other larger water bodies and rivers throughout the project area. However, the project would not result in major impacts to foraging habitat.
Brown pelican (*Pelecanus occidentalis*)	FD/SD/FP	Forages and roosts in coastal marine habitats.	May forage in ocean waters in the vicinity of the MRWPCA ocean outfall and the subsurface slant wells. Brown pelicans do not breed locally.	Low. Low potential to occur in the project area on anything other than a transient basis due to lack of suitable roosting habitat.
California yellow warbler (*Setophaga petechia brewsteri*)	CSSC (nesting)	Breeds in riparian woodland and meadow edges.	Only CNDDB record in the region is from Camp Roberts, about 70 miles southeast of the project area. Other observations are primarily of migratory or wintering birds concentrated in the riparian areas on the Salinas River and in Laguna Grande Park.	Low. May breed in riparian areas on the Salinas River along the Castroville Pipeline alignment. Otherwise suitable habitat is sparse within the project area.
Mammals				
pallid bat (*Antrozous pallidus*)	CSSC/ WBWG-H	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	CNDDB records are primarily east and south of the project area. Distribution unknown in the project area.	Low to Moderate. No occurrences identified within project area. Some suitable roosting habitat present under overpasses and in trees.
Salinas kangaroo rat (*Dipodomys heermanni goldmani*)	--/**	Brushy and grassy areas.	Lower (northern) end of the Salinas Valley from the coast of Monterey Bay south of the mouth of the Salinas River to the vicinity of Soledad.	Low to Moderate: Potential to occur in brushy, chaparral, and grassy areas. Locally sensitive within the coastal areas of the City of Marina.
Western mastiff bat (*Eumops perotis*)	CSSC/ WBWG-H	Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	In Monterey County CNDDB records are from Arroyo Seco in the Santa Lucia Mountains to the south and near Soledad to the east.	Low. No occurrences identified within project area and suitable habitat generally not present. The project would not substantially impact foraging habitat. May occur on a transient basis during migratory periods in spring and fall.
Western red bat (*Lasiurus blossevillii*)	CSSC/ WBWG-H	Often associated with riparian habitats and edge habitats adjacent to streams and open fields.	Found in coastal areas south of the San Francisco Bay and in the Central Valley.	Low to Moderate. Suitable habitat in trees, particularly in riparian areas, throughout the project area.

TABLE F-1 (Continued)
TERRESTRIAL SPECIAL-STATUS SPECIES CONSIDERED FOR THE MONTEREY PENINSULA WATER SUPPLY PROJECT AREA

Name	Status* (USFWS/ CDFW/CRPR)	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
OTHER SPECIAL-STATUS SPECIES (cont.)				
Mammals (cont.)				
Hoary bat (*Lasiurus cinereus*)	WBWG-M	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths.	Widespread throughout California though no CNDDB records in the region.	Low. Project area lacks dense wooded areas suitable for breeding. May occur on a transient basis while foraging.
Monterey dusky-footed woodrat (*Neotoma fuscipes luciana*)	CSSC	Riparian, dense chaparral, or oak woodlands with moderately dense understory and abundant dead wood for nest construction.	Endemic to western and central Monterey County and northwestern San Luis Obispo County.	Moderate. Potential to occur in suitable habitat within the project area.
Monterey shrew (*Sorex ornatus salarius*)	CSSC	Coastal salt marshes and adjacent sandhills, Riparian wetland, woodland and upland communities with thick duff or downed logs. May also occur in coast live oak woodland, grasslands, coastal scrub, maritime chaparral, and savannah vegetation.	Distribution poorly known. Historical collections from the Pajaro River to Carmel. More recently collected from the Salinas River delta. No CNDDB records in the region.	Moderate. May potentially occur in suitable habitat at the ASR Facilities and Interconnection Improvements sites.
American badger (*Taxidea taxus*)	CSSC	Grasslands and other open habitats with friable soils.	Distributed throughout the region. Locally known from Fort Ord.	Moderate. Occurrence records at Fort Ord in vicinity of proposed ASR Pipelines. Potential to occur in suitable habitat within the project area.

*Special-Status Species Code Designations:

Federal
FE = Federally listed as Endangered
FT = Federally listed as Threatened
FD = Federally delisted

State
SE = State listed as Endangered
ST = State listed as Threatened
SR = State listed as Rare
SD = State Delisted
FP = State listed as Fully Protected
CSSC = California Species of Special Concern
3503.5 = Section 3503.5 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

**Locally sensitive

SOURCES: CalFlora, 2016; CDFW, 2016; CNPS, 2016; eBird, 2016; USFWS, 2016.

California Rare Plant Rank (Formerly known as CNPS List):
1A = Plants presumed extinct in California.
1B = Plants rare, threatened, or endangered in California and elsewhere.
2A = Plants presumed extirpated in California.
2B = Plants rare, threatened, or endangered in California, but more common elsewhere.
3 = Plants about which more information is needed.
4 = Plants of limited distribution.

An extension reflecting the level of threat to each species is appended to each CRPR as follows:
.1 – Seriously threatened in California.
.2 – Moderately threatened in California.
.3 – Not very threatened in California.

Western Bay Working Group (WBWG):
WBWG-H = High priority; Species that are imperiled or at a high risk of imperilment.
WBWG-M = Medium priority; Species that warrant a closer evaluation due to potential imperilment.

APPENDIX G1

Air Quality and Greenhouse Gas Emissions Estimates

G1.1.1 CRITERIA POLLUTANT EMISSIONS SUMMARIES

Maximum Day Total Unmitigated Construction Emissions

Emissions Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Equipment and Vehicle Exhaust	29.41	374.27	217.14	15.05	12.79
Fugitive Dust	--	--	--	189.88	27.56
Off-gassing from Paving	4.53	--	--	--	--
Total	33.94	374.27	217.14	204.93	40.35

Maximum Day Total Mitigated Construction Emissions

Emissions Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Equipment and Vehicle Exhaust	15.17	316.18	312.85	12.63	11.13
Fugitive Dust	--	--	--	55.71	8.57
Off-gassing from Paving	4.53	--	--	--	--
Total	19.70	316.18	312.85	68.34	19.70

Proposed Action (9.6 MGD) Operational Emissions

Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
On-road Exhaust	0.09	1.46	2.36	0.10	0.04
Emergency Generator Testing	0.32	16.92	1.93	1.10	1.02
Slant Well Maintenance (off-road equipment)	0.94	8.28	6.30	0.31	0.29
Total	1.35	26.66	10.59	1.51	1.35
Significance Criteria	137	137	550	82	55
Significant Impact?	No	No	No	No	No

Alternative 5 (6.4 MGD) Operational Emissions

Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
On-road Exhaust	0.09	1.46	2.36	0.10	0.04
Emergency Generator Testing	0.27	14.23	1.62	0.90	0.83
Slant Well Maintenance (off-road equipment)	0.94	8.28	6.30	0.31	0.29
Total	1.30	23.97	10.28	1.31	1.16
Significance Criteria	137	137	550	82	55
Significant Impact?	No	No	No	No	No

G1.1.2 MPWSP ESTIMATED CONSTRUCTION PHASING

MPWSP Estimated Construction Phasing	**2018**												**2019**												**2020**											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
9 Additional Slant Wells																																				
Approx 15 months							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨															
MPWSP Desalination Plant																																				
Approx 24 months							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨						
Source Water Pipeline (from CEMEX)																																				
Approx 6 months													▨	▨	▨	▨	▨	▨																		
Source Water Pipeline (from Potrero)																										`										
Approx 12 months							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																		
New Desalinated Water Pipeline and New Transmission Main Pipeline																																				
Approx 15 months							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨															
Pipeline to the CSIP Pond																																				
Approx 2 months																	▨	▨																		
Castroville Pipeline																																				
Approx 4 months															▨	▨	▨	▨																		
Brine Discharge Pipeline																																				
Approx 3 months																▨	▨	▨																		
ASR Pipelines (ASR Conveyance PL, ASR Redistribution PL, ASR Pump-to-Waste)																																				
Approx 5 months																▨	▨	▨	▨	▨																
Terminal Reservoir																																				
Approx 15 months.							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨															
ASR Injection/Extraction Wells (ASR-5 and ASR-6 Wells)																																				
Approx 12 months.							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																		
Main System-Hidden Hills Interconnection Improvements																																				
Approx 3 months																			▨	▨	▨															
Ryan Ranch-Bishop Interconnection Improvements																																				
Approx 4 months																			▨	▨	▨	▨														
Carmel Valley Pump Station																																				
Approx 6 months													▨	▨	▨	▨	▨	▨																		
Spoils Hauling / Disposal / Pipelineacement																																				
***Mon-Fri, 7am-7pm (24 months)*																																				

G1.1.3 CONSTRUCTION WORKER AUTO AND TRUCK TRIPS

				Vehicle Trips for Criteria Pollutants (per day)				Vehicle Trips Total for GHG			
		Construction		Worker		Truck		Worker		Truck	
9.6 MGD Facility	Const. workdays	Workers	Trucks	Roundtrip	One-Way	Roundtrip	One-Way	Roundtrip	One-Way	Roundtrip	One-Way
Subsurface Slant Wells (9 wells)	315	30	20	33	66	20	40	8,316	16,632	5,040	10,080
Desalination Plant	504	88	55	97	194	55	110	39,110	78,221	22,176	44,352
Source Water Pipeline	126	25	12	28	56	12	24	3,528	7,056	1,512	3,024
Brine Discharge Pipeline	63	12	6	14	28	6	12	882	1,764	378	756
Brine Mixing Box	189	12	6	14	28	6	12	2,646	5,292	1,134	2,268
Castroville Pipeline	84	12	6	14	28	6	12	1,176	2,352	504	1,008
Pipeline to CSIP Pond	42	12	6	14	28	6	12	588	1,176	252	504
New Desalinated Water Pipeline	126	25	12	28	56	12	24	3,528	7,056	1,512	3,024
New Transmission Main Pipeline	189	25	12	28	56	12	24	5,292	10,584	2,268	4,536
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	105	25	12	28	56	12	24	2,940	5,880	1,260	2,520
ASR Injection/Extraction Wells	252	25	12	28	56	12	24	5,645	11,290	2,419	4,838
Carmel Valley Pump Station	126	12	6	14	28	6	12	1,411	2,822	605	1,210
Ryan Ranch-Bishop Interconnection	84	12	6	14	28	6	12	1,176	2,352	504	1,008
Main System to Hidden Hills	63	12	6	14	28	6	12	882	1,764	378	756
								Total	154,241	Total	79,884

Note: worker roundtrips per day are estimated assuming they would be equal to 110% of workers, rounded up to the nearest integer.

G1.1.4 AVERAGE DAILY OFFROAD CONSTRUCTION EQUIPMENT HOURS FOR CALEEMOD INPUT AND EQUIPMENT FUEL USE ESTIMATES

Desalination Plant

Off Road Equipment	Approx. HP	Number	Hour/Day	Days	Total hours	Total Workdays	Average Hours/day
Paver	160	1	12	21	252	504	0.5
Rollers	90	2	12	63	1,512	504	1.5
Excavator	200	2	12	42	1,008	504	1.0
Loader	90	2	12	42	1,008	504	1.0
Backhoe	150	2	12	462	11,088	504	11.0
Cranes	200	2	12	462	11,088	504	11.0
Graders	200	1	12	42	504	504	1.0
Off-Highway Trucks	350	1	12	42	504	504	1.0
Off-Highway Tractor	200	1	12	42	504	504	1.0
Forklifts	150	4	12	462	22,176	504	11.0
Water Truck	350	1	4	42	168	504	0.3
Generator	200	2	12	504	12,096	504	12.0

Notes: Construction would occur over 24 months with three main activities: site preperation (2 months); plant development and construction (22 months); site paving (1 month). There would be approximately 21 workdays per month. Construction activites would occur around the clock, with average equipment usage at 12 hours per day.

Subsurface Slant Wells

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Bore/Drill Rigs	350	1	24	90	2,160	315	6.9
Crane	200	2	12	315	7,560	315	12.0
Trencher	150	1	12	315	3,780	315	12.0
Generator	200	2	12	90	2,160	315	3.4
Excavators	200	1	12	90	1,080	315	3.4

Notes: Construction of the 9.5 MGD project would take 15 months with drilling (10 days for each of the nine wells); well development (10 days each well); electrical and pump-to-waste pipeline (1 month). Construction of the 6.1 MGD project would last approximately 12 months with drilling (10 days for each of the seven wells); well development (10 days each well); electrical and pump-to-waste pipeline (1 month). Although overall construction emissions associated with the 6.1 MGD project would be less than the emissions for the 9.5 MGD project, the avarage daily emissions shown above represent both the 9.5 MGD and 6.1 MGD projects. There would be approximately 21 workdays per month. Drilling-related activites would occur around the clock, with drill usage at 24 hours per day and the usage for other equipment at 12 hours per day.

Source Water Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	126	756	126	6.0
Rollers	90	1	6	126	756	126	6.0
Backhoe	150	1	8	126	1,008	126	8.0
Excavators	200	1	8	126	1,008	126	8.0
Cranes	200	1	6	126	756	126	6.0
Jack-and-Bore Rig	350	1	8	10	80	126	0.6
Loader	90	1	8	126	1,008	126	8.0
Generator	200	1	8	126	1,008	126	8.0

Notes: Construction would last 6 months. There would be 10 days of jack-and-boring at the Highway 1 crossing. There would be approximately 21 workdays per month.

Castroville Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	84	504	84	6.0
Rollers	90	1	6	84	504	84	6.0
Backhoe	150	1	8	84	672	84	8.0
Excavators	200	1	8	84	672	84	8.0
Cranes	200	1	6	84	504	84	6.0
Jack-and-Bore Rig	350	1	8	10	80	84	1.0
Loader	90	1	8	84	672	84	8.0
Generator	200	1	8	84	672	84	8.0

Notes: Construction would last 4 months. There would be 10 days of jack-and-boring at the State Route 183 crossing. There would be approximately 21 workdays per month.

Brine Discharge Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	63	378	63	6.0
Rollers	90	1	6	63	378	63	6.0
Backhoe	150	1	8	63	504	63	8.0
Excavators	200	1	8	63	504	63	8.0
Cranes	200	1	6	63	378	63	6.0
Loader	90	1	8	63	504	63	8.0
Generator	200	1	8	63	504	63	8.0

Notes: Construction would last 3 months. There would be approximately 21 workdays per month.

Brine Mixing Box

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	189	1,134	63	18.0
Rollers	90	1	6	189	1,134	63	18.0
Backhoe	150	1	8	189	1,512	63	24.0
Excavators	200	1	8	189	1,512	63	24.0
Cranes	200	1	6	189	1,134	63	18.0
Loader	90	1	8	189	1,512	63	24.0
Generator	200	1	8	189	1,512	63	24.0

Notes: Construction would last 9 months. There would be approximately 21 workdays per month.

CSIP Pond Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	42	252	42	6.0
Rollers	90	1	6	42	252	42	6.0
Backhoe	150	1	8	42	336	42	8.0
Excavators	200	1	8	42	336	42	8.0
Cranes	200	1	6	42	252	42	6.0
Loader	90	1	8	42	336	42	8.0
Generator	200	1	8	42	336	42	8.0

Notes: Construction would last 2 months. There would be approximately 21 workdays per month.

New Desalinated Water Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	126	756	126	6.0
Rollers	90	1	6	126	756	126	6.0
Backhoe	150	1	8	126	1,008	126	8.0
Excavators	200	1	8	126	1,008	126	8.0
Cranes	200	1	6	126	756	126	6.0
Loader	90	1	8	126	1,008	126	8.0
Generator	200	1	8	126	1,008	126	8.0

Notes: Construction would last 6 months. There would be approximately 21 workdays per month.

New Transmission Main Pipeline

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	189	1,134	189	6.0
Rollers	90	1	6	189	1,134	189	6.0
Backhoe	150	1	8	189	1,512	189	8.0
Excavators	200	1	8	189	1,512	189	8.0
Cranes	200	1	6	189	1,134	189	6.0
Jack-and-Bore Rig	350	1	8	30	240	189	1.3
Loader	90	1	8	189	1,512	189	8.0
Generator	200	1	8	189	1,512	189	8.0

Notes: Construction would last 9 months. There would be 30 days of jack-and-boring at the two Highway 1 crossings and the crossing of Reservation Road. There would be approximately 21 workdays per month.

ASR Pipelines (ASR Conveyance, ASR Redistribution, and ASR Pump-to-Waste)

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	105	630	105	6.0
Rollers	90	1	6	105	630	105	6.0
Backhoe	150	1	8	105	840	105	8.0
Excavators	200	1	8	105	840	105	8.0
Cranes	200	1	6	105	630	105	6.0
Loader	90	1	8	105	840	105	8.0
Generator	200	1	8	105	840	105	8.0

Notes: Construction would last 5 months. There would be approximately 21 workdays per month.

ASR Injection/Extraction Wells

Off Road Equipment	Approx. HP	Number	Hour/Day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	8	5	40	252	0.2
Rollers	90	1	8	47	376	252	1.5
Excavator	200	1	8	42	336	252	1.3
Loader	90	1	8	42	336	252	1.3
Backhoe	150	1	8	42	336	252	1.3
Drill Rig	350	1	24	40	960	252	3.8
Cranes	200	2	8	42	672	252	1.3
Graders	200	1	8	5	40	252	0.2
Off-Highway Trucks	350	1	8	42	336	252	1.3
Off-Highway Tractor	200	1	8	42	336	252	1.3
Generator	200	1	8	210	1,680	252	6.7

Notes: Construction would last 12 months. Site preperation (2 months), well and basin development (10 months); 1 week of paving, and there would be 4 weeks of continious drilling for each well. There would be approximately 21 workdays per month.

Carmel Valley Pump Station

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	8	1	8	126	0.1
Rollers	90	1	8	43	344	126	2.7
Loader	90	1	8	42	336	126	2.7
Backhoe	150	1	8	42	336	126	2.7
Crane	200	1	8	21	168	126	1.3
Grader	200	1	8	5	40	126	0.3
Generator	200	1	8	126	1,008	126	8.0

Notes: Construction would last 6 months. There would be 2 months of site preperation, 4 months of building construction, and 1 day of paving. There would be approximately 21 workdays per month.

Ryan Ranch-Bishop Interconnection Improvements

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	84	504	84	6.0
Rollers	90	1	6	84	504	84	6.0
Backhoe	150	1	8	84	672	84	8.0
Excavators	200	1	8	84	672	84	8.0
Cranes	200	1	6	84	504	84	6.0
Loader	90	1	8	84	672	84	8.0
Generator	200	1	8	84	672	84	8.0

Notes: Construction would last 4 months. There would be approximately 21 workdays per month.

Main System-Hidden Hills Interconnection Improvements Construction Exhaust Emissions

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Pavers	160	1	6	63	378	63	6.0
Rollers	90	1	6	63	378	63	6.0
Backhoe	150	1	8	63	504	63	8.0
Excavators	200	1	8	63	504	63	8.0
Cranes	200	1	6	63	378	63	6.0
Loader	90	1	8	63	504	63	8.0
Generator	200	1	8	63	504	63	8.0

Notes: Construction would last 3 months. There would be approximately 21 workdays per month.

Slant Well Maintenance (2025/2026)

Off-Road Equipment	Approx. HP	Number	Hour/day	Days	Total hours	Total Workdays	Average Hours/day
Grader	200	1	8	60	480	90	5.3
Cranes	200	1	6	90	540	90	6.0
Loader	90	1	8	60	480	90	5.3
Generator	200	1	8	90	720	90	8.0

Notes: Construction would last 3 months. There would be approximately 21 workdays per month.

G1.1.5 EQUIPMENT AND VEHICLE FUEL USE

Off-road 2011 Model Construction Equipment Fuel Consumption Output

Calendar Year	Air Basin	Equipment Type	BSFC (lbs/yr)	Activity (hrs/yr)	BSFC (gal/hr)*
2018	NCC	Bore/Drill Rigs	292,968	7,220	5.71
2018	NCC	Cranes	696,745	28,487	3.44
2018	NCC	Excavators	3,099,104	139,457	3.13
2018	NCC	Graders	1,167,436	41,203	3.99
2018	NCC	Off-Highway Tractors	655,307	32,668	2.82
2018	NCC	Off-Highway Trucks	3,930,849	69,534	7.96
2018	NCC	Other Construction Equipment	877,052	33,231	3.72
2018	NCC	Pavers	206,630	10,447	2.78
2018	NCC	Rollers	535,654	47,340	1.59
2018	NCC	Rough Terrain Forklifts	581,596	39,175	2.09
2018	NCC	Tractors/Loaders/Backhoes	4,306,119	324,756	1.87
2018	NCC	Trenchers	178,019	11,828	2.12

*There is 1.874 pounds/liter of diesel, and 3.79 liters/gallon.

NCC = North Central Coast Air Basin; BSFC = brake specific fuel consumption.

Construction

Total Fuel Use During Contruction

Fuel Type	Fuel Consumed (gal/proj)	Fuel Consumed (av. gal/yr)	Gallons sold in County in 2012	% Project gall/County gal
Gasoline	74,512	37,256	147,000,000	0.03%
Diesel	1,106,802	553,401	68,000,000	0.81%

Construction Equipment Total Diesel Fuel Use

Off Road Equipment	Fuel Consumption (gal/hr)	Total Hours (hrs/project)	Diesel Fuel Consumed (gal/proj)	Diesel Fuel Consumed (av. gal/yr)
Paver	2.8	6,726	18,730	9,365
Rollers	1.6	8,658	13,793	6,897
Excavator	3.1	9,912	31,013	15,507
Loader	1.9	10,248	19,132	9,566
Backhoe	1.9	20,328	37,950	18,975
Cranes	3.4	25,914	89,239	44,620
Graders	4.0	584	2,330	1,165
Off-Highway Trucks	8.0	840	6,686	3,343
Off-Highway Tractor	2.8	840	2,372	1,186
Forklifts	2.1	22,176	46,354	23,177
Water Truck	8.0	168	1,337	669
Generator	3.7	24,432	90,788	45,394
Drill Rigs	5.7	3,120	17,825	8,912
Trencher	2.1	3,780	8,010	4,005
Jack and Bore Rig	5.7	400	2,285	1,143
	Total	138,126	387,846	193,923

Average gallons/hour 2.8

See Appendix Section G.1.4 for detail regarding the equipment total hours estimates.

Construction Vehicles Total Fuel Use

Vehicle Type	Fuel Type	Total Trips	Miles/trip	Total Miles Travelled	Ave consum. rate (miles/gallon)	Total Gallons		
						gal/proj	gal/year	
Light Duty Truck	gasoline	154,241	10	1,542,408	20.7	74,512	37,256	20.7
Heavy Duty Truck	diesel	79,884	63	5,032,692	7.0	718,956	359,478	7.0

diesel fuel economcy obtained from http://www.dieselforum.org/about-clean-diesel/trucking

Operation and Maintenance

Total Fuel Use During Operation and Maintenance

Fuel Type	Fuel Consumed (ave. gal/yr)	Gallons sold in County in 2012	% Project gall/County gal
Gasoline	10,580	147,000,000	0.01%
Diesel	15,509	68,000,000	0.02%

Slant Well Maintenance Equipment Total Diesel Fuel Use

Off Road Equipment	Fuel Consumption (gal/hr)	Total Hours (hrs/project)	Diesel Fuel Consumed	
			(gal/eventj)	(av. gal/yr)
Grader	4.0	480	1,915	383
Cranes	3.4	540	1,860	372
Loader	1.9	480	896	179
Generator	3.7	720	2,675	535
	Total	2,220	7,346	1,469
		Average gallons/hour	3.3	

See Appendix Section G.1.4 for detail regarding the equipment total hours estimates.

Operations Vehicles Fuel Use

Vehicle Type	Fuel Type	Total Trips/year	Miles/trip	Total Miles Travelled	Ave consumption rate (miles/gallon)	Total Gallons gal/yr
Light Duty Truck	gasoline	21,900	10	219,000	20.7	10,580
Heavy Duty Truck	diesel	1,560	63	98,280	7.0	14,040

diesel fuel economcy obtained from http://www.dieselforum.org/about-clean-diesel/trucking

G1.1.6 CONSTRUCTION CRITERIA POLLUTANT EXHAUST EMISSIONS

2019 Maximum Day Unmitigated Construction Exhaust Emissions (pounds)

Project Component	ROG	NO$_x$	CO	PM$_{10}$	PM$_{2.5}$
Desalination Plant	6.39	90.11	48.47	3.36	2.71
Subsurface Slant Wells	3.57	48.28	23.09	1.84	1.56
Source Water Pipeline	2.51	31.10	19.34	1.31	1.12
Brine Discharge Pipeline	2.34	26.99	17.21	1.18	1.04
Brine Mixing Box*	2.34	26.99	17.21	1.18	1.04
Castroville Pipeline	2.39	27.59	17.61	1.19	1.06
Pipeline to CSIP	2.34	26.99	17.21	1.18	1.04
New Transmission Main	2.54	31.52	19.62	1.32	1.13
ASR Pipelines	2.47	30.74	19.10	1.30	1.10
ASR Injection and Extraction Wells	1.45	20.36	10.73	0.70	0.55
Carmel Valley Pump Station	1.09	13.62	7.56	0.51	0.44
Total Emissions	29.41	374.27	217.14	15.05	12.79

Notes: See Esimated Construction Phasing schdule.

*Subsequent to the release of the Draft EIR/EIS, a Brine Mixing Box has been added to the project and the Terminal Reservoir has been removed. The Brine Mixing Box would require the same daily construction equipment use as the Brine Discharge Pipeline so average daily construction emissions for the Brine Mixing Box would be the same as those of the Brine Discharge Pipeline.

2019 Maximum Day Mitigated Construction Exhaust Emissions (pounds)

Project Component	ROG	NO$_x$	CO	PM$_{10}$	PM$_{2.5}$
Desalination Plant	3.35	75.46	66.78	2.77	2.26
Subsurface Slant Wells	2.36	41.97	33.59	1.63	1.40
Source Water Pipeline	1.23	26.13	27.35	1.08	0.96
Brine Discharge Pipeline	1.06	21.84	24.86	0.94	0.88
Brine Mixing Box*	1.06	21.84	24.86	0.94	0.88
Castroville Pipeline	1.11	22.74	25.86	0.97	0.91
Pipeline to CSIP	1.06	21.84	24.86	0.94	0.88
New Transmission Main	1.26	26.76	28.05	1.11	0.99
ASR Pipelines	1.20	25.59	26.75	1.06	0.94
ASR Injection and Extraction Wells	0.92	19.82	17.91	0.73	0.61
Carmel Valley Pump Station	0.58	12.21	11.99	0.48	0.42
Total Emissions	15.17	316.18	312.85	12.63	11.13

Notes: See Esimated Construction Phasing schdule.

*Subsequent to the release of the Draft EIR/EIS, a Brine Mixing Box has been added to the project and the Terminal Reservoir has been removed. The Brine Mixing Box would require the same daily construction equipment use as the Brine Discharge Pipeline so average daily construction emissions for the Brine Mixing Box would be the same as those of the Brine Discharge Pipeline.

Desalination Plant

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	6.39	90.11	48.47	3.36	2.71
Mitigated	3.35	75.46	66.78	2.77	2.26

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	5.17	56.05	34.57	2.33	2.19
Mitigated	2.13	41.40	52.88	1.74	1.74

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Light duty truck (gas)	194	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.35	1.16	10.60	0.21	0.09
Heavy duty truck (diesel)	110	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.87	32.90	3.30	0.82	0.43
							Total	1.22	34.06	13.90	1.03	0.52

Subsurface Slant Wells

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	3.57	48.28	23.09	1.84	1.56
Mitigated	2.36	41.97	33.59	1.63	1.40

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	3.14	35.92	18.28	1.47	1.37
Mitigated	1.93	29.61	28.78	1.26	1.21

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Light duty truck (gas)	66	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.12	0.39	3.60	0.07	0.03
Heavy duty truck	40	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.31	11.96	1.20	0.30	0.16
							Total	0.43	12.36	4.81	0.37	0.19

Source Water Pipeline

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.51	31.10	19.34	1.31	1.12
Mitigated	1.23	26.13	27.35	1.08	0.96

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.22	23.59	15.56	1.07	1.00
Mitigated	0.94	18.62	23.57	0.84	0.84

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	56	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.10	0.34	3.06	0.06	0.03
Heavy duty truck	24	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.19	7.18	0.72	0.18	0.09
							Total	0.29	7.51	3.78	0.24	0.12

Brine Discharge Pipeline

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.34	26.99	17.21	1.18	1.04
Mitigated	1.06	21.84	24.86	0.94	0.88

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.19	23.23	15.32	1.06	0.98
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

Castroville Pipeline

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.39	27.59	17.61	1.19	1.06
Mitigated	1.11	22.74	25.86	0.97	0.91

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.24	23.83	15.72	1.07	1.00
Mitigated	0.96	18.98	23.97	0.85	0.85

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

Pipeline to CSIP

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.34	26.99	17.21	1.18	1.04
Mitigated	1.06	21.84	24.86	0.94	0.88

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.19	23.23	15.32	1.06	0.98
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

New Desalinated Water Pipeline (2018)

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.71	33.82	19.42	1.45	1.25
Mitigated	1.20	25.59	26.75	1.06	0.94

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.42	26.31	15.64	1.21	1.13
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	56	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.10	0.34	3.06	0.06	0.03
Heavy duty truck	24	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.19	7.18	0.72	0.18	0.09
							Total	0.29	7.51	3.78	0.24	0.12

New Transmission Main

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.54	31.52	19.62	1.32	1.13
Mitigated	1.26	26.76	28.05	1.11	0.99

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.25	24.01	15.84	1.08	1.01
Mitigated	0.97	19.25	24.27	0.87	0.87

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

Vehicle Type	Trips/day	miles/trip	Emission Factors (grams/mile)					Emissions (pounds/day)				
			ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	56	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.10	0.34	3.06	0.06	0.03
Heavy duty truck	24	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.19	7.18	0.72	0.18	0.09
							Total	0.29	7.51	3.78	0.24	0.12

ASR Pipelines

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.47	30.74	19.10	1.30	1.10
Mitigated	1.20	25.59	26.75	1.06	0.94

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

Offroad Equipment	Emissions (pounds)				
	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	2.18	23.23	15.32	1.06	0.98
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

Vehicle Type	Trips/day	miles/trip	Emission Factors (grams/mile)					Emissions (pounds/day)				
			ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	56	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.10	0.34	3.06	0.06	0.03
Heavy duty truck	24	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.19	7.18	0.72	0.18	0.09
							Total	0.29	7.51	3.78	0.24	0.12

ASR Injection and Extraction Wells

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	1.45	20.36	10.73	0.70	0.55
Mitigated	0.92	19.82	17.91	0.73	0.61

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

Offroad Equipment	Emissions (pounds)				
	ROG	NOX	CO	PM_{10}	$PM_{2.5}$
Unmitigated	1.16	12.85	6.95	0.46	0.43
Mitigated	0.63	12.31	14.13	0.49	0.49

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

Vehicle Type	Trips/day	miles/trip	Emission Factors (grams/mile)					Emissions (pounds/day)				
			ROG	NOx	CO	PM_{10}	$PM_{2.5}$	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck (gas)	56	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.10	0.34	3.06	0.06	0.03
Heavy duty truck	24	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.19	7.18	0.72	0.18	0.09
							Total	0.29	7.51	3.78	0.24	0.12

Carmel Valley Pump Station

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Unmitigated	1.09	13.62	7.56	0.51	0.44
Mitigated	0.58	12.21	11.99	0.48	0.42

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	0.94	9.86	5.67	0.39	0.38
Mitigated	0.43	8.45	10.10	0.36	0.36

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

Ryan Ranch-Bishop Interconnection

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	2.34	26.99	17.21	1.18	1.04
Mitigated	1.06	21.84	24.86	0.94	0.88

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	2.19	23.23	15.32	1.06	0.98
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

MainSystem to Hidden Hills Interconnection

Total Daily Construction Exhaust Emissions (pounds/day)

Emissions	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	2.34	26.99	17.21	1.18	1.04
Mitigated	1.06	21.84	24.86	0.94	0.88

Includes offroad and on-road emissions sources.

Average Daily Offroad Equipment Construction Exhaust Emissions

	Emissions (pounds)				
Offroad Equipment	ROG	NOX	CO	PM$_{10}$	PM$_{2.5}$
Unmitigated	2.19	23.23	15.32	1.06	0.98
Mitigated	0.91	18.08	22.97	0.82	0.82

See CalEEMod output for equipment use assumptions.

On-road Daily Construction Emissions

			Emission Factors (grams/mile)					Emissions (pounds/day)				
Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$	ROG	NOx	CO	PM$_{10}$	PM$_{2.5}$
Light duty truck (gas)	28	10	0.0823	0.2714	2.4773	4.8E-02	2.1E-02	0.05	0.17	1.53	0.03	0.01
Heavy duty truck	12	25	0.1428	5.4260	0.5447	1.4E-01	7.1E-02	0.09	3.59	0.36	0.09	0.05
							Total	0.15	3.76	1.89	0.12	0.06

G1.1.7 CONSTRUCTION FUGITIVE DUST

Grading and Earth Moving Fugitive Dust

Fugitive dust from Desalination Plant, Slant Wells, Brine Mixing Box, Monterey Pump Station, Carmel Valley Pump Station, and ASR Facilities Soil Disturbance

	Emission Factor	Emissions[2]	
Area Disturbed	(pounds/acre) [1]	(pounds/day)	
(acres)	PM10	PM10	PM2.5 [3]
3.83	20	76.6	15.9
	Mitigated =	26.8	5.6

Maximum acres disturbed: site preparation and grading for the desalination plant (2 acres), slant wells (1 acre), ASR wells (0.25 acre), Carmel Valley Pump Station (0.08 acre), and the Brine Mixing Box (0.5 acre) sites.

Fugitive dust from Pipeline Construction Earth Moving Activities

	Emission Factor		Emissions	
Soil Disturbed [4]	(pounds/cubic yard) [5]		(pounds/day)	
(cubic yards/day)	PM10	PM2.5	PM10	PM2.5
3,556	0.001634267	0.000247475	5.8	0.9
		Mitigated =	2.0	0.3

[1] The Midwest Research Institute has derived a value of 0.11 tons/acre/month, which converts to 10 pounds per day. The California Air Resources Board review has reviewed this factor and concluded that it represents PM10 emissions with watering. Consequently, CARB concludes that 20 pounds per acre day is more appropriate for unmitigated fugitive dust conditions (CARB, 2002).

[2] Mitigation is assumed to reduce emissions by 65 percent, based SCAQMD, 2007

[3] PM2.5 fractions for soil disturbance and earth moving were obtained from SCAQMD, 2006.

[4] Assumes1,778 cubic yards of soil x 2 = daily trench dimensions (6 feet * 8 feet * 1,000 feet) = 48,000 ft3 = 1,778 cubic yards x 2 = 3,556. Assumes all pipelines would be constructed concurrently; the ASR Pipelines would proceed at a rate of 250 feet per day, all of the other pipelines are assumed to proceed at a rate of 150 feet per day.

[5] Based on *truck loading* emission factors included in CalEEMod. Mean wind speed is 7.1 mph. Material moisture content is 2.5% based on AP42. See CalEEMod users manual Appendix A page 10 (http://www.aqmd.gov/caleemod/doc/AppendixA.pdf).

Based on AP-42 Emission Factor: EF (lbs/ton) = k (0.0032)(U/5)^1.3 / (M/2)^1.4

Where:

EF = emission rate in pounds PM10 per ton material handled.

k = particle size multiplier (assumed 0.35 for PM10 and 0.053 for PM2.5 per CalEEMod Users Guide, Appendix A)

U = mean wind speed

M = material moisture content (%).

Particulate Matter size	pounds PM per ton material	tons material per cubic yard	pounds PM per cubic yard
PM10	0.001292763	1.2641662	0.001634267
PM2.5	0.000195761	1.2641662	0.000247475

Unpaved Fugitive Dust From Truck Travel

9. MGD Project - Unpaved Road Fugitive Dust from Trucks

		Emission Factors		Emissions	
	VMT [1]	(pounds/VMT) [2]		(pounds/day)	
Source	(miles/day)	PM10	PM2.5	PM10	PM2.5
Dirt road to Slant Well sites	37.1	1.9	0.2	69.8	7.0
Castroville Pipeline	20.0	1.9	0.2	37.6	3.8
Total	57.1		Unmitigated =	107.5	10.7
			Mitigated [3] =	26.9	2.7

[1] Assumes that there would be 40 trips per day along 0.5 mile unpaved road to Castroville Pipeline, resulting in 20.0 VMT on unpaved roads; and also assumes 106 trips per day along a 0.35 dirt road to the subsurface slant well sites, resulting in an additional 37.1 VMT per day on unpaved roads.

[2] Based on AP-42 Emission Factor: E (lbs/VMT) = k (s/12)^a (W/3)^b

Where:

E = emission rate in pounds per vehicle mile traveled

k = particle size multiplier (assumed 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5 per AP-42, Table 13.2.2-2)

a = 0.9

b = 0.45

s = silt content (assumed 8.5% for a construction site per AP-42, Table 13.2.2-1)

W = average weight (tons) of vehicles assumed to be 9.9 tons for the road to the slant wells and Castroville Pipeline (62% trucks weigh 2 tons, 38% weigh 23 tons).

[3] Mitigated emissions assume that the dirt roads to the slant well sites, it was assumed that watering twice daily and limiting speeds to 15 mph, emissions could be reduced by 75%, based URBEMIS 2007.

Total Fugitive Dust

Applies to both 9.5 MGD and 6.1 MGD Projects

	Emissions	
	(pounds/day)	
Total	PM10	PM2.5
Unmitigated =	189.88	27.56
Mitigated =	55.71	8.57

G1.1.8 ON-ROAD OPERATIONAL CRITERIA POLLUTANT EMISSIONS

Emission Factors

	Running Exhaust Emission Factors				
	(grams/mile)				
Vehicle Type	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck	0.0460	0.1896	1.6776	4.8E-02	2.1E-02
Heavy duty truck	0.1016	3.6610	0.4327	1.1E-01	5.2E-02

Note: derived from EMFAC 2014.
PM10 and PM2.5 emission factors include break and tire wear factors in addition to exhaust.

Daily Operational Emissions (pounds/day)

Proposed Project*

Vehicle Type	Trips/day	miles/trip	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Light duty truck	60	10	0.06	0.25	2.22	0.06	0.03
Heavy duty truck	6	25	0.03	1.21	0.14	0.04	0.02
Total	66		0.09	1.46	2.36	0.10	0.04

Notes: Trips are one-way; assumes 30 employees would require 2 trips per day; 3 material hauls.
Average truck trip length represents from the Santa Clara/San Benito County line (south of Gilroy) down to Seaside.
Daily trip amounts obtained from the EIR Team traffic engineer (2013).

*There would be no change in daily emissions associated with the 6.4 Variant compared to the proposed 9.6 MDG Project.
There are 453.59 grams per pound.

G1.1.9 ROG OFF-GASSING FROM ASPHALT PAVING

Proposed Action ROG Off-gassing from Asphalt Paving

	Area Paved		Emission Factor (pounds/acre) [1]	Emissions (pounds/acre) [1]
Project Component	(square feet)[1]	(acres)[2]	ROG[3]	ROG
MPWSP Plant	43,560	1.00	2.62	2.62
Road to Terminal Reservoir	24,000	0.55	2.62	1.44
Pump Stations	1,800	0.04	2.62	0.11
Pipelines	6,000	0.14	2.62	0.36
Total	75,360	1.73	2.62	4.53

Notes:

[1] It is assumed that 1 acre would be paved per day at the MPWSP Plant, the pump stations would result in a total of 1,800 square feet of paving, and pipeline installation could result in up to 6,000 square feet (1,000 feet by 6 feet) of paving per day.

[2] There are 43560 square feet per acre.

[3] Emission factor source is from CalEEMod, 2013, and is described in terms of volatile organic compounds, which for the purposes of this analysis is equivalent to reactive organic compounds.

G1.1.10a PROPOSED ACTION EMERGENCY GENERATOR TESTING CRITERIA POLLUTANT EMISSIONS

Criteria Pollutant Emission Factors

Equipment	HP[a]	Load Factor[b]	Emission Factors (g/bhp-hr)				Emission Rates (lb/hr)				
			HC[c]	NOx[d]	PM[e]	CO[c]	ROG[f]	NOx	PM10	PM2.5	CO
Emergency Generator - at Desal Plant	1,000	0.74	0.030	2.000	0.150	0.230	0.062	3.263	0.245	0.226	0.375
Emergency Generator - at Desal Plant (Alternative 5)	804	0.74	0.030	2.000	0.150	0.230	0.050	2.623	0.197	0.182	0.302
Emergency Generator at Carmel Valley Pump Station	68	0.74	0.100	6.900	0.150	0.761	0.014	0.765	0.017	0.015	0.084

Notes:

[a] Proposed generator at desal plant horsepower is from RBF, 2013, Memorandum - MPWSP Capital and O&M Cost Estimate Update, January 9, 2013, Table 2.

[b] Load factors are from CalEEMod.

[c] Emission factors are from Caterpillar specification sheets:

Standby 800 ekW 1,000 kVA 60 Hz 1,800 rpm 480 Volts, Tier 2.
Standby 250 ekW 313 kVA 60 Hz 1,800 rpm 480 Volts, Tier 3.
Standby 50 ekW 50 kVA 60 Hz 1,800 rpm 120 Volts, Tier 3.

[d] Emission factor adjusted per MBUAPCD BACT.

[e] Emission factor adjusted per MBUAPCD Rule 1010.

[f] ROG emission factor based on Offroad database for "other construction equipment". Nox emission factor is conservative; includes Nox+HC

1 kw = 1.340483 hp

A factor of 1.26639 was applied to THC to obtain ROG based on CARB (2000). A factor of 0.92 was applied to PM10 to obtain PM2.5 based on SCAQMD (2006).

Emergency Generator Criteria Pollutant Emissions

Equipment	Test Duration		Maximum Day (lbs/day)					Annual Average (lbs/day)				
	hrs/test	test/yr	ROG	NOx	PM10	PM2.5	CO	ROG	NOx	PM10	PM2.5	CO
Emergency Generator - at Desal Plant	4.2	12	0.26	13.70	1.03	0.95	1.58	0.01	0.45	0.03	0.03	0.05
Emergency Generator - at Desal Plant (Variant)	4.2	12	0.21	11.02	0.83	0.76	1.27	0.01	0.36	0.03	0.03	0.04
Emergency Generator at Carmel Valley Pump Station	4.2	12	0.06	3.21	0.07	0.06	0.35	0.00	0.11	0.00	0.00	0.01
Total Emergency Generator Emissions for Project			0.32	16.92	1.10	1.02	1.93	0.01	0.56	0.04	0.03	0.06
Total Emergency Generator Emissions for Alternative 5			0.27	14.23	0.90	0.83	1.62	0.01	0.47	0.03	0.03	0.05

It is assumed that each diesel generator would be tested approximately 50 hours per year (4.2 hours per test, 12 tests per year) persuant to Rule 1010.

G1.10b ALTERNATIVE 3 EMERGENCY GENERATOR TESTING CRITERIA POLLUTANT EMISSIONS

Criteria Pollutant Emission Factors

Equipment	MW	HP	Load Factor[a]	BACT Emission Factor (g/bhp-hr)[b]				BACT Emission Rates (lb/hr)				
				HC	NOx	PM[c]	CO	ROG[d]	NOx	PM10	PM2.5	CO
Emergency Generator - Natural Gas	10	13,405	0.74	0.150	2.000		2.000	4.154	43.737			43.737

Notes:

[a] Load factors are from CalEEMod.

[b] Emission factors are based on BACT requirements for natural gas engines:

[c] There are no BACT emissions limits for particulate matter in natural gas exhaust, because particulate emissions emission from gas combustion is limited.

[d] ROG emission factor based on Offroad database for "other construction equipment".

1 kw = 1.340483 hp

Emergency Generator Criteria Pollutant Emissions

Equipment	Test Duration		Maximum Day (lbs/day)					Annual Average (lbs/day)				
	hrs/test	hrs/yr	ROG	NOx	PM10	PM2.5	CO	ROG	NOx	PM10	PM2.5	CO
Emergency Generator 1	5.0	12	20.77	218.69	0.00	0.00	218.69	0.68	7.19	0.00	0.00	7.19
Emergency Generator 2	5.0	12	20.77	218.69	0.00	0.00	218.69	0.68	7.19	0.00	0.00	7.19
Emergency Generator 3	5.0	12	20.77	218.69	0.00	0.00	218.69	0.68	7.19	0.00	0.00	7.19
Total Emergency Generator Emissions for Project			62.31	656.06	0.00	0.00	656.06	2.05	21.57	0.00	0.00	21.57

It is assumed that each generator would be tested approximately 60 hours per year (5.0 hours per test, 12 tests per year).

G1.1.11 GHG CONSTRUCTION EMISSIONS

Total Construction GHG Emissions Summary

Project Component	CO_2e Emissions (metric tons)
Desalination Plant	7,087.22
Subsurface Slant Wells	1,880.56
Source Water Pipeline	575.17
Brine Discharge Pipeline	198.02
Brine Mixing Box*	594.06
Castroville Pipeline	271.09
Pipeline to CSIP	189.61
New Desalinated Water Pipeline	571.10
New Transmission Main	873.98
ASR Pipelines	472.24
ASR Injection and Extraction Wells	866.65
Carmel Valley Pump Station	249.65
Ryan Ranch-Bishop Interconnection	264.03
MainSystem to Hidden Hills Interconnection	198.02
Total Emissions	14,291.41
Amortized Emissions (over 40 years)	357.29

*Subsequent to the release of the Draft EIR/EIS, a Brine Mixing Box has been added to the project and the Terminal Reservoir has been removed. The Brine Mixing Box would require the same daily construction equipment use as the Brine Discharge Pipeline, but would last for 9 months (3 times the period of construction for the Brine Discharge Pipeline), so construction emissions for the Brine Mixing Box are three times those of the Brine Discharge Pipeline.

Desalination Plant

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	7,087.22

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

Source	CO_2e (metric tons)			
	2018	2019	2020	Total
Off-road Equipment	555.96	1,098.33	466.00	2,120.29

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

On-road Sources	Miles/trip	Trips	Emission Factors (gram/mile)			Total Emissions (Metric tons)			
			CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	78,221	373.90	0.045	0.087	292	0.04	0.07	314
Heavy duty truck	63	44,352	1,663.79	0.005	0.005	4,649	0.01	0.01	4,653
					Total	4,941	0.05	0.08	4,967

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Subsurface Slant Wells

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	1,880.56

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment	316.87	439.44		756.31

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	16,632	373.90	0.045	0.087	62	0.01	0.01	67
Heavy duty truck	63	10,080	1,663.79	0.005	0.005	1,057	0.00	0.00	1,058
					Total	1,119	0.01	0.02	1,124

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Source Water Pipeline

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	575.17

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		229.61		229.61

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	7,056	373.90	0.045	0.087	26	0.00	0.01	28
Heavy duty truck	63	3,024	1,663.79	0.005	0.005	317	0.00	0.00	317
					Total	343	0.00	0.01	346

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Brine Discharge Pipeline

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	198.02

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		111.63		111.63

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	1,764	373.90	0.045	0.087	7	0.00	0.00	7
Heavy duty truck	63	756	1,663.79	0.005	0.005	79	0.00	0.00	79
					Total	86	0.00	0.00	86

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Castroville Pipeline

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	271.09

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		155.90		155.90

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	2,352	373.90	0.045	0.087	9	0.00	0.00	9
Heavy duty truck	63	1,008	1,663.79	0.005	0.005	106	0.00	0.00	106
					Total	114	0.00	0.00	115

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Pipeline to CSIP

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	189.61

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		74.42		74.42

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	1,176	373.90	0.045	0.087	9	0.00	0.00	9
Heavy duty truck	63	504	1,663.79	0.005	0.005	106	0.00	0.00	106
					Total	114	0.00	0.00	115

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

New Desalinated Water Pipeline (2018)

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	571.10

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment	225.54			225.54

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	7,056	373.90	0.045	0.087	26	0.00	0.01	28
Heavy duty truck	63	3,024	1,663.79	0.005	0.005	317	0.00	0.00	317
					Total	343	0.00	0.01	346

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

New Transmission Main

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	873.98

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment	9.51	346.13		355.64

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	10,584	373.90	0.045	0.087	40	0.00	0.01	42
Heavy duty truck	63	4,536	1,663.79	0.005	0.005	475	0.00	0.00	476
					Total	515	0.01	0.01	518

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

ASR Pipelines

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	472.24

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		184.27		184.27

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	5,880	373.90	0.045	0.087	22	0.00	0.01	24
Heavy duty truck	63	2,520	1,663.79	0.005	0.005	264	0.00	0.00	264
					Total	286	0.00	0.01	288

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

ASR Injection and Extraction Wells

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	866.65

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment	163.83	149.92		313.75

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	11,290	373.90	0.045	0.087	42	0.01	0.01	45
Heavy duty truck	63	4,838	1,663.79	0.005	0.005	507	0.00	0.00	508
					Total	549	0.01	0.01	553

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Carmel Valley Pump Station

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	249.65

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		111.43		111.43

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	2,822	373.90	0.045	0.087	11	0.00	0.00	11
Heavy duty truck	63	1,210	1,663.79	0.005	0.005	127	0.00	0.00	127
					Total	137	0.00	0.00	138

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Ryan Ranch-Bishop Interconnection

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	264.03

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		148.84		148.84

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	2,352	373.90	0.045	0.087	9	0	0	9
Heavy duty truck	63	1,008	1,663.79	0.005	0.005	106	0	0	106
					Total	114	0.00	0.00	115

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

MainSystem to Hidden Hills Interconnection

Total Construction Emissions (metric tons)

Source	CO_2e
Construction Emissions	198.02

Includes offroad and on-road emissions sources.

Total Offroad Equipment Emissions

	CO_2e (metric tons)			
Source	2018	2019	2020	Total
Off-road Equipment		111.63		111.63

See CalEEMod output for equipment use assumptions.

Total On-road Construction GHG Emissions

			Emission Factors			Total Emissions			
			(gram/mile)			(Metric tons)			
On-road Sources	Miles/trip	Trips	CO_2	CH_4	N2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck	10	1,764	373.90	0.045	0.087	7	0.00	0.00	7
Heavy duty truck	63	756	1,663.79	0.005	0.005	79	0.00	0.00	79
					Total	86	0.00	0.00	86

See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO_2) and TCR, 2016 (for N_2O and CH_4). It is assumed that workers would commute 10 miles to the construction site and truck trips would average 63 miles one-way.

Alternative 1 Construction Emissions Increase Compared to Proposed Project

Emissions Source	CO_2e
Proposed Source Water Pipeline	575.17
Alternative Source Water Pipeline	2,013.10
Amortized	50.33

Note: the alternative pipeline length would be 3.5 times (7.7 miles / 2.2 miles) longer than the proposed pipeline length.

Alternative 5a Total Construction Emissions (2/3 of Slant Well Emissions)

Emissions Source	CO_2e
Equipment and Vehicle Exhaust	13,664.55
Amortized (40 years)	341.61
Proposed Proj. Amortized (40 years)	357
Emissions Decrease	15.67

Alternative 5b Total Construction Emissions (7/9 of Slant Well Emissions and Longer Source Water Pipeline)

Emissions Source	CO_2e
Equipment and Vehicle Exhaust	16,030.40
Amortized (40 years)	400.76
Proposed Proj. Amortized (40 years)	357
Emissions Increase	43.47
Increase compared to Alternantive 5a	59.15

G1.1.12 GHG OPERATIONAL EMISSIONS

Total GHG Emissions for Operations of the Proposed Action

Operation Emissions Source	Operational Emissions (total metric tons)			
	CO_2	N_2O	CH_4	CO_2e
Baseline Electricity Consumption	1,508.27	0.03	0.16	1,521.11
Electricity Consumption with Project	8,335.14	0.16	0.89	8,406.07
Net Increase in Electricity	6,826.87	0.13	0.73	6,884.96
Vehicle Trips	233.58	0.020	0.01	239.66
Emergency Generator Testing	24.86	0.00	0.00	25.09
Off-road Equipment for Slant Well Maintenance (amortized over 5 years)	14.811	0.000	0.002	14.856
Degassing from Discharge Water at the Brine Storage	735.00	---	---	735.00
Loss of Carbon Sequestration	107.981	---	---	107.981
Total	**7,943.10**	**0.15**	**0.75**	**8,007.54**

Total GHG Emissions for Operations of Alternative 5

Operation Emissions Source	Operational Emissions (total metric tons)			
	CO_2	N_2O	CH_4	CO_2e
Baseline Electricity Consumption	1,508.27	0.03	0.16	1,521.11
Electricity Consumption with Project	5,791.27	0.11	0.62	5,840.55
Net Increase in Electricity	4,283.00	0.08	0.46	4,319.44
Vehicle Trips	233.58	0.020	0.01	239.66
Emergency Generator Testing	20.32	0.00	0.00	20.50
Off-road Equipment for Slant Well Maintenance (amortized over 5 years)	10.368	0.000	0.002	10.399
Degassing from Discharge Water at the Brine Storage	490.00	---	---	490.00
Loss of Carbon Sequestration	107.981	---	---	107.981
Total	**5,145.24**	**0.10**	**0.47**	**5,187.99**

Baseline Indirect Emissions from Electricity Consumption

GHGs from Electricity Consumption				
GHG	Emission Factor (lb/kWh)	Electricity Consumption kWhr	metric tons	CO_2e* (metric tons)
CO_2	0.29000	11,466,000	1,508.27	1,508.27
CH_4	0.000031	11,466,000	0.16	4.05
N_20	0.000006	11,466,000	0.03	8.79
			Total =	1,521.11

Indirect Emissions from Electricity Consumption

GHGs from Electricity Consumption				
GHG	Emission Factor (lb/kWh)	Electricity Consumption kWhr	metric tons	CO_2e* (metric tons)
9.6 MGD Proposed Action				
CO_2	0.29000	63,364,310	8,335.14	8,335.14
CH_4	0.000031	63,364,310	0.89	22.36
N_20	0.000006	63,364,310	0.16	48.56
			Total =	8,406.07
6.4 MGD Alternative 5				
CO_2	0.29000	44,025,643	5,791.27	5,791.27
CH_4	0.000031	44,025,643	0.62	15.54
N_20	0.000006	44,025,643	0.11	33.74
			Total =	5,840.55

*Subsequent to the release of the Draft EIR/EIS, a Brine Mixing Box has been added to the project. The Brine Mixing Box would require 200,000 kWhr electricity per year.This amount was added to the total electrical consumption.

Net Increase in Indirect Emissions from Electricity Consumption

GHGs from Electricity Consumption				
GHG	Emission Factor (lb/kWh)	Electricity Consumption kWhr	metric tons	CO_2e* (metric tons)
9.6 MGD Proposed Action				
CO_2	0.29000	51,898,310	6,826.87	6,826.87
CH_4	0.000031	51,898,310	0.73	18.31
N_20	0.000006	51,898,310	0.13	39.78
			Total =	6,884.96
6.4 MGD Alternative 5				
CO_2	0.29000	32,559,643	4,283.00	4,283.00
CH_4	0.000031	32,559,643	0.46	11.49
N_20	0.000006	32,559,643	0.08	24.95
			Total =	4,319.44

Notes: The emission factor for CO_2 was obtained from PG&E, 2015. Emission factors for CH_4 and N_2O are from TCR, 2016.
Project baseline and proposed electricity consumption estimates provided by CalAm June 17, 2016.
*Global Warming Potential for CH_4 = 25; GWP for N_2O = 298 (CARB, 2014).
California Air Resources Board (CARB), 2014. Updated Scoping Report. May 2014.
Pacific Gas and Electric Company (PG&E), 2015. Greenhouse Gas Emission Factors: Guidance for PG&E Customers, November 2015.
The Climate Registry (TCR), 2016. The Climate Registry 2016 Default Emission Factors, April 19, 2016.

Project Mobile Sources

			Running Exhaust Emission Factor (grams/mile)			Total Emissions (Metric tons)			
On-road Sources	Miles/trip	One way Trips	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e
Light duty truck (gas)	10	21,900	342.04	0.045	0.087	74.91	0.010	0.019	80.84
Heavy duty truck	63	1,560	1,614.50	0.005	0.005	158.67	0.001	0.000	158.83
						233.58	0.01	0.020	239.66

Notes: See Section 5, Construction Worker Auto and Truck Trips, for trip assumptions. Emission factors are from Emfac2014 (for CO2) and TCR, 2016 (for N_2O and CH_4). It is assumed that 30 employees would each generate two light duty truck trips per day; 7 days per week (365 days per year), and that there would be 3 heavy duty truck deliveries 260 days per year.

Emergency Generator Emissions

GHG Emissions Factors for Diesel Exhaust

Fuel	CO_2 (g/gal)	N_2O (g/gal)	CH_4 (g/gal)
Diesel Fuel	10,210.00	0.26	0.58

Notes: Emission factors obtained from TCR, 2016, Tables 13.1 and 13.7.

Emergency Generator Emissions associated with the Proposed Action

			Diesel Fuel Consumption[b]		Total Emissions (metric tons)			
Off-Road Equipment	MaxHP[a]	Hrs/yr	gal/hr	gal/yr	CO_2	N_2O	CH_4	CO_2e
Emergency Generator - at Desal Plant	1,000	50.00	45.40	2,270.00	23.177	0.001	0.001	23.39
Emergency Generator - at Desal Plant (Variant)	804	50.00	36.50	1,825.08	18.634	0.000	0.001	18.80
Emergency Generator at Carnel Valley Pump Station	68	50.00	3.30	165.00	1.685	0.000	0.000	1.70
Total Emergency Generator Emissions for Project				2,435.00	24.86	0.00	0.00	25.09
Total Emergency Generator Emissions for Project Variant				1,990.08	20.32	0.00	0.00	20.50

Assumed at 75 percent load with fan.

[a] Proposed generator at desal plant horsepower is from RBF, 2013, Memorandum - MPWSP Capital and O&M Cost Estimate Update, January 9, 2013, Table 2.

[b] Diesel fuel consumption factors are from Caterpillar specification sheets:

Standby 800 ekW 1,000 kVA 60 Hz 1,800 rpm 480 Volts, Tier 2.
Standby 250 ekW 313 kVA 60 Hz 1,800 rpm 480 Volts, Tier 3.
Standby 50 ekW 50 kVA 60 Hz 1,800 rpm 120 Volts, Tier 3.

GHG Emissions Factors for Natural Gas

Fuel	CO_2 (kg/MMBtu)	N_2O (g/MMBtu)	CH_4 (g/MMBtu)
Diesel Fuel	53.06	0.95	3.8

Notes: Emission factors obtained from TCR, 2016, Tables 13.1 and 12.5.

Emergency Generator Emissions associated with Alternative 3

			Natural Gas Consumption[b]		Total Emissions (metric tons)			
Off-Road Equipment	MW	Hrs/yr	scf/MWhr	MMBtu/yr	CO_2	N_2O	CH_4	CO_2e
Emergency Generator - at Desal Plant	30	60.00	10,147	18,739	994	0.018	0.071	1,001

Generators would be natural gas powered. It is assumed that 1,026 Btu/scf natural gas (TCR, 2016), and that for every 1 MW of power, 10,147 scf of natual gas would be consumed each hour for 3/4 load (DSS, 2016).

Diesel Service and Supply (DSS), 2016. Approximate Natrual Gas Consumption Chart, accessed at: http://www.dieselserviceandsupply.com/Natural_Gas_Fuel_Consumption.aspx, on July 18, 2016.

Slant Well Maintenance (2025) emissions

Proposed Action

	Total Emissions (metric tons)			
Source	CO_2	N_2O	CH_4	CO_2e
Off-road Equipment	74.06	0.00	0.01	74.28
Amortized over 5 years	14.81	0.00	0.00	14.86

Alternative 5

Source	Total Emissions (metric tons)			
	CO_2	N_2O	CH_4	CO_2e
Off-road Equipment	51.84	0.00	0.01	52.00
Amortized over 5 years	10.37	0.00	0.00	10.40

CO_2 Degassing Emissions

Source	CO_2 factor	CO_2	Change
	metric tons/yr	metric tons	from project
Proposed Action - 9.6 MGD	735	735.00	0.00
Alternative 3	95	190.00	-545.00
Alternative 4	95	125.40	-609.60
Alternative 5 - 6.4 MGD	735	490.00	-245.00

735 metric tons represents groundwater (slant well) extraction; 95 metric tons represents open water intake.
Degassing emissions for the Alternative 3 would be open water intake (use [95 metric tons/9.6 mgd]*2).
Degassing emissions for the Alternative 4 would be open water intake (use [95 metric tons/9.6 mgd]*1.32).
Degassing emissions for the 6.4 MGD plant would be 2/3s the degasing emissions of the 9.6 MGD plant.

Long-term Carbon Sequestration

Carbon Uptake for Proposed Action

Vegetation Type	CO2 (MT/ac-yr)	acres permanently disturbed						CO_2 (MT/yr)
		Desal Plant	Slant Wells	ASR Wells	Terminal Reservoir	C. Valley Pump Sta.	Total	
Grasslands	4.31	15	0	0	0	0.1	15.1	65.081
Shrub	14.3	0	1	1	1	0	3	42.9
							Total	107.981

Notes: CO_2 uptake factor obtained from CAPCOA, 2013.
Acres of vegetation removal are based on values identified in EIS/EIR Section 4.6, Terrestrial Biological Resources.

Carbon Uptake for Alternative 3

Vegetation Type	CO2 (MT/ac-yr)	acres permanently disturbed						CO_2 (MT/yr)
		Desal Plant	Intake Pump Station	ASR Wells	Terminal Reservoir	C. Valley Pump Sta.	Total	
Grasslands	4.31	91	0	0	0	0.1	91.1	392.641
Shrub	14.3	0	0	1	1	0	2	28.6
							Total	421.241
							Difference compared to project	313.26

Notes: CO_2 uptake factor obtained from CAPCOA, 2013.
Acres of vegetation removal are based on values identified in EIS/EIR Section 4.6, Terrestrial Biological Resources.

Carbon Uptake for Alternative 4

Vegetation Type	CO2 (MT/ac-yr)	acres permanently disturbed						CO_2 (MT/yr)
		Desal Plant	Intake Pump Station	ASR Wells	Terminal Reservoir	C. Valley Pump Sta.	Total	
Grasslands	4.31	0	0	0	0	0.1	0.1	0.431
Shrub	14.3	0	0	1	1	0	2	28.6
							Total	29.031
							Difference compared to project	78.95

Notes: CO_2 uptake factor obtained from CAPCOA, 2013.
Acres of vegetation removal are based on values identified in EIS/EIR Section 4.6, Terrestrial Biological Resources.

Total Proposed Project Amortized Operation and Construction Emissions

Source	Total CO_2e Emissions (metric tons)		
	Operation	Construction	Total
Proposed Project	8,007.54	357.29	8,364.83
Alternative 5	5,187.99	341.61	5,529.60
		Difference	2,835.23

G1.1.13 EMFAC 2014 ON-ROAD EMISSION FACTORS

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Monterey
Calendar Year: 2018
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	ROG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM2_5_RUNEX	PM2_5_PMTW	PM2_5_PMBW
Monterey	2018	LDT1	Aggregated	Aggregated	GAS	9518.7	340980.3	57551	0.0823	2.4773	0.2714	373.9	0.0036	0.008	0.0368	0.00331	0.002	0.01575
Monterey	2018	T7 single construction	Aggregated	Aggregated	DSL	39.989	3653.145	0	0.1428	0.5447	5.426	1663.8	0.0373	0.036	0.0617	0.03567	0.009	0.02646

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Monterey
Calendar Year: 2021
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	ROG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM2_5_RUNEX	PM2_5_PMTW	PM2_5_PMBW
Monterey	2021	LDT1	Aggregated	Aggregated	GAS	8117.6	303291.3	49250	0.046	1.6776	0.1896	342.04	0.0031	0.008	0.0368	0.00281	0.002	0.01575
Monterey	2021	T7 single construction	Aggregated	Aggregated	DSL	41.508	3965.606	0	0.1016	0.4327	3.661	1614.5	0.017	0.036	0.0617	0.01624	0.009	0.02646

G1.2 CALEEMOD OUTPUT - ANNUAL EMISSIONS

Monterey Peninsula Water Supply Project

Monterey County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	0.00	1000sqft	15.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Land use duty entered here is not relevent to the model run, and only serves the purpose of allowing data to be entered for the construction phase. Note that operational emissions are estimated outside of CalEEMod

Construction Phase - See Appendix Sections 5, Construction Trips, and 6, MPWSP Estimated Construction Phasing, for additional information about phasing of construction actvitities and total workdays.

Off-road Equipment - Hour/day assumptions are presented in Appendix G.

Off-road Equipment - project specific assumptions have been entered.

Off-road Equipment - Refer to "Average Daily Offroad Construction Equipment Hours For CalEEMod" for equipment unit amounts, hours, and hp assumptions.

Off-road Equipment - project information based on project assumptions

Off-road Equipment - Refer to "Average Daily Offroad Construction Equipment Hours for CalEEMod Input" for unit amount, hours/day, and hp assumptions.

Off-road Equipment - See "Average Daily Offroad Construction Equipment Hours for CalEEMod Input" for assumptions regarding unit amounts, hour/day, and hp.

Off-road Equipment - See construction equipment hours assumption in Appendix G

Trips and VMT - Worker and haul trips are estimated outside of CalEEMod using Emfac 2014 emission factors

Grading - Fugitive dust emissions are estimated outside of CalEEMod.

Construction Off-road Equipment Mitigation - Mitigation for off-road equipment is to have engines that meet at least tier 3 emissions requirements.

Off-road Equipment - Slant well maintenance would occur every 5 years after start of operations.

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tblOffRoadEquipment	PhaseName		Slant Well Maintenance

tblOffRoadEquipment	PhaseName		Slant Well Maintenance
tblOffRoadEquipment	UsageHours	8.00	2.70
tblOffRoadEquipment	UsageHours	8.00	2.70
tblOffRoadEquipment	UsageHours	8.00	11.00
tblOffRoadEquipment	UsageHours	8.00	6.90
tblOffRoadEquipment	UsageHours	8.00	1.30
tblProjectCharacteristics	OperationalYear	2014	2020
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	53.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	28.00	0.00
tblTripsAndVMT	WorkerTripNumber	30.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	1.1309	12.7563	6.8258		0.0000	0.5368	0.5368	0.0000	0.5015	0.5015			1,702.4164	0.3429	0.0000	1,709.6169
2019	2.3570	25.5664	15.5740		0.0000	1.0914	1.0914	0.0000	1.0202	1.0202			3,866.0339	0.7642	0.0000	3,882.0818
2020	0.2644	2.7702	1.8959		0.0000	0.1143	0.1143	0.0000	0.1072	0.1072			464.2369	0.0838	0.0000	465.9964
2025	0.0310	0.2732	0.2079			0.0101	0.0101		9.5000e-003	9.5000e-003			74.0572	0.0106	0.0000	74.2799
2026	0.0117	0.1035	0.0787			3.8300e-003	3.8300e-003		3.6000e-003	3.6000e-003			28.0520	4.0200e-003	0.0000	28.1363
Total	**3.7951**	**41.4694**	**24.5822**		**0.0000**	**1.7565**	**1.7565**	**0.0000**	**1.6419**	**1.6419**			**6,134.7964**	**1.2055**	**0.0000**	**6,160.1114**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.4805	8.8508	10.4793		0.0000	0.3772	0.3772	0.0000	0.3745	0.3745			1,702.4144	0.3429	0.0000	1,709.6149

2019	1.0566	19.9649	24.2794		0.0000	0.8650	0.8650	0.0000	0.8612	0.8612			3,866.0293	0.7642	0.0000	3,882.0772
2020	0.1195	2.3187	2.9612		0.0000	0.0974	0.0974	0.0000	0.0974	0.0974			464.2363	0.0838	0.0000	465.9959
2025	0.0186	0.3657	0.4178			0.0150	0.0150		0.0150	0.0150			74.0571	0.0106	0.0000	74.2798
2026	7.0600e-003	0.1385	0.1582			5.6700e-003	5.6700e-003		5.6700e-003	5.6700e-003			28.0519	4.0200e-003	0.0000	28.1363
Total	**1.6822**	**31.6387**	**38.2959**		**0.0000**	**1.3602**	**1.3602**	**0.0000**	**1.3538**	**1.3538**			**6,134.7891**	**1.2055**	**0.0000**	**6,160.1040**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**55.67**	**23.71**	**-55.79**	**0.00**	**0.00**	**22.56**	**22.56**	**0.00**	**17.55**	**17.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Subsurface Slant Wells (9 wells)	Site Preparation	7/2/2018	9/13/2019	5	315	
2	Desalination Plant	Site Preparation	7/2/2018	6/4/2020	5	504	
3	New Desalinated Water Pipeline	Site Preparation	7/2/2018	12/24/2018	5	126	
4	Terminal Reservoir	Site Preparation	7/2/2018	9/13/2019	5	315	
5	ASR Injection/Extraction Wells	Site Preparation	7/2/2018	6/18/2019	5	252	
6	New Monterey Pipeline	Site Preparation	7/2/2018	9/13/2019	5	315	
7	New Transmission Main Pipeline	Site Preparation	12/25/2018	9/13/2019	5	189	
8	Source Water Pipeline	Site Preparation	1/2/2019	6/26/2019	5	126	
9	Carmel Valley Pump Station	Site Preparation	1/2/2019	6/26/2019	5	126	
10	Monterey Pump Station	Site Preparation	1/2/2019	6/26/2019	5	126	
11	Castroville Pipeline	Site Preparation	3/2/2019	6/27/2019	5	84	
12	ASR Pipelines (ASR Conveyance, ASR Redisribution	Site Preparation	4/2/2019	8/24/2019	5	104	
13	Brine Discharge Pipeline	Site Preparation	4/2/2019	6/27/2019	5	63	

14	Pipeline to CSIP Pond	Site Preparation	5/2/2019	6/28/2019	5	42	
15	Ryan Ranch-Bishop Interconnection	Site Preparation	7/1/2019	10/24/2019	5	84	
16	Main System to Hidden Hills	Site Preparation	7/1/2019	9/25/2019	5	63	
17	Slant Well Maintenance	Site Preparation	10/1/2025	2/4/2026	5	91	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Cranes	1	6.00	200	0.29
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Excavators	1	8.00	200	0.38
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Generator Sets	1	8.00	200	0.74
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Pavers	1	6.00	160	0.42
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Rollers	1	6.00	90	0.38
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Rubber Tired Loaders	1	8.00	90	0.36
ASR Pipelines (ASR Conveyance, ASR Redisribution, and ASR Pump-to-Waste pipelines)	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Subsurface Slant Wells (9 wells)	Bore/Drill Rigs	1	6.90	350	0.50
Subsurface Slant Wells (9 wells)	Cranes	2	12.00	200	0.29
Subsurface Slant Wells (9 wells)	Excavators	1	3.40	200	0.38
Subsurface Slant Wells (9 wells)	Generator Sets	2	3.40	200	0.74
Subsurface Slant Wells (9 wells)	Trenchers	1	12.00	150	0.50

Desalination Plant	Cranes	2	11.00	200	0.29
Desalination Plant	Excavators	2	1.00	200	0.38
Desalination Plant	Forklifts	4	11.00	150	0.20
Desalination Plant	Generator Sets	2	12.00	200	0.74
Desalination Plant	Graders	1	1.00	200	0.41
Desalination Plant	Off-Highway Tractors	1	1.00	200	0.44
Desalination Plant	Off-Highway Trucks	1	1.00	350	0.38
Desalination Plant	Off-Highway Trucks	1	0.30	350	0.38
Desalination Plant	Pavers	1	0.50	160	0.42
Desalination Plant	Rollers	2	1.50	90	0.38
Desalination Plant	Rubber Tired Loaders	2	1.00	90	0.36
Desalination Plant	Tractors/Loaders/Backhoes	2	11.00	150	0.37
New Desalinated Water Pipeline	Cranes	1	6.00	200	0.29
New Desalinated Water Pipeline	Excavators	1	8.00	200	0.38
New Desalinated Water Pipeline	Generator Sets	1	8.00	200	0.74
New Desalinated Water Pipeline	Pavers	1	6.00	160	0.42
New Desalinated Water Pipeline	Rollers	1	6.00	90	0.38
New Desalinated Water Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Desalinated Water Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Terminal Reservoir	Cranes	2	6.90	200	0.29
Terminal Reservoir	Excavators	1	1.10	200	0.38
Terminal Reservoir	Generator Sets	1	8.00	200	0.74
Terminal Reservoir	Graders	1	1.10	200	0.41
Terminal Reservoir	Off-Highway Tractors	1	1.10	200	0.44
Terminal Reservoir	Off-Highway Trucks	1	0.50	350	0.38
Terminal Reservoir	Pavers	1	0.50	160	0.42
Terminal Reservoir	Rollers	1	1.60	90	0.38
Terminal Reservoir	Rubber Tired Loaders	1	1.10	90	0.36
Terminal Reservoir	Tractors/Loaders/Backhoes	1	6.90	150	0.37
ASR Injection/Extraction Wells	Bore/Drill Rigs	1	3.80	350	0.50

ASR Injection/Extraction Wells	Cranes	2	1.30	200	0.29
ASR Injection/Extraction Wells	Excavators	1	1.30	200	0.38
ASR Injection/Extraction Wells	Generator Sets	1	6.70	200	0.74
ASR Injection/Extraction Wells	Graders	1	0.20	200	0.41
ASR Injection/Extraction Wells	Off-Highway Tractors	1	1.30	200	0.44
ASR Injection/Extraction Wells	Off-Highway Trucks	1	1.30	350	0.38
ASR Injection/Extraction Wells	Pavers	1	0.20	160	0.42
ASR Injection/Extraction Wells	Rollers	1	1.50	90	0.38
ASR Injection/Extraction Wells	Rubber Tired Loaders	1	1.30	90	0.36
ASR Injection/Extraction Wells	Tractors/Loaders/Backhoes	1	1.30	150	0.37
New Monterey Pipeline	Bore/Drill Rigs	1	0.80	350	0.50
New Monterey Pipeline	Cranes	1	6.00	200	0.29
New Monterey Pipeline	Excavators	1	8.00	200	0.38
New Monterey Pipeline	Generator Sets	1	8.00	200	0.74
New Monterey Pipeline	Pavers	1	6.00	160	0.42
New Monterey Pipeline	Rollers	1	6.00	90	0.38
New Monterey Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Monterey Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
New Transmission Main Pipeline	Bore/Drill Rigs	1	1.30	350	0.50
New Transmission Main Pipeline	Cranes	1	6.00	200	0.29
New Transmission Main Pipeline	Excavators	1	8.00	200	0.38
New Transmission Main Pipeline	Generator Sets	1	8.00	200	0.74
New Transmission Main Pipeline	Pavers	1	6.00	160	0.42
New Transmission Main Pipeline	Rollers	1	6.00	90	0.38
New Transmission Main Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Transmission Main Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Source Water Pipeline	Bore/Drill Rigs	1	0.60	350	0.50
Source Water Pipeline	Cranes	1	6.00	200	0.29
Source Water Pipeline	Excavators	1	8.00	200	0.38
Source Water Pipeline	Generator Sets	1	8.00	200	0.74

Source Water Pipeline	Pavers	1	6.00	160	0.42
Source Water Pipeline	Rollers	1	6.00	90	0.38
Source Water Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Source Water Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Carmel Valley Pump Station	Cranes	1	1.30	200	0.29
Carmel Valley Pump Station	Generator Sets	1	8.00	200	0.74
Carmel Valley Pump Station	Graders	1	0.30	200	0.41
Carmel Valley Pump Station	Pavers	1	0.10	160	0.42
Carmel Valley Pump Station	Rollers	1	2.70	90	0.38
Carmel Valley Pump Station	Rubber Tired Loaders	1	2.70	90	0.36
Carmel Valley Pump Station	Tractors/Loaders/Backhoes	1	2.70	150	0.37
Monterey Pump Station	Cranes	1	1.30	200	0.29
Monterey Pump Station	Generator Sets	1	8.00	200	0.74
Monterey Pump Station	Graders	1	0.30	200	0.41
Monterey Pump Station	Pavers	1	0.10	160	0.42
Monterey Pump Station	Rollers	1	2.70	90	0.38
Monterey Pump Station	Rubber Tired Loaders	1	2.70	90	0.36
Monterey Pump Station	Tractors/Loaders/Backhoes	1	2.70	150	0.37
Castroville Pipeline	Bore/Drill Rigs	1	1.00	350	0.50
Castroville Pipeline	Cranes	1	6.00	200	0.29
Castroville Pipeline	Excavators	1	8.00	200	0.38
Castroville Pipeline	Generator Sets	1	8.00	200	0.74
Castroville Pipeline	Pavers	1	6.00	160	0.42
Castroville Pipeline	Rollers	1	6.00	90	0.38
Castroville Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Castroville Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Brine Discharge Pipeline	Cranes	1	6.00	200	0.29
Brine Discharge Pipeline	Excavators	1	8.00	200	0.38
Brine Discharge Pipeline	Generator Sets	1	8.00	200	0.74
Brine Discharge Pipeline	Pavers	1	6.00	160	0.42

Brine Discharge Pipeline	Rollers	1	6.00	90	0.38
Brine Discharge Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Brine Discharge Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Pipeline to CSIP Pond	Cranes	1	6.00	200	0.29
Pipeline to CSIP Pond	Excavators	1	8.00	200	0.38
Pipeline to CSIP Pond	Generator Sets	1	8.00	200	0.74
Pipeline to CSIP Pond	Pavers	1	6.00	160	0.42
Pipeline to CSIP Pond	Rollers	1	6.00	90	0.38
Pipeline to CSIP Pond	Rubber Tired Loaders	1	8.00	90	0.36
Pipeline to CSIP Pond	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Ryan Ranch-Bishop Interconnection	Cranes	1	6.00	200	0.29
Ryan Ranch-Bishop Interconnection	Excavators	1	8.00	200	0.38
Ryan Ranch-Bishop Interconnection	Generator Sets	1	8.00	200	0.74
Ryan Ranch-Bishop Interconnection	Pavers	1	6.00	160	0.42
Ryan Ranch-Bishop Interconnection	Rollers	1	6.00	90	0.38
Ryan Ranch-Bishop Interconnection	Rubber Tired Loaders	1	8.00	90	0.36
Ryan Ranch-Bishop Interconnection	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Main System to Hidden Hills	Cranes	1	6.00	200	0.29
Main System to Hidden Hills	Excavators	1	8.00	200	0.38
Main System to Hidden Hills	Generator Sets	1	8.00	200	0.74
Main System to Hidden Hills	Pavers	1	6.00	160	0.42
Main System to Hidden Hills	Rollers	1	6.00	90	0.38
Main System to Hidden Hills	Rubber Tired Loaders	1	8.00	90	0.36
Main System to Hidden Hills	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Slant Well Maintenance	Graders	1	5.30	200	0.41
Slant Well Maintenance	Cranes	1	6.00	200	0.29
Slant Well Maintenance	Rubber Tired Loaders	1	5.30	90	0.36
Slant Well Maintenance	Generator Sets	1	8.00	200	0.74

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Subsurface Slant Wells (9 wells) - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2221	2.6032	1.2372			0.1067	0.1067		0.0990	0.0990			315.2462	0.0775	0.0000	316.8727
Total	**0.2221**	**2.6032**	**1.2372**		**0.0000**	**0.1067**	**0.1067**	**0.0000**	**0.0990**	**0.0990**			**315.2462**	**0.0775**	**0.0000**	**316.8727**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1281	1.9610	1.8838			0.0831	0.0831		0.0804	0.0804			315.2458	0.0775	0.0000	316.8723
Total	**0.1281**	**1.9610**	**1.8838**		**0.0000**	**0.0831**	**0.0831**	**0.0000**	**0.0804**	**0.0804**			**315.2458**	**0.0775**	**0.0000**	**316.8723**

3.2 Subsurface Slant Wells (9 wells) - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2888	3.3046	1.6818			0.1357	0.1357		0.1259	0.1259			437.1615	0.1085	0.0000	439.4408
Total	**0.2888**	**3.3046**	**1.6818**		**0.0000**	**0.1357**	**0.1357**	**0.0000**	**0.1259**	**0.1259**			**437.1615**	**0.1085**	**0.0000**	**439.4408**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1780	2.7237	2.6478			0.1155	0.1155		0.1117	0.1117			437.1610	0.1085	0.0000	439.4403
Total	**0.1780**	**2.7237**	**2.6478**		**0.0000**	**0.1155**	**0.1155**	**0.0000**	**0.1117**	**0.1117**			**437.1610**	**0.1085**	**0.0000**	**439.4403**

3.3 Desalination Plant - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.3732	4.1697	2.3235			0.1750	0.1750		0.1640	0.1640			553.8724	0.0994	0.0000	555.9601
Total	**0.3732**	**4.1697**	**2.3235**		**0.0000**	**0.1750**	**0.1750**	**0.0000**	**0.1640**	**0.1640**			**553.8724**	**0.0994**	**0.0000**	**555.9601**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1398	2.7120	3.4635			0.1139	0.1139		0.1139	0.1139			553.8718	0.0994	0.0000	555.9594
Total	**0.1398**	**2.7120**	**3.4635**		**0.0000**	**0.1139**	**0.1139**	**0.0000**	**0.1139**	**0.1139**			**553.8718**	**0.0994**	**0.0000**	**555.9594**

3.3 Desalination Plant - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.6746	7.3146	4.5108			0.3046	0.3046		0.2855	0.2855			1,094.1864	0.1971	0.0000	1,098.3257
Total	**0.6746**	**7.3146**	**4.5108**		**0.0000**	**0.3046**	**0.3046**	**0.0000**	**0.2855**	**0.2855**			**1,094.1864**	**0.1971**	**0.0000**	**1,098.3257**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2784	5.4033	6.9005			0.2270	0.2270		0.2270	0.2270			1,094.1851	0.1971	0.0000	1,098.3244
Total	**0.2784**	**5.4033**	**6.9005**		**0.0000**	**0.2270**	**0.2270**	**0.0000**	**0.2270**	**0.2270**			**1,094.1851**	**0.1971**	**0.0000**	**1,098.3244**

3.3 Desalination Plant - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2644	2.7702	1.8959			0.1143	0.1143		0.1072	0.1072			464.2369	0.0838	0.0000	465.9964
Total	**0.2644**	**2.7702**	**1.8959**		**0.0000**	**0.1143**	**0.1143**	**0.0000**	**0.1072**	**0.1072**			**464.2369**	**0.0838**	**0.0000**	**465.9964**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1195	2.3187	2.9612			0.0974	0.0974		0.0974	0.0974			464.2363	0.0838	0.0000	465.9959
Total	**0.1195**	**2.3187**	**2.9612**		**0.0000**	**0.0974**	**0.0974**	**0.0000**	**0.0974**	**0.0974**			**464.2363**	**0.0838**	**0.0000**	**465.9959**

3.4 New Desalinated Water Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1522	1.6574	0.9851			0.0761	0.0761		0.0709	0.0709			224.5592	0.0465	0.0000	225.5357
Total	**0.1522**	**1.6574**	**0.9851**		**0.0000**	**0.0761**	**0.0761**	**0.0000**	**0.0709**	**0.0709**			**224.5592**	**0.0465**	**0.0000**	**225.5357**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0575	1.1393	1.4468			0.0517	0.0517		0.0517	0.0517			224.5589	0.0465	0.0000	225.5354
Total	**0.0575**	**1.1393**	**1.4468**		**0.0000**	**0.0517**	**0.0517**	**0.0000**	**0.0517**	**0.0517**			**224.5589**	**0.0465**	**0.0000**	**225.5354**

3.5 Terminal Reservoir - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1337	1.5449	0.7289			0.0617	0.0617		0.0577	0.0577			193.7106	0.0360	0.0000	194.4658
Total	**0.1337**	**1.5449**	**0.7289**		**0.0000**	**0.0617**	**0.0617**	**0.0000**	**0.0577**	**0.0577**			**193.7106**	**0.0360**	**0.0000**	**194.4658**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0490	0.9530	1.1424			0.0387	0.0387		0.0387	0.0387			193.7103	0.0360	0.0000	194.4656
Total	**0.0490**	**0.9530**	**1.1424**		**0.0000**	**0.0387**	**0.0387**	**0.0000**	**0.0387**	**0.0387**			**193.7103**	**0.0360**	**0.0000**	**194.4656**

3.5 Terminal Reservoir - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1699	1.9153	0.9830			0.0755	0.0755		0.0707	0.0707			269.6703	0.0503	0.0000	270.7264
Total	**0.1699**	**1.9153**	**0.9830**		**0.0000**	**0.0755**	**0.0755**	**0.0000**	**0.0707**	**0.0707**			**269.6703**	**0.0503**	**0.0000**	**270.7264**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0688	1.3386	1.6046			0.0544	0.0544		0.0544	0.0544			269.6700	0.0503	0.0000	270.7260
Total	**0.0688**	**1.3386**	**1.6046**		**0.0000**	**0.0544**	**0.0544**	**0.0000**	**0.0544**	**0.0544**			**269.6700**	**0.0503**	**0.0000**	**270.7260**

3.6 ASR Injection/Extraction Wells - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0826	0.9548	0.4657			0.0342	0.0342		0.0323	0.0323			163.1867	0.0304	0.0000	163.8254
Total	**0.0826**	**0.9548**	**0.4657**		**0.0000**	**0.0342**	**0.0342**	**0.0000**	**0.0323**	**0.0323**			**163.1867**	**0.0304**	**0.0000**	**163.8254**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0414	0.8060	0.9253			0.0321	0.0321		0.0321	0.0321			163.1865	0.0304	0.0000	163.8252
Total	**0.0414**	**0.8060**	**0.9253**		**0.0000**	**0.0321**	**0.0321**	**0.0000**	**0.0321**	**0.0321**			**163.1865**	**0.0304**	**0.0000**	**163.8252**

3.6 ASR Injection/Extraction Wells - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0703	0.7776	0.4206			0.0278	0.0278		0.0262	0.0262			149.3307	0.0280	0.0000	149.9177
Total	**0.0703**	**0.7776**	**0.4206**		**0.0000**	**0.0278**	**0.0278**	**0.0000**	**0.0262**	**0.0262**			**149.3307**	**0.0280**	**0.0000**	**149.9177**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0382	0.7445	0.8547			0.0296	0.0296		0.0296	0.0296			149.3305	0.0280	0.0000	149.9175
Total	**0.0382**	**0.7445**	**0.8547**		**0.0000**	**0.0296**	**0.0296**	**0.0000**	**0.0296**	**0.0296**			**149.3305**	**0.0280**	**0.0000**	**149.9175**

3.7 New Monterey Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1609	1.7584	1.0450			0.0801	0.0801		0.0747	0.0747			242.3778	0.0511	0.0000	243.4513
Total	**0.1609**	**1.7584**	**1.0450**		**0.0000**	**0.0801**	**0.0801**	**0.0000**	**0.0747**	**0.0747**			**242.3778**	**0.0511**	**0.0000**	**243.4513**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0622	1.2314	1.5568			0.0556	0.0556		0.0556	0.0556			242.3775	0.0511	0.0000	243.4510
Total	**0.0622**	**1.2314**	**1.5568**		**0.0000**	**0.0556**	**0.0556**	**0.0000**	**0.0556**	**0.0556**			**242.3775**	**0.0511**	**0.0000**	**243.4510**

3.7 New Monterey Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2050	2.1813	1.4389			0.0985	0.0985		0.0919	0.0919			336.8918	0.0716	0.0000	338.3945
Total	**0.2050**	**2.1813**	**1.4389**		**0.0000**	**0.0985**	**0.0985**	**0.0000**	**0.0919**	**0.0919**			**336.8918**	**0.0716**	**0.0000**	**338.3945**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0874	1.7296	2.1866			0.0780	0.0780		0.0780	0.0780			336.8914	0.0716	0.0000	338.3941
Total	**0.0874**	**1.7296**	**2.1866**		**0.0000**	**0.0780**	**0.0780**	**0.0000**	**0.0780**	**0.0780**			**336.8914**	**0.0716**	**0.0000**	**338.3941**

3.8 New Transmission Main Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	6.2100e-003	0.0680	0.0404			3.0800e-003	3.0800e-003		2.8700e-003	2.8700e-003			9.4636	2.0200e-003	0.0000	9.5059
Total	**6.2100e-003**	**0.0680**	**0.0404**		**0.0000**	**3.0800e-003**	**3.0800e-003**	**0.0000**	**2.8700e-003**	**2.8700e-003**			**9.4636**	**2.0200e-003**	**0.0000**	**9.5059**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	2.4300e-003	0.0481	0.0607			2.1600e-003	2.1600e-003		2.1600e-003	2.1600e-003			9.4635	2.0200e-003	0.0000	9.5059
Total	**2.4300e-003**	**0.0481**	**0.0607**		**0.0000**	**2.1600e-003**	**2.1600e-003**	**0.0000**	**2.1600e-003**	**2.1600e-003**			**9.4635**	**2.0200e-003**	**0.0000**	**9.5059**

3.8 New Transmission Main Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.2073	2.2088	1.4572			0.0994	0.0994		0.0926	0.0926			344.5722	0.0740	0.0000	346.1260
Total	**0.2073**	**2.2088**	**1.4572**		**0.0000**	**0.0994**	**0.0994**	**0.0000**	**0.0926**	**0.0926**			**344.5722**	**0.0740**	**0.0000**	**346.1260**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0896	1.7708	2.2328			0.0796	0.0796		0.0796	0.0796			344.5718	0.0740	0.0000	346.1256
Total	**0.0896**	**1.7708**	**2.2328**		**0.0000**	**0.0796**	**0.0796**	**0.0000**	**0.0796**	**0.0796**			**344.5718**	**0.0740**	**0.0000**	**346.1256**

3.9 Source Water Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1397	1.4862	0.9803			0.0672	0.0672		0.0627	0.0627			228.5939	0.0483	0.0000	229.6089
Total	**0.1397**	**1.4862**	**0.9803**		**0.0000**	**0.0672**	**0.0672**	**0.0000**	**0.0627**	**0.0627**			**228.5939**	**0.0483**	**0.0000**	**229.6089**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0593	1.1731	1.4847			0.0530	0.0530		0.0530	0.0530			228.5936	0.0483	0.0000	229.6086
Total	**0.0593**	**1.1731**	**1.4847**		**0.0000**	**0.0530**	**0.0530**	**0.0000**	**0.0530**	**0.0530**			**228.5936**	**0.0483**	**0.0000**	**229.6086**

3.10 Carmel Valley Pump Station - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0590	0.6210	0.3571			0.0248	0.0248		0.0237	0.0237			111.1949	0.0112	0.0000	111.4299
Total	**0.0590**	**0.6210**	**0.3571**		**0.0000**	**0.0248**	**0.0248**	**0.0000**	**0.0237**	**0.0237**			**111.1949**	**0.0112**	**0.0000**	**111.4299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0270	0.5326	0.6365			0.0229	0.0229		0.0229	0.0229			111.1947	0.0112	0.0000	111.4298
Total	**0.0270**	**0.5326**	**0.6365**		**0.0000**	**0.0229**	**0.0229**	**0.0000**	**0.0229**	**0.0229**			**111.1947**	**0.0112**	**0.0000**	**111.4298**

3.11 Monterey Pump Station - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0590	0.6210	0.3571			0.0248	0.0248		0.0237	0.0237			111.1949	0.0112	0.0000	111.4299
Total	**0.0590**	**0.6210**	**0.3571**		**0.0000**	**0.0248**	**0.0248**	**0.0000**	**0.0237**	**0.0237**			**111.1949**	**0.0112**	**0.0000**	**111.4299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0270	0.5326	0.6365			0.0229	0.0229		0.0229	0.0229			111.1947	0.0112	0.0000	111.4298
Total	**0.0270**	**0.5326**	**0.6365**		**0.0000**	**0.0229**	**0.0229**	**0.0000**	**0.0229**	**0.0229**			**111.1947**	**0.0112**	**0.0000**	**111.4298**

3.12 Castroville Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0940	1.0008	0.6602			0.0451	0.0451		0.0421	0.0421			155.2010	0.0331	0.0000	155.8963
Total	**0.0940**	**1.0008**	**0.6602**		**0.0000**	**0.0451**	**0.0451**	**0.0000**	**0.0421**	**0.0421**			**155.2010**	**0.0331**	**0.0000**	**155.8963**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0403	0.7971	1.0067			0.0359	0.0359		0.0359	0.0359			155.2008	0.0331	0.0000	155.8961
Total	**0.0403**	**0.7971**	**1.0067**		**0.0000**	**0.0359**	**0.0359**	**0.0000**	**0.0359**	**0.0359**			**155.2008**	**0.0331**	**0.0000**	**155.8961**

3.13 ASR Pipelines (ASR Conveyance, ASR Redisribution, and

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.1138	1.2080	0.7967			0.0549	0.0549		0.0512	0.0512			183.4713	0.0383	0.0000	184.2745
Total	**0.1138**	**1.2080**	**0.7967**		**0.0000**	**0.0549**	**0.0549**	**0.0000**	**0.0512**	**0.0512**			**183.4713**	**0.0383**	**0.0000**	**184.2745**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0475	0.9404	1.1942			0.0427	0.0427		0.0427	0.0427			183.4711	0.0383	0.0000	184.2743
Total	**0.0475**	**0.9404**	**1.1942**		**0.0000**	**0.0427**	**0.0427**	**0.0000**	**0.0427**	**0.0427**			**183.4711**	**0.0383**	**0.0000**	**184.2743**

3.14 Brine Discharge Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0689	0.7318	0.4826			0.0333	0.0333		0.0310	0.0310			111.1413	0.0232	0.0000	111.6278
Total	**0.0689**	**0.7318**	**0.4826**		**0.0000**	**0.0333**	**0.0333**	**0.0000**	**0.0310**	**0.0310**			**111.1413**	**0.0232**	**0.0000**	**111.6278**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0288	0.5697	0.7234			0.0259	0.0259		0.0259	0.0259			111.1411	0.0232	0.0000	111.6277
Total	**0.0288**	**0.5697**	**0.7234**		**0.0000**	**0.0259**	**0.0259**	**0.0000**	**0.0259**	**0.0259**			**111.1411**	**0.0232**	**0.0000**	**111.6277**

3.15 Pipeline to CSIP Pond - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0460	0.4879	0.3217			0.0222	0.0222		0.0207	0.0207			74.0942	0.0155	0.0000	74.4186
Total	**0.0460**	**0.4879**	**0.3217**		**0.0000**	**0.0222**	**0.0222**	**0.0000**	**0.0207**	**0.0207**			**74.0942**	**0.0155**	**0.0000**	**74.4186**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0192	0.3798	0.4823			0.0172	0.0172		0.0172	0.0172			74.0941	0.0155	0.0000	74.4185
Total	**0.0192**	**0.3798**	**0.4823**		**0.0000**	**0.0172**	**0.0172**	**0.0000**	**0.0172**	**0.0172**			**74.0941**	**0.0155**	**0.0000**	**74.4185**

3.16 Ryan Ranch-Bishop Interconnection - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0919	0.9757	0.6435			0.0444	0.0444		0.0414	0.0414			148.1884	0.0309	0.0000	148.8371
Total	**0.0919**	**0.9757**	**0.6435**		**0.0000**	**0.0444**	**0.0444**	**0.0000**	**0.0414**	**0.0414**			**148.1884**	**0.0309**	**0.0000**	**148.8371**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0384	0.7595	0.9645			0.0345	0.0345		0.0345	0.0345			148.1882	0.0309	0.0000	148.8369
Total	**0.0384**	**0.7595**	**0.9645**		**0.0000**	**0.0345**	**0.0345**	**0.0000**	**0.0345**	**0.0345**			**148.1882**	**0.0309**	**0.0000**	**148.8369**

3.17 Main System to Hidden Hills - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0689	0.7318	0.4826			0.0333	0.0333		0.0310	0.0310			111.1413	0.0232	0.0000	111.6278
Total	**0.0689**	**0.7318**	**0.4826**		**0.0000**	**0.0333**	**0.0333**	**0.0000**	**0.0310**	**0.0310**			**111.1413**	**0.0232**	**0.0000**	**111.6278**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Off-Road	0.0288	0.5697	0.7234			0.0259	0.0259		0.0259	0.0259			111.1411	0.0232	0.0000	111.6277
Total	**0.0288**	**0.5697**	**0.7234**		**0.0000**	**0.0259**	**0.0259**	**0.0000**	**0.0259**	**0.0259**			**111.1411**	**0.0232**	**0.0000**	**111.6277**

3.18 Slant Well Maintenance - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0310	0.2732	0.2079			0.0101	0.0101		9.5000e-003	9.5000e-003			74.0572	0.0106	0.0000	74.2799
Total	**0.0310**	**0.2732**	**0.2079**			**0.0101**	**0.0101**		**9.5000e-003**	**9.5000e-003**			**74.0572**	**0.0106**	**0.0000**	**74.2799**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0186	0.3657	0.4178			0.0150	0.0150		0.0150	0.0150			74.0571	0.0106	0.0000	74.2798
Total	**0.0186**	**0.3657**	**0.4178**			**0.0150**	**0.0150**		**0.0150**	**0.0150**			**74.0571**	**0.0106**	**0.0000**	**74.2798**

3.18 Slant Well Maintenance - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0117	0.1035	0.0787			3.8300e-003	3.8300e-003		3.6000e-003	3.6000e-003			28.0520	4.0200e-003	0.0000	28.1363
Total	**0.0117**	**0.1035**	**0.0787**			**3.8300e-003**	**3.8300e-003**		**3.6000e-003**	**3.6000e-003**			**28.0520**	**4.0200e-003**	**0.0000**	**28.1363**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.0600e-003	0.1385	0.1582			5.6700e-003	5.6700e-003		5.6700e-003	5.6700e-003			28.0519	4.0200e-003	0.0000	28.1363
Total	**7.0600e-003**	**0.1385**	**0.1582**			**5.6700e-003**	**5.6700e-003**		**5.6700e-003**	**5.6700e-003**			**28.0519**	**4.0200e-003**	**0.0000**	**28.1363**

G1.3 CALEEMOD OUTPUT - MAXIMUM DAILY

Monterey Peninsula Water Supply Project

Monterey County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	0.00	1000sqft	15.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Land use duty entered here is not relevent to the model run, and only serves the purpose of allowing data to be entered for the construction phase. Note that operational emissions are estimated outside of CalEEMod

Construction Phase - See Appendix Sections 5, Construction Trips, and 6, MPWSP Estimated Construction Phasing, for additional information about phasing of construction actvitities and total workdays.

Off-road Equipment - Hour/day assumptions are presented in Appendix G.

Off-road Equipment - project specific assumptions have been entered.

Off-road Equipment - Refer to "Average Daily Offroad Construction Equipment Hours For CalEEMod" for equipment unit amounts, hours, and hp assumptions.

Off-road Equipment - project information based on project assumptions

Off-road Equipment - Refer to "Average Daily Offroad Construction Equipment Hours for CalEEMod Input" for unit amount, hours/day, and hp assumptions.

Off-road Equipment - See "Average Daily Offroad Construction Equipment Hours for CalEEMod Input" for assumptions regarding unit amounts, hour/day, and hp.

Off-road Equipment - See construction equipment hours assumption in Appendix G

Trips and VMT - Worker and haul trips are estimated outside of CalEEMod using Emfac 2014 emission factors

Grading - Fugitive dust emissions are estimated outside of CalEEMod.

Construction Off-road Equipment Mitigation - Mitigation for off-road equipment is to have engines that meet at least tier 3 emissions requirements.

Off-road Equipment - Slant well maintenance would occur every 5 years after start of operations.

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tblConstructionPhase	PhaseEndDate	1/21/2020	9/25/2019
tblConstructionPhase	PhaseEndDate	8/19/2021	6/4/2020
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tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	17.3311	195.5940	104.7080		0.0000	8.2213	8.2213	0.0000	7.6792	7.6792			28,884.5735	5.8434	0.0000	29,007.2837
2019	28.6902	310.1877	190.5386		0.0000	13.3359	13.3359	0.0000	12.4653	12.4653			52,229.3086	10.3598	0.0000	52,446.8652
2020	4.7220	49.4671	33.8553		0.0000	2.0418	2.0418	0.0000	1.9142	1.9142			9,138.0993	1.6493	0.0000	9,172.7340
2025	0.9391	8.2777	6.2987		0.0000	0.3066	0.3066	0.0000	0.2879	0.2879			2,473.7608	0.3542	0.0000	2,481.1996
2026	0.9391	8.2777	6.2987		0.0000	0.3066	0.3066	0.0000	0.2879	0.2879			2,473.7608	0.3542	0.0000	2,481.1996
Total	**52.6215**	**571.8041**	**341.6992**		**0.0000**	**24.2121**	**24.2121**	**0.0000**	**22.6345**	**22.6345**			**95,199.5028**	**18.5609**	**0.0000**	**95,589.2822**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	7.3930	136.2462	161.2444		0.0000	5.8015	5.8015	0.0000	5.7600	5.7600			28,884.5734	5.8434	0.0000	29,007.2837
2019	12.8692	244.6743	297.9042		0.0000	10.6751	10.6751	0.0000	10.6347	10.6347			52,229.3085	10.3598	0.0000	52,446.8652
2020	2.1336	41.4047	52.8777		0.0000	1.7393	1.7393	0.0000	1.7393	1.7393			9,138.0993	1.6493	0.0000	9,172.7340
2025	0.5650	11.0824	12.6594		0.0000	0.4539	0.4539	0.0000	0.4539	0.4539			2,473.7608	0.3542	0.0000	2,481.1996
2026	0.5650	11.0824	12.6594		0.0000	0.4539	0.4539	0.0000	0.4539	0.4539			2,473.7608	0.3542	0.0000	2,481.1996
Total	**23.5257**	**444.4900**	**537.3450**		**0.0000**	**19.1236**	**19.1236**	**0.0000**	**19.0417**	**19.0417**			**95,199.5028**	**18.5609**	**0.0000**	**95,589.2821**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**55.29**	**22.27**	**-57.26**	**0.00**	**0.00**	**21.02**	**21.02**	**0.00**	**15.87**	**15.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Subsurface Slant Wells (9 wells)	Site Preparation	7/2/2018	9/13/2019	5	315	
2	Desalination Plant	Site Preparation	7/2/2018	6/4/2020	5	504	
3	New Desalinated Water Pipeline	Site Preparation	7/2/2018	12/24/2018	5	126	
4	Terminal Reservoir	Site Preparation	7/2/2018	9/13/2019	5	315	
5	ASR Injection/Extraction Wells	Site Preparation	7/2/2018	6/18/2019	5	252	
6	New Monterey Pipeline	Site Preparation	7/2/2018	9/13/2019	5	315	
7	New Transmission Main Pipeline	Site Preparation	12/25/2018	9/13/2019	5	189	
8	Source Water Pipeline	Site Preparation	1/2/2019	6/26/2019	5	126	
9	Carmel Valley Pump Station	Site Preparation	1/2/2019	6/26/2019	5	126	
10	Monterey Pump Station	Site Preparation	1/2/2019	6/26/2019	5	126	
11	Castroville Pipeline	Site Preparation	3/2/2019	6/27/2019	5	84	
12	ASR Pipelines (ASR Conveyance, ASR Redisribution,	Site Preparation	4/2/2019	8/24/2019	5	104	
13	Brine Discharge Pipeline	Site Preparation	4/2/2019	6/27/2019	5	63	
14	Pipeline to CSIP Pond	Site Preparation	5/2/2019	6/28/2019	5	42	
15	Ryan Ranch-Bishop Interconnection	Site Preparation	7/1/2019	10/24/2019	5	84	
16	Main System to Hidden Hills	Site Preparation	7/1/2019	9/25/2019	5	63	
17	Slant Well Maintenance	Site Preparation	10/1/2025	2/4/2026	5	91	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Cranes	1	6.00	200	0.29
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Excavators	1	8.00	200	0.38
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Generator Sets	1	8.00	200	0.74
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Pavers	1	6.00	160	0.42
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Rollers	1	6.00	90	0.38
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Rubber Tired Loaders	1	8.00	90	0.36
ASR Pipelines (ASR Conveyance, ASR Redisribution and ASR Pump-to-Waste	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Subsurface Slant Wells (9 wells)	Bore/Drill Rigs	1	6.90	350	0.50
Subsurface Slant Wells (9 wells)	Cranes	2	12.00	200	0.29
Subsurface Slant Wells (9 wells)	Excavators	1	3.40	200	0.38
Subsurface Slant Wells (9 wells)	Generator Sets	2	3.40	200	0.74
Subsurface Slant Wells (9 wells)	Trenchers	1	12.00	150	0.50
Desalination Plant	Cranes	2	11.00	200	0.29
Desalination Plant	Excavators	2	1.00	200	0.38
Desalination Plant	Forklifts	4	11.00	150	0.20
Desalination Plant	Generator Sets	2	12.00	200	0.74
Desalination Plant	Graders	1	1.00	200	0.41
Desalination Plant	Off-Highway Tractors	1	1.00	200	0.44
Desalination Plant	Off-Highway Trucks	1	1.00	350	0.38
Desalination Plant	Off-Highway Trucks	1	0.30	350	0.38
Desalination Plant	Pavers	1	0.50	160	0.42
Desalination Plant	Rollers	2	1.50	90	0.38
Desalination Plant	Rubber Tired Loaders	2	1.00	90	0.36
Desalination Plant	Tractors/Loaders/Backhoes	2	11.00	150	0.37
New Desalinated Water Pipeline	Cranes	1	6.00	200	0.29

New Desalinated Water Pipeline	Excavators	1	8.00	200	0.38
New Desalinated Water Pipeline	Generator Sets	1	8.00	200	0.74
New Desalinated Water Pipeline	Pavers	1	6.00	160	0.42
New Desalinated Water Pipeline	Rollers	1	6.00	90	0.38
New Desalinated Water Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Desalinated Water Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Terminal Reservoir	Cranes	2	6.90	200	0.29
Terminal Reservoir	Excavators	1	1.10	200	0.38
Terminal Reservoir	Generator Sets	1	8.00	200	0.74
Terminal Reservoir	Graders	1	1.10	200	0.41
Terminal Reservoir	Off-Highway Tractors	1	1.10	200	0.44
Terminal Reservoir	Off-Highway Trucks	1	0.50	350	0.38
Terminal Reservoir	Pavers	1	0.50	160	0.42
Terminal Reservoir	Rollers	1	1.60	90	0.38
Terminal Reservoir	Rubber Tired Loaders	1	1.10	90	0.36
Terminal Reservoir	Tractors/Loaders/Backhoes	1	6.90	150	0.37
ASR Injection/Extraction Wells	Bore/Drill Rigs	1	3.80	350	0.50
ASR Injection/Extraction Wells	Cranes	2	1.30	200	0.29
ASR Injection/Extraction Wells	Excavators	1	1.30	200	0.38
ASR Injection/Extraction Wells	Generator Sets	1	6.70	200	0.74
ASR Injection/Extraction Wells	Graders	1	0.20	200	0.41
ASR Injection/Extraction Wells	Off-Highway Tractors	1	1.30	200	0.44
ASR Injection/Extraction Wells	Off-Highway Trucks	1	1.30	350	0.38
ASR Injection/Extraction Wells	Pavers	1	0.20	160	0.42
ASR Injection/Extraction Wells	Rollers	1	1.50	90	0.38
ASR Injection/Extraction Wells	Rubber Tired Loaders	1	1.30	90	0.36
ASR Injection/Extraction Wells	Tractors/Loaders/Backhoes	1	1.30	150	0.37
New Monterey Pipeline	Bore/Drill Rigs	1	0.80	350	0.50
New Monterey Pipeline	Cranes	1	6.00	200	0.29
New Monterey Pipeline	Excavators	1	8.00	200	0.38

New Monterey Pipeline	Generator Sets	1	8.00	200	0.74
New Monterey Pipeline	Pavers	1	6.00	160	0.42
New Monterey Pipeline	Rollers	1	6.00	90	0.38
New Monterey Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Monterey Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
New Transmission Main Pipeline	Bore/Drill Rigs	1	1.30	350	0.50
New Transmission Main Pipeline	Cranes	1	6.00	200	0.29
New Transmission Main Pipeline	Excavators	1	8.00	200	0.38
New Transmission Main Pipeline	Generator Sets	1	8.00	200	0.74
New Transmission Main Pipeline	Pavers	1	6.00	160	0.42
New Transmission Main Pipeline	Rollers	1	6.00	90	0.38
New Transmission Main Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
New Transmission Main Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Source Water Pipeline	Bore/Drill Rigs	1	0.60	350	0.50
Source Water Pipeline	Cranes	1	6.00	200	0.29
Source Water Pipeline	Excavators	1	8.00	200	0.38
Source Water Pipeline	Generator Sets	1	8.00	200	0.74
Source Water Pipeline	Pavers	1	6.00	160	0.42
Source Water Pipeline	Rollers	1	6.00	90	0.38
Source Water Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Source Water Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Carmel Valley Pump Station	Cranes	1	1.30	200	0.29
Carmel Valley Pump Station	Generator Sets	1	8.00	200	0.74
Carmel Valley Pump Station	Graders	1	0.30	200	0.41
Carmel Valley Pump Station	Pavers	1	0.10	160	0.42
Carmel Valley Pump Station	Rollers	1	2.70	90	0.38
Carmel Valley Pump Station	Rubber Tired Loaders	1	2.70	90	0.36
Carmel Valley Pump Station	Tractors/Loaders/Backhoes	1	2.70	150	0.37
Monterey Pump Station	Cranes	1	1.30	200	0.29
Monterey Pump Station	Generator Sets	1	8.00	200	0.74

Monterey Pump Station	Graders	1	0.30	200	0.41
Monterey Pump Station	Pavers	1	0.10	160	0.42
Monterey Pump Station	Rollers	1	2.70	90	0.38
Monterey Pump Station	Rubber Tired Loaders	1	2.70	90	0.36
Monterey Pump Station	Tractors/Loaders/Backhoes	1	2.70	150	0.37
Castroville Pipeline	Bore/Drill Rigs	1	1.00	350	0.50
Castroville Pipeline	Cranes	1	6.00	200	0.29
Castroville Pipeline	Excavators	1	8.00	200	0.38
Castroville Pipeline	Generator Sets	1	8.00	200	0.74
Castroville Pipeline	Pavers	1	6.00	160	0.42
Castroville Pipeline	Rollers	1	6.00	90	0.38
Castroville Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Castroville Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Brine Discharge Pipeline	Cranes	1	6.00	200	0.29
Brine Discharge Pipeline	Excavators	1	8.00	200	0.38
Brine Discharge Pipeline	Generator Sets	1	8.00	200	0.74
Brine Discharge Pipeline	Pavers	1	6.00	160	0.42
Brine Discharge Pipeline	Rollers	1	6.00	90	0.38
Brine Discharge Pipeline	Rubber Tired Loaders	1	8.00	90	0.36
Brine Discharge Pipeline	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Pipeline to CSIP Pond	Cranes	1	6.00	200	0.29
Pipeline to CSIP Pond	Excavators	1	8.00	200	0.38
Pipeline to CSIP Pond	Generator Sets	1	8.00	200	0.74
Pipeline to CSIP Pond	Pavers	1	6.00	160	0.42
Pipeline to CSIP Pond	Rollers	1	6.00	90	0.38
Pipeline to CSIP Pond	Rubber Tired Loaders	1	8.00	90	0.36
Pipeline to CSIP Pond	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Ryan Ranch-Bishop Interconnection	Cranes	1	6.00	200	0.29
Ryan Ranch-Bishop Interconnection	Excavators	1	8.00	200	0.38
Ryan Ranch-Bishop Interconnection	Generator Sets	1	8.00	200	0.74

Ryan Ranch-Bishop Interconnection	Pavers	1	6.00	160	0.42
Ryan Ranch-Bishop Interconnection	Rollers	1	6.00	90	0.38
Ryan Ranch-Bishop Interconnection	Rubber Tired Loaders	1	8.00	90	0.36
Ryan Ranch-Bishop Interconnection	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Main System to Hidden Hills	Cranes	1	6.00	200	0.29
Main System to Hidden Hills	Excavators	1	8.00	200	0.38
Main System to Hidden Hills	Generator Sets	1	8.00	200	0.74
Main System to Hidden Hills	Pavers	1	6.00	160	0.42
Main System to Hidden Hills	Rollers	1	6.00	90	0.38
Main System to Hidden Hills	Rubber Tired Loaders	1	8.00	90	0.36
Main System to Hidden Hills	Tractors/Loaders/Backhoes	1	8.00	150	0.37
Slant Well Maintenance	Graders	1	5.30	200	0.41
Slant Well Maintenance	Cranes	1	6.00	200	0.29
Slant Well Maintenance	Rubber Tired Loaders	1	5.30	90	0.36
Slant Well Maintenance	Generator Sets	1	8.00	200	0.74

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
ASR Pipelines (ASR Conveyance, ASR	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Subsurface Slant Wells (9 wells)	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Desalination Plant	21	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
New Desalinated Water Pipeline	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Terminal Reservoir	11	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
ASR Injection/Extraction	12	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
New Monterey Pipeline	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
New Transmission Main Pipeline	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Source Water Pipeline	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Carmel Valley Pump Station	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Monterey Pump Station	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Castroville Pipeline	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Brine Discharge Pipeline	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Pipeline to CSIP Pond	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Ryan Ranch-Bishop Interconnection	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Main System to Hidden Hills	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Subsurface Slant Wells (9 wells) - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	3.3913	39.7433	18.8891			1.6290	1.6290		1.5114	1.5114			5,305.3354	1.3035		5,332.7081
Total	**3.3913**	**39.7433**	**18.8891**		**0.0000**	**1.6290**	**1.6290**	**0.0000**	**1.5114**	**1.5114**			**5,305.3354**	**1.3035**		**5,332.7081**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.9556	29.9385	28.7602			1.2682	1.2682		1.2267	1.2267			5,305.3354	1.3035		5,332.7081

Total	**1.9556**	**29.9385**	**28.7602**		**0.0000**	**1.2682**	**1.2682**	**0.0000**	**1.2267**	**1.2267**			**5,305.3354**	**1.3035**		**5,332.7081**

3.2 Subsurface Slant Wells (9 wells) - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	3.1394	35.9193	18.2804			1.4749	1.4749		1.3683	1.3683			5,237.9141	1.3004		5,265.2233
Total	**3.1394**	**35.9193**	**18.2804**		**0.0000**	**1.4749**	**1.4749**	**0.0000**	**1.3683**	**1.3683**			**5,237.9141**	**1.3004**		**5,265.2233**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.9347	29.6058	28.7803			1.2550	1.2550		1.2146	1.2146			5,237.9141	1.3004		5,265.2233
Total	**1.9347**	**29.6058**	**28.7803**		**0.0000**	**1.2550**	**1.2550**	**0.0000**	**1.2146**	**1.2146**			**5,237.9141**	**1.3004**		**5,265.2233**

3.3 Desalination Plant - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	5.6982	63.6594	35.4732			2.6719	2.6719		2.5032	2.5032			9,321.2187	1.6730		9,356.3521
Total	**5.6982**	**63.6594**	**35.4732**		**0.0000**	**2.6719**	**2.6719**	**0.0000**	**2.5032**	**2.5032**			**9,321.2187**	**1.6730**		**9,356.3521**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1336	41.4047	52.8777			1.7393	1.7393		1.7393	1.7393			9,321.2187	1.6730		9,356.3521
Total	**2.1336**	**41.4047**	**52.8777**		**0.0000**	**1.7393**	**1.7393**	**0.0000**	**1.7393**	**1.7393**			**9,321.2187**	**1.6730**		**9,356.3521**

3.3 Desalination Plant - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	5.1696	56.0509	34.5658			2.3344	2.3344		2.1878	2.1878			9,242.4063	1.6650		9,277.3708
Total	**5.1696**	**56.0509**	**34.5658**		**0.0000**	**2.3344**	**2.3344**	**0.0000**	**2.1878**	**2.1878**			**9,242.4063**	**1.6650**		**9,277.3708**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1336	41.4047	52.8777			1.7393	1.7393		1.7393	1.7393			9,242.4063	1.6650		9,277.3708
Total	**2.1336**	**41.4047**	**52.8777**		**0.0000**	**1.7393**	**1.7393**	**0.0000**	**1.7393**	**1.7393**			**9,242.4063**	**1.6650**		**9,277.3708**

3.3 Desalination Plant - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	4.7220	49.4671	33.8553			2.0418	2.0418		1.9142	1.9142			9,138.0993	1.6493		9,172.7340
Total	**4.7220**	**49.4671**	**33.8553**		**0.0000**	**2.0418**	**2.0418**	**0.0000**	**1.9142**	**1.9142**			**9,138.0993**	**1.6493**		**9,172.7340**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1336	41.4047	52.8777			1.7393	1.7393		1.7393	1.7393			9,138.0993	1.6493		9,172.7340
Total	**2.1336**	**41.4047**	**52.8777**		**0.0000**	**1.7393**	**1.7393**	**0.0000**	**1.7393**	**1.7393**			**9,138.0993**	**1.6493**		**9,172.7340**

3.4 New Desalinated Water Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4151	26.3073	15.6357			1.2071	1.2071		1.1256	1.1256			3,929.1136	0.8136		3,946.1989
Total	**2.4151**	**26.3073**	**15.6357**		**0.0000**	**1.2071**	**1.2071**	**0.0000**	**1.1256**	**1.1256**			**3,929.1136**	**0.8136**		**3,946.1989**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,929.1136	0.8136		3,946.1989
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,929.1136**	**0.8136**		**3,946.1989**

3.5 Terminal Reservoir - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.0414	23.5861	11.1282			0.9416	0.9416		0.8813	0.8813			3,259.9898	0.6053		3,272.7006
Total	**2.0414**	**23.5861**	**11.1282**		**0.0000**	**0.9416**	**0.9416**	**0.0000**	**0.8813**	**0.8813**			**3,259.9898**	**0.6053**		**3,272.7006**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.7483	14.5502	17.4418			0.5915	0.5915		0.5915	0.5915			3,259.9898	0.6053		3,272.7006
Total	**0.7483**	**14.5502**	**17.4418**		**0.0000**	**0.5915**	**0.5915**	**0.0000**	**0.5915**	**0.5915**			**3,259.9898**	**0.6053**		**3,272.7006**

3.5 Terminal Reservoir - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.8470	20.8183	10.6848			0.8208	0.8208		0.7685	0.7685			3,231.0936	0.6025		3,243.7470
Total	**1.8470**	**20.8183**	**10.6848**		**0.0000**	**0.8208**	**0.8208**	**0.0000**	**0.7685**	**0.7685**			**3,231.0936**	**0.6025**		**3,243.7470**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.7483	14.5502	17.4418			0.5915	0.5915		0.5915	0.5915			3,231.0936	0.6025		3,243.7470
Total	**0.7483**	**14.5502**	**17.4418**		**0.0000**	**0.5915**	**0.5915**	**0.0000**	**0.5915**	**0.5915**			**3,231.0936**	**0.6025**		**3,243.7470**

3.6 ASR Injection/Extraction Wells - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.2607	14.5764	7.1100			0.5223	0.5223		0.4931	0.4931			2,746.2975	0.5119		2,757.0478
Total	**1.2607**	**14.5764**	**7.1100**		**0.0000**	**0.5223**	**0.5223**	**0.0000**	**0.4931**	**0.4931**			**2,746.2975**	**0.5119**		**2,757.0478**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.6320	12.3051	14.1274			0.4894	0.4894		0.4894	0.4894			2,746.2975	0.5119		2,757.0478
Total	**0.6320**	**12.3051**	**14.1274**		**0.0000**	**0.4894**	**0.4894**	**0.0000**	**0.4894**	**0.4894**			**2,746.2975**	**0.5119**		**2,757.0478**

3.6 ASR Injection/Extraction Wells - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1614	12.8523	6.9516			0.4592	0.4592		0.4337	0.4337			2,720.8085	0.5093		2,731.5038
Total	**1.1614**	**12.8523**	**6.9516**		**0.0000**	**0.4592**	**0.4592**	**0.0000**	**0.4337**	**0.4337**			**2,720.8085**	**0.5093**		**2,731.5038**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.6320	12.3051	14.1274			0.4894	0.4894		0.4894	0.4894			2,720.8085	0.5093		2,731.5038
Total	**0.6320**	**12.3051**	**14.1274**		**0.0000**	**0.4894**	**0.4894**	**0.0000**	**0.4894**	**0.4894**			**2,720.8085**	**0.5093**		**2,731.5038**

3.7 New Monterey Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4568	26.8461	15.9542			1.2232	1.2232		1.1404	1.1404			4,079.0202	0.8603		4,097.0855
Total	**2.4568**	**26.8461**	**15.9542**		**0.0000**	**1.2232**	**1.2232**	**0.0000**	**1.1404**	**1.1404**			**4,079.0202**	**0.8603**		**4,097.0855**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9502	18.8001	23.7679			0.8481	0.8481		0.8481	0.8481			4,079.0202	0.8603		4,097.0855
Total	**0.9502**	**18.8001**	**23.7679**		**0.0000**	**0.8481**	**0.8481**	**0.0000**	**0.8481**	**0.8481**			**4,079.0202**	**0.8603**		**4,097.0855**

3.7 New Monterey Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.2280	23.7098	15.6398			1.0707	1.0707		0.9984	0.9984			4,036.5178	0.8574		4,054.5226
Total	**2.2280**	**23.7098**	**15.6398**		**0.0000**	**1.0707**	**1.0707**	**0.0000**	**0.9984**	**0.9984**			**4,036.5178**	**0.8574**		**4,054.5226**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9502	18.8001	23.7679			0.8481	0.8481		0.8481	0.8481			4,036.5178	0.8574		4,054.5226
Total	**0.9502**	**18.8001**	**23.7679**		**0.0000**	**0.8481**	**0.8481**	**0.0000**	**0.8481**	**0.8481**			**4,036.5178**	**0.8574**		**4,054.5226**

3.8 New Transmission Main Pipeline - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.4828	27.1828	16.1533			1.2333	1.2333		1.1497	1.1497			4,172.7119	0.8894		4,191.3897
Total	**2.4828**	**27.1828**	**16.1533**		**0.0000**	**1.2333**	**1.2333**	**0.0000**	**1.1497**	**1.1497**			**4,172.7119**	**0.8894**		**4,191.3897**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9733	19.2476	24.2694			0.8651	0.8651		0.8651	0.8651			4,172.7119	0.8894		4,191.3897
Total	**0.9733**	**19.2476**	**24.2694**		**0.0000**	**0.8651**	**0.8651**	**0.0000**	**0.8651**	**0.8651**			**4,172.7119**	**0.8894**		**4,191.3897**

3.8 New Transmission Main Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.2530	24.0090	15.8393			1.0799	1.0799		1.0069	1.0069			4,128.5422	0.8865		4,147.1584
Total	**2.2530**	**24.0090**	**15.8393**		**0.0000**	**1.0799**	**1.0799**	**0.0000**	**1.0069**	**1.0069**			**4,128.5422**	**0.8865**		**4,147.1584**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9733	19.2476	24.2694			0.8651	0.8651		0.8651	0.8651			4,128.5422	0.8865		4,147.1583
Total	**0.9733**	**19.2476**	**24.2694**		**0.0000**	**0.8651**	**0.8651**	**0.0000**	**0.8651**	**0.8651**			**4,128.5422**	**0.8865**		**4,147.1583**

3.9 Source Water Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.2181	23.5901	15.5599			1.0670	1.0670		0.9950	0.9950			3,999.7081	0.8457		4,017.4683
Total	**2.2181**	**23.5901**	**15.5599**		**0.0000**	**1.0670**	**1.0670**	**0.0000**	**0.9950**	**0.9950**			**3,999.7081**	**0.8457**		**4,017.4683**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9409	18.6210	23.5672			0.8413	0.8413		0.8413	0.8413			3,999.7081	0.8457		4,017.4683
Total	**0.9409**	**18.6210**	**23.5672**		**0.0000**	**0.8413**	**0.8413**	**0.0000**	**0.8413**	**0.8413**			**3,999.7081**	**0.8457**		**4,017.4683**

3.10 Carmel Valley Pump Station - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9357	9.8577	5.6680			0.3935	0.3935		0.3753	0.3753			1,945.5769	0.1958		1,949.6891
Total	**0.9357**	**9.8577**	**5.6680**		**0.0000**	**0.3935**	**0.3935**	**0.0000**	**0.3753**	**0.3753**			**1,945.5769**	**0.1958**		**1,949.6891**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.4287	8.4544	10.1039			0.3639	0.3639		0.3639	0.3639			1,945.5769	0.1958		1,949.6891
Total	**0.4287**	**8.4544**	**10.1039**		**0.0000**	**0.3639**	**0.3639**	**0.0000**	**0.3639**	**0.3639**			**1,945.5769**	**0.1958**		**1,949.6891**

3.11 Monterey Pump Station - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9357	9.8577	5.6680			0.3935	0.3935		0.3753	0.3753			1,945.5769	0.1958		1,949.6891
Total	**0.9357**	**9.8577**	**5.6680**		**0.0000**	**0.3935**	**0.3935**	**0.0000**	**0.3753**	**0.3753**			**1,945.5769**	**0.1958**		**1,949.6891**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.4287	8.4544	10.1039			0.3639	0.3639		0.3639	0.3639			1,945.5769	0.1958		1,949.6891
Total	**0.4287**	**8.4544**	**10.1039**		**0.0000**	**0.3639**	**0.3639**	**0.0000**	**0.3639**	**0.3639**			**1,945.5769**	**0.1958**		**1,949.6891**

3.12 Castroville Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.2380	23.8295	15.7196			1.0744	1.0744		1.0018	1.0018			4,073.3276	0.8690		4,091.5769
Total	**2.2380**	**23.8295**	**15.7196**		**0.0000**	**1.0744**	**1.0744**	**0.0000**	**1.0018**	**1.0018**			**4,073.3276**	**0.8690**		**4,091.5769**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9594	18.9791	23.9685			0.8549	0.8549		0.8549	0.8549			4,073.3276	0.8690		4,091.5769
Total	**0.9594**	**18.9791**	**23.9685**		**0.0000**	**0.8549**	**0.8549**	**0.0000**	**0.8549**	**0.8549**			**4,073.3276**	**0.8690**		**4,091.5769**

3.13 ASR Pipelines (ASR Conveyance, ASR Redisribution, and

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1882	23.2311	15.3205			1.0559	1.0559		0.9848	0.9848			3,889.2789	0.8108		3,906.3054
Total	**2.1882**	**23.2311**	**15.3205**		**0.0000**	**1.0559**	**1.0559**	**0.0000**	**0.9848**	**0.9848**			**3,889.2789**	**0.8108**		**3,906.3054**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,889.2789	0.8108		3,906.3054
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,889.2789**	**0.8108**		**3,906.3054**

3.14 Brine Discharge Pipeline - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1882	23.2311	15.3205			1.0559	1.0559		0.9848	0.9848			3,889.2789	0.8108		3,906.3054
Total	**2.1882**	**23.2311**	**15.3205**		**0.0000**	**1.0559**	**1.0559**	**0.0000**	**0.9848**	**0.9848**			**3,889.2789**	**0.8108**		**3,906.3054**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,889.2789	0.8108		3,906.3054
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,889.2789**	**0.8108**		**3,906.3054**

3.15 Pipeline to CSIP Pond - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1882	23.2311	15.3205			1.0559	1.0559		0.9848	0.9848			3,889.2789	0.8108		3,906.3054
Total	**2.1882**	**23.2311**	**15.3205**		**0.0000**	**1.0559**	**1.0559**	**0.0000**	**0.9848**	**0.9848**			**3,889.2789**	**0.8108**		**3,906.3054**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,889.2789	0.8108		3,906.3054
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,889.2789**	**0.8108**		**3,906.3054**

3.16 Ryan Ranch-Bishop Interconnection - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1882	23.2311	15.3205			1.0559	1.0559		0.9848	0.9848			3,889.2789	0.8108		3,906.3054
Total	**2.1882**	**23.2311**	**15.3205**		**0.0000**	**1.0559**	**1.0559**	**0.0000**	**0.9848**	**0.9848**			**3,889.2789**	**0.8108**		**3,906.3054**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,889.2789	0.8108		3,906.3054
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,889.2789**	**0.8108**		**3,906.3054**

3.17 Main System to Hidden Hills - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	2.1882	23.2311	15.3205			1.0559	1.0559		0.9848	0.9848			3,889.2789	0.8108		3,906.3054
Total	**2.1882**	**23.2311**	**15.3205**		**0.0000**	**1.0559**	**1.0559**	**0.0000**	**0.9848**	**0.9848**			**3,889.2789**	**0.8108**		**3,906.3054**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.9131	18.0840	22.9654			0.8209	0.8209		0.8209	0.8209			3,889.2789	0.8108		3,906.3054
Total	**0.9131**	**18.0840**	**22.9654**		**0.0000**	**0.8209**	**0.8209**	**0.0000**	**0.8209**	**0.8209**			**3,889.2789**	**0.8108**		**3,906.3054**

3.18 Slant Well Maintenance - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9391	8.2777	6.2987			0.3066	0.3066		0.2879	0.2879			2,473.7608	0.3542		2,481.1996
Total	**0.9391**	**8.2777**	**6.2987**			**0.3066**	**0.3066**		**0.2879**	**0.2879**			**2,473.7608**	**0.3542**		**2,481.1996**

3.18 Slant Well Maintenance - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9391	8.2777	6.2987			0.3066	0.3066		0.2879	0.2879			2,473.7608	0.3542		2,481.1996
Total	**0.9391**	**8.2777**	**6.2987**			**0.3066**	**0.3066**		**0.2879**	**0.2879**			**2,473.7608**	**0.3542**		**2,481.1996**

G1.4.1 HEALTH RISK ASSESSMENT CALCULATIONS

CalAm - Carmel Valley Pump Station

Pollutant	Concentration (ug/m3)		Cancer Risk (in a million)					Chronic REL	Chronic HI
			3rd Tri-Birth	0 to 2	2 to 16	16 to 70	Total		
DPM	1.37E-01	1.10E+00	4.08E-07	4.79E-06	0.00E+00	0.00E+00	5.20E-06	5	0.027434
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
TOTALS							5.20E-06		2.743E-02
							Cancer Risk		Chronic HI
							5.2		
							per million		

Cancer Risk Inputs **1**

Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0.25	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0.25	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

Cancer Risk Inputs **2**

Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

Cancer Risk Inputs **3**

Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

Cancer Risk Inputs **4-Jan**

Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	1

CalAm - ASR Injection

			Cancer Risk (in a million)						
Pollutant	Concentration (ug/m3)	Factor (slope factor)	3rd Tri-Birth	0 to 2	2 to 16	16 to 70	Total	Chronic REL	Chronic HI
DPM	1.68E-01	1.10E+00	4.99E-07	5.86E-06	0.00E+00	0.00E+00	6.36E-06	5	0.0336
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
DPM	0.00E+00	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5	0
TOTALS							6.36E-06		3.360E-02
							Cancer Risk		Chronic HI
							6.4		
							per million		

Cancer Risk Inputs	**1**							
Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0.25	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0.75	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

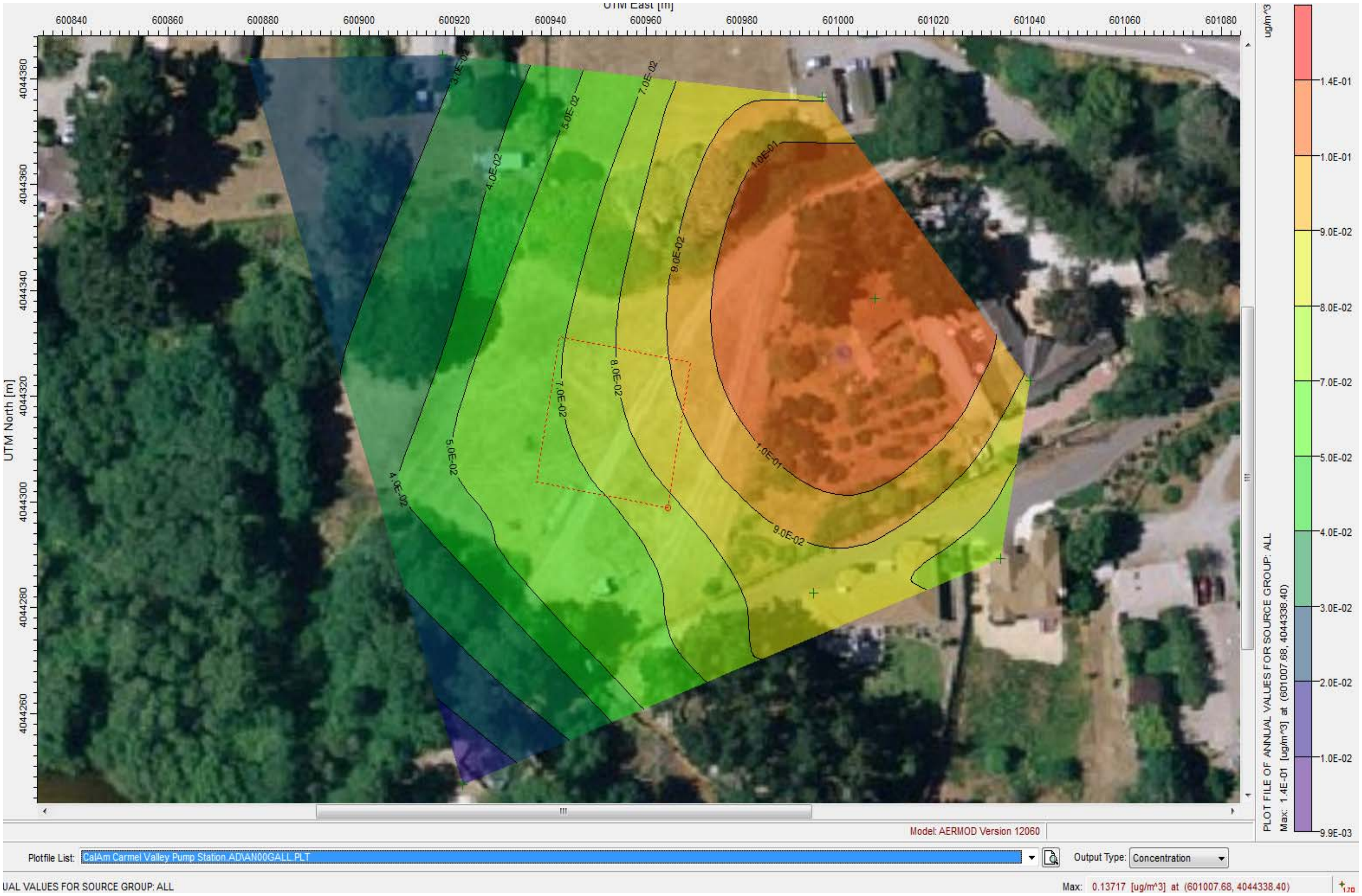
Cancer Risk Inputs	**2**							
Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

Cancer Risk Inputs	**3**							
Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	0.73

Cancer Risk Inputs	**4-Jan**							
Age Category	Daily Breathing Rate	Inhalation Absorption Rate	days/year	years		Average Time days	Child Risk Factor	Fraction of Time at Home
3rd tri - birth	361	1	90	0	1.00E-06	25550	10	0.85
0 to 2	1090	1	350	0	1.00E-06	25550	10	0.85
2 to 16	745	1	350	0	1.00E-06	25550	3	0.72
16 to 70	290	1	350	0	1.00E-06	25550	1	1

G1.4.2 HEALTH RISK ASSESSMENT DISPERSION MODELING RESULTS

Carmel Valley Pump Station Modeling Results - showing annual concentration contours



Model: AERMOD Version 12060

Plotfile List: CalAm Carmel Valley Pump Station.AD\AN00GALL.PLT

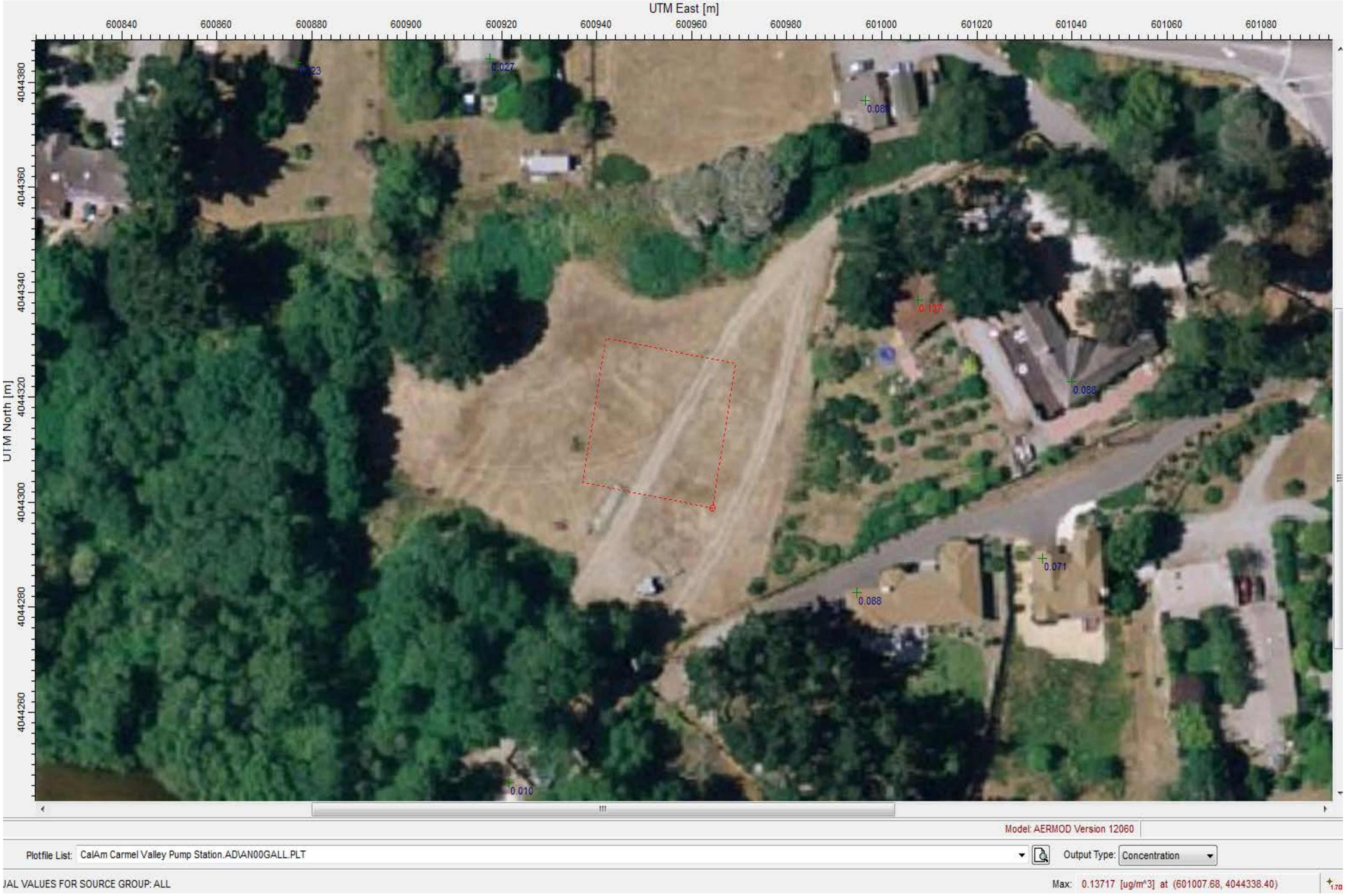
Output Type: Concentration

UAL VALUES FOR SOURCE GROUP: ALL

Max: 0.13717 [ug/m^3] at (601007.68, 4044338.40)

0.13717 Annual Max used in health risk calcus

Carmel Valley Pump Station Modeling Results - Without Contours but showing concentrations at receptors



Model: AERMOD Version 12060

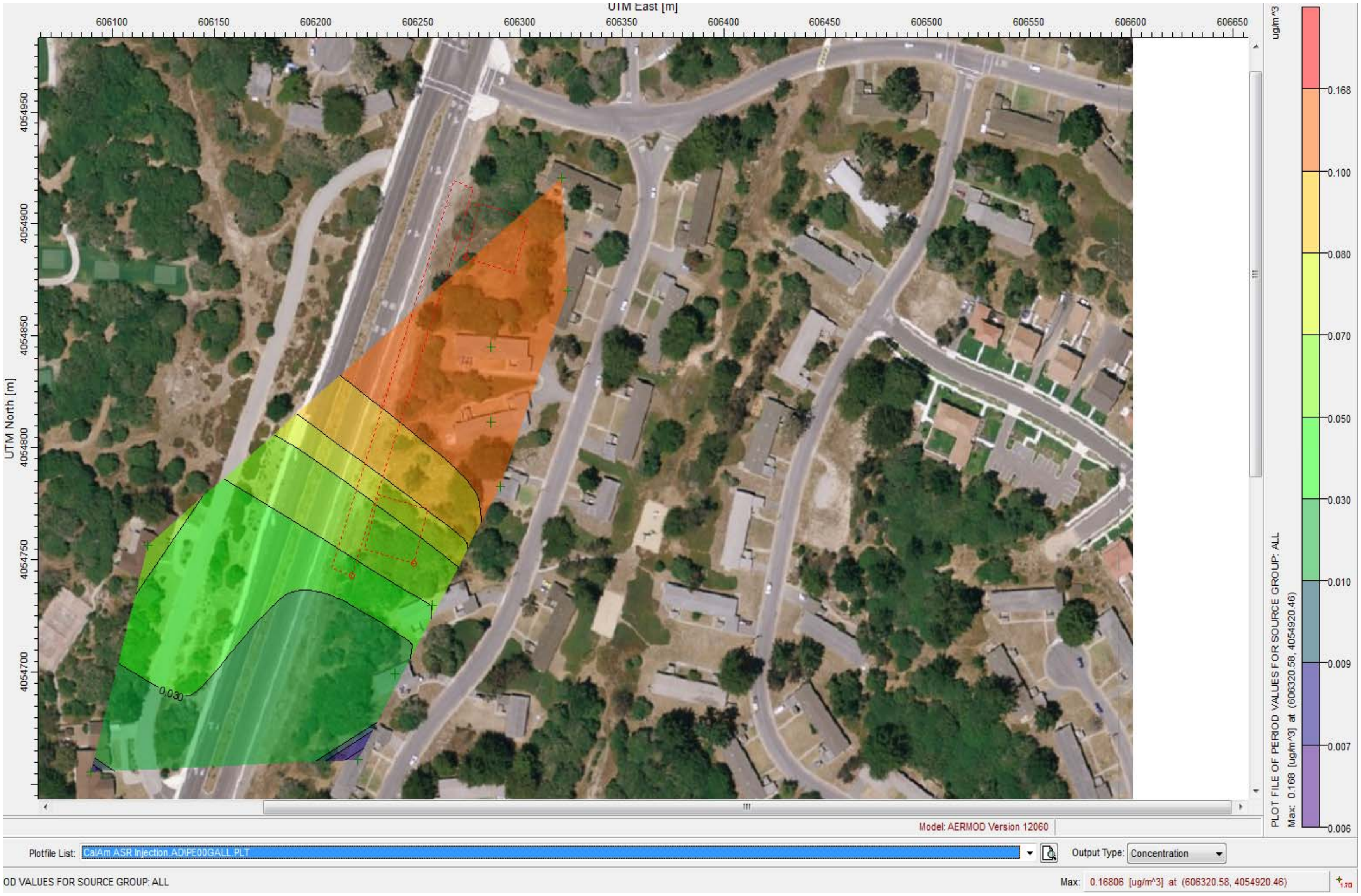
Plotfile List: CalAm Carmel Valley Pump Station.AD\AN00GALL.PLT

Output Type: Concentration

JAL VALUES FOR SOURCE GROUP: ALL

Max: 0.13717 [ug/m^3] at (601007.68, 4044338.40)

ASR Injection Modeling Results - showing annual concentration contours



Model: AERMOD Version 12060

Plotfile List: CalAm ASR Injection.AD\PE00GALL.PLT

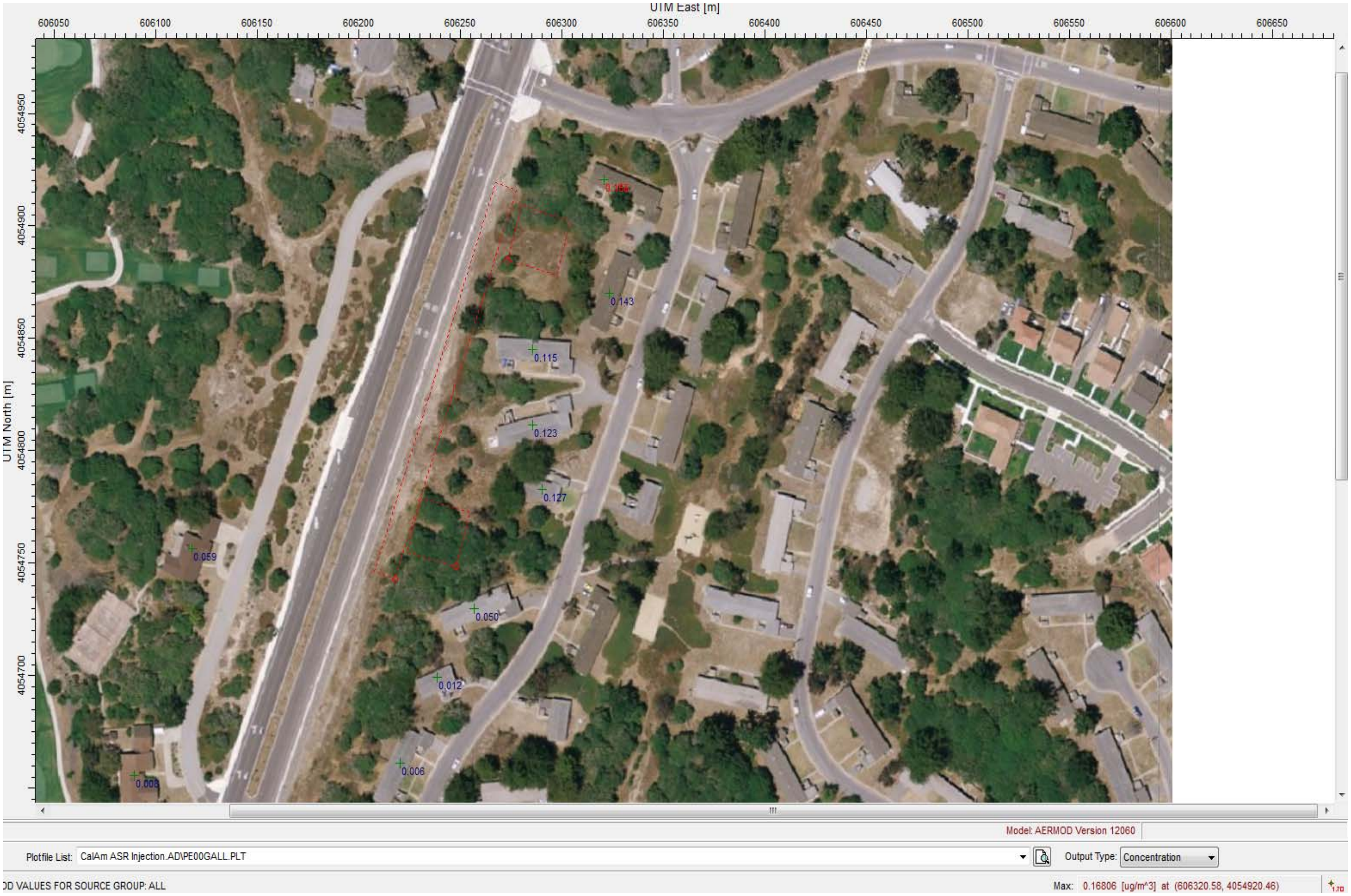
Output Type: Concentration

OD VALUES FOR SOURCE GROUP: ALL

Max: 0.16806 [ug/m^3] at (606320.58, 4054920.46)

0.168 Annual max used in health risk calculations

ASR Injection Modeling Results - Without Contours but showing concentrations at receptors



Model: AERMOD Version 12060

Plotfile List: CalAm ASR Injection.AD\PE00GALL.PLT

Output Type: Concentration

)D VALUES FOR SOURCE GROUP: ALL

Max: 0.16806 [ug/m^3] at (606320.58, 4054920.46)

APPENDIX G2

Trussell Technologies Inc. Technical Memorandum, Response to CalAm MPWSP DEIR

Technical Memorandum
Response to Comment on CalAm MPWSP DEIR

Date: **November 29, 2016**

To: **Environmental Science Associates**
Eric Zigas

CC: **California American Water**
Ian Crooks

Prepared by: **Trussell Technologies, Inc.**
Anya Kaufmann
Rhodes Trussell, Ph.D., P.E., BCEE

Reviewed by: **Trussell Technologies, Inc.**
John Kenny, P.E.
Céline Trussell, P.E., BCEE

Subject: **Response to comment from William Bourcier on CalAm Monterey Peninsula Water Supply Project; Draft Environmental Impact Report**

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1 INTRODUCTION

On September 30, 2015, a private citizen, William Bourcier, submitted a comment on the April 2015 Draft Environmental Impact Report (DEIR) for the Monterey Peninsula Water Supply Project (MPWSP) prepared by Environmental Science Associates (ESA) on behalf of the California Public Utilities Commission. Mr. Bourcier expressed concerns about the release of greenhouse gases (GHG) from feed water sourced from subsurface intakes. Trussell Technologies was retained to evaluate the GHG releases anticipated from the groundwater sources used for the MPWSP.

In August 2016, Trussell Technologies prepared a short technical memorandum and presented an initial analysis of carbon dioxide releases from the water sources used for the MPWSP to several members of the State Water Resources Control Board (SWRCB), the National Oceanic and Atmospheric Administration (NOAA), and ESA. Trussell Technologies was asked to prepare an additional technical memorandum detailing the assumptions and methods used to estimate carbon dioxide releases.

2 BACKGROUND

Mr. Bourcier used data contained in the April 2015 DEIR to estimate the amount of carbon dioxide that would be released when the water equilibrates with the atmosphere. Using data from the exploratory boreholes (GeoScience 2014a), Mr. Bourcier estimated that between 822 and 14,877 tons of carbon dioxide could be released per year. Mr. Bourcier expressed his concerns regarding the potential for GHG releases from the source water used for the MPWSP, and suggested that an analysis of the GHG potential from source water be included in the DEIR.

To address Mr. Bourcier's comment, we performed an analysis of the potential for carbon dioxide releases from the source water for the planned desalination plant. This technical memorandum provides details about the methods used in the analysis including calculations and assumptions.

To estimate carbon dioxide releases, we took several steps and made several assumptions including (1) flow path assumptions, (2) source water assumptions, (3) reverse osmosis (RO) modeling assumptions, and finally (4) equilibrium calculations. Each of these steps and assumptions is detailed in this technical memorandum.

3 FLOW PATH ASSUMPTIONS

In his comment, Mr. Bourcier mentioned that the potential carbon dioxide release can be calculated "assuming the feed water eventually equilibrates with the atmosphere." Carbon dioxide will be released to the atmosphere if the concentration of carbon dioxide in the water ($CO_{2(aq)}$) is proportionally larger than the partial pressure of carbon dioxide (P_{CO2}) in the atmosphere as defined by the Henry's Law constant for carbon dioxide (K_H). This will only occur when the water is allowed to equilibrate with the atmosphere.

$$K_H = \frac{P_{CO_2}}{[CO_2(aq)]}$$

However, the source water for the MPWSP would not contact the atmosphere until after the water has passed through the desalination plant. The feedwater would be extracted through slant wells and conveyed to the desalination plant in an enclosed pipe. The water would then travel through the desalination plant. While the filtered water tanks prior to the reverse osmosis system allow for the water to contact the atmosphere, but there will not be enough residence time or mixing for the water to equilibrate with the atmosphere at that time and the mass transfer in these tanks will be insignificant. After the plant, the water would either contact the atmosphere (1) as finished water in the finished water tanks, or (2) as concentrate at the storage reservoir or the Monterey Regional Water Pollution Control Agency (MRWPCA) outfall. Figure 1 shows the process flow diagram for the MPWSP.

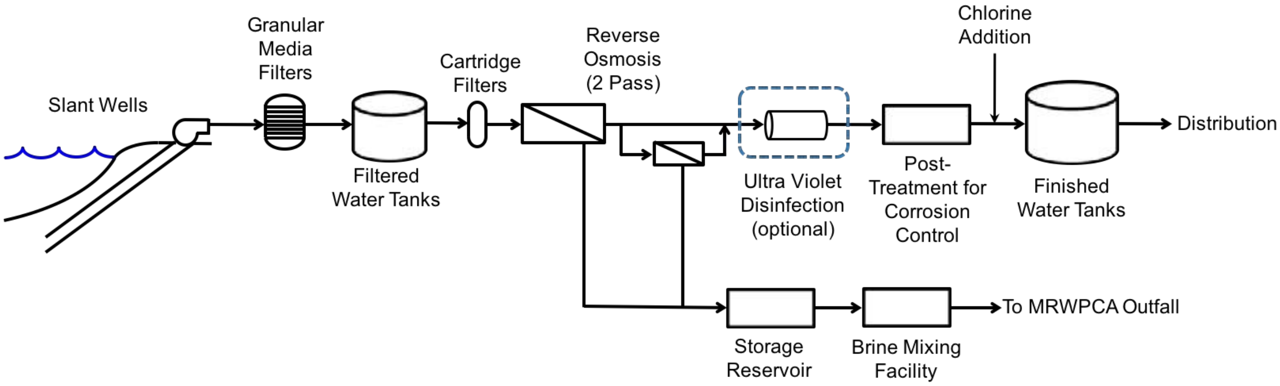


Figure 1 Process Flow Diagram of MPWSP

The water in the finished water tanks would travel through each treatment process prior to equilibration with the atmosphere. During post-treatment, the pH of the desalinated water would be adjusted to ensure that carbon dioxide would not be released from the desalinated water as it contacts the atmosphere. However, the concentrate from the RO process would not undergo any additional treatment or pH adjustment and would be released back to the ocean, at which point, it would equilibrate with the atmosphere and may release carbon dioxide. Therefore, to determine the amount of carbon dioxide that would be released from the MPWSP, we determined the amount of carbon dioxide in the RO concentrate as it is produced relative to the levels when the concentrate is at equilibrium with the carbon dioxide in the atmosphere.

4 SOURCE WATER ASSUMPTIONS

It is difficult to predict the future water quality of the source water with precision as the MPWSP will not be constructed for several years. Yet, the water quality of the source water impacts the concentration of carbon dioxide in the RO concentrate. To account for uncertainties in the source water quality, we considered two potential source waters that are representative of a “worst-case” and a “best-case” source water. The “worst-case” source water is water that is currently being drawn through a test slant well. The “best-case” source water is fresh seawater from the Monterey Bay.

A test slant well is currently operating at the CEMEX site. The location of the test slant well is shown in Figure 2. This test slant well is expected to be representative of the slant wells that will feed the MPWSP. The slant wells for the MPWSP are projected to pull 93 percent seawater from the Monterey Bay and 7 percent groundwater from the surrounding area when the MPWSP is operating (GeoScience 2014b). However, the test slant well only began operating in April 2015 and has not been running continuously. Hydrogeologists have modeled the groundwater and shown that it could take several years for the slant well to begin to draw fresh seawater because the fresh seawater must flush out any old intruded seawater in the flow path. (Figure 3).

Figure 2 Test Slant Well Location, Marina, CA.

If the test slant well pulled fresh seawater (that is already at equilibrium with the atmosphere), there would be minimal change in pH and carbon dioxide concentration as the water traveled through the ground, to the slant well, and into the desalination plant. Therefore, fresh seawater from the Monterey Bay is considered the "best-case" water quality for this analysis because it represents the scenario where the water quality would not change as it is drawn through the slant well.

In contrast, the test slant well water is considered the "worst-case" water because the seawater it is drawing is not fresh. Figure 3 shows that it could take up to four years for the slant well to be drawing 96% seawater, and the well has only been operating intermittently since April 2015. Currently, it is drawing old intruded seawater with a lower pH and higher silica concentration than seawater and would result in the release of more carbon dioxide.

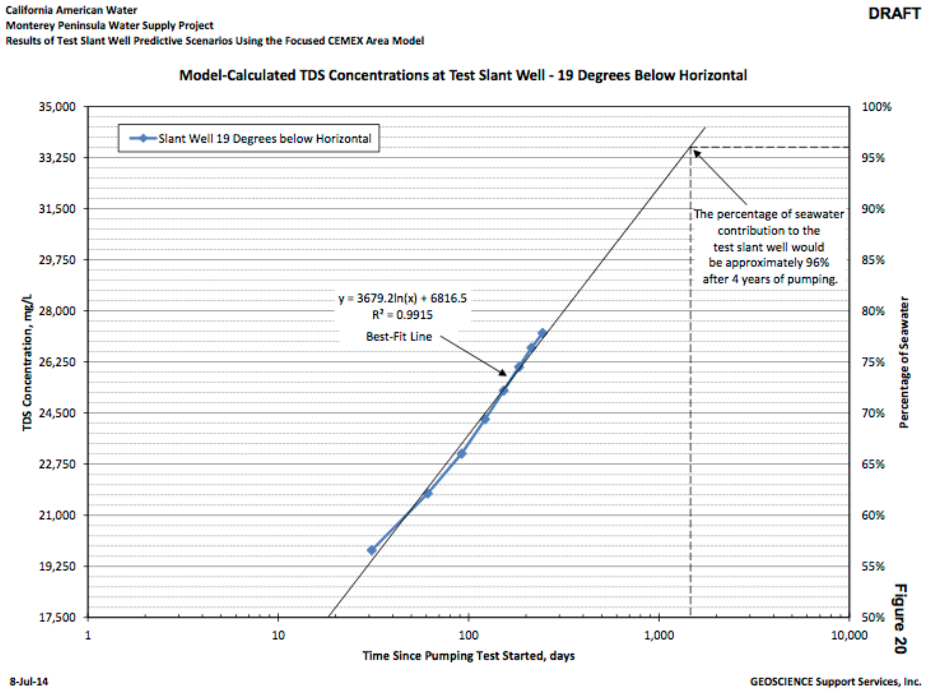


Figure 3 Time for Slant Well to Pull 96% Seawater (GeoScience 2014b).

To estimate the concentration of carbon dioxide in the RO concentrate, we modeled the RO process using the water quality of the two source waters: (1) the “worst-case” test slant well water, and (2) the “best-case” seawater.

4.1 TEST SLANT WELL WATER QUALITY

The water quality data from the test slant well was collected by GeoScience for California American Water (CalAm). Data that was used to perform the RO modeling is provided in Table 1 (GeoScience 2016). Sampling data from September 2016 was used because it was the most recent data available at the time of the analysis. By the end of September 2016, the test slant well had been operating continuously for 5 months and intermittently since April 2015. GeoScience sampled from the test slant well five times in September 2016. The water quality parameters of interest are the parameters that are input into the RO modeling software. Any non-detect (ND) values were set at the method detection limit (MDL). The average value from the five sampling events in September 2016 are shown in Table 1 and were input into the RO modeling software for analysis.

Table 1 Test Slant Well Water Quality Data from GeoScience

Constituent	Units	September 2016*
Temperature	˚C	16.1
pH	-	7.08
Calcium	mg/L	472
Magnesium	mg/L	1,052
Sodium	mg/L	8,914
Potassium	mg/L	274
Ammonia (NH_4^+)	mg/L	0.03
Barium	µg/L	0.071
Strontium	µg/L	7,440
Bicarbonate	mg/L	142
Sulfate	mg/L	2,339
Chloride	mg/L	16,406
Fluoride	mg/L	0.94
Nitrate	mg/L	4.20
Phosphate	mg/L	0.10
Silica	mg/L	12.4
Boron	mg/L	3.24

*Average of the 5 sampling events during September 2016

4.2 SEAWATER QUALITY

To evaluate the “best-case” scenario, we used existing seawater data from the Monterey Bay area. These data are found in the appendices of the MPWSP Request for Proposals (RFP) released by CalAm in 2013 (California American Water 2013).The raw water quality conditions for the basis of design of the proposed desalination plant were assumed to be representative of the seawater in the area. The raw water quality data reported in the MPWSP RFP was determined from the compilation of data from several projects in the area including the Moss Landing Desalination Pilot Study (MWH 2010), the Santa Cruz/Soquel Creek Desalination Pilot Study (CDM 2010), and the Santa Cruz/Soquel Creek Watershed Sanitary Survey (Archibald Consulting, Palencia Consulting Engineers et al. 2010).

The data is shown in Table 2. The MPWSP RFP did not include values for ammonia and nitrate. However, these values were determined from the same dataset used to produce the RFP.

Table 2 Seawater Quality Data

Constituent	Units	Average Values*
Temperature	˚C	12
pH	-	8
Calcium	mg/L	405
Magnesium	mg/L	1,262
Sodium	mg/L	10,604
Potassium	mg/L	392
Ammonia (NH_4^+)	mg/L	1.29
Barium	mg/L	0.013
Strontium	mg/L	7.81
Bicarbonate	mg/L	105
Sulfate	mg/L	2,667
Chloride	mg/L	19,030
Fluoride	mg/L	1.28
Nitrate	mg/L	0.89
Phosphate	mg/L	1.7
Silica	mg/L	1.3
Boron	mg/L	5

*Values are based on the central tendency observed from three projects in the area (Archibald Consulting, Palencia Consulting Engineers et al. 2010, CDM 2010, MWH 2010).

5 RO MODELING

All RO modeling was performed using IMSDesign-2016 by Hydranautics. The integrated membrane solutions design software is a free software that can be downloaded from the Hydranautics website (Hydranautics 2016). The software allows for many different configurations and assumptions. For the purposes of this analysis, the RO software was set up to replicate the design of the RO process planned for the MPWSP.

5.1 RO MODELING ASSUMPTIONS

The RO system configuration consists of a first pass seawater RO (SWRO) system followed by a 40% partial second pass brackish water RO system (BWRO) (CDM 2014). The first pass recovery is 45% followed by a second pass recovery of 90% resulting in an overall recovery of 41%. Additional design parameters that were modeled are shown in Table 3. Figure 4 shows the configuration of the modeled RO process.

Table 3 RO Process Design and Modeled Assumptions

RO Configuration		
Well-type	Sea Well conventional	
No. of Passes	2	
Overall Recovery	41	%
First Pass SWRO		
Permeate Flow/train	1.44	mgd/train
Recovery	42.5	%
Maximum Membrane Flux	8.75	gfd
Maximum Feed Pressure	1000	psi
Elements per Vessel	7	
Element Type	SWC5	
No. of Pressure Vessels	70	
Membrane Age	5	yr
Flux Decline	5	%/yr
Fouling Factor	0.774	
Salt Passage Increase	7	%/yr
Second Pass BWRO		
Maximum Capacity/Train	0.52	mgd/train
Minimum Percent of Total First Pass Permeate to Second Pass Feed	40	%
No. of BWRO Stages Per Train	2	
Recovery	90	%
Maximum Membrane Flux	18	gfd
Maximum Feed Pressure	230	psi
Elements per vessel	7	
Element Type	ESPA2	
No. of Pressure Vessels	8	
Maximum pH	10	
Membrane Age	5	yr
Flux Decline	3	%/yr
Fouling Factor	0.859	
Salt Passage Increase	5	%/yr
Energy Recovery Device		
Type of Energy Recovery Device	Pressure/Work Exchanger	
Leakage	1	%
Volumetric Mixing	3	%
H.P. Differential	7.25	psi

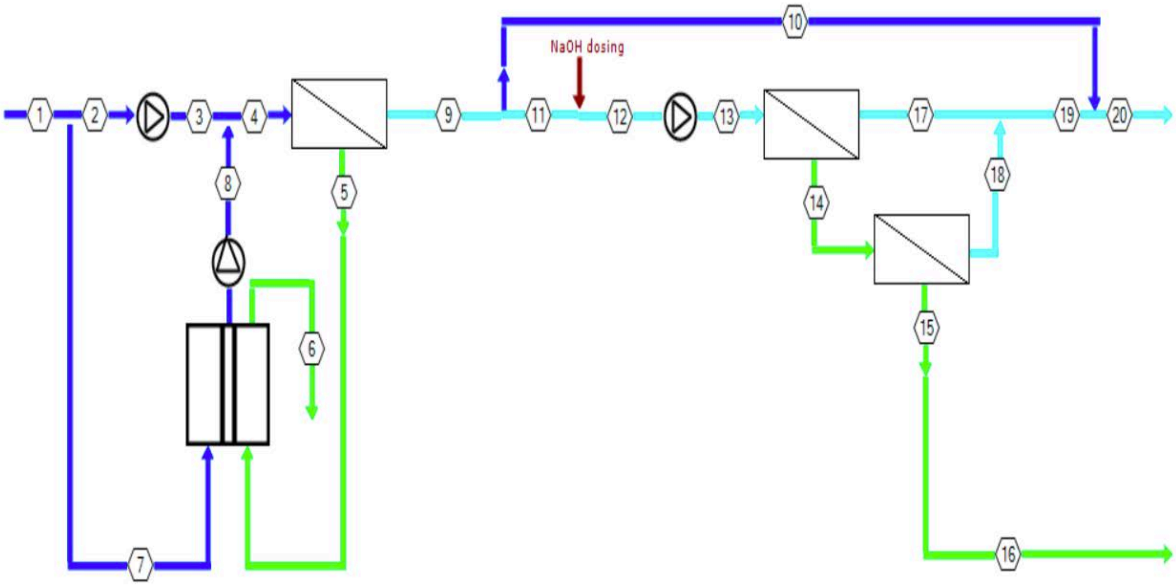
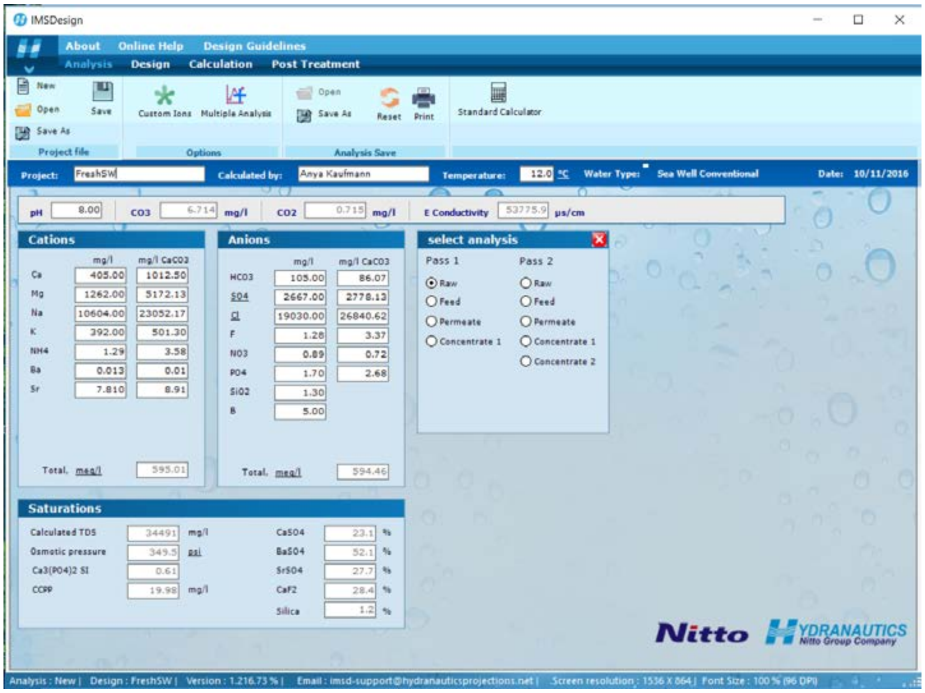


Figure 4 Screenshot of the RO Configuration Modeled Using the IMSDesign-2016 Software by Hydranautics

The RO modeling software allows for the input of the water quality parameters listed in Table 1 and Table 2 as shown in the screenshot of the software in Figure 5. The software produces an output of water quality parameters for the raw water, blended water, feed water, permeate water, concentrate, and the Energy Recovery Device (ERD) reject. A printout of one set of results is provided in Appendix A.



Project: FreshSW
Calculated by: Anya Kaufmann
Temperature: 12.0 °C
Water Type: Sea Well Conventional
Date: 10/11/2016

pH 8.00
CO3 6.714 mg/l
CO2 0.715 mg/l
E Conductivity 53775.9 µs/cm

Cations

	mg/l	mg/l CaCO3
Ca	405.00	1012.50
Mg	1262.00	5172.13
Na	10604.00	23052.17
K	392.00	501.30
NH4	1.29	3.58
Ba	0.013	0.01
Sr	7.810	8.91
Total, meq/l		595.01

Anions

	mg/l	mg/l CaCO3
HCO3	105.00	86.07
SO4	2667.00	2778.13
Cl	19030.00	26840.62
F	1.28	3.37
NO3	0.89	0.72
PO4	1.70	2.68
SiO2	1.30	
B	5.00	
Total, meq/l		594.46

select analysis

Pass 1	Pass 2
● Raw	○ Raw
○ Feed	○ Feed
○ Permeate	○ Permeate
○ Concentrate 1	○ Concentrate 1
	○ Concentrate 2

Saturations

Calculated TDS	34491	mg/l	CaSO4	23.1	%
Osmotic pressure	349.5	psi	BaSO4	52.1	%
Ca3(PO4)2 SI	0.61		SrSO4	27.7	%
CCPP	19.98	mg/l	CaF2	28.4	%
			Silica	1.2	%

Analysis : New | Design : FreshSW | Version : 1.216.73 % | Email : imsd-support@hydranauticsprojections.net | Screen resolution : 1536 X 864 | Font Size : 100 % (96 DPI)

Figure 5 Example RO Model Input Parameters Screenshot

5.2 RO MODELING RESULTS

For this analysis, the parameters of interest from the RO modeling are the pH, bicarbonate, carbonate, and total dissolved solids of the RO concentrate. Using pH, bicarbonate, and carbonate, the alkalinity of the RO concentrate was calculated, using the typical assumption in seawater that the carbonate species are the predominate acid buffering constituents.

$$Alkalinity\left(\frac{meq}{L}\right)=\left[\frac{HCO_3^-\left(\frac{mg}{L}\right)}{61\left(\frac{mg\ HCO_3^-}{mmol}\right)}\right]+2\left[\frac{CO_3^{2-}\left(\frac{mg}{L}\right)}{60\left(\frac{mg\ CO_3^{2-}}{mmol}\right)}\right]+\left[10^{-(pK_w^*-pH)}*1000\left(\frac{mmol}{mol}\right)\right]-\left[10^{-pH}*1000\left(\frac{mmol}{mol}\right)\right]$$

$$Alkalinity\left(\frac{mg}{L}as\ CaCO_3\right)=\ Alkalinity\left(\frac{meq}{L}\right)\times 50\left(\frac{mg\ CaCO_3}{meq}\right)$$

The results from the RO Modeling, and the subsequent alkalinity calculation, are shown in Table 4.

Table 4 Modeled RO Concentrate Water Quality Parameters

Constituent	Test Slant Well (RO Concentrate)	Seawater (RO Concentrate)
Temperature (˚C)	16.1	12
pH	7.25	8.17
Bicarbonate (mg/L)	244	166
Carbonate (mg/L)	4.7	31
TDS (mg/L)	52,052	60,614
Alkalinity (mg/L as $CaCO_3$)	207.8	187.9

Using the parameters shown in Table 4, we calculated the expected amount of carbon dioxide released for each source water.

6 ESTIMATING CARBON DIOXIDE RELEASED

There are many relationships between the species of carbon dioxide in seawater. Using temperature and salinity corrected equilibrium constants K_0, K_1^*, K_2^*, K_w^*, pH, and alkalinity, we determined the total carbon in a sample of water, assuming the carbonate species are the predominate pH buffering species. The equilibrium constants are dependent on the salinity and temperature of the water, and we corrected the equilibrium constants using data from literature.

6.1 CALCULATING TOTAL CARBON

The total carbon (C_T) in a sample of water is defined as the sum of the concentrations of carbon dioxide, bicarbonate, and carbonate in the water.

$$C_T=[CO_2]+[HCO_3^-]+[CO_3^{2-}]$$

Where carbon dioxide in water is often written as $[H_2CO_3^*]$ and it takes two forms, (1) carbonic acid $[H_2CO_3]$, and (2) aqueous carbon dioxide $[CO_{2(aq)}]$.

$$[CO_2] = [H_2CO_3^*] = CO_{2\,(aq)} + [H_2CO_3]$$

Which results in the following form:

$$C_T = [H_2CO_3^*] + [HCO_3^-] + [CO_3^{2-}]$$

Using the definition of total carbon, alkalinity (A_T), the temperature and salinity corrected equilibrium constants, and pH, C_T of the RO concentrate can be calculated. The pH was adjusted for the appropriate scale assumed by the equilibrium constants.

$$K_0 = \frac{[H_2CO_3^*]}{p(CO_2)}\,;\ K_1^* = \frac{[H^+][HCO_3^-]}{[H_2CO_3^*]}\,;\ K_2^* = \frac{[H^+][CO_3^{2-}]}{[HCO_3^-]};\ K_W^* = [H^+][OH^-]$$

$$A_T = [HCO_3^-] + 2[CO_3^{2-}] + [OH^-] - [H^+]$$

We compared the calculated C_T of the RO concentrate to the anticipated C_T of the RO concentrate at equilibrium with the atmosphere to estimate the amount of carbon dioxide that would be released from the RO concentrate. We determined the C_T of the RO concentrate at equilibrium with the atmosphere by iteratively varying the pH until the carbon dioxide concentration was in equilibrium with the atmosphere.

The difference between the calculated C_T of the RO concentrate and the anticipated C_T of the RO concentrate at equilibrium is the amount of carbon dioxide that will be released.

There are several important considerations when performing these calculations. First, the equilibrium constants are dependent on temperature and salinity. Corrections to the equilibrium constants at standard conditions must be incorporated to reflect the true temperature and salinity of the samples. Second, the concentration of carbon dioxide in the atmosphere must be determined.

The methods for correcting the equilibrium constants and determining the concentration of carbon dioxide in the atmosphere are discussed below.

6.2 EQUILIBRIUM CONSTANT CORRECTIONS

The equilibrium constants of the carbonic species are defined at a standard temperature of 25˚C and a salinity of 35 PSS. However, the RO concentrates of both the test slant well samples and the fresh seawater have non-standard temperatures and salinity.

6.2.1 Determining Salinity

The temperature of the water is known; however, the salinity of the water must be determined. The RO model reported the total dissolved solids (TDS) of the RO concentrate. Using TDS, we calculated the salinity of the RO concentrate.

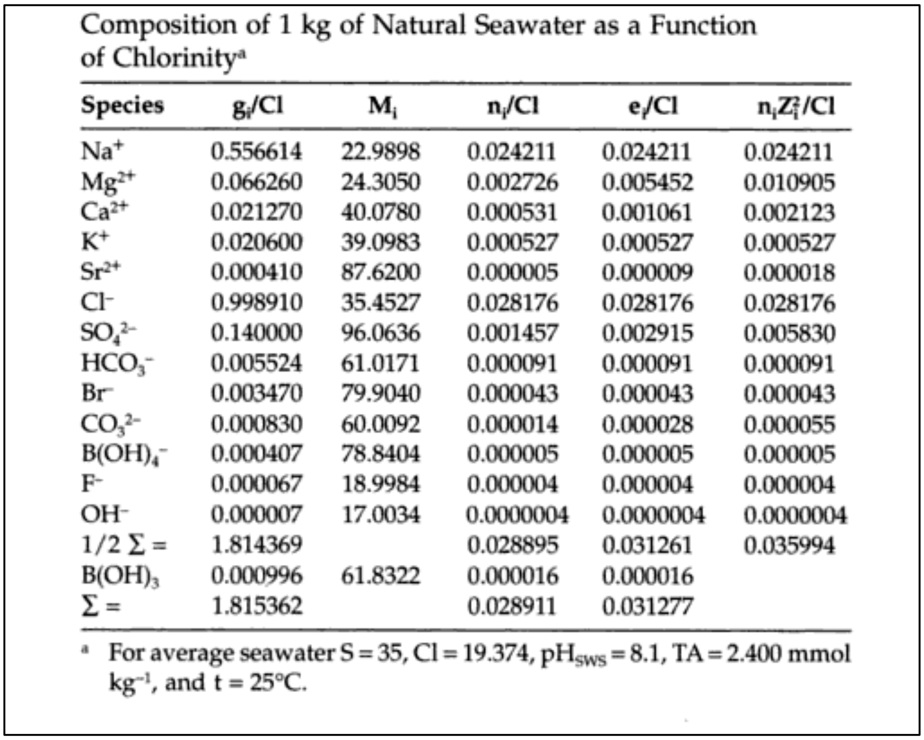
The major seawater ions can be calculated from salinity because it is known that the proportions of major ion constituents in seawater are relatively constant (Stumm and Morgan 1981). Conceptually, salinity is a measure of the mass of dissolved inorganic matter in a given mass of seawater. The constant proportions of ions in seawater around the globe has been observed and documented by researchers as far back as 1779 by Bergman, and then in 1884 by Dittmar, among others (Millero 2006). These proportions have been reassessed over time, with only very slight changes made. Ion proportions representative of “average” seawater, which are consistent but not identical to ratios measured by Dittmar, are reported by Millero (2006) and are shown in Table 5, below. In Table 5, the second column reports “g/Cl” which is the mass of the ion species in grams per kilogram of seawater as a function of chlorinity (also in g/kg). These ratios are the basis for the calculation of major ion concentrations from measured salinity values.

Millero (2006) also provides the relationship between chlorinity and salinity as being:

$$S\ (‰) = \ 1.80655 \times Cl\ (‰).$$

Knowing the chlorinity as a function of salinity, and the mass of each ion species as a function of chlorinity, the mass (g/kg) of each of the major ion constituents in seawater was calculated. The ion concentration as g/kg was converted to mg/L by multiplying by the density of seawater (approximately 1.025). Millero and Sohn (1992) provide an equation that relates density to the Practical Salinity Scale (PSS), which was used in converting ion concentration in g/kg to mg/L.

Table 5 Ion Ratios in "Average" Seawater as a Function of Chlorinity (Millero 2006)



Composition of 1 kg of Natural Seawater as a Function of Chlorinity[a]

Species	g_i/Cl	M_i	n_i/Cl	e_i/Cl	$n_iZ_i^2$/Cl
Na^+	0.556614	22.9898	0.024211	0.024211	0.024211
Mg^{2+}	0.066260	24.3050	0.002726	0.005452	0.010905
Ca^{2+}	0.021270	40.0780	0.000531	0.001061	0.002123
K^+	0.020600	39.0983	0.000527	0.000527	0.000527
Sr^{2+}	0.000410	87.6200	0.000005	0.000009	0.000018
Cl^-	0.998910	35.4527	0.028176	0.028176	0.028176
SO_4^{2-}	0.140000	96.0636	0.001457	0.002915	0.005830
HCO_3^-	0.005524	61.0171	0.000091	0.000091	0.000091
Br^-	0.003470	79.9040	0.000043	0.000043	0.000043
CO_3^{2-}	0.000830	60.0092	0.000014	0.000028	0.000055
$B(OH)_4^-$	0.000407	78.8404	0.000005	0.000005	0.000005
F^-	0.000067	18.9984	0.000004	0.000004	0.000004
OH^-	0.000007	17.0034	0.0000004	0.0000004	0.0000004
$1/2\ \Sigma =$	1.814369		0.028895	0.031261	0.035994
$B(OH)_3$	0.000996	61.8322	0.000016	0.000016	
$\Sigma =$	1.815362		0.028911	0.031277	

[a] For average seawater S = 35, Cl = 19.374, pH_{SWS} = 8.1, TA = 2.400 mmol kg^{-1}, and t = 25°C.

Using the ion concentrations and the relationship between salinity and chlorinity, the salinity of the water was calculated from the TDS. The salinity of each of the RO concentrates is shown below in Table 6.

Table 6 Salinity Values of the RO Concentrate Calculated from TDS

Constituent	Test Slant Well (RO Concentrate)	Seawater (RO Concentrate)
TDS (mg/L)	52,052	60,614
Salinity (PSS)	48.7	56.7

6.2.2 Temperature and Salinity Corrections

Once salinity of the RO concentrate was determined, the equilibrium constants were corrected according to the temperature and salinity of the sample water.

K_0 was corrected for temperature (T,˚K) and salinity (S) using the equation derived by Weiss (1974) and the corresponding constants shown in Table 7.

$$\ln K_0 = A_1 + A_2 \frac{100}{T} + A_3 \ln\left(\frac{T}{100}\right) + S\left[B_1 + B_2 \frac{T}{100} + B_3 \left(\frac{T}{100}\right)^2\right]$$

Table 7 Constants for the calculation of K_0

Constant	Value (moles/kg*atm)
A_1	-60.2409
A_2	93.4517
A_3	23.3585
B_1	0.023517
B_2	-0.023656
B_3	0.00474036

Millero, Pierrot et al. (2002) compared different laboratory measurements of the equilibrium constants K_1 and K_2 at different temperatures and salinities. Using the relationships developed by Millero, Pierrot et al. (2002), K_1 and K_2 were determined for the appropriate temperature (T,˚K) and salinity (S).

$$pK_1^* = -8.712 - 9.460 \times 10^{-3} S + 8.56 \times 10^{-5} S^2 + \frac{1355.1}{T} + 1.7979 \ln(T)$$

$$pK_2^* = 17.0001 - 0.01259S - 7.9334 \times 10^{-5} S^2 + \frac{936.291}{T} - 1.87354 \ln(T) - 2.61471 \frac{S}{T} + 0.07479 \frac{S^2}{T}$$

K_w was corrected for temperature (T,˚K) and salinity (S) using constants and relationships defined by Harned and Owen (1958) and Millero (2013).

$$\log K_w = -\frac{4470.99}{T} + 6.0875 - 0.017060T$$

$$\ln K_w = \ln(10) \times \log K_w$$

$$\ln K_w^* = \ln K_w + 0.37201\sqrt{S} - 0.0162\, S$$

6.3 ATMOSPHERIC CARBON DIOXIDE

The concentration of carbon dioxide in the atmosphere is an important parameter of this analysis. The concentration of carbon dioxide in the atmosphere is measured daily at the Mauna Loa Observatory in Hawaii. Charles David Keeling of the Scripps Institution of Oceanography began taking carbon dioxide measurements in 1956, and there is a near continuous record of carbon dioxide in the atmosphere since 1958. The data is called the Keeling Curve. The average concentration of carbon dioxide in the atmosphere in 2016 was determined by plotting annual averages of carbon dioxide and extrapolating (Figure 6). From this analysis, the anticipated average concentration of carbon dioxide in the atmosphere in 2016 is 402 ppm.

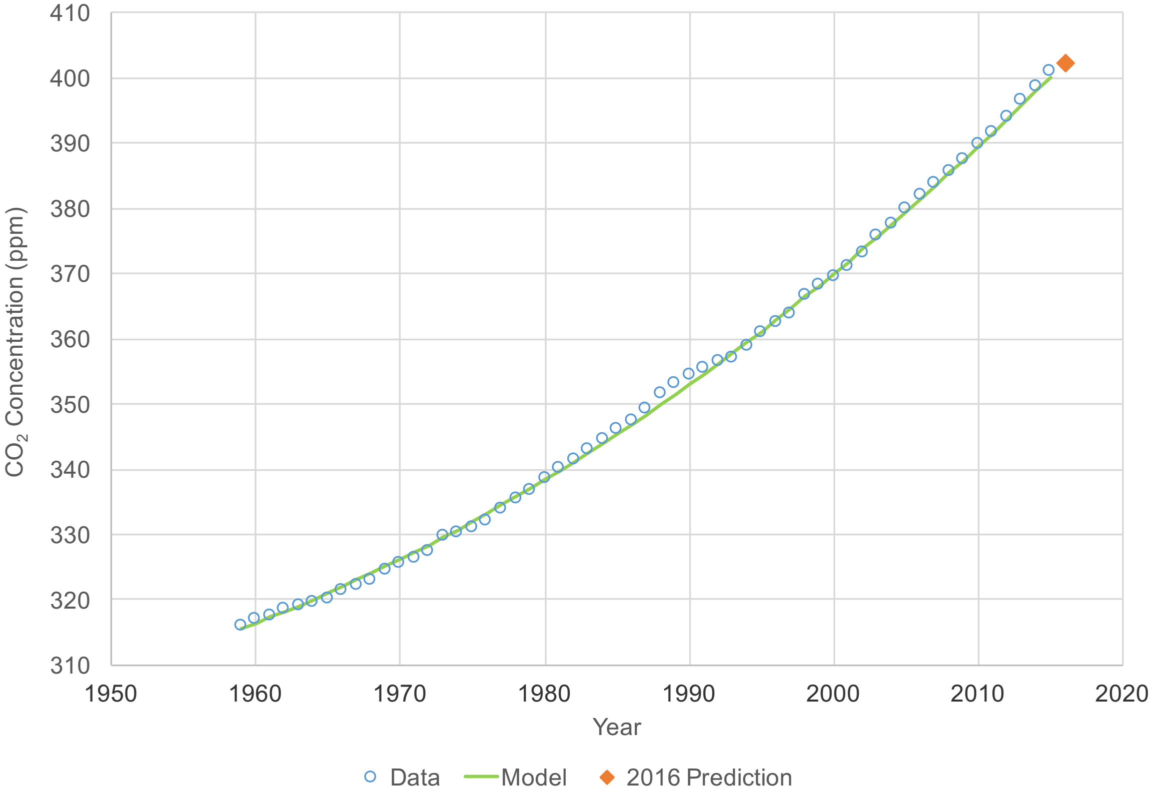


Figure 6 Annual Average Carbon Dioxide Concentrations (Tans and Keeling 2016)

6.4 CALCULATING CARBON DIOXIDE IN RO CONCENTRATE

Once the equilibrium constants were corrected for temperature and salinity, release of carbon dioxide from the RO concentrate was estimated. The difference between the calculated C$_T$ of the RO concentrate and the C$_T$ of the RO concentrate estimated at equilibrium with the atmosphere yielded the concentration of carbon dioxide released. Using the expected recovery and capacity of the desalination plant, we calculated the rate of concentrate production. The MPWSP is a 9.6 mgd desalination facility with 41% percent overall recovery. This yielded a concentrate production of 14 mgd.

$$Q_{concentrate} = \frac{Q_{permeate}}{\%_{recovery}} - Q_{permeate}$$

The total mass of carbon dioxide released is calculated using the concentrate production and the concentration of carbon dioxide released. Results are discussed in the following section.

6.5 RESULTS

The results of the analysis are shown in Table 8. The test slant well water source is projected to produce 735 metric tons of carbon dioxide per year. A fresh seawater source is projected to produce 95 metric tons of carbon dioxide per year.

Table 8 Carbon dioxide released from MPWSP with different source waters

Result	Test Slant Well	Seawater
CO_2 (metric tons/yr)	735	95

7 CONCLUSIONS

To estimate carbon dioxide release from the source water for the MPWSP we looked at the flow path through the desalination plant, made assumptions about the source water, modeled the RO process, and used relationships among carbonic species. Through our analysis, we determined that the RO concentrate is the only water in the process that may release CO_2 as it comes to equilibrium with the atmosphere. We used RO modeling software to estimate the water quality of the RO concentrate, and we performed this analysis using different source water assumptions.

The analysis looked at “worst-case” and “best-case” source water qualities. The “worst-case” water quality was the quality in the current test slant well water because it has a lower pH and higher alkalinity than seawater and is expected to be worse than the water quality the MPWSP would actually use as source water. The water being drawn from the slant well is expected to become more representative of seawater as it continues to be pumped; however, at the present time, evidence suggests the slant well is still drawing old intruded seawater. The amount of carbon dioxide projected to be released from the MPWSP if the current test slant well water is used as the water source would be 735 metric tons per year.

The “best-case” water quality for this analysis was fresh seawater because, ultimately, there should be minimal change in pH and alkalinity as the water travels through the ground, to the slant well, and into the desalination plant. If fresh seawater is the source water for the MPWSP, the projected amount of carbon dioxide released would be 95 metric tons per year. Even in the best-case scenario there would be carbon dioxide released because of the RO process. The water would be concentrated as it travels through the RO membranes and the concentrate would eventually equilibrate with the atmosphere.

Mr. Bourcier estimated that 822 to 14,577 metric tons of carbon dioxide would be released if the exploratory boreholes cited in the DEIR are the source water for the MPWSP. However, this analysis shows that the projected range of released carbon dioxide would be 95 to 735 metric tons per year.

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APPENDIX A

RO Modeling Results Using August 2016 Slant Well Data

Two Pass With Inter-Pass Pump, Pressure/Work Exchanger, Partial

Project name	SlantWellWQ_Sep2016		
Calculated by	Anya Kaufmann		
HP Pump flow	1013.01	401.03	gpm
Feed pressure	669.5	171.8	psi
Feed temperature		16.2	°C(61.2°F)
Feed water pH	7.08	10.00	
Chem dose, mg/l, - / 100 %	None	9.4	NaOH
Leakage		1	%
Volumetric mixing		3	%
H.P. differential		7.25	psi
Boost pressure		24.47	psi
Specific energy		1.10	kwh/kgal
Pass NDP	252.4	144.8	psi
Average flux rate	7.35	15.5	gfd

Permeate flow/train	1.440	0.520	mgd
Total product flow		9.67	mgd
Number of trains		7	
Raw water flow/train	3.388		mgd
P1 Permeate to P2 Feed		40.1	%
Blended permeate flow		9.674	mgd
Permeate recovery	42.50	90.00	%
Total system recovery		40.8	%
Element age	5.0	5.0	years
Flux decline %, per year	5.0	3.0	
Fouling factor	0.77	0.86	
SP increase, per year	7.0	5.0	%
Inter-stage pipe loss		3.0	psi
Feed type	Sea Well Conventional		

Pass -	Perm.	Flow / Vessel		Flux	DP	Flux	Beta	Stagewise Pressure			Perm.	Element	Element	PV# x
Stage	Flow gpm	Feed gpm	Conc gpm	gfd	psi	Max gfd		Perm. psi	Boost psi	Conc psi	TDS mg/l	Type	Quantity	Elem #
1-1	999.6	33.6	19.3	7.3	17.2	11.7	1.04	0	0	652.3	170.9	SWC5	490	70 x 7M
2-1	258	50.2	17.9	16.6	26.4	18.1	1.21	0	0	145.5	2.3	ESPA2	56	8 x 7M
2-2	103.4	35.8	10	13.3	15.1	14.6	1.29	0	0	127.3	8	ESPA2	28	4 x 7M

Ion (mg/l)	Raw Water	Blended Water	Feed Water	Permeate Water	Concentrate	ERD Reject
Hardness, as CaCO3	5491.48	5491.48	5562.79	4.936	9666.0	9540.79
Ca	472.00	472.00	478.13	0.424	830.8	820.04
Mg	1052.00	1052.00	1065.66	0.946	1851.7	1827.73
Na	8914.00	8914.00	9029.13	38.826	15653.3	15451.10
K	274.00	274.00	277.53	1.494	480.8	474.59
NH4	0.03	0.03	0.03	0.000	0.1	0.05
Ba	0.000	0.000	0.000	0.000	0.0	0.00
Sr	7.440	7.440	7.537	0.007	13.1	12.93
H	0.00	0.00	0.00	0.002	0.0	0.00
CO3	1.14	1.14	1.20	0.001	4.7	4.61
HCO3	142.00	142.00	143.74	0.993	244.1	241.06
SO4	2339.00	2339.00	2369.37	2.205	4117.0	4063.62
Cl	16406.00	16406.00	16618.08	62.404	28820.4	28448.02
F	0.94	0.94	0.95	0.007	1.6	1.63
NO3	4.20	4.20	4.25	0.128	7.3	7.16
PO4	0.10	0.10	0.10	0.000	0.2	0.17
OH	0.00	0.00	0.00	0.020	0.0	0.01
SiO2	12.40	12.40	12.56	0.036	21.8	21.51
B	3.24	3.24	3.27	0.586	5.1	5.03
CO2	7.62	7.62	7.62	4.75	7.62	7.62
TDS	**29628.49**	**29628.49**	**30011.55**	**108.08**	**52051.94**	**51379.26**
pH	**7.08**	**7.08**	**7.08**	**5.57**	**7.25**	**7.25**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	25	26	51	400
SrSO4 / ksp * 100, %	25	25	50	1200
BaSO4 / ksp * 100, %	0	0	0	10000
SiO2 saturation, %	12	12	20	140
CaF2 / ksp * 100, %	17	18	118	50000
Ca3(PO4)2 saturation index	-1.3	-1.3	-0.5	2.4
CCPP, mg/l	17.93	18.82	86.50	100000
Ionic strength	0.59	0.60	1.04	
Osmotic pressure, psi	302.9	306.9	532.1	

Two Pass With Inter-Pass Pump, Pressure/Work Exchanger, Partial

Project name	SlantWellWQ_Sep2016						
Calculated by	Anya Kaufmann			Permeate flow/train	1.440	0.520	mgd
HP Pump flow	1013.01	401.03	gpm	Total product flow		9.67	mgd
Feed pressure	669.5	171.8	psi	Number of trains		7	
Feed temperature		16.2	°C(61.2°F)	Raw water flow/train	3.388		mgd
Feed water pH	7.08	10.00		P1 Permeate to P2 Feed		40.1	%
Chem dose, mg/l, - / 100 %	None	9.4	NaOH	Blended permeate flow		9.674	mgd
Leakage		1	%	Permeate recovery	42.50	90.00	%
Volumetric mixing		3	%	Total system recovery		40.8	%
H.P. differential		7.25	psi	Element age	5.0	5.0	years
Boost pressure		24.47	psi	Flux decline %, per year	5.0	3.0	
Specific energy		1.10	kwh/kgal	Fouling factor	0.77	0.86	
Pass NDP	252.4	144.8	psi	SP increase, per year	7.0	5.0	%
Average flux rate	7.35	15.5	gfd	Inter-stage pipe loss		3.0	psi
				Feed type	Sea Well Conventional		

Pass -	Perm.	Flow / Vessel		Flux	DP	Flux Max	Beta	Stagewise Pressure			Perm.	Element	Element	PV# x Elem #
Stage	Flow	Feed	Conc					Perm.	Boost	Conc	TDS	Type	Quantity	
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
1-1	999.6	33.6	19.3	7.3	17.2	11.7	1.04	0	0	652.3	170.9	SWC5	490	70 x 7M
2-1	258	50.2	17.9	16.6	26.4	18.1	1.21	0	0	145.5	2.3	ESPA2	56	8 x 7M
2-2	103.4	35.8	10	13.3	15.1	14.6	1.29	0	0	127.3	8	ESPA2	28	4 x 7M

Pass -	Element	Feed	Pressure	Conc	NDP	Permeate Water	Permeate Water	Beta	Permeate (Passwise cumulative)				
Stage	No.	Pressure	Drop	Osmo.		Flow	Flux		TDS	Ca	Mg	Na	Cl
		psi	psi	psi	psi	gpm	gfd						
1-1	1	669.5	3.45	339.5	336	3.3	11.7	1.04	82.3	0.326	0.727	29.568	47.55
1-1	2	666	3	373.8	296.6	2.8	10.1	1.03	93.1	0.369	0.823	33.47	53.826
1-1	3	663	2.64	408.8	259.4	2.4	8.5	1.03	105.4	0.418	0.932	37.878	60.916
1-1	4	660.4	2.34	443.1	222.9	2	7.1	1.03	119.3	0.473	1.055	42.873	68.95
1-1	5	658.1	2.1	475.7	188.2	1.6	5.8	1.03	134.9	0.535	1.193	48.473	77.958
1-1	6	656	1.92	505.5	156.3	1.3	4.6	1.02	152.1	0.604	1.346	54.666	87.92
1-1	7	654.1	1.77	531.9	127.9	1	3.7	1.02	170.9	0.679	1.512	61.428	98.798
2-1	1	171.8	6.03	2.2	166.8	5	18.1	1.1	1.5	0.001	0.003	0.536	0.819
2-1	2	165.8	5.17	2.5	160.9	4.9	17.5	1.11	1.6	0.001	0.003	0.571	0.873
2-1	3	160.6	4.38	2.8	155.9	4.7	16.9	1.12	1.7	0.001	0.003	0.61	0.932
2-1	4	156.3	3.65	3.2	151.5	4.6	16.5	1.13	1.9	0.001	0.003	0.653	0.998
2-1	5	152.6	2.98	3.7	147.7	4.5	16	1.15	2	0.001	0.003	0.7	1.07
2-1	6	149.6	2.36	4.4	144.4	4.4	15.7	1.17	2.1	0.002	0.004	0.753	1.151
2-1	7	147.3	1.79	5.5	141.5	4.3	15.3	1.21	2.3	0.002	0.004	0.813	1.242
2-2	1	142.5	3.73	6.2	134.8	4.1	14.6	1.11	2.4	0.002	0.004	0.844	1.29
2-2	2	138.8	3.13	7.1	130.6	3.9	14.1	1.13	2.5	0.002	0.004	0.877	1.341
2-2	3	135.6	2.57	8.2	126.8	3.8	13.7	1.14	2.7	0.002	0.004	0.929	1.42
2-2	4	133.1	2.07	9.6	123.2	3.7	13.3	1.16	2.8	0.002	0.005	0.996	1.523
2-2	5	131	1.61	11.7	119.6	3.6	12.9	1.19	3.1	0.002	0.005	1.085	1.658
2-2	6	129.4	1.2	14.7	115.7	3.5	12.5	1.23	3.4	0.003	0.006	1.207	1.845
2-2	7	128.2	0.84	19.5	110.7	3.3	11.9	1.29	3.9	0.003	0.007	1.384	2.115

Two Pass With Inter-Pass Pump, Pressure/Work Exchanger, Partial [Pass 1]

Project name	SlantWellWQ_Sep2016	
Calculated by	Anya Kaufmann	
Feed flow	2352.78	gpm
Feed pressure	669.5	psi
Feed temperature	16.2	°C(61.2°F)
Feed water pH	7.08	
Chem dose, mg/l, -	None	
Leakage	1	%
Volumetric mixing	3	%
H.P. differential	7.25	psi
Boost pressure	24.47	psi
Specific energy	6.44	kwh/kgal
Pass NDP	252.4	psi
Average flux rate	7.35	gfd

Permeate flow/train	1.440	mgd
Raw water flow/train	3.388	mgd
Permeate recovery	42.50	%
Element age	5.0	years
Flux decline %, per year	5.0	
Fouling factor	0.77	
SP increase, per year	7.0	%
Feed type	Sea Well Conventional	

Pass -	Perm.	Flow / Vessel		Flux	DP	NDP	Beta	Stagewise Pressure			Perm.	Element	Element	PV# x
Stage	Flow gpm	Feed gpm	Conc gpm	gfd	psi	gfd		Perm. psi	Boost psi	Conc psi	TDS mg/l	Type	Quantity	Elem #
1-1	999.6	33.6	19.3	7.3	17.2	252.5	1.04	0.0	0.0	652.3	170.9	SWC5	490	70 x 7M

Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1
Hardness, as CaCO3	5491.48	5562.79	7.895	9666.0
Ca	472.00	478.13	0.679	830.8
Mg	1052.00	1065.66	1.512	1851.7
Na	8914.00	9029.13	61.428	15653.3
K	274.00	277.53	2.359	480.8
NH4	0.03	0.03	0.000	0.1
Ba	0.000	0.000	0.000	0.0
Sr	7.440	7.537	0.011	13.1
H	0.00	0.00	0.003	0.0
CO3	1.14	1.20	0.000	4.7
HCO3	142.00	143.74	1.537	244.1
SO4	2339.00	2369.37	3.525	4117.0
Cl	16406.00	16618.08	98.798	28820.4
F	0.94	0.95	0.011	1.6
NO3	4.20	4.25	0.188	7.3
PO4	0.10	0.10	0.000	0.2
OH	0.00	0.00	0.000	0.0
SiO2	12.40	12.56	0.058	21.8
B	3.24	3.27	0.815	5.1
CO2	7.62	7.62	7.62	7.62
TDS	**29628.49**	**30011.55**	**170.92**	**52051.94**
pH	**7.08**	**7.08**	**5.55**	**7.25**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	25	26	51	400
SrSO4 / ksp * 100, %	25	25	50	1200
BaSO4 / ksp * 100, %	0	0	0	10000
SiO2 saturation, %	12	12	20	140
CaF2 / ksp * 100, %	17	18	118	50000
Ca3(PO4)2 saturation index	-1.3	-1.3	-0.5	2.4
CCPP, mg/l	17.93	18.82	86.50	100000
Ionic strength	0.59	0.60	1.04	
Osmotic pressure, psi	302.9	306.9	532.1	

Two Pass With Inter-Pass Pump, Pressure/Work Exchanger, Partial [Pass 2]

Project name	SlantWellWQ_Sep2016			Page : 4/5	
Calculated by	Anya Kaufmann		Permeate flow/train	0.520	mgd
Feed flow	401.03	gpm	Raw water flow/train	1.439	mgd
Feed pressure	171.8	psi	Permeate recovery	90.00	%
Feed temperature	16.2	°C(61.2°F)	Element age	5.0	years
Feed water pH	10.00		Flux decline %, per year	3.0	
Chem dose, mg/l, 100 %	9.4	NaOH	Fouling factor	0.86	
Leakage	1	%	SP increase, per year	5.0	%
Volumetric mixing	3	%	Inter-stage pipe loss	3.0	psi
H.P. differential	7.25	psi			
Boost pressure	24.47	psi			
Specific energy	1.81	kwh/kgal			
Pass NDP	144.8	psi			
Average flux rate	15.5	gfd			
			Feed type	Sea Well Conventional	

Pass -	Perm.	Flow / Vessel		Flux	DP	NDP	Beta	Stagewise Pressure			Perm.	Element	Element	PV# x
Stage	Flow	Feed	Conc					Perm.	Boost	Conc	TDS	Type	Quantity	Elem #
	gpm	gpm	gpm	gfd	psi	gfd		psi	psi	psi	mg/l			
2-1	258.0	50.2	17.9	16.6	26.4	153.1	1.21	0.0	0.0	145.5	2.3	ESPA2	56	8 x 7M
2-2	103.4	35.8	10.0	13.3	15.1	123.6	1.29	0.0	0.0	127.4	8.0	ESPA2	28	4 x 7M

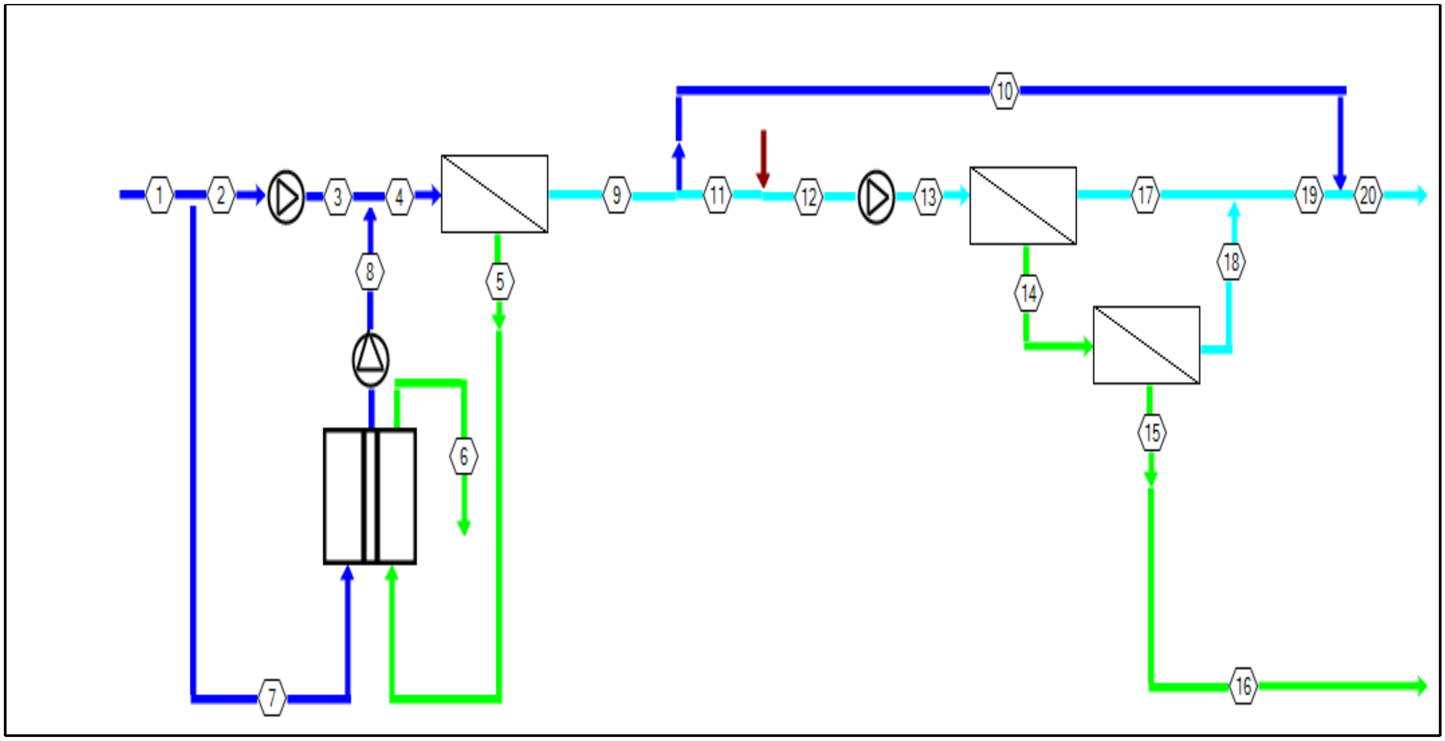
Ion (mg/l)	Raw Water	Feed Water	Permeate Water	Concentrate 1	Concentrate 2
Hardness, as CaCO3	7.89	7.89	0.034	22.1	79.1
Ca	0.68	0.68	0.003	1.9	6.8
Mg	1.51	1.51	0.007	4.2	15.2
Na	61.43	66.82	1.384	185.7	659.8
K	2.36	2.36	0.061	6.5	23.2
NH4	0.00	0.00	0.000	0.0	0.0
Ba	0.000	0.000	0.000	0.0	0.0
Sr	0.011	0.011	0.000	0.0	0.1
H	0.00	0.00	0.000	0.0	0.0
CO3	0.00	5.85	0.003	18.5	72.1
HCO3	1.54	2.34	0.090	4.1	8.1
SO4	3.53	3.53	0.019	9.9	35.3
Cl	98.80	98.80	2.115	274.5	975.0
F	0.01	0.01	0.000	0.0	0.1
NO3	0.19	0.19	0.028	0.5	1.6
PO4	0.00	0.00	0.000	0.0	0.0
OH	0.00	0.97	0.053	1.9	4.5
SiO2	0.06	0.06	0.000	0.2	0.6
B	0.82	0.82	0.207	2.0	6.3
CO2	7.62	0.00	0.00	0.00	0.00
TDS	**170.92**	**183.93**	**3.97**	**509.97**	**1808.75**
pH	**5.55**	**10.00**	**8.80**	**11.71**	**11.46**

Saturations	**Raw Water**	**Feed Water**	**Concentrate**	**Limits**
CaSO4 / ksp * 100, %	0	0	0	400
SrSO4 / ksp * 100, %	0	0	0	1200
BaSO4 / ksp * 100, %	0	0	0	10000
SiO2 saturation, %	0	0	0	140
CaF2 / ksp * 100, %	0	0	0	50000
Ca3(PO4)2 saturation index	-7.9	-2.2	0.6	2.4
CCPP, mg/l	-16.57	6.49	117.09	100000
Ionic strength	0.00	0.00	0.03	
Osmotic pressure, psi	1.8	2.0	19.3	

Two Pass With Inter-Pass Pump, Pressure/Work Exchanger, Partial

Project name SlantWellWQ_Sep2016

Temperature : 16.2 °C Element age, P1/P2 : 5.0/5.0 years



Stream No.	Flow (gpm)	Pressure (psi)	TDS	pH	B
1	2353	0	29628	7.08	3.24
2	1013	0	29628	7.08	3.24
3	1013	669	29628	7.08	3.24
4	2353	669	30012	7.08	3.27
5	1353	652	52052	7.25	5.09
6	1353	0	51379	7.25	5.03
7	1340	0	29628	7.08	3.24
8	1340	669	30301	7.08	3.30
9	1000	0	171	5.55	0.815
10	599	0	171	5.55	0.815
11	401	0	171	5.55	0.815
12	401	0	184	10.0	0.815
13	401	172	184	10.0	0.815
14	143	145	510	11.7	2.04
15	40.3	127	1809	11.5	6.33
16	40.3	0	1809	11.5	6.33
17	258	0	2.34	8.57	0.135
18	103	0	8.03	9.10	0.386
19	361	0	3.97	8.80	0.207
20	960	0	108	5.57	0.586

APPENDIX H

Pure Water Monterey GWR Project Consolidated Final EIR Chapter 2 Project Description

CHAPTER 2 PROJECT DESCRIPTION

2.1 INTRODUCTION

2.1.1 Overview of Proposed Project

The Proposed Groundwater Replenishment Project (GWR Project or Proposed Project) consists of two components: the Pure Water Monterey Groundwater Replenishment improvements and operations (GWR Features) that would develop purified recycled water to replace existing urban supplies; and an enhanced agricultural irrigation (Crop Irrigation) component that would increase the amount of recycled water available to the existing Castroville Seawater Intrusion Project (CSIP) agricultural irrigation system in northern Monterey County. Water supplies proposed to be recycled and reused by the Proposed Project include municipal wastewater, industrial wastewater, urban stormwater runoff and surface water diversions. The Proposed Project is being proposed by the Monterey Regional Water Pollution Control Agency (MRWPCA) in partnership with the Monterey Peninsula Water Management District (Water Management District). **Figure 2-1, Project Location Map,** shows the regional location of the Proposed Project.

2.1.1.1 Source Waters for Recycling

The Proposed Project would recycle and reuse water from the following sources:

- *Municipal Wastewater Collection and Treatment System*. MRWPCA collects municipal wastewater from communities in northern Monterey County and treats it at its Regional Wastewater Treatment Plant (Regional Treatment Plant). Currently, most of that wastewater is recycled for crop irrigation in the dry season at an onsite tertiary treatment plant called the Salinas Valley Reclamation Plant. The tertiary-treated wastewater is delivered to growers through a conveyance and irrigation system called the CSIP. During wet periods, recycled wastewater is used only intermittently for crop irrigation. The wastewater that is not recycled for crop irrigation is discharged to the ocean through MRWPCA's existing ocean outfall. The Proposed Project would include improvements that would enable more of the municipal wastewater to be recycled than is possible today; thus, less municipal wastewater would be discharged through the ocean outfall.
- *Salinas Agricultural Wash Water System*. Water from the City of Salinas agricultural industries, 80 to 90% of which is water used for washing produce, is currently conveyed to ponds at the Salinas Industrial Wastewater Treatment Facility for treatment (aeration) and disposal by evaporation and percolation. The Proposed Project would include improvements that would enable the agricultural wash water to be conveyed to the Regional Treatment Plant to be recycled. The Proposed Project also would include improvements at the Salinas Industrial Wastewater Treatment Facility to allow storage of agricultural wash water and south Salinas stormwater in the winter and recovery of that water for recycling and reuse in the spring, summer and fall.
- *Salinas Stormwater Collection System.* Currently, storm water from urban areas in southern portions of the City of Salinas is collected and released to the Salinas River through an outfall near Davis Road. The Proposed Project would include improvements that would enable Salinas Stormwater to be conveyed to the Regional Treatment Plant to be recycled.
- *Reclamation Ditch / Tembladero Slough.* The Reclamation Ditch is a network of excavated earthen channels used to drain natural, urban, and agricultural runoff

and agricultural tile drainage. The Proposed Project would include improvements that would enable water from the Reclamation Ditch watershed to be diverted in two locations--—from the Reclamation Ditch at Davis Road and from Tembladero Slough (to which the Reclamation Ditch is a tributary) near Castroville -- to be conveyed to the Regional Treatment Plant to be recycled.

- *Blanc*o *Drain.* The Blanco Drain collects water from approximately 6,400 acres of agricultural lands near Salinas. The Proposed Project would include improvements that would enable water in the Blanco Drain to be diverted and conveyed to the Regional Treatment Plant to be recycled.
- *Lake El Estero.* The City of Monterey actively manages the water level in Lake El Estero so that there is storage capacity for large storm events. Prior to a storm event, the lake level is lowered by pumping or gravity flow for discharge to Del Monte Beach. The Proposed Project would include improvements that would enable water that would otherwise be discharged to the beach to instead be conveyed to the Regional Treatment Plant to be recycled.

The source waters above would be combined within the wastewater collection system prior to the flow entering the headworks of the Regional Treatment Plant. The flow would be treated using the existing Regional Treatment Plant processes and then further treated and recycled for two purposes, as described in the following paragraphs.

2.1.1.2 GWR Facilities

The primary purpose of the Proposed Project is to provide high quality replacement water to allow California American Water Company (or CalAm)[1] to extract 3,500 acre-feet per year (AFY) more water from the Seaside Basin for delivery to its customers in the Monterey District service area and reduce Carmel River system water use by an equivalent amount. To meet this objective, the GWR Features would create a reliable source of water supply by using source waters described above to produce highly-treated water using existing secondary treatment processes and a new Advanced Water Treatment (AWT) Facility at the Regional Treatment Plant. After treatment by the AWT Facility, the purified recycled water would be conveyed using two pump stations and a new pipeline (the Product Water Conveyance System), and would be injected into the Seaside Groundwater Basin (or Seaside Basin) using a series of shallow and deep injection wells (Injection Well Facilities). Once injected into the Seaside Basin, the treated water would mix with the groundwater present in the aquifers and be stored for future urban use. CalAm would use existing wells and improved potable water supply distribution facilities (CalAm Distribution System) to extract and distribute the GWR water, enabling CalAm to reduce its diversions from the Carmel River system by this same amount. CalAm is under a State order to secure replacement water supplies and cease over-pumping of the Carmel River by January 2017.[2]

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[1] CalAm is an investor-owned public utility with approximately 38,500 connections in the Monterey Peninsula area.

[2] In addition, CalAm's ability to produce water from the Seaside Groundwater Basin has been limited by Monterey County Superior Court by an adjudication that imposes a series of pumping reductions designed to limit production of natural basin water to its safe yield.

2.1.1.3 Crop Irrigation

Another purpose of the Proposed Project is to provide additional water to the Regional Treatment Plant that could be recycled at the existing tertiary treatment facility (the Salinas Valley Reclamation Plant), and used for crop irrigation using the CSIP system. For MRWPCA to secure the necessary rights and agreements to use the source waters needed for the Proposed Project, preliminary negotiations with stakeholders lead to MRWPCA proposing to increase the amount of recycled water provided to the area served by the CSIP by approximately 4,750 AFY and up to 5,290 AFY during certain dry years. This amount, in combination with the existing recycling and use of municipal wastewater for crop irrigation of approximately 13,000 AFY[3], would remain less than the treatment design capacity of the Salinas Valley Reclamation Plant of 29.6 million gallons per day (mgd) or an annual use of recycled water for irrigation of approximately 21,600 acre feet (Greater Monterey County Regional Water Management Group, 2013).

The Salinas Valley Reclamation Plant produces tertiary-treated, disinfected recycled water for agricultural irrigation within the CSIP service area. Municipal wastewater and certain urban dry weather runoff diversions treated at the Regional Treatment Plant are currently the only sources of supply for the Salinas Valley Reclamation Plant. Municipal wastewater flows have declined in recent years due to aggressive water conservation efforts by the MRWPCA member entities.

The new sources of water supply developed for the Proposed Project would increase supply available at the Regional Treatment Plant for use by the Salinas Valley Reclamation Plant during the peak irrigation season (April to September). In addition, the Proposed Project would include Salinas Valley Reclamation Plant modifications to allow tertiary treatment at lower daily production rates, facilitating increased use of recycled water during the late fall, winter and early spring months when demand drops below 5 mgd. The Salinas Valley Reclamation Plant can currently only operate within the range of 5 to 29.6 mgd.

The Proposed Project would also include a drought reserve system that would allow increased use of Proposed Project source waters to be used for crop irrigation within the CSIP area during dry years. To accomplish this objective, the GWR Features would be designed to produce, convey, and inject up to 3,700 AFY (up to 200 AFY more than the annual amount needed by CalAm for extraction and delivery to its customers) of water for injection in wet and normal years for up to five (5) consecutive years. This would result in a “banked” drought reserve totaling up to 1,000 AF. During drought periods, MRWPCA would reduce its deliveries of advanced treated water to the Seaside Basin by up to the amount that has been banked in the drought reserve. CalAm would be able to extract the banked water to make up the difference to its supplies, such that its extractions and deliveries would not fall below 3,500 AFY. The water that is not sent to the AWT Facility during drought years would be sent to the Salinas Valley Reclamation Plant to increase supplies for the CSIP irrigation area.

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[3] This amount represents the five-year average actual production of tertiary-treated water by the Salinas Valley Reclamation Plant (2009 – 2013).

2.1.2 Project Benefits

Based on the analysis in this EIR, as well as the accompanying feasibility studies and technical reports, the Proposed Project has the potential to provide the following benefits:

- Replace 3,500 AFY of unauthorized Carmel River diversions for municipal use with additional groundwater pumping enabled by recharge of purified recycled water;
- Improve water quality in the Seaside Groundwater Basin;
- Provide up to 5,290 AFY of additional recycled water to Salinas Valley growers for crop irrigation;
- Reduce the volume of water pumped from Salinas Valley aquifers;
- Increase water supply reliability and drought resistance;
- Maximize the use of recycled water in compliance with the state Recycled Water Policy;
- Reduce urban stormwater "first flush" pollutant loads to the Salinas River and Monterey Bay;
- Reduce pollutant loads from agricultural areas to sensitive environmental areas including the Salinas River and the Monterey Bay;
- Help meet requirements for improving water quality in several local impaired water bodies;
- Reduce discharges of treated wastewater to Monterey Bay;

2.2 PROJECT LOCATION

The Proposed Project would be located within northern Monterey County and would include new facilities located within unincorporated areas of Monterey County and the cities of Salinas, Marina, Seaside, Monterey, and Pacific Grove as shown in **Figure 2-1, Project Location Map**. **Figure 2-1** also shows the Seaside Basin and the CalAm Monterey District Service Area. Specific locations for physical components of the Proposed Project are described later in this Chapter.

2.3 PROJECT BACKGROUND

This section provides information on the impetus for the Proposed Project, including a description of the agencies that have primary responsibility for its development and implementation (MRWPCA and Water Management District), an overview of the Seaside Groundwater Basin, an overview of the water resources of the Salinas Valley, a discussion of the relationship of the GWR Features to the proposed CalAm desalination plant, and a discussion of the relationship of the Crop Irrigation component to the Salinas Valley Reclamation Plant and CSIP.

2.3.1 Monterey Regional Water Pollution Control Agency

The Lead Agency for the Proposed Project is the Monterey Regional Water Pollution Control Agency. MRWPCA was established in 1972 under a Joint Powers Authority agreement between the City of Monterey, the City of Pacific Grove and the Seaside County Sanitation District. MRWPCA operates the regional wastewater treatment plant, including a water recycling facility (collectively known as the Regional Treatment Plant), a non-potable crop irrigation water distribution system known as the CSIP, sewage collection pipelines, and 25 wastewater pump stations. Since 1972, other northern Monterey County communities became Joint Powers Authority participants including the cities of Del Rey Oaks, Seaside, Sand City, Marina, and Salinas and the unincorporated communities of Castroville, Moss Landing, and Boronda, in addition to other unincorporated areas in northern Monterey County. The current MRWPCA service area is shown in dark blue in **Figure 2-2, MRWPCA Service Area Map**.

MRWPCA's Regional Treatment Plant is located two miles north of the City of Marina, on the south side of the Salinas River, and has a permitted capacity to treat 29.6 mgd of wastewater effluent.[4] At the Regional Treatment Plant, water is treated to two different standards: (1) Title 22 California Code of Regulations standards (tertiary filtration and disinfection) for unrestricted agricultural irrigation use within a facility known as the Salinas Valley Reclamation Plant, and (2) secondary treatment for permitted discharge through the ocean outfall. Influent flow that has been treated to a tertiary level is distributed to nearly 12,000 acres of farmland in the northern Salinas Valley for irrigation use (recycled water is delivered using a distribution system called the CSIP). The Regional Treatment Plant primarily treats municipal wastewater, but also accepts some dry weather urban runoff and other discrete wastewater flows. Additional information about the existing wastewater collection and conveyance system and the Regional Treatment Plant is provided in **Section 2.5, Overview of Existing Systems**, below.

2.3.2 Monterey Peninsula Water Resources System

The primary objective of the Proposed Project is to replenish the Seaside Groundwater Basin with 3,500 AFY of high quality water to replace a portion of CalAm's water supply as required by state orders. Cal Am currently supplies water for the Monterey Peninsula from

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[4] The Regional Treatment Plant currently treats approximately 16 to 17 million gallons per day of municipal wastewater from a total population of about 250,000 in the northern Monterey County area shown generally in **Figure 2-1, Project Location Map**.

the Carmel River and the Seaside Groundwater Basin, and the Monterey Peninsula Water Management District (Water Management District), a partner agency on the Proposed Project, manages these water resources. Both of these sources have historically been over-drafted and are currently being actively managed, as discussed below.

2.3.2.1 Monterey Peninsula Water Management District

The Water Management District is partnering with MRWPCA to fund and manage the studies for the Proposed Project. The Water Management District is a special district, with a seven-member Board of Directors, created by the California Legislature in 1977 and endorsed by a public vote in 1978, for the purposes of conserving and augmenting the water supplies by integrated management of ground and surface water supplies; control and conservation of storm and wastewater; and promotion of the reuse and reclamation of water. Approximately 104,000 people live within the jurisdictional boundary of the Water Management District, which includes the six Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Seaside, and Sand City, the Monterey Peninsula Airport District, and unincorporated communities within Monterey County including Pebble Beach, the Carmel Highlands, a portion of Carmel Valley, and areas adjacent to Highway 68 between Del Rey Oaks and the Laguna Seca area.

The Water Management District manages production and use of water from the Carmel River stored in Los Padres Reservoir, water production in the Carmel Valley Alluvial ~~a~~Aquifer, and groundwater pumped from municipal and private wells in Carmel Valley, the Seaside Groundwater Basin, and other areas within the Water Management District boundary. The Water Management District's jurisdictional area includes portions of watersheds and groundwater basins that lie partially outside the Water Management District political boundary. Activities affecting those areas of the watersheds and basins influence the quantity and quality of water resources within the Water Management District boundary.

The Water Management District regulates public fresh water supply systems within its boundaries, including systems owned by CalAm, the largest purveyor of water in the region, although CalAm has ultimate responsibility for the management and operation of its water system. The Water Management District also monitors the production of water from approximately 1,100 public and private wells, of which approximately 800 are currently active. In addition, the Water Management District regulates the creation of new water distribution systems and expansions, water connection permits, and allocation of water to jurisdictions (cities and unincorporated areas). The Water Management District adopts and implements water conservation ordinances, determines drought emergencies and can impose rationing programs. The District also regulates activities within the streamside corridor of the lower 15.5 miles of the Carmel River. The Water Management District has played key roles in several water augmentation projects, including completing planning and technical studies, engineering and cost analyses, environmental review in compliance with federal and state regulations, obtaining water rights and construction permits, facility construction and/or project financing. The District has also analyzed numerous water supply alternatives at varying degrees of specificity. The District was an integral partner in development of the Peralta Well in Seaside, Pebble Beach Reclamation Project, and Aquifer Storage and Recovery (Phases 1 and 2). The District constructed and owns the two ASR Phase 1 wells at the Santa Margarita site.

2.3.2.2 Seaside Groundwater Basin

Purified recycled water produced by the Proposed Project's Advanced Water Treatment Facilities would be injected into the Seaside Groundwater Basin, which would enable CalAm to extract the water from the Seaside Basin for delivery to its customers~~ and also would replenish the Basin~~. The Seaside Groundwater Basin underlies an approximately 19-square-mile area at the northwest corner of the Salinas Valley, adjacent to Monterey Bay (see **Figure 2-3 rev, Seaside Groundwater Basin Boundaries**). The southern boundary of the Seaside Groundwater Basin follows the Chupines fault zone, where a relatively impermeable shale unit of the Monterey Formation is uplifted to near sea level. The western boundary extends to the shoreline, although it is recognized that the aquifers extend offshore under the seafloor. The eastern boundary of the basin is defined by the flow divide in the Paso Robles aquifer, which approximately coincides with the surface drainage between the Canyon del Rey and El Toro Creek watersheds. The northern boundary also follows a groundwater flow divide with the aquifers of the northern Salinas Valley groundwater basin.

The hydrogeology of the Seaside Groundwater Basin has been the subject of numerous studies beginning with a California Department of Water Resources study in 1974. Monitoring data gathered since 1987 shows that water levels have been trending downward in many areas of the basin. A steep decline since 1995 in the northern coastal portion of the basin, where most of the groundwater production occurs, has coincided with increased extraction in that area after the State Water Resources Control Board required CalAm to reduce its Carmel River diversions, and concomitantly maximize its pumping in the Seaside Groundwater Basin.

Figure 2-3rev, Seaside Groundwater Basin Boundaries shows the following areas/boundaries that are relevant to understanding the physical extent of the Seaside Groundwater Basin: (1) the Seaside Area subbasin of the Salinas Valley Groundwater Basin as delineated by the California Department of Water Resources (DWR) in Bulletin 118 (DWR, 2004), (2) the basin boundary used for adjudication based on reconnaissance-level analyses published by the United States Geological Survey in 1982, and (3) the basin boundary as delineated in a report titled *Seaside Groundwater Basin: Update on Water Resource Conditions* (Yates et al., 2005). This more recent and detailed analysis of boundary conditions by Yates et al. is considered to be the most current and accurate documented depiction of the basin boundaries and has been used in the Monterey Peninsula Integrated Regional Water Management Plan (Monterey Peninsula Regional Water Management Group, 2014) and the Final Seaside Groundwater Basin Salt and Nutrient Management Plan (2014). The Seaside Groundwater Basin is divided into four subareas: the Northern Coastal, the Southern Coastal, the Northern Inland, and the Laguna Seca.

Groundwater is currently extracted from approximately 37 wells by 20 well owners in the Seaside Groundwater Basin. CalAm owns 12 wells and pumps approximately 80% of the water produced in the basin. In addition, CalAm and the Water Management District operate a Seaside Groundwater Basin Aquifer Storage and Recovery system that stores excess Carmel River water supplies during the wet season in the groundwater basin and recovers the banked water during the following dry season for consumptive use. The Water Management District estimates that the long-term average yield of the existing Aquifer

Storage and Recovery facilities is 1,920 AFY[5], but this varies yearly based on runoff due to the requirement to maintain adequate Carmel River instream flows. Additional informational about the Aquifer Storage and Recovery facilities is found in **Section 2.5, Overview of Existing Systems**, below.

Historical and persistent low groundwater elevations caused by pumping have led to concerns that seawater intrusion may threaten the Basin's groundwater resources. The Seaside Groundwater Basin has experienced chronic overdraft conditions with declining water levels in both of the Basin's primary aquifers that are used for water supply (the deeper, confined Santa Margarita aquifer and the shallower, unconfined Paso Robles aquifer). **Figure 2-4rev, Seaside Groundwater Basin Groundwater Levels,** shows groundwater elevation contour maps of the two aquifers and includes ~~highlights~~ the areas where water levels have fallen below sea level (areas below 0-contour). Additional information about the groundwater elevations and potential for seawater intrusion is found in **Section 4.10, Hydrology and Water Quality: Groundwater**.

In 2006, an adjudication process (CalAm v. City of Seaside et al., Case No. M66343) led to the issuance of a court decision that created the Seaside Groundwater Basin Watermaster (Watermaster). The Watermaster consists of nine representatives: one representative from each of CalAm, City of Seaside, Sand City, City of Monterey, City of Del Rey Oaks, Water Management District and Monterey County Water Resources Agency; and two representatives from landowner groups. The Watermaster evaluated water levels in the basin and determined that while seawater intrusion has not been observed, current water levels were lower than those required to protect against seawater intrusion. In 2012, water levels were found to be below sea level in the two primary aquifers within the Seaside Groundwater Basin; therefore, the Watermaster recognized that recharge into both aquifers would be beneficial for protection against seawater intrusion.

The adjudication requires all basin pumpers, except overlying users, to decrease their operating yield from the Basin triennially until each ~~requires CalAm to decrease its operating yield from the basin by 10% triennially until it~~ reaches ~~its~~ their allotted portion of the court-defined "natural safe yield" of ~~1,494~~ 3,000 AFY ~~beginning~~ (expected to occur in Water Year 2021), as detailed in **Table 2-1, CalAm's Adjudicated Allocation of Native Seaside Groundwater Basin: Water Years 2006 ‑ 2026**. This natural safe yield was defined by the adjudication as the quantity of groundwater existing in the Basin that occurs solely as a result of natural replenishment. In addition to these reductions in pumping, CalAm is required to "pay back" historic over-pumping and plans to accomplish this by reducing its pumping from the Seaside Groundwater Basin by an additional 700 AFY for 25 years.

Table 2-1
CalAm's Adjudicated Allocation of Native Seaside Groundwater Basin: Water Years 2006 ‑ 2026

Year	AFY
2006-2008	3,504
2009	3,191
2010-2011	3,087
2012-2014	2,669

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[5] CalAm's application to the CPUC for the Monterey Peninsula Water Supply Project presumes a 1,300 AFY average yield for Aquifer Storage and Recovery. This was based on the start-up period for Aquifer Storage and Recovery and the possibility that an amount less than the long-term yield would be available for extraction starting in 2017.

Table 2-1
CalAm's Adjudicated Allocation of Native Seaside Groundwater Basin: Water Years 2006 ‑ 2026

Year	AFY
2015-2017	2,251
2018-2020	1,820
2021-2023	1,494
2024-2026	1,494

2.3.2.3 Carmel River System

By providing 3,500 AFY of purified recycled water for extraction from the Seaside Groundwater Basin, the Proposed Project would enable CalAm to reduce its diversions from the Carmel River System by an equivalent amount. The 255-square-mile Carmel River Basin is bounded by the Santa Lucia Mountains to the south and the Sierra del Salinas to the north. It flows northwest through the Carmel Valley and drains into Carmel Bay at the northern end of the Big Sur Coast. The Carmel Valley ~~Groundwater Basin~~ Alluvial Aquifer lies along the downstream portion of the Carmel River.

There are two reservoirs on the Carmel River -- Los Padres and San Clemente -- the latter of which is scheduled to be removed in 2015. Los Padres Dam and Reservoir are located on the Carmel River, approximately 25 miles upstream of the Pacific Ocean. Los Padres Dam, an earth and rock-fill embankment dam constructed in 1948, has been owned and operated by CalAm since 1966. Constructed with an original storage capacity of 3,030 acre-feet (AF), sedimentation and siltation have reduced the storage capacity of Los Padres Reservoir to approximately 1,785 AF as of 2008 (Monterey Peninsula Water Management District/The Shibatani Group, 2014).

The San Clemente Dam, which impounds San Clemente Reservoir, is also located on the Carmel River, approximately 18 miles from the Pacific Ocean near the confluence of San Clemente Creek. Due to the reservoir's reduced storage capacity and the dam's seismic safety issues, as well as to remove barriers to fish passage, restore ecological functions, and enhance recreational opportunities along the Carmel River, a formal agreement was reached between CalAm and federal, state, and local agencies to cooperatively remove San Clemente Dam (MPWMD, 2014). The removal of San Clemente Dam was initiated in June 2013.

The Carmel Valley ~~Groundwater Basin~~ Alluvial Aquifer is primarily located on the valley floor, which is about 16 miles long and varies in width from 300 to 4,500 feet. The groundwater basin consists of younger alluvium and river deposits, and older alluvium and terrace deposits. These deposits are primarily underlain by Monterey Shale and Tertiary sandstone units. The primary water bearing formation is the younger alluvium with a typical thickness of 50 to 100 feet. The younger alluvium consists of boulders, gravel, sand, silt, and clay. The thickness varies from approximately 30 feet in the upper basin to about 180 feet near the mouth of the basin (California Department of Water Resources, 2004). ~~As a result of the significant reduction in usable storage in both reservoirs,~~ CalAm currently relies entirely on multiple wells in the alluvial aquifer along the lower Carmel River for its Carmel River supplies.

2.3.2.4 State Orders to Reduce Carmel River Diversions

The Carmel Valley Alluvial A~~a~~quifer, which underlies the alluvial portion of the Carmel River downstream of San Clemente Dam, is about six square-miles and is approximately ~~18~~ 16 miles long. ~~In the summer and fall, other private pumpers extract approximately 2,200 to~~

~~2,400 AFY of water from the alluvial aquifer, and CalAm extracts approximately 7,880 AFY.~~ Historically, ~~this~~ combined pumping, including authorized pumping in the summer and fall, has resulted in dewatering of the lower six miles of the river for several months in most years and up to nine miles of the river in dry and critically dry years. Recharge of the aquifer is derived primarily from river infiltration. The aquifer is replenished relatively quickly each year during the rainy season, except during prolonged periods of extreme drought.

In 1995, the State Water Resources Control Board (SWRCB) issued Order No. WR 95-10, which found that CalAm was diverting more water from the Carmel River Basin than it was legally entitled to divert. The State Board ordered CalAm to implement actions to terminate its unlawful diversions from the Carmel River and to maximize use of the Seaside Groundwater Basin (to the extent feasible) to reduce diversions of Carmel River water. In addition, a subsequent Cease and Desist Order (SWRCB Order Number WR 2009-0060) issued in 2009 requires CalAm to secure replacement water supplies for its Monterey District service area by January 2017 and reduce its Carmel River diversions to 3,376 AFY no later than December 31, 2016. In their recent submittals to the California Public Utilities Commission, CalAm estimates that it needs a total supply source of 15,296 AFY to satisfy the Cease and Desist Order and forecasted demand. In order to do this, CalAm ~~will~~ asserted in its application submittals that it needs to augment its water supplies by 9,752 AFY, which they contend includes water to satisfy a requirement to return water to the Salinas Valley to offset the amount of fresh water in the feed water from the desalination plant’s slanted coastal intake wells.

2.3.2.5 Monterey Peninsula Water Supply Project

CalAm, working with local agencies, has proposed construction and operation of a CalAm-owned and operated desalination project (known as the Monterey Peninsula Water Supply Project). CalAm is an investor-owned utility that is regulated by the California Public Utilities Commission (CPUC); the proposed Water Supply Project is identified as CPUC Application A.12-04-019. The Monterey Peninsula Water Supply Project is designed to provide the replacement water CalAm needs to comply with the Cease and Desist Order and the Seaside Groundwater Basin Adjudication and satisfy forecasted demand.

In its application to the CPUC for approval of the Monterey Peninsula Water Supply Project, CalAm proposed a three-pronged approach. The three prongs, or components, consist of: (1) desalination, (2) groundwater replenishment, and (3) aquifer storage and recovery. The CPUC is the CEQA lead agency for the Monterey Peninsula Water Supply Project, and published a Notice of Preparation of an EIR in October 2012. The Notice of Preparation identifies Monterey Peninsula Water Supply Project facilities and improvements, including: a seawater intake system; a 9-mgd desalination plant; desalinated water storage and conveyance facilities; and expanded Aquifer Storage and Recovery facilities.

The Monterey Peninsula Water Supply Project Notice of Preparation also explains that if the GWR Project is timely approved and implemented, CalAm’s proposed desalination plant would be a smaller, 5.4 mgd plant and CalAm would enter into an agreement to purchase 3,500 AFY of product water from the Proposed GWR Project. After publication of the Notice of Preparation, CalAm determined that, to fully satisfy the Monterey Peninsula Water Supply Project objectives, the full-sized desalination plant would need to be a 9.6 mgd plant, and the smaller desalination plant, proposed to be constructed if the GWR Project is implemented, would need to be a 6.4 mgd plant (CPUC, 2103).

The Monterey Peninsula Water Supply Project EIR will study both the proposed 9.6 mgd desalination plant and a proposed “MPWSP Variant,” which assumes a 6.4 mgd desalination plant and purchase of 3,500 AFY of product water from the GWR Project. The following section further describes the relationship of the Monterey Peninsula Water Supply Project to the GWR Project.

2.3.2.6 Relationship of GWR Project to the Monterey Peninsula Water Supply Project

The Proposed Project is designed to provide part of the replacement water needed for CalAm to comply with the Cease and Desist Order and the Seaside Groundwater Basin Adjudication. The Proposed Project would not produce all of the needed replacement water; the primary goal of the Proposed Project is to produce 3,500 AFY and deliver the water to the Seaside Basin where CalAm can extract the same amount and also reduce its Carmel River diversions by that same amount. The Proposed Project could provide this quantity of replacement water even if the CPUC denies CalAm's application to construct and operate a desalination plant. In other words, the Proposed Project could accomplish its objective, and be useful in reducing Carmel River diversions, independent from approval of CalAm's proposed desalination plant.

While the Proposed Project could proceed as an independent project, the Proposed Project is related to CalAm's project in that the GWR Project would reduce the size of CalAm's proposed desalination plant if such plant is approved by the CPUC. As explained in the preceding section, if the GWR Facilities are timely approved and implemented, CalAm's proposed desalination plant would be reduced in size from a 9.6 mgd plant to a 6.4 mgd plant.

In April 2012, the Water Management District, MRWPCA, and CalAm entered into a *Groundwater Replenishment Project Planning Term Sheet and Memorandum of Understanding to Negotiate in Good Faith* to, among other things, enable planning and environmental evaluation of a groundwater replenishment project with the following provisions:

- to commit themselves to evaluate the ways in which a groundwater replenishment project could be effectively accomplished;
- to commit themselves to negotiate in good faith to reach agreement on such a project, should it be deemed viable;
- for MRWPCA to commit to act as lead agency to achieve California Environmental Quality Act compliance for such a project, should it be deemed viable;
- for Water Management District to assist MRWPCA in providing the necessary financial support for planning and California Environmental Quality Act compliance; and
- to identify non-binding preliminary terms of a Proposed Project agreement.

Subsequent to the Memorandum of Understanding, the principles for evaluating the GWR Facilities have been memorialized in an agreement spearheaded by the Monterey Peninsula Regional Water Authority (Regional Water Authority), and presented to the CPUC. The Regional Water Authority is made up of the mayors of the six Peninsula cities that are served by CalAm and whose purpose is to enable development of a feasible solution to the Monterey Peninsula water supply deficits. The Regional Water Authority adopted a Policy Position Statement on July 11, 2013 that establishes four basic criteria that any water project is expected to satisfy, as well as eight conditions that CalAm would have to meet in order to obtain Regional Water Authority support for a water supply project. The position statement expressed the Authority's support for a "portfolio approach" to water projects, which included the desalination option with groundwater replenishment. Three agreements were reached on July 31, 2013 among the Regional Water Authority, CalAm, and a significant number of interest groups who had previously expressed concerns with elements of CalAm's Monterey Peninsula Water Supply Project. These agreements are called the "Settlement Agreements" and will be considered by the CPUC in its decision-making process for the Monterey Peninsula Water Supply Project. The three agreements address the following items: (1) an agreement that provides for settlement on most of the contested issues, (2) an agreement on the size of the desalination plant proposed in the Monterey Peninsula Water Supply Project for design and planning purposes, and (3) an agreement that relates to design, permitting, and land acquisition for infrastructure that must be constructed by CalAm regardless of which version of the water supply project eventually gets built. The full text of the agreements, as well as the Regional Water Authority Policy Position Statement, may be found on the Authority web site at www.mprwa.org.

2.3.3 Salinas River and Salinas Valley Groundwater Basin

A secondary objective of the Proposed Project is to provide additional water to the Regional Treatment Plant that could be used for crop irrigation through the Salinas Valley Reclamation Plant and CSIP system. The provision of recycled water through the Salinas Valley Reclamation Plant and CSIP reduces use of groundwater from the Salinas Valley Groundwater Basin for crop irrigation. By increasing source water available for recycling and by enabling the Salinas Valley Reclamation Plant to operate more consistently throughout the year, the Crop Irrigation component of the Proposed Project would further reduce use of groundwater from the Salinas Valley Groundwater Basin.

The Salinas River is the largest river of the Central Coast of California, running 170 miles and draining 4,160 square miles (**Figure 2-5, Salinas River Basin**). It originates near the town of Santa Margarita in San Luis Obispo County and flows north-northwest through Monterey County and into the Monterey Bay. The Salinas River watershed is bounded by the Gabilan Range to the east and the Sierra de Salinas and Santa Lucia Range on the west. The combination of steep terrain on the sides of the watershed and intense farming of the valley floor leads to high sediment loads within the river. The Salinas River has three main tributaries, the Nacimiento, San Antonio and Arroyo Seco Rivers. Many early sources indicate that while high-volume summer flows were largely absent on the lower Salinas River, many reaches had baseflow and substantial summertime pools. Much of the Salinas River was prone to flooding during extreme winter and spring storm events. Levees were constructed to prevent flooding and restrict channel migration on the historic floodplain and adjacent lands.[6] Modifications to the natural hydrologic condition occurred with the construction of reservoirs for flood control and water supply, as listed in **Table 2-2, Reservoirs in the Salinas Basin**.

Table 2-2
Reservoirs in the Salinas Basin

Reservoir Name	Storage Capacity Drainage Area Year Constructed	Owner
Lake Nacimiento	377,900 acre-feet (AF) 362 square miles	Monterey County Water Resources Agency

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[6] Salinas River Stream Maintenance Program EIR, Executive Summary, Cardno ENTRIX, 2013

	1957	
Lake San Antonio	335,000 AF 344 square miles 1967	Monterey County Water Resources Agency
Santa Margarita Lake	23,843 AF 112 square miles 1941	City of San Luis Obispo

The Salinas Valley Groundwater Basin extends along the river valley floor from Bradley north to the Monterey Bay. It is the primary source of water supply for Monterey County, providing approximately 500,000 acre-feet per year for agricultural, industrial and municipal use. ~~The groundwater basin has four designated subareas, the Upper Valley, Forebay, East Side and Pressure whose geographic extent is shown in **Figure 2-6, Salinas Valley Groundwater Basin**. The groundwater basin is recharged in all but the Pressure Subarea, which has a clay layer above the major water bearing layers.~~ California Department of Water Resources Bulletin 118 identifies nine sub-basins within the aquifer. Monterey County Water Resources manages the seven interconnected sub-basins, but refers to them as four major areas: the Upper Valley Area, the Forebay Area (includes DWR Forebay and Arroyo Seco Areas), the East Side Area (includes DWR East Side and Langley Areas) and the Pressure Area (includes DWR 180/400 Foot Area and Corral de Tierra Areas). The geographic extents of these areas are shown in **Figure 2-6, Salinas Valley Groundwater Basin**. The Paso Robles Area and the Seaside Area are considered separate formations. The Upper Valley and Forebay Subareas receive substantial recharge from river percolation and infiltration of rainfall and irrigation water. The Salinas River does not cross the Eastside Subarea, where recharge is primarily from rainfall, irrigation, and inflow from other subareas. In the Pressure Subarea, a regionally extensive clay layer (the Salinas Valley Aquiclude) greatly restricts the downward movement of recharge from rainfall, irrigation and the river to the underlying water supply aquifers. Much of the recharge in that subarea is groundwater inflow from the Forebay Subarea. The Pressure Subarea encompasses approximately 140 square miles, and consists of three primary aquifers: the 180-Foot Aquifer, the 400-Foot Aquifer and the 900-Foot (Deep) Aquifer. The 180-Foot and 400-Foot Aquifers connect to the Pacific Ocean, and have experienced seawater intrusion since the 1930’s due to groundwater pumping along the coast. The geographic extent of seawater intrusion in these aquifers is shown in **Figure 2-7rev, Salinas Valley Groundwater Basin Seawater Intrusion Maps**. Several projects have been developed to address this seawater intrusion, as discussed below.

2.3.3.1 Monterey County Water Resources Agency

The Monterey County Water Resources Agency is a water and flood control agency with jurisdiction coextensive with Monterey County and governed by the Monterey County Water Resources Agency Board of Directors and Board of Supervisors. The Monterey County Water Resources Agency was established in 1995 pursuant to the Monterey County Water Resources Agency Act, and was formerly the Monterey County Flood Control and Water Conservation District. The Monterey County Water Resources Agency has flood control responsibility for the natural and man-made stormwater channels within the County, including the Carmel, Pajaro and Salinas Rivers, the Blanco Drain and the Reclamation Ditch system in northern Monterey County.

The Salinas Valley Groundwater Basin is not adjudicated, but the Monterey County Water Resources Agency manages the Basin to address the problem of seawater intrusion. As described in **Section 2.3.3.4** below, the Monterey County Water Resources Agency operates Lakes Nacimiento and San Antonio to recharge the groundwater basin, and with MRWPCA operates the CSIP and Salinas Valley Water Project to supply recycled and river water to growers to reduce the use of groundwater for crop irrigation on land overlying the Pressure subarea of the Salinas Valley Groundwater Basin. Funding for operation and maintenance of these facilities originate from zones of assessment and benefit.

2.3.3.2 City of Salinas

The City of Salinas is located in northern Monterey County, approximately ten miles inland from the coast. Salinas is the largest city in Monterey County with a population of over 150,000 people and covering an area of about 23 square miles. Monterey County is called the nation's salad bowl, and a significant portion of the industry in Salinas is agricultural processing. The City's water supply comes from wells in the Pressure and East Side Subareas of the Salinas Valley Groundwater Basin. Municipal wastewater from the City is collected at the MRWPCA Salinas Pump Station at the southwest corner of the City and pumped to the MRWPCA Regional Treatment Plant. Wastewater from the agricultural processing industries in the southeastern part of the City is collected separately and treated at the Salinas Industrial Wastewater Treatment Facility, located along the Salinas River at Davis Road.

Most of stormwater from the City flows into the Reclamation Ditch system, which includes Alisal, Gabilan and Natividad Creeks, and stormwater from much of the southern part of the city flows to the Salinas River. The City has a stormwater management program that is implemented to comply with their permit from the Central Coast Regional Water Quality Control Board for Municipal Stormwater Discharges.

2.3.3.3 Marina Coast Water District

The Marina Coast Water District is a county water district established in 1960 pursuant to Water Code §30000, et seq. The District provides water supply and wastewater collection services to the City of Marina and the former Fort Ord. This service area is generally located between the MRWPCA Regional Treatment Plant and the Seaside Groundwater Basin, where the Proposed Project's injection wells would be located.

Marina Coast Water District's water supply comes from wells in the Pressure Subarea of the Salinas Valley Groundwater Basin. Wastewater from the District's service areas is collected and conveyed to the MRWPCA interceptor system, and treated at the Regional Treatment Plant. Marina Coast Water District is the only member jurisdiction within the MRWPCA with the right to purchase back its municipal wastewater as recycled water.

Water demands on the former Fort Ord are projected to increase with development envisioned in the Fort Ord Base Reuse Plan. To address the need for additional water supply, Marina Coast Water District is developing the Regional Urban Water Augmentation Project (RUWAP). The RUWAP would provide an additional 2,400 AFY of potable and/or recycled water. Marina Coast Water District certified the EIR for the RUWAP in 2005, and approved addenda to the EIR in 2007 and 2008 to address changes to the proposed pipeline alignment, construction assumptions, and water quantities. The trunk main of the RUWAP system is coincident with the Proposed Project's RUWAP Pipeline alignment option. The RUWAP recycled water distribution system has been designed and partially constructed, but is not yet in operation.

MCWD and others have implemented numerous projects to eliminate the long-term overdraft condition of the Salinas Valley Groundwater Basin and address seawater intrusion. For example, between 1985 and 2000, MCWD constructed both a seawater desalination plant (currently inactive) and a wastewater recycling facility (the recycling facility was retired when the MCWD connected to the MRWPCA system). More recently MCWD has implemented numerous water conservation programs, including, among others: (1) the Water Conservation Commission; (2) a conservation rate structure; (3) an automatic meter reading (AMR) system with leak detection; (4) the California State University Monterey Bay student learning partnership and student internship programs; (5) free conservation devices (showerheads, faucet aerators, leak detection tablets, etc.); (6) free water conservation education materials (e-flyers, newsletter, magnets and stickers, restaurant and commercial business placards, water conservation website, etc.); (7) a landscape demonstration garden; (8) high-efficiency clothes washer and toilet rebates; (9) leak and high water use and detection notification procedures; (10) free property surveys; (11) landscape walk-throughs and irrigation system checks; (12) water use investigations, water use data logs, and water use charts and tables; (13) property certification on resale; (14) in-school water education classes and assemblies; (15) landscape building standards and plan check procedures; (16) water-wise landscape incentives for turf removal, conversion from sprinkler to drip irrigation, "smart" controller replacement, rail and soil moisture shut-off switches, etc.; (17) regional participation in Water Awareness Committee of Monterey County. MCWD states that a significant portion of its budget is allocated to water conservation programs, and that MCWD will spend approximately $465,155 on its conservation programs over the next year alone. MCWD estimates that its conservation programs reduce pumping for the Salinas Valley Groundwater Basin by approximately 520 to 600 acre-feet of water per year. MCWD has also adopted a Water Shortage Contingency Plan for staged voluntary and mandatory conservation efforts.

In addition to the conservation programs listed above, MCWD states that various agreements have been signed by MCWD, MCWRA, and MRWPCA to limit groundwater use and to address seawater intrusion in the Salinas Valley, including for example, the Annexation Agreement and Groundwater Mitigation Framework for Marina Area Lands (MCWD/MCWRA.J.G. Armstrong Family Members, RMC Lonestar (now CEMEX), and the City of Marina, March 1996).

2.3.3.4 Salinas Valley Water Projects

In addition to the ongoing projects and programs by MCWD and other water users in the County to implement water conservation and groundwater use reduction programs, Monterey County, acting through the Monterey County Water Resources Agency, has implemented several projects to reduce seawater intrusion along the coast and increase the reliability and availability of water supply. These projects are described in the following sections.

Reservoirs

Nacimiento Reservoir was constructed in 1957 to provide water supply for municipal, domestic, industrial, irrigation and recreational uses. The Monterey County Water Resources Agency may capture up to 180,000 AFY from the Nacimiento River basin, which is approximately 372 square miles in size. The reservoir holds 377,900 acre-feet of water. The agency may use up to 350,000 AFY of diverted and/or stored water for the permitted uses.

San Antonio Reservoir was constructed in 1967 for flood control and to provide water supply for municipal, domestic, industrial, irrigation and recreational uses. The Monterey County Water Resources Agency may capture up to 220,000 AFY from the San Antonio River basin, which is approximately 344 square miles in size. The reservoir holds 335,000 acre-feet of water. The agency may use up to 210,000 AFY of diverted and/or stored water for the permitted uses.

Monterey County Water Resources Agency releases flows from Lakes Nacimiento and San Antonio to recharge the Salinas Valley Groundwater Basin. This practice has resulted in sustained high groundwater levels in the Upper Valley and Forebay Subareas. Before the development of the Salinas Valley Water Project (discussed below), releases were managed to achieve 100% percolation of released flows from the Salinas River into the Salinas Valley Groundwater Basin (that is, no non-stormwater flow in the Salinas River over the Pressure Subarea). Following construction of the Salinas Valley Water Project, increased reservoir releases are made and rediverted for beneficial use at the Salinas River Diversion Facility.

Salinas Valley Reclamation Project/Plant

The MRWPCA Regional Treatment Plant was constructed in 1988 and 1989 and began operation in 1990, treating municipal wastewater to a secondary level and discharging it to the Pacific Ocean. In 1992, MRWPCA and the Monterey County Water Resources Agency formed a partnership to build the Monterey County Reclamation Projects, including the Salinas Valley Reclamation Project recycled water plant (Salinas Valley Reclamation Plant) and the CSIP distribution system. The Reclamation Projects provide recycled water for crop irrigation, reducing the use of Salinas Valley Groundwater Basin groundwater along the coast.

The Salinas Valley Reclamation Plant was constructed in 1995 through 1997, and is located within the Regional Treatment Plant site. At the plant, secondary-treated municipal wastewater is tertiary treated and disinfected using a three-step process (flocculation, filtration and disinfection) and stored in an 80 acre-foot reservoir. The plant has been in operation since 1998, producing up to 15,000 acre-feet per year of recycled, treated wastewater for crop irrigation use. In addition to retarding seawater intrusion and protecting drinking water supplies by reducing use of well water, wastewater recycling also reduces wastewater discharge into the Monterey Bay National Marine Sanctuary.

Castroville Seawater Intrusion Project (CSIP)

The CSIP is the distribution system for the recycled wastewater produced by the Salinas Valley Reclamation Plant. It consists of 45 miles of pipelines and 22 wells, supplying irrigation water to growers on 12,000 acres in northern Monterey County. While the CSIP is designed to reduce groundwater use for irrigation, some groundwater pumping still occurs in the summer months to meet peak day demands which exceed the available amount of recycled water, and in the winter months when demands are smaller than the 5 mgd minimum production rate of the Salinas Valley Reclamation Plant. The CSIP system is owned by the Monterey County Water Resources Agency, but operated by the MRWPCA under contract.

Salinas Valley Water Project and Salinas River Diversion Facility

In 2009, the Monterey County Water Resources Agency constructed the Salinas River Diversion Facility near the Salinas Valley Reclamation Plant. Water released from San Antonio and Nacimiento Reservoirs that does not percolate into the Salinas Valley Groundwater Basin may be rediverted at the Salinas River Diversion Facility. This water is filtered, chlorinated and added to the 80 AF reservoir at the Salinas Valley Reclamation Plant for use in the CSIP system, further reducing the amount of groundwater pumped to meet peak day demands. The facility includes an inflatable rubber dam that creates a seasonal intake pool for the diversion pump station, a metered release weir for maintenance of downstream flows and a fish ladder to allow passage of migratory fish species.

Relationship of the GWR Project to the CSIP

As discussed in detail above, the Salinas Valley Groundwater Basin is experiencing seawater intrusion due to continued overdraft of the aquifer. The CSIP, operated by MRWPCA and by the Monterey County Water Resources Agency supplies recycled water produced at the Salinas Valley Reclamation Plant, Salinas River water, and Salinas Valley groundwater for irrigation of farmland in northern Monterey County. The river water is diverted at the Salinas River Diversion Facility, located southeast of the Regional Treatment Plant. The recycled and river water supplies have replaced between 16,600 AFY and 21,500 AFY of Salinas Valley groundwater pumping for irrigation, depending on the annual irrigation demands[7]. The CSIP system still uses from 2,700 AFY to 8,600 AFY of Salinas Valley groundwater to meet summer peak demands that exceed the available recycled and river supplies, and also to meet small winter demands that are below the minimum 5 mgd capacity of the Salinas Valley Reclamation Plant. The Proposed Project would provide up to 5,290 AFY of additional recycled water for distribution through the CSIP system. This would reduce the amount of groundwater used within the existing CSIP system.

The Proposed Project would collect various new source water supplies, which include agricultural wash water from the City of Salinas, stormwater runoff from the Cities of Salinas and Monterey, surface water diversions from the Reclamation Ditch, Blanco Drain and Tembladero Slough, and unused municipal wastewater (see **Section 2.6, Overview of Proposed Project Facilities and Operations** for detailed descriptions). All of the collected source waters would be conveyed to the MRWPCA Regional Treatment Plant, blended with the existing wastewater streams and would then be treated to a primary and secondary level before a portion is diverted to the newly constructed Advanced Water Treatment Facility (AWT Facility). New source water beyond the amount needed to supply 3,500 AFY per year to CalAm would be used as additional influent for the Salinas Valley Reclamation Plant to increase the volume and consistency of recycled water produced during the peak demand months.

The Salinas Valley Reclamation Plant has a design minimum production capacity of 8 mgd. Through operational efficiencies, the plant managers can currently meet demands as low as 5 mgd. Irrigation demands within the CSIP service area below that level have been met in the past using groundwater. As part of the Proposed Project, the Salinas Valley Reclamation Plant would also be modified to meet wet-season irrigation demands as low as 0.5 mgd. This would increase the late fall, winter, and early spring use of secondary-treated municipal wastewater, which would otherwise be discharged through the ocean outfall.

As an additional means of providing recycled water for crop irrigation, the GWR Features would be sized to produce a 1,000 acre-foot drought reserve in addition to producing 3,500 AFY per year for use by CalAm. This would be accomplished by seasonally treating additional source water (when available) during the months of October through March to produce up to 200 acre-feet per year for groundwater injection, until a surplus of 1,000 acre-feet has been injected into the Seaside Groundwater Basin. During dry years, MRWPCA would reduce the amount of treated water that it injects into the Seaside Groundwater Basin

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[7] Monthly data from Monterey County Water Resources Agency, presented as calendar year totals.

during the peak irrigation demand months (April through September), making more of its source water available to recycle and distribute to meet agricultural irrigation demands in the CSIP area. CalAm extractions of GWR-injected water quantities of 3,500 AFY would continue in those years by drawing upon the previously "banked" groundwater up to the amount of drought reserve water previously injected.

2.4 PROJECT OBJECTIVES

The primary objective of the Proposed Project is to replenish the Seaside Groundwater Basin with 3,500 AFY of purified recycled water to replace a portion of CalAm's water supply as required by state orders. To accomplish this primary objective, the Proposed Project would need to meet the following objectives:

- Be capable of commencing operation, or of being substantially complete, by the end of 2016 or, if after 2016, no later than necessary to meet CalAm's replacement water needs;[8]
- Be cost-effective such that the project would be capable of supplying reasonably-priced water; and
- Be capable of complying with applicable water quality regulations intended to protect public health.

Secondary objectives of the Proposed Project include the following:

- Provide additional water to the Regional Treatment Plant that could be used for crop irrigation through the Salinas Valley Reclamation Plant and CSIP system;
- Develop a drought reserve to allow the increased use of Proposed Project source waters as crop irrigation within the area served by the CSIP during dry years;
- Assist in preventing seawater intrusion in the Seaside Groundwater Basin;
- Assist in diversifying Monterey County's water supply portfolio.

2.5 OVERVIEW OF EXISTING SYSTEMS

This section describes the existing wastewater and water infrastructure systems that are relevant to the Proposed Project. As explained in **Section 2.1, Introduction**, the Proposed Project would recycle and reuse water from the following sources:

- Municipal Wastewater
- Salinas Agricultural Wash Water
- Salinas Stormwater
- Reclamation Ditch/ Tembladero Sough
- Blanco Drain

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[8] The Monterey Peninsula Water Supply Project has been delayed to the point where it is not possible for CalAm to meet the State Water Resources Control Board Cease and Desist Order 2009-60 deadline of December 31, 2016. Accordingly, representatives of the local agencies have been in discussion with the State Board to develop proposals for a CDO extension that would be acceptable to the public and have the potential to obtain State Board approval.

- City of Monterey Stormwater at Lake El Estero

Existing infrastructure systems that are relevant to these sources of water include the following:

- MRWPCA Regional Treatment Plant (including water recycling facilities at the existing Salinas Valley Reclamation Plant)
- municipal wastewater collection and conveyance systems
- agricultural wash water[9] collection, conveyance and treatment system
- urban dry-weather runoff and stormwater collection and conveyance systems

After source water is treated at the proposed new Advanced Water Treatment Facility, it would be conveyed to new Well Injection Facilities at the Seaside Groundwater Basin. The purified recycled water would then be extracted by CalAm for delivery to its customers. Existing infrastructure systems that are relevant to extraction and delivery of the purified recycled water to urban users include the following:

- Monterey Peninsula Aquifer Storage and Recovery facilities
- CalAm water supply facilities (Monterey District)

In addition, recycled water produced for crop irrigation would be conveyed to growers through the existing CSIP distribution system.

2.5.1 MRWPCA Regional Treatment Plant, including Water Recycling Facilities and Ocean Outfall

The existing MRWPCA Regional Treatment Plant would be used to provide secondary treatment for all source waters. A new Advanced Water Treatment Facility would be constructed at the existing MRWPCA Regional Treatment Plant, and improvements would be made to the existing Salinas Valley Reclamation Plant, which also is located at the Regional Treatment Plant.

MRWPCA currently serves a population of approximately 250,000 and was created in 1972. MRWPCA operates a regional wastewater collection system, treatment, disposal and reclamation facilities. MRWPCA provides services to the cities of Monterey, Pacific Grove, Del Rey Oaks, Sand City, Marina, and Salinas, the Seaside Sanitation District, the Castroville, Moss Landing and Boronda Community Service Districts, and former Fort Ord lands. Each member entity retains ownership and operating/maintenance responsibility for wastewater collection and transport systems up to the point of connection with interceptors and pump stations owned and operated by MRWPCA.

Residential, commercial, and industrial wastewater is conveyed to the MRWPCA Regional Treatment Plant. The plant is located north of the City of Marina and south of the Salinas

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[9] The Salinas Industrial Wastewater Treatment system collects wastewater from agricultural-related businesses; 80 to 90% of the wastewater in this system is estimated to originate from facilities that wash produce. These facilities also include corrugated box manufacturing and fish processing in the southeastern portions of the City of Salinas for conveyance to the City's Salinas Industrial Wastewater Treatment Facility (also referred to herein as the Salinas Treatment Facility) for treatment and disposal. The wastewater that is currently collected in this system is referred to herein as Agricultural Wash Water.

River in unincorporated Monterey County. The Regional Treatment Plant has an average dry weather design capacity of 29.6 mgd and a peak wet weather design capacity of 75.6 mgd. It currently receives and treats approximately 16 to 17 million gallons per day of wastewater and therefore has capacity to treat additional flows. The Regional Treatment Plant primarily treats municipal wastewater, but also accepts some dry weather urban runoff and other discrete wastewater flows. An aerial image annotated with the key treatment facilities at the Regional Treatment Plant is found in **Figure 2-8, Existing Regional Treatment Plant Facilities Map.**

At the MRWPCA Regional Treatment Plant, water is treated to two different standards: 1) primary and secondary treatment in the Regional Treatment Plant for discharge through the MRWPCA ocean outfall or use as influent for the tertiary treatment system, and 2) Title 22 California Code of Regulations standards (tertiary filtration and disinfection) for unrestricted crop irrigation use.

In most winter months, secondary treated wastewater from the Regional Treatment Plant is discharged to Monterey Bay through the MRWPCA ocean outfall, which includes a diffuser that extends 11,260 feet offshore at a depth of approximately 100 feet. The diffuser on the ocean outfall is designed to convey wet weather flows of up to 81.2 mgd. However, the current permitted capacity of the outfall is 75.6 mgd, which is less than its 81.2 mgd capacity. Wastewater discharges in recent years have decreased to below 5,000 AFY.

Secondary treated effluent from the Regional Treatment Plant is also recycled at the co-located Salinas Valley Reclamation Plant for irrigation of 12,000 acres of farmland in the northern Salinas Valley. The existing facilities at the Regional Treatment Plant, including the Reclamation Plant are designed to produce up to 29.6 mgd of recycled water. The Salinas Valley Reclamation Plant includes an 80 acre-foot storage pond that holds tertiary-treated and Salinas River water before it is distributed to farmland by a distribution system called the CSIP. The use of recycled wastewater for irrigation reduces regional dependence on and use of local groundwater, which, in turn reduces groundwater pumping-related seawater intrusion into the Salinas Valley aquifers.

The amount of tertiary water that has been delivered via the CSIP for crop irrigation has averaged 12,936 AFY (2001 through 2013), but is trending upward. The amount of water delivery each year is dependent on the crops grown and weather patterns. The amount of wastewater available for recycled water production is trending lower during this same period due to reduced flows of wastewater to the Regional Treatment Plant. **Figure 2-9, Historic Regional Treatment Plant Flows,** shows the wastewater influent to the Regional Treatment Plant, Salinas Valley Reclamation Plant production, and ocean outfall discharge flows for the period 1998-2013 in acre-feet per year.

In January 2014, Brezack & Associates, Inc. completed a report that projected municipal wastewater flows to the Regional Treatment Plant to help MRWPCA plan for use of available water for recycling. The MRWPCA has observed that influent to the Regional Treatment Plant has been decreasing for the last several years and thus, a key objective of the analysis was to determine if the trend would continue. The report forecasts wastewater flows based on population and per capita wastewater generation in the service area. A spreadsheet model was developed using historical population and flow data to produce a range of potential projections through the year 2055. **Figure 2-10, Projected Regional Treatment Plant Flows**, shows the results of the analysis. Specifically, the analysis found that municipal wastewater flow to the Regional Treatment Plant is projected to decrease to a range of 19.2 to 17.1 mgd. After 2030, flows may increase to a range of highs between 22.7 and 24.3 mgd. The future increase is dependent upon whether urban growth projections assumed in the 2014 projections are realized. Because it is not certain that such planned urban growth will occur, the Proposed Project source water estimates assume municipal wastewater availability will not increase in the future. If municipal wastewater flows were to increase, less of the other source waters would potentially be used for the Proposed Project. **Section 2.7.1.2, Source Water Operation: Diversion, Treatment and Use**, describes how the Proposed Project would divert source water diversions to augment wastewater flows only up to the demands for purified and/or tertiary recycled water.

2.5.2 Municipal Wastewater Collection and Conveyance Systems

Under the Proposed Project, the existing municipal wastewater collection and conveyance systems would continue to be used to convey wastewater to the Regional Treatment Plant. In addition, several new connections would be constructed to convey the new proposed sources of water to the Regional Treatment Plant. Use of the existing conveyance and collection system would minimize Proposed Project costs and environmental impacts, and would assist in enabling the Proposed Project to be constructed within the short time period needed to accomplish the Project Objectives.

Figure 2-2, MRWPCA Service Area Map provides an overview of the existing MRWPCA wastewater collection and conveyance systems, which includes ten pump stations located throughout the northern Monterey County area, including Castroville and Moss Landing to the north, and City of Salinas to the east. Following are descriptions of the wastewater collection and conveyance systems serving the Salinas and Monterey Peninsula areas.

2.5.2.1 Salinas Wastewater Collection and Conveyance

Several of the new sources (Salinas agricultural wash water, Salinas stormwater runoff, and the Reclamation Ditch waters diverted at Davis Road) would be diverted into the existing wastewater conveyance and collection system prior to flowing into the Salinas Pump Station. MRWPCA's sanitary sewer pump station that serves the City of Salinas (Salinas Pump Station) is located on Hitchcock Road in Salinas, a half mile southeast of the intersection of Blanco and Davis Roads. The Salinas Pump Station was constructed in 1983 and is located within the City of Salinas at the site of the City's former municipal wastewater treatment plant, known as Treatment Plant No. 1 or "TP1." The site is surrounded by unincorporated land within Monterey County that is currently used for agricultural production. Existing stormwater, municipal wastewater (or sanitary sewer), and agricultural wash water pipelines traverse the pump station property in very close proximity to one another, but currently flow to different ultimate endpoints. Only the municipal wastewater enters the Salinas Pump Station at this time.

Municipal wastewater is conveyed from the Salinas Pump Station to the Regional Treatment Plant in a 36-inch diameter interceptor, force main pipeline that is approximately 7.5 miles in length. The average daily and peak flows through the pump station have been relatively constant at approximately 12 mgd and 25 mgd, respectively, over the last several years. Flows at the pump station are highest during the summer months when the population of the City of Salinas expands due to the large migrant workforce associated with the agricultural industry. The City of Salinas's aggressive collection system improvement program has reduced winter infiltration and inflow of stormwater into the municipal wastewater system and thus has also reduced total flows reaching the Salinas Pump Station. MRWPCA conducted flow testing of the Salinas Pump Station in October 2008 as part of the Salinas Pump Station Flow Study. The testing indicated the pump station had a pumping capacity of 32.8 to 35.4 mgd (assuming one pump is out of service), and a capacity of up to 38.5 mgd with all pumps running. **Figure 2-11, Salinas Pump Station Monthly Average Discharge,** shows the Salinas Pump Station average monthly discharge to the MRWPCA Salinas sewer force main (or interceptor) for the period 2003-2012. Independent from the Proposed Project, the City of Salinas and MRWPCA are currently developing plans to address potential emergency sewer overflow situations at the Salinas Pump Station by designing and implementing improvements to the municipal and industrial wastewater collection and conveyance systems to allow wastewater to flow (in emergency situations, only) to the Salinas Industrial Wastewater Treatment Facility for temporary storage before returning to the Salinas Pump Station for conveyance to the Regional Treatment Plant.

2.5.2.2 Monterey Peninsula Wastewater Collection and Conveyance

One of the proposed water sources for recycling (stormwater in Lake El Estero) would be diverted into the existing wastewater conveyance and collection system in Monterey that flows into the Monterey Peninsula interceptor system. The Monterey Peninsula interceptor system collects municipal wastewater that originates as far southwest as Pacific Grove. In Pacific Grove, the wastewater flows through two main MRWPCA-owned pump stations (located at the end of Coral Street and Fountain Street). Then the wastewater flows past the Reeside Pump Station (in the City of Monterey at the end of Reeside Avenue) to the Monterey Pump Station (located in the City of Monterey on the ocean side of Del Monte Boulevard, across from the Naval Postgraduate School). From the Monterey Pump Station, wastewater is conveyed to the Seaside Pump Station in Sand City, from there to the Fort Ord Pump Station near the entrance to the City of Marina, and on to the Regional Treatment Plant. **Figure 2-12, MRWPCA Wastewater Collection System Network Diagram and Pump Station Flows,** summarizes design capacities of all the MRWPCA pump stations and also shows the average dry weather and peak wet weather flows over the last 10 years. Based on this MRWPCA data, the pump stations along the Monterey Peninsula interceptor system operate below their design flows year-round, and have operated at 15 to 20% of their design capacity during an average dry weather flow event and 42 to 50% of their capacity during peak wet weather flow days.

2.5.2.3 Moss Landing and Castroville Wastewater Collection and Conveyance

One of the proposed water sources for recycling (surface water in Tembladero Slough) would be diverted to the existing Moss Landing and Castroville portions of the wastewater conveyance and collection system just prior to where the wastewater flows into the Castroville Pump Station. The Moss Landing and Castroville interceptors and pump stations are north of the Regional Treatment Plant and collect and convey wastewater from those communities to the Regional Treatment Plant, as shown on **Figure 2-12, MRWPCA Wastewater Collection System Network Diagram and Pump Station Flows**. Flows from Moss Landing are pumped through a force main paralleling Highway 1 to the Castroville Pump Station, which is west of Highway 1 and north of Tembladero Slough. Wastewater from Castroville flows to the pump station through a gravity pipeline. The Castroville Pump Station pumps wastewater through the Castroville interceptor to the MRWPCA Regional Treatment Plant. The Castroville Pump Station is designed to pump 2.7 mgd and the current annual average flow is 0.7 mgd.

2.5.3 Agricultural Wash Water Generation, Collection/Conveyance, and Treatment

Existing operations and infrastructure relevant to the proposed Salinas agricultural wash water diversion are described in this section. The City of Salinas (hereafter, "Salinas") operates an industrial wastewater conveyance and treatment system that serves approximately 25 agricultural processing and related businesses located east of Sanborn Road and south of U.S. Highway 101. This wastewater collection system is completely separate from the Salinas municipal wastewater collection system and includes 14-inch to 33-inch diameter gravity pipelines that flow to the Salinas Pump Station Diversion site, and then flow into a 42-inch gravity pipeline to the Salinas Industrial Wastewater Treatment Facility (Salinas Treatment Facility). Over 80% of the wastewater flows in this system are from fresh vegetable packing facilities (typically, wash water used on harvested row crops). The remainder of flows originate from businesses associated with seafood processing, refrigerated warehousing, manufactured ice, preserves (frozen fruits, jams and jellies) and corrugated paper boxes. Wastewater is conveyed in a pipeline that traverses near the Salinas Pump Station to the Industrial Treatment Facility located adjacent to the Salinas River, downstream of the Davis Road crossing. The Salinas Treatment Facility consists of an influent pump station, an aeration lagoon, percolation ponds, and rapid infiltration beds to treat, percolate and evaporate the industrial wastewater.

All industrial wastewater entering the ponds passes through a bar screen at the influent pump station with a peak design flow of 6.8 mgd. Piping and valves permit the water to be pumped to the aeration lagoon, the percolation ponds, or the rapid infiltration beds; however, the National Pollutant Discharge Elimination System permit for the facility requires aeration as part of the treatment process. Biological treatment in the aeration lagoon includes aerobic decomposition to about 1/3 of the water depth using twelve 50-horsepower surface aerators and natural anaerobic decomposition in the lower layers.

The wastewater is treated using aeration then flows by gravity to three percolation ponds in series (from east to west, Ponds 1 through 3). Water levels must be maintained with no less than 1-foot of freeboard. These water levels are maintained by pumping to rapid infiltration beds, including permanent beds (also referred to as "drying beds" north of Pond 3) and temporary rapid infiltration basins located between the ponds and the Salinas River. A conceptual process flow schematic of the Salinas Treatment Facility is shown in **Figure 2-13, Salinas Industrial Wastewater Treatment Facility Process Flow Schematic** and locations of existing industrial wastewater infrastructure is shown in **Figure 2-14, Salinas Industrial Wastewater Treatment System Location Map**.

The Salinas Treatment Facility operates year-round, with a peak monthly inflow during summer months of approximately 3.5 to 4.0 mgd (annual average of approximately 3 mgd). This summer peak corresponds with the peak agricultural harvesting season in the Salinas Valley. In recent years, substantial flows to the Salinas Treatment Facility have continued during the winter months due to the importation of agricultural products from Arizona for processing in the facilities that discharge wastewater to this system.

2.5.4 Stormwater Runoff, Agricultural Drainage Collection and Conveyance

The existing systems for the collection and conveyance of various types of runoff and agricultural land drainage that are relevant to the Proposed Project include the following systems:

- Facilities that capture and discharge City of Salinas stormwater to the Salinas River (see **Section 2.5.4.1**),
- Watershed characteristics (natural, urban, and agricultural) of the Reclamation Ditch system (see **Section 2.5.4.2**),
- Agricultural runoff and tile drain systems contributing to the Blanco Drain system (see **Section 2.5.4.3**), and
- Stormwater and wastewater collection systems near Lake El Estero (see **Section 2.5.4.4**).

The following sections describe these systems and their characteristics.

2.5.4.1 City of Salinas: Urban Runoff to Salinas River

The Proposed Project would capture and divert runoff from the City of Salinas. Urban runoff from the southwestern part of the City of Salinas flows through pipes that cross nearby the Salinas Pump Station site southeast of the intersection of Blanco and Davis Roads. The runoff system currently drains an area of about 2.5 square miles and eventually flows to the Salinas River through a 66-inch gravity pipeline. The drainage area is virtually all within the developed portion of Salinas and does not appear to intercept water from non-urban areas. Therefore, flows are likely to be almost entirely from urban runoff. The climate of Salinas is semiarid, with the rainy season occurring from November through March. **Table 2-3, Estimated Urban Runoff from the City of Salinas to Salinas River (acre-feet)** shows an estimate of stormwater runoff from the City's Salinas River watershed. No flow gage or other measurements of runoff exist for this watershed, so a hydrologic analysis using rainfall gage data, hydrologic soil group information, and land use data was conducted to develop estimates of surface runoff into the Salinas River from the City of Salinas (Schaaf & Wheeler, 2015a).

Table 2-3

Estimated Urban Runoff from the City of Salinas to Salinas River (acre-feet)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	8	26	53	53	45	34	19	2	0	0	0	1	242
Maximum	65	229	390	414	530	147	238	31	10	8	22	18	857

Salinas has an existing municipal stormwater permit issued by the Central Coast Regional Water Quality Control Board that requires reductions in pollutant loads to nearby surface water bodies, including the Salinas River and the Reclamation Ditch and its downstream receiving waters, such as Tembladero Slough. The latter water bodies are described in the following section.

2.5.4.2 Reclamation Ditch and Tembladero Slough Watersheds: Mixed Runoff

Another Proposed Project source of water, the Reclamation Ditch, created between 1917 and 1920, is a network of excavated earthen channels used to drain surface runoff and facilitate agricultural use of the surrounding lands. The Reclamation Ditch watershed is approximately 157 square miles that includes headlands, agricultural areas, the City of Salinas and portions of Castroville and Prunedale. It collects water from Alisal Creek at Smith Lake southeast of the City of Salinas, Gabilan and Natividad Creeks within Salinas at Carr Lake, and Santa Rita Creek west of Salinas. The Reclamation Ditch is a major drainage channel that flows from east to west through Salinas and continues west where it drains into Tembladero Slough, thence to the Old Salinas River Channel, and ultimately into Moss Landing Harbor through the Potrero Road Tide Gates (see **Figure 2-15, Reclamation Ditch Watershed Boundary**).

Alisal, Gabilan and Natividad Creeks are seasonal in their upper reaches. The Reclamation Ditch is perennial downstream of agricultural and urban development. However, the presence of dry-season flow is a consequence of dry-season urban discharges and agricultural runoff and tile drain water (Casagrande and Watson, 2006). There is a United States Geological Survey gage station on the Reclamation Ditch at San Jon Road, approximately one mile west of Salinas. Flow data from that gage is provided in **Table 2-4, United States Geological Survey Gage, Reclamation Ditch at San Jon Road, period 2003 to 2013 (AF)**. The lower reaches of the system, including Tembladero Slough and the Old Salinas River Channel, are tidally influenced.

Table 2-4
United States Geological Survey Gage, Reclamation Ditch at San Jon Road, period 2003 to 2013 (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	300	293	1,044	1,329	1,203	1,598	905	263	198	193	181	133	7,640

2.5.4.3 Blanco Drain Watershed: Agricultural Runoff and Tile Drainage

The Blanco Drain is a proposed source of water for the Proposed Project. The Blanco Drain is a man-made reclamation ditch draining approximately 6,400 acres of agricultural lands east of the City of Salinas. The watershed for the Blanco Drain is between the Salinas River and Alisal Slough, and discharges to the Salinas River at river mile 5 (see **Figure 2-16 <u>rev</u>, Blanco Drain Storm Drain Maintenance District**). The Blanco Drain is separated from the Salinas River by a flap gate, which prevents high-water conditions in the Salinas River from migrating up the Blanco Drain channel. Summer flows in the Blanco Drain are generally tile drainage and runoff from irrigated agriculture. Winter flows include stormwater runoff, although some fields remain in production and are irrigated year-round.

In 2009-2010, the Monterey County Water Resources Agency constructed the Salinas River Diversion Facility downstream of the Blanco Drain. The Salinas River Diversion Facility includes an inflatable rubber dam that impounds water during the summer months to supply the diversion pump station. To overcome the backwater into the Blanco Drain channel, a new slide gate and pump station were installed at the lower end of the Drain, several hundred feet above the confluence with the Salinas River. The pump station lifts Blanco Drain flows past the slide gate and into the gravity portion of the channel. **Table 2-5, Blanco**

Drain Flow Availability Estimate (acre-feet) shows an estimate of flows in Blanco Drain (Schaaf & Wheeler, 2014b).

Table 2-5
Blanco Drain Flow Availability Estimate (acre-feet)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totals
Estimated Flow Availability	209	223	246	252	225	274	277	244	184	168	133	185	2,620

2.5.4.4 Monterey Peninsula: Urban Runoff

The Proposed Project includes diversion and use of stormwater that presently is stored at Lake El Estero and discharged to nearby beaches before large storm events. The cities of the Monterey Peninsula generally use storm drain infrastructure to collect, convey and discharge urban runoff that does not sheet flow to natural areas. Infrastructure for collection and discharge of urban runoff in the cities does not connect to the wastewater collection system, except in the City of Pacific Grove where the City has implemented three phases of a dry weather Urban Runoff Diversion Project in order to reduce pollutant discharges and comply with the requirements of the Areas of Special Biological Significance program (City of Pacific Grove, plans and environmental documents for Urban Runoff Diversion Project Phases 1 through 3).[10] The cities of Pacific Grove and Monterey are also in the planning stages of an additional wet weather diversion project that would expand the existing dry weather diversion facilities as part of their efforts to comply with additional Areas of Special Biological Significance requirements.[11]

Within the watersheds of the Areas of Special Biological Significance, surface storage locations for detaining stormwater are limited or non-existent in the cities of Pacific Grove and Monterey. In addition, much of the soils underlying Pacific Grove and Monterey are granitic, and thus, have a very low ability to infiltrate and reduce runoff. Large flows of stormwater runoff become available within a very short time after initiation of a storm event. The City of Monterey's stormwater system includes the use of two lakes, Del Monte Lake and Lake El Estero. The City actively manages the water levels in these lakes so that there is storage capacity for large storm events. Prior to a storm event, the lake levels are lowered by pumping or gravity flow for discharge to the beaches north of the lakes. Additional information about existing Monterey Peninsula stormwater collection systems is presented in **Section 4.11, Hydrology/Water Quality: Surface Water**.

During the 2012 to 2013 wet season, MRWPCA, the Water Management District, and the City of Monterey partnered to collect flow gage data of runoff from Lake El Estero. For the

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[10] The three phases of the Urban Runoff Diversion Project include redirecting dry weather flows in the storm drain system to the sanitary sewer from a 652-acre watershed area under normal non-rainfall conditions (typically, April 1 – November 1 of each year). Urban Runoff Diversion Project Phase 1, completed in 2004, redirected seasonal urban runoff collected from a 487-acre drainage area into the sanitary sewer system at two locations. The Urban Runoff Diversion Project Phase 2, completed in 2006, expanded the Phase 1 system by collecting surface runoff from an additional 99 acres before feeding directly into the Phase 1 pipelines. The Urban Runoff Diversion Project Phase 3 is currently being constructed to pump discharges from an additional 66 acres of the watershed into the storm drain facilities installed under Phase 2, which then connect to the facilities installed in Phase 1.

[11] More information is provided at: http://www.monterey.org/Portals/1/peec/stormwater/Monterey-PG_ASBS_Stormwater_Management_Project_DEIR.pdf (Accessed February 2014).

purpose of this EIR, Schaaf & Wheeler prepared hydrologic calculations using rainfall gage data, National Resource Conservation Service hydrologic soil group information, and land use data to develop estimates of surface runoff into Lake El Estero (Schaaf & Wheeler, 2014a). **Table 2-6, Estimated Monthly and Annual Historic Urban Runoff into Lake El Estero with Existing Infrastructure (AF)** shows an estimate of stormwater runoff from the Lake El Estero watershed, a 2,810-acre drainage basin.

Table 2-6
Estimated Monthly and Annual Historic Urban Runoff into Lake El Estero with Existing Infrastructure (AF)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Average	70	52	40	16	2	1	0	0	2	9	30	45	268
Maximum	273	653	246	142	31	17	9	4	72	59	199	215	1,232

The City of Monterey is a member city in the Monterey Regional Stormwater Management Program,[12] which collectively monitors systems in Northern Monterey County under the statewide General Permit for the Phase II Small Municipal Separate Storm Sewer System (MS4) Program, and is described in detail at the State Water Resources Control Board website.[13]

2.5.5 CalAm Monterey District Water Supply Facilities

Several existing CalAm infrastructure facilities would be used to extract purified recycled water produced by the Proposed Project from the Seaside Groundwater Basin and convey the water to urban customers.

2.5.5.1 Seaside Groundwater Basin Extraction and Treatment Facilities

CalAm's operations within the Seaside Groundwater Basin are described above in **Section 2.3.2.2** and in more detail in **Section 4.10, Hydrology/Water Quality: Groundwater.**

2.5.5.2 Aquifer Storage and Recovery Project

Under the Proposed Project, existing CalAm wells, including four wells used for the Monterey Peninsula Aquifer Storage and Recovery Project, would be used to extract purified recycled water from the Seaside Groundwater Basin. **Figure 2-17, Aquifer Storage and Recovery Project Location Map,** shows the location of the Aquifer Storage and Recovery wells in the Seaside Groundwater Basin. The Monterey Peninsula Aquifer Storage and Recovery Project is cooperatively implemented by the Water Management District and CalAm, and involves the diversion of excess winter/spring flows from the Carmel River system for recharge of, storage in and subsequent recovery from the Seaside Groundwater Basin. Carmel River water is diverted when there is excess water in the River (i.e., minimum flow criteria are met), treated by CalAm to potable drinking water standards, conveyed in the CalAm distribution system, and then injected into the Santa Margarita aquifer of the Seaside Groundwater Basin via four existing Aquifer Storage and Recovery wells located at two

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[12] See www.montereysea.org for program description and details

[13] State Water Resources Control Board, accessed January 2014. http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Aquifer Storage and Recovery facilities. The injected water is stored within the aquifer and subsequently extracted and distributed by CalAm for use during dry periods. The overall objective of the Aquifer Storage and Recovery Project is to facilitate the conjunctive use of water supplies in the Carmel River system and Seaside Groundwater Basin that would benefit the resources of both systems.

Aquifer Storage and Recovery operations generally consist of three components or phases: (1) injection of drinking-quality water into the aquifer through the Aquifer Storage and Recovery wells; (2) storage of the injected water within the aquifer; and, (3) recovery of the stored water by pumping at one or more of the Aquifer Storage and Recovery wells or at CalAm production wells within the basin. Periodic samples of the injected, stored, and recovered waters are collected from the Aquifer Storage and Recovery wells and associated monitoring wells and analyzed for a variety of water-quality constituents pursuant to requirements of the Central Coast Regional Water Quality Control Board oversight of the Aquifer Storage and Recovery Project <u>and the extracted groundwater must also meet SWRCB Division of Drinking Water drinking water regulations</u>..

The first phase (Phase 1) of the Aquifer Storage and Recovery Project included two <u>MPWMD</u> injection/extraction wells at the Santa Margarita site and was approved in 2006 and operational in 2007; however, test injections began in 2001 and test extractions began in 2003. Phase 1 operational injections began in Water Year 2007-2008 and extractions from the Aquifer Storage and Recovery wells for use in the CalAm system began in Water Year 2010-2011. Phase 2 of the project has been constructed and includes operation of two additional permanent wells (the 3rd and 4th Aquifer Storage and Recovery Wells, or ASR-3 and ASR-4) at the Seaside Middle School site. The new ASR wells that will be operational within 2015 or early 2016 and will serve as additional extraction wells from which CalAm can extract existing groundwater in the Seaside Basin, and in the future, they may be used to extract the water that would be injected by the Proposed Project, mixed with existing native groundwater and other waters. In addition, if the Monterey Peninsula Water Supply Project desalination project is built, the wells would extract desalinated water that is proposed to be injected into the Seaside Basin using the 5th and 6th ASR wells that are proposed to be built as part of that project.

2.5.5.3 CalAm Monterey District Distribution Facilities and Demands

Under the Proposed Project, existing CalAm distribution systems would be used to convey the purified recycled water extracted from the Seaside Basin to CalAm's customers. CalAm's Monterey District includes a "main" system and several satellite systems, and has approximately 38,500 connections. CalAm provides water service to most of the Monterey Peninsula, including the cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside, and the unincorporated areas of Carmel Highlands, Carmel Valley, and Pebble Beach via the Monterey District's water distribution system. This is referred to as the Main Monterey System and its location is shown in **Figure 2-1, Project Location Map**. In addition to the main system, CalAm also operates the following satellite water systems that provide water to customers within Monterey County: Bishop/Pasadera, Ambler, Hidden Hills, Ryan Ranch, Toro, Chualar, and Ralph Lane. CalAm's Monterey District service area is supplied by the Carmel River system and groundwater from the coastal subareas of the Seaside Groundwater Basin. The Bishop/Pasadera, Hidden Hills, and Ryan Ranch systems also rely on groundwater from the Seaside Groundwater Basin. The remaining systems (Toro, Chualar, and Ralph Lane) do not rely on either the Carmel River or the Seaside Basin.

Table 2-7, CalAm Monterey District Service Area Demand shows total annual demand in CalAm's Monterey system over the 5-year period from 2007 to 2011. Annual demand during the time period of 2007 – 2011 ranged from 11,989 AF to 14,644 AF, and averaged 13,291 AF. The maximum annual demand during this time period (14,644 AF in 2007) occurred before the economic downturn (estimated to have occurred in 2008), before the 3-year drought of 2012 - 2015, and before implementation of additional water conservation measures which were initiated in response to the SWRCB Cease and Desist Order.

Table 2-7
CalAm Monterey District Service Area Demand

Calendar Year (Jan-Dec)	Total Annual Demand (AF)
2007	14,644
2008	14,460
2009	13,192
2010	12,171
2011	11,989
5-Year Average	**13,291**

The following are the components of CalAm's forecasted total customer demand in its Monterey District of 15,296 acre-feet per year, as described by the California Public Utilities Commission in the Plant Size and Operation Agreement for CalAm's Monterey Peninsula Water Supply Project (California Public Utilities Commission, 2013):[14]

- 13,290 AF 5-year customer demand
- 500 AF for economic recovery
- 325 AF for Pebble Beach buildout
- 1,181 AF for legal lots of record

Based on total forecasted demand of 15,296 acre-feet per year, CalAm estimates that new water supplies of 9,752 acre-feet per year would be required, along with use of the following existing sources:

- Supply from Carmel River Wells - 3,376 AF
- Extraction from Seaside Groundwater Basin – 774 AF[15]
- Average Aquifer Storage and Recovery Capacity - 1,300 AF
- Sand City Plant Firm Yield to CalAm – 94 AF

Because the CalAm system was initially built to deliver water from Carmel Valley to the Monterey Peninsula cities, a hydraulic trough currently exists in the CalAm peninsula distribution system that prevents water delivery at adequate quantities from the Seaside

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[14] California Public Utilities Commission. Filings for Proceeding A1204019 (referred to as one of the "Settlement Agreements") filed 7/31/13) and found at http://www.watersupplyproject.org/Websites/coastalwater/files/Content/3877658/Sizing_Agreement_PDFA.pdf, accessed November 2013.

[15] CalAm and the Seaside Groundwater Basin Watermaster reached an agreement on the replenishment of CalAm's historical overpumping of the Seaside Groundwater Basin per the adjudication decision. The agreement requires California American Water to reduce extraction from the Basin by 700 acre-feet of water annually on a 5-year average basis for an estimated twenty five years. The reduced annual extraction volume from the Seaside Groundwater Basin would be 774 acre-feet. The reduction in extraction volume is not treated as demand but is instead treated as a reduction in supply. (Joe Oliver, MPWMD, October 30, 2014)

Groundwater Basin to most of Monterey, and all of Pacific Grove, Pebble Beach, Carmel Valley, and the City of Carmel areas. The hydraulic trough is an area of the CalAm distribution system with very small pipe diameters and very low elevation such that the required high flow rates of water and high pressures needed to convey water from the north between two pressure zones of the system cannot be achieved with the current infrastructure. This system deficiency would need to be addressed regardless of whether the Proposed Project is implemented by itself, CalAm's Monterey Peninsula Water Supply Project with the full-size desalination plant is implemented without the GWR Project, or the variant to the Monterey Peninsula Water Supply Project that includes both a smaller desalination plant and the GWR Project is implemented.

2.5.5.4 CalAm Historic Water Production

Table 2-8, CalAm Water Production for Water Years 2006 – 2014 (in Acre-Feet) presents the CalAm water production for their Monterey District Service Area, including the "Main System" and the "Laguna Seca Subarea" (LSS) that draws water exclusively from the Seaside Basin.

Table 2-8

CalAm Water Production for Water Years 2006 – 2014 (in Acre-Feet)

	Production by Sources						Production by CalAm System	
Water Year	**Sand City Desal Project**	**ASR Projects Recovery**	**Seaside Basin Coastal Subareas**	**Seaside Basin Laguna Seca Subarea**	**Carmel Valley Alluvial Aquifer**	**Carmel River**	**Main System (all sources except LSS)**	**All Sources Total (Main System plus LSS)**
2006	--	0	3,263	446	10,542	0	13,805	14,251
2007	--	0	3,625	435	10,443	0	14,068	14,503
2008	--	60	3,329	534	10,600	0	13,989	14,523
2009	--	182	2,449	516	10,285	0	12,916	13,432
2010	46	0	3,283	430	8,673	0	12,002	12,432
2011	276	1,111	3,034	382	7,441	0	11,862	12,244
2012	242	1,224	2,701	370	7,515	0	11,682	12,052
2013	188	644	2,700	377	7,713	0	11,245	11,622
2014	179	0	2,871	362	7,744	0	10,793	11,154
SUMMARY STATISTICS FOR SELECTED PERIODS								
Water Years 2006-2014								
Mean	NA	358	3,028	428	8,995	NA	12,485	12,913
Median	NA	60	3,034	430	8,673	NA	12,002	12,432
Minimum	NA	0	2,449	362	7,441	NA	10,793	11,154
Maximum	NA	1,224	3,625	534	10,600	NA	14,068	14,523
Water Years 2010-2014								
Mean	186	596	2,918	384	7,817	NA	11,517	11,901
Median	188	644	2,871	377	7,713	NA	11,682	12,052
Minimum	46	0	2,700	362	7,441	NA	10,793	11,154
Maximum	276	1,224	3,283	430	8,673	NA	12,002	12,432

NOTES:
(1) ASR = Aquifer Storage and Recovery; ~~CVA = Carmel Valley Aquifer; CR = Carmel River;~~ LSS = Laguna Seca Subarea of Seaside Basin. Carmel River System production values include reductions for water produced for injection into the Seaside Basin.

(2) Carmel River System and Seaside Basin production values were compiled by the MPWMD from monthly production reports submitted by the California American Water (Cal-Am), Monterey Division.
(3) "NA" in the "Summary Statistics for Selected Periods" sections indicate "Not Applicable" when production data for that source are not included for the entire indicated period.
Source: MPWMD, 2014.

2.6 OVERVIEW OF PROPOSED PROJECT FACILITIES AND OPERATIONS

2.6.1 Proposed Project Facilities Overview

This and the following sections describe the new physical components of the Proposed Project. **Figure 2-18, Proposed Project Facilities Overview** shows an overview of the Proposed Project facilities and **Figures 2-19 and 2-20** provide overall project process flow schematics to illustrate the existing and proposed facilities and relevant water flow paths by type of water. **Figure 2-19, Proposed Project Flow Schematic – Source Water to Treatment**, shows the flow paths and facilities to be used for collection and conveyance of source water to the Regional Treatment Plant. **Figure 2-20, Proposed Project Flow Schematic –Regional Treatment Plant**, shows the flows into and out of the Regional Treatment Plant. The following project components are described in the subsections below:

- *Source water diversion and storage* – facilities to enable diversion of new source waters to the existing municipal wastewater collection system and conveyance of those waters as municipal wastewater to the Regional Treatment Plant to increase availability of wastewater for recycling. Modifications would also be made to the existing Salinas Industrial Wastewater Treatment Facility to allow the use of the existing treatment ponds for storage of excess winter source water flows and later delivery to the Regional Treatment Plant for recycling.
- *Treatment facilities at Regional Treatment Plant* – use of existing primary and secondary treatment facilities at the Regional Treatment Plant, as well as new pre-treatment, advanced water treatment (AWT), product water stabilization, product water pump station, and concentrate disposal facilities, and modifications to the Salinas Valley Reclamation tertiary treatment plant.
- *Product water conveyance* – new pipelines, booster pump station, appurtenant facilities along one of two optional pipeline alignments to move the product water from the Regional Treatment Plant to the Seaside Groundwater Basin injection well facilities.
- *Injection well facilities* – new deep and vadose zone wells to inject Proposed Project product water into the Seaside Groundwater Basin, along with associated back-flush facilities, pipelines, electricity/ power distribution facilities, and electrical/motor control buildings.
- *Distribution of groundwater from Seaside Groundwater Basin* – new CalAm distribution system improvements needed to convey extracted groundwater and deliver it to CalAm customers. These same CalAm distribution improvements also would be needed if CalAm were to implement the Monterey Peninsula Water Supply Project, which is undergoing separate CEQA review.

2.6.2 Proposed Project Operations Overview

The Proposed Project would operate with annual and seasonal variations based on the amount of available runoff, the water year type, the varying irrigation demand for recycled water, and the amount of water stored in the Seaside Groundwater Basin as a drought reserve each year.

The primary project objective is to replenish the Seaside Groundwater Basin to produce high quality water to replace CalAm water supply as required by State Orders. The ability of the project to meet the primary project objective of providing CalAm extractions of 3,500 AFY would not depend on water year type (wet, normal, or dry).

The Proposed Project would also increase the amount of recycled water available for crop irrigation within the existing CSIP service area by approximately 4,500 to 4,750 AFY during normal and wet years, and by up to 5,900 AFY during drought conditions. For MRWPCA to secure the necessary rights and agreements to use the source waters needed for the Proposed Project, preliminary negotiations with stakeholders indicate that MRWPCA also would need to increase the amount of recycled water provided to the CSIP area. This amount is within the total permitted capacity of the Salinas Valley Reclamation Plant of 29.6 mgd. Irrigation demands vary seasonally, peaking in the spring and summer months, and also by water year type, increasing in dry and hotter years. Irrigation demand can also change in response to changes in cropping patterns and irrigation practices. The Salinas Valley Reclamation Plant produces tertiary-treated, disinfected water supply (recycled water) from treated municipal wastewater for the CSIP. Peak irrigation demands in the CSIP system exceed the amount of available treated municipal wastewater, so additional water is supplied from the Salinas River and the Salinas Groundwater Basin. The Proposed Project would increase the availability of recycled water during the peak demand periods by providing new sources of water supply to the Salinas Valley Reclamation Plant. The Project also would increase the availability of recycled water for crop irrigation during low demand periods by modifying the Salinas Valley Reclamation Plant to allow production and delivery at lower daily rates, thus further reducing pumping from supplementary groundwater wells.

In addition, to better accommodate variable annual crop irrigation demands for recycled water, an additional 200 AFY would be produced and injected into the Seaside Groundwater Basin during most years to develop a drought reserve of up to 1,000 acre-feet of stored water. This would allow MRWPCA to reduce deliveries of product water to the Seaside Groundwater Basin during drought years, while still enabling CalAm to pump 3,500 AFY from the Seaside Groundwater Basin by using the reserved water. By reducing deliveries of product water to the Seaside Groundwater Basin during drought years, MRWPCA would be able to increase deliveries of recycled water to growers by a commensurate amount.

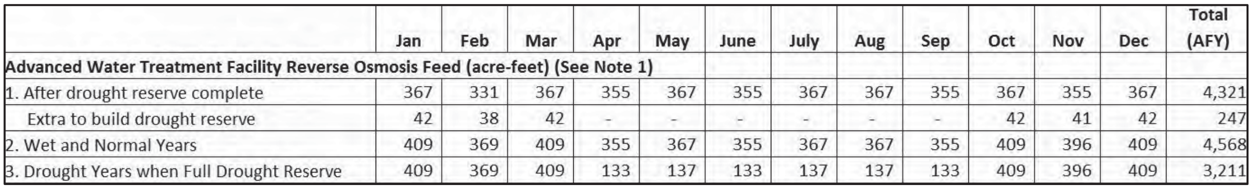
The Proposed Project's AWT Facility would be designed and constructed to allow production rates from 1.3 mgd (900 gpm) to 4.0 mgd (2,700 gpm). During a wet or normal year, the AWT Facility would operate at an average rate of 3.5 mgd during the summer months (April to September). If the drought reserve is full (1,000 acre-feet additional have been "deposited" in the Seaside Groundwater Basin), the winter production rate would remain 3.5 mgd. If the drought reserve is not full, the winter production rate would be increased to 4.0 mgd to allow the production of an additional 200 AFY. During certain dry years, the AWT Facility production rate would be decreased in the summer months, to rates as low as 1.3 mgd, depending upon the amount of water "deposited" in the drought reserve and the demands of the CSIP irrigators. The Proposed Project would produce enough advanced treated water in each year so that the amount of injected water plus the amount of "withdrawn" drought reserve equals the 3,500 AFY extracted by CalAm. Water supplies not used for the AWT Facility would be used by the Salinas Valley Reclamation Plant to produce additional recycled water for the CSIP.

Table 2-9, Proposed Project Monthly Flows for Various Flow Scenarios summarizes typical flow operations for the AWT Facility based on seasonal flow and demand conditions. Although presented as fixed water year types, actual system operation would require daily or weekly management of the production rates to address the variability in irrigation demands and supply availability. Source water diversions would be similarly managed to maximize water availability during the peak irrigation season, as discussed in **Section 2.7.1**.

Table 2-9

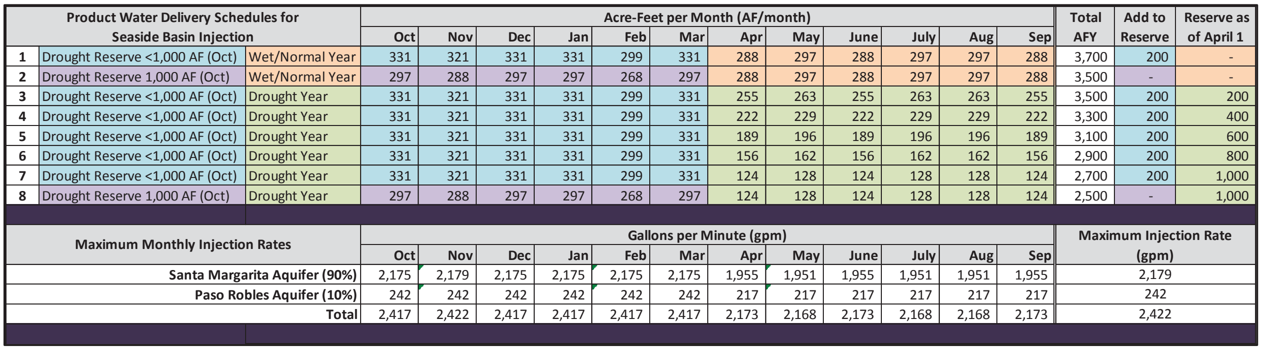
Proposed Project Monthly Flows for Various Flow Scenarios

AWT Facility Influent/Feed



	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total (AFY)
Advanced Water Treatment Facility Reverse Osmosis Feed (acre-feet) (See Note 1)													
1. After drought reserve complete	367	331	367	355	367	355	367	367	355	367	355	367	4,321
Extra to build drought reserve	42	38	42	-	-	-	-	-	-	42	41	42	247
2. Wet and Normal Years	409	369	409	355	367	355	367	367	355	409	396	409	4,568
3. Drought Years when Full Drought Reserve	409	369	409	133	137	133	137	137	133	409	396	409	3,211

Purified Recycled Water Delivery



Product Water Delivery Schedules for Seaside Basin Injection			Acre-Feet per Month (AF/month)												Total	Add to	Reserve as
			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	AFY	Reserve	of April 1
1	Drought Reserve <1,000 AF (Oct)	Wet/Normal Year	331	321	331	331	299	331	288	297	288	297	297	288	3,700	200	-
2	Drought Reserve 1,000 AF (Oct)	Wet/Normal Year	297	288	297	297	268	297	288	297	288	297	297	288	3,500	-	-
3	Drought Reserve <1,000 AF (Oct)	Drought Year	331	321	331	331	299	331	255	263	255	263	263	255	3,500	200	200
4	Drought Reserve <1,000 AF (Oct)	Drought Year	331	321	331	331	299	331	222	229	222	229	229	222	3,300	200	400
5	Drought Reserve <1,000 AF (Oct)	Drought Year	331	321	331	331	299	331	189	196	189	196	196	189	3,100	200	600
6	Drought Reserve <1,000 AF (Oct)	Drought Year	331	321	331	331	299	331	156	162	156	162	162	156	2,900	200	800
7	Drought Reserve <1,000 AF (Oct)	Drought Year	331	321	331	331	299	331	124	128	124	128	128	124	2,700	200	1,000
8	Drought Reserve 1,000 AF (Oct)	Drought Year	297	288	297	297	268	297	124	128	124	128	128	124	2,500	-	1,000

Maximum Monthly Injection Rates	Gallons per Minute (gpm)												Maximum Injection Rate
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	(gpm)
Santa Margarita Aquifer (90%)	2,175	2,179	2,175	2,175	2,175	2,175	1,955	1,951	1,955	1,951	1,951	1,955	2,179
Paso Robles Aquifer (10%)	242	242	242	242	242	242	217	217	217	217	217	217	242
Total	2,417	2,422	2,417	2,417	2,417	2,417	2,173	2,168	2,173	2,168	2,168	2,173	2,422

Note 1: These estimated flows exclude the membrane filtration backwash quantities that would be recirculated back to the Regional Treatment Plant headworks and thus would not be considered to be new flows.

Operation of the Proposed Project facilities would require some additional staff at the MRWPCA Regional Treatment Plant and administrative office. The AWT Facility would require up to five personnel to operate the facility 24-hours a day, 7-days a week. The Salinas Valley Reclamation Plant would operate with the same number of staff as currently assigned, but operations would extend into the wet season. The source water diversion and product water conveyance and injection facilities would not require on-site staff, but would require periodic site visits and maintenance activities. These are discussed in detail in the sections below regarding each component.

The Proposed Project would require an estimated 10,952 megawatt-hours per year (mW-hr/yr). Power use for the Crop Irrigation component would peak during drought years when additional recycled water is being produced. Electrical power at the existing MRWPCA facilities comes from solar panels and from generators running on a mix of methane (from the Regional Treatment Plant) and natural gas (from PG&E), with back-up electrical service from PG&E. Additional power would be generated using increased methane from processing of new source water, and increased purchase of natural gas from PG&E. Electrical power for the source water diversion facilities, product water booster pump station, and injection well facilities would be purchased from PG&E.

Table 2-10, Overview of Typical Facility Operations – Proposed Project provides an overview of typical facility operations, truck trips and employees under the Proposed Project. **Table 2-11, Overview of Proposed Project Electricity Demand (all in megawatt-hours per year)** summarizes the power demands of the Proposed Project.

Table 2-10
Overview of Typical Facility Operations – Proposed Project

Proposed Project Component Site	Trucks (per day)	Employees	Employee Trips (per day)	Operations Schedules
Source Water Diversion and Storage Sites				
Salinas Pump Station Diversion	0	0	0	24 hours per day, 365 days per year. No new operations/ maintenance staff expected beyond existing MRWPCA staff.
Salinas Treatment Facility Storage and Recovery	0	0	0	24 hours per day, 365 days per year. No new operations/ maintenance staff expected beyond existing City staff.
Reclamation Ditch and Tembladero Slough Diversions	1	1	2	24 hours per day, 365 days per year. For Reclamation Ditch one trip up to three times per week. For Tembladero no new operations/maintenance staff expected beyond existing MRWPCA staff.
Blanco Drain Diversions (in this case the pump station site)	0	0	0	24 hours per day, 365 days per year. No new operations/ maintenance staff expected beyond existing County and MRWPCA staff.
Lake El Estero Diversion	0	0	0	24 hours per day for urban runoff, wet season (typically ~~November~~ October through April) dependent on pipe and pump station capacity and weather. No new operations and maintenance staff expected beyond existing City of Monterey staff.
Treatment Facilities at Regional Treatment Plant				
All new and modified treatment facilities, including AWT Facility, Brine Mixing Facility, Product Water Pump Station and SVRP Modifications	2	5	10	24 hours per day, 365 days per year (10% offline time for maintenance)
Product Water Conveyance				
Pipelines, appurtenant facilities, and Booster Pump Station	1	1	2	24 hours per day, 365 days per year (10% offline time for maintenance)
Injection Well Facilities				
- Injection Wells (4 clusters of 2), each includes a deep injection well, a vadose zone well, and a motor control/electrical building - Monitoring wells (six clusters of 2) - Back-flush water pipeline, product water conveyance pipelines, and electrical conduit under new roadways to each site	0	2	4	24 hours per day, 365 days per year (each well assumed to be inoperable 20% of the year for back-flushing and maintenance)
Total without the CalAm components	**4**	**9**	**18**	
CalAm Distribution of Seaside Groundwater Basin Water via the CalAm System, including the proposed new Monterey and Transfer Pipelines	0	0	4	24 hours per day, 365 days per year
Total with the CalAm components	**4**	**9**	**22**	

Table 2-11
Overview of Proposed Project Electricity Demand (all in megawatt-hours per year)

Source Water Diversion and Storage Sites (Source: Vinod Badani, E2 Consulting, October 2014, except as noted)	
Existing MRWPCA Wastewater Collection System Pump Stations (increased pumping for source water collection) (Source: Bob Holden, MRWPCA, October 2014)	1,100
Proposed Salinas Pump Station Diversions (lighting, SCADA, misc. electricity)	10
Proposed Salinas Industrial Wastewater Treatment Plant Storage and Recovery Component (pumping, lighting, SCADA, misc. electricity)	224
Existing Salinas Treatment Facility and Stormwater Operations (reduction of pumping, Ron Cole, February 2014 modified by MRWPCA staff October 2014)	(1,875)
Proposed Reclamation Ditch Diversion (pumping, lighting, SCADA, misc. electricity)	250
Proposed Tembladero Slough Diversion (pumping, lighting, SCADA, misc. electricity)	461
Proposed Blanco Drain Diversion (pumping, lighting, SCADA, misc. electricity)	731
Proposed Lake El Estero Diversion (lighting, SCADA, misc. electricity)	10
Treatment Facilities at Regional Treatment Plant (Source: Bob Holden, October 2014)	
Existing Primary and Secondary Processes (existing on-site cogeneration facility would provide a reduction in this value, see below) (9,900 AFY more wastewater flows through treatment processes)	3,673
Existing Salinas Valley Reclamation Plant (existing plant operations use solar array electricity, which has reduced electricity demand by up to 1,400 mWhr/yr) (4,260 AFY more crop irrigation water produced)	1,300
AWT Facility (new treatment facilities, not including product water pumping; assumes 3,700 AFY of water production to build drought reserve; demand will be less when Drought Reserve is at full capacity and when Drought Reserve is being used by CSIP)	7,007
CSIP Supplemental Wells **(Source: Bob Holden, MRWPCA, October 2014)**	
Reduction of use of CSIP Supplemental Wells by 4,260 AFY	(1,900)
Product Water Conveyance (Source: TG Cole, October 2014)	
Pumping of product water to Injection Well Facilities under either option (RUWAP or Coastal)	1,912
Injection Well Facilities (Source: Vinod Badani, E2 Consulting Engineers, October 2014)	
Back-flush of four (4) deep injection wells, lighting, HVAC, meters, instruments, SCADA	147
CalAm Distribution System Changes (Source: CalAm, 2014)	
Increase by moving 3,500 AFY extractions from Carmel River to Seaside Basin wells	630
Proposed New Electricity Generation at Existing Cogeneration Facility	**(2,726)**
TOTAL NET NEW ELECTRICITY DEMAND (in megawatt-hours per year)	10,952

2.7 SOURCE WATER

2.7.1 Overview of Source Water Approach

The preliminary determination of feasibility of the Proposed Project required technical investigations to estimate the regulatory and design requirements, and preliminary capital and operational costs of Proposed Project facilities. One of the key feasibility/planning actions was to assess the ability for the Proposed Project to obtain supplemental source waters to augment existing secondary-treated wastewater flows available to the Project. Water supply sources considered included urban stormwater and dry-weather runoff, surface water diversions from water bodies receiving agricultural tile drainage, and use of industrial wastewater currently treated by the City of Salinas. Additional technical studies were prepared for those sources identified as feasible in the initial studies.

Previous interagency agreements established entitlements to recycled water produced from the existing municipal wastewater flows to the Regional Treatment Plant. As source flows for the Proposed Project were studied and the seasonal variability of each was understood, the stakeholder agencies entered into a Memorandum of Understanding Regarding Source Waters and Water Recycling (MOU) provided in **Appendix B rev**. The Parties to the MOU are the Monterey Regional Water Pollution Control Agency, the Monterey County Water Resources Agency, the City of Salinas, the Marina Coast Water District, and the Monterey Peninsula Water Management District. The MOU is an agreement to "negotiate a Definitive Agreement to establish contractual rights and obligations of all Parties," that would include (1) protection of Marina Coast Water District's recycled water right entitlement, (2) provision of up to 5,290 AFY of recycled water to Monterey County Water Resources Agency for the CSIP, and (3) provision of 3,500 AFY of purified recycled water for injection into the Seaside Groundwater Basin and extraction by CalAm. The MOU also includes provisions for creation of a drought reserve by allowing the GWR Features to produce, convey and inject up to 200 AFY of additional purified recycled water during wet and normal years. The MOU reflects the stakeholder agencies' positions regarding the combined benefits and conditions that would be required to secure the necessary rights and agreements to use the source waters needed for the Proposed Project.

Based on the preliminary feasibility studies and the MOU, the following sources of water are included for collection and use by the Proposed Project:

- Monterey Peninsula urban stormwater and runoff (in particular, the Proposed Project includes diversion and use of water that currently flows into Lake El Estero and then is pumped by the City of Monterey, or allowed to flow by gravity, through storm drain pipelines to Del Monte Beach);[16]

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[16] Projects that propose to capture stormwater flows from other Monterey Peninsula watersheds, including areas of the cities of Pacific Grove and Monterey that flow to the Areas of Special Biological Significance in the Monterey Bay, and divert them to the MRWPCA wastewater collection system are assumed to occur with or without implementation of the Proposed Project. Although other stormwater flows from the Monterey Peninsula are referenced in the MOU for Source Waters and Water Recycling, diversion and use of these flows are assumed to occur independently from the Proposed Project and have independent utility (i.e., to reduce stormwater containing pollutants from flowing into the portion of the ocean that is an Area of Special Biological Significance) and thus the implementation and assessment of impacts of other stormwater diversion project(s) are included as

- City of Salinas urban stormwater and runoff from the southwest portion of the city that is currently discharged into the Salinas River near Davis Road via a 66-inch outfall line;
- Salinas agricultural wash water, 80 to 90% of which is water used for washing produce, that is currently conveyed to the Salinas Treatment Facility for treatment (aeration) and disposal by evaporation and percolation;
- Urban and agricultural runoff and tile drainage water from the Reclamation Ditch and Tembladero Slough (to which the Reclamation Ditch is tributary);[17]
- Water from the Blanco Drain, a man-made reclamation ditch that collects drainage from approximately 6,400 acres of agricultural lands near Salinas;[18]
- Municipal wastewater from MRWPCA member agencies that is treated with existing primary and secondary processes at the Regional Treatment Plant and would otherwise be discharged to the Pacific Ocean (i.e., not treated to a tertiary level for agricultural irrigation).

To maximize the ability to use these sources, two existing facilities would be modified:

- Modifications to the existing Salinas Valley Reclamation Plant to enable the plant to run at less than 5 mgd, and
- Addition of a pipeline and pump station at the Salinas Treatment Facility and slip-lining of an existing 33-inch industrial wastewater pipeline between TP1 and the Salinas Treatment Facility to allow storage and recovery of winter agricultural wash water and south Salinas stormwater.

This combination of source waters and modifications to existing treatment facilities would be capable of achieving the project objectives at a reasonable cost. In particular, the proposed source waters except Blanco Drain diversions would use existing infrastructure facilities with available capacity for conveyance purposes, thus minimizing capital costs and environmental impacts.

2.7.1.1 Summary of Source Water Flow Availability for Proposed Project

Table 2-12, Source Waters Flows: Existing and Assumed Available for Proposed Project (in AFY) summarizes the results of the Water Management District and MRWPCA's analysis of the data and assumptions used to estimate source water availability and use. These estimates have been used to identify the range of flows affecting design of the Proposed Project facilities. **Appendices B <u>rev</u>** and **C <u>rev</u>** include the assumptions regarding source water availability, including estimates by month to develop the range of potential

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cumulative project(s) (see **Section 4.1, Environmental Setting, Impacts, and Mitigation Measures,** of this Draft EIR).

[17] The amount of water has been estimated based on assuming water available for diversion for the Proposed Project would be in excess of required fish passage flows and under the flow rate that can be conveyed to the Regional Treatment Plan using the existing municipal wastewater collection system.

[18] The Blanco Drain is the only source of supply not located near an existing wastewater collection facility which could be used to convey flows to the Regional Treatment Plant. Development of this source would require not only a new pump station, but also a pipeline crossing the Salinas River. The pipeline may extend to the Regional Treatment Plant headworks or may connect to the gravity portion of the Salinas interceptor (to be determined during detailed design).

flows for use in designing Proposed Project facilities (for Advanced Water Treatment Facility, Product Water Conveyance, and Injection Well Facilities) to meet the primary Proposed Project goal of delivering purified recycled water to the Seaside Groundwater Basin, as well as the secondary Project goals of increasing crop irrigation water for growers in the CSIP area and establishing a drought reserve of up to 1,000 AF (Schaaf & Wheeler, 2015c).

Table 2-12
Source Waters Flows: Existing and Assumed Available for Proposed Project (in AFY)

Type of Source Water:	**Definitions of "Existing" Flows (in AFY)**							**Projected future flows in 2017 (AFY)**	**Proposed Project Maximum Use of Source Water Flows, (AFY) (Note 2)**
	2012 (actual)	**2013 (actual)**	**Historical Average Flows (averaging period)**						
			2012-13 *(2-yr average)*	2009-13 *(5-yr average)*	2007-13 *(7-yr average)*	2004-13 *(10-yr average)*	All data (see below)		
Excess/Unused Regional Treatment Plant Municipal Effluent (MRWPCA, Regional Treatment Plant flow monitoring data, January 2014)	9,714	4,621	7,183	8,225	8,704	9,457	10,300 (1999-2013)	6,242 (Note 1)	3,000 to more than 5,000
Agricultural Wash Water Flows (Source: City of Salinas and MRWPCA, 2014)	3,058	3,228	3,143	2,676	2,579	NA (Note 3)	2,579 (2007-13)	3,732 (Note 1)	2,579
City of Salinas Urban Runoff to Salinas River (Source: Schaaf & Wheeler, 2015a)	229	19	124	196	165	176	225 (1932-2013)	225	
Reclamation Ditch at Davis Road (Source: Schaaf & Wheeler, 2015b)	6,759	1,965	4,362	7,034	6,374	7,482	7,159 (2003-13)	7,159	1,522
Tembladero Slough at Castroville (Source: Schaaf & Wheeler, 2015b)	9,190	2,610	5,900	9,536	8,531	10,030	9,593 (2003-13)	9,593	1,135
Blanco Drain Diversions (Source: Schaaf & Wheeler, 2014b)	NA (Note 5)	NA (Note 5)	NA (Note 5)	NA	NA	NA	2,620 (2010-12)	2,620 (Note 5)	2,620
Lake El Estero Storage Management Water (Source: Schaaf & Wheeler, 2014a)	65	0	33	66	55	60	87 (1952-2013)	87	87
TOTALS (Note 6)	**22,256**	**10,478**	**16,383**	**21,557**	**20,034**	**NA (Note 4)**	**25,404**	**NA**	**9,311 (Note 6)**

Notes:

1. Projection of flows available in first year of Proposed Project operation 2017 (See **Appendix B rev**).
2. Source: Schaaf & Wheeler/Monterey Peninsula Water Management District, 2015 (see **Appendix B rev**).
3. Flows not available for years prior to 2007.
4. Due to lack of data regarding agricultural wash water prior to 2007 and recent trends, these numbers could not be summed to provide a total of source water flows for this averaging period.
5. Blanco Drain flows calculated based on seasonal pumping records (April to November)
6. The total use of source water would be less than the sum of all source waters due to seasonal nature of the demands and losses due to Salinas Treatment Facility Storage and Recovery. The analysis assumes that new source water that exceeds the amount used by the Proposed Project for recycling would be disposed via the MRWPCA existing ocean outfall. The amount of effluent to be disposed to the MRWPCA ocean outfall would be less with Proposed Project than current conditions as shown in **Appendix B rev**.

NA = Not available.

2.7.1.2 Source Water Operation: Diversion, Treatment and Use

The availability of some of the sources of water supplies for the Proposed Project would vary inversely with the Project's water demands. The sources of supply that capture rainfall (urban runoff and surface water diversions within urban areas in their watershed) peak during periods of low irrigation demands, and have minimal or no available flows during periods of peak irrigation demands. By contrast, two sources of supply, agricultural wash water and secondary treated municipal wastewater, have some seasonal variability but are available year-round.

To address the seasonality of supplies and demands, the use of source water would be prioritized by source, and in some cases managed by season. **Table 2-13, Source Water Use Scenarios, including Priority, Seasonality, and Use by Project Phase and Drought Reserve Status** lists proposed sources by priority of use wherein excess unused wastewater is assumed to be used first as the most efficient source water to collect, convey, and treat. Detailed use scenarios are provided in **Appendix B rev** to demonstrate some potential operational scenarios that may be used in various water year types to optimize the Proposed Project by prioritizing source waters for energy efficiency and reduction of ocean discharges (Schaaf & Wheeler, 2015c).

Treated municipal wastewater currently is used to produce recycled water at the Salinas Valley Reclamation Plant for crop irrigation. Recycled water users under previous agreements have the first right to this supply. Under the Proposed Project, at times when unused treated municipal wastewater is not needed for crop irrigation, and instead would otherwise be discharged through the ocean outfall, it would become the first priority source of supply for the AWT Facility, with a goal of minimizing the amount of flow discharged to the ocean and energy use by the Proposed Project.

Agricultural wash water, which is currently treated at the Salinas Treatment Facility, is available year-round and is the most reliable source of new water supply for the Project. It would be diverted to the Regional Treatment Plant during peak irrigation time periods and managed to meet the peak summer demand season by storing winter flows in the existing ponds at the Salinas Treatment Facility. In the summer months, both the incoming agricultural wash water and the stored stormwater would be directed to the Regional Treatment Plant, allowing production of advanced treated water for groundwater injection and increased recycled water production for CSIP.

Urban stormwater runoff may be diverted to the sanitary sewer collection system for minimal cost and without a water rights permit, and is therefore the next priority source of supply for the Proposed Project. However, when this supply is most available, irrigation demands are low and secondary-treated municipal wastewater would typically be available in adequate quantities to meet project objectives. If that is the case, urban runoff at Lake El Estero may not be diverted, and urban runoff from the City of Salinas would not be routed to the Salinas Treatment Facility for seasonal storage. Runoff from summer storms would be diverted from the City of Salinas stormwater system when available.

Table 2-13
Source Water Use Scenarios, including Priority, Seasonality, and Use by Project Phase and Drought Reserve Status

				Projected Use Scenarios by Type of Operational Year (AFY)		
Priority	**Source**	**Seasonal Availability**	**Usage Period**	**While Building Drought Reserve**	**Drought Reserve is Full at 1,000 AFY**	**During Years when CSIP Uses Drought Reserve**
1	Unused Treated Municipal Wastewater	October through March	When available	1,992	1,787	1,503
2	Agricultural Wash Water (See Note 1)	Year-round	Store at Salinas Treatment Facility for summer	2,579	2,579	2,362
3	Salinas Urban Stormwater Runoff (See Note 1)	October through April				
4	Reclamation Ditch at Davis Road	Year-round, higher in October through April	When available	721	721	1,071
5	Blanco Drain Pump Station	Year-round, higher in April through September	When available	1,268	1,020	2,003
6	Tembladero Slough At Castroville	Year-round, higher in October through April	When available	0	0	478
7	Monterey Stormwater at Lake El Estero (See Note 2)	October through April	When available	0	0	0

Notes:
1. The amount of Agricultural Wash Water and Salinas Urban Stormwater Runoff source water use shown in this table are combined because they will be mixed, stored, and diverted to the Regional Treatment Plant together. The ability of the Proposed Project to recycle the full amount available (shown in Table 2-12) would be reduced due to the storage and recovery of these waters at the Salinas Treatment Facility and the associated percolation and evaporation during storage. The storage and recovery component does, however, shift the availability of the supplies to the dry season when there is a greater demand for irrigation water within the CSIP area.
2. Wet season supply from Lake El Estero is not required in these typical scenarios shown; however, there may be conditions during which diversions may occur.

See **Appendix B** rev for detailed monthly source water use projections based on water year type, drought reserve status, and project phase.

Water rights permits from the SWRCB would be required for surface water diversions from the Blanco Drain, Reclamation Ditch, and Tembladero Slough. Pursuant to the provisions of the MOU Regarding Source Waters and Water Recycling, the MRWPCA and the Water Management District would work with the Monterey County Water Resources Agency to secure water rights needed for the Proposed Project. The County Water Resources Agency has filed SWRCB application 32263 to secure rights to use the water within these water bodies. The Proposed Project would not need all of the water in Blanco Drain, Reclamation Ditch and Tembladero Slough. A maximum expected diversion flow has been developed for the Proposed Project based on an assessment of infrastructure capacity and peak flow availabilities in those water bodies. Flows in these channels are less seasonal than urban runoff, but still peak in the winter months during rain events. These sources would be diverted when flows are available and when the other sources of supply are not sufficient to meet the full Project demands. Radio-controlled supervisory control and data acquisition (SCADA) equipment at each diversion pump station would allow the system operators to adjust the diversion rates in response to daily rainfall and irrigation conditions.

Based on the maximum expected diversion flows developed for the Proposed Project, the following water rights would be needed for the Proposed Project:

1) diversion from the Reclamation Ditch at Davis Road of up to 2,000 AFY with a 6 cfs maximum diversion rate;
2) diversion from Tembladero Slough at the Castroville pump station of up to 1,500 AFY with a 3 cubic foot per second (cfs) maximum diversion rate; and
3) diversion from the Blanco Drain of up to 3,000 AFY with a 6 cfs maximum diversion rate.

The place of use in each of these applications would be for storage in the Seaside Basin and use within the CSIP area and CalAm's Monterey District system. The 6 cfs quantity was determined to be the peak water flows that could be diverted from the Reclamation Ditch at Davis Road (Schaaf & Wheeler, 2015b) and the peak amount of flow available in the Blanco Drain for diversion in new infrastructure (Schaaf & Wheeler, 2015b). Currently, the wastewater collection and conveyance infrastructure between Castroville and the Regional Treatment Plant can only feasibly accommodate flows of up to 3 cfs and thus limits the amount of water that would be diverted in Castroville from the Tembladero Slough. It should be noted that the annual diversion amounts are considered "face amounts" that cannot be exceeded in any single year. These amounts do not reflect the Proposed Project use on an average basis. In addition, the Proposed Project description of yield and the assumed diversions for the impact analyses (i.e., biological resources and surface water hydrology) assumes some water would be left in the Reclamation Ditch and Tembladero Slough for fisheries resources. Specifically, flows of 0.69 cfs and 2.0 cfs are proposed to be left in the Reclamation Ditch at Davis Road from June through November and December through May, respectively. A minimum flow of 1 cfs is proposed to remain in the Tembladero Slough year round; however much more than that is anticipated to be present even under Proposed Project diversions. See **Section 4.4, Biological Resources: Fisheries,** for more discussion of fisheries issues.

The Monterey County Water Resources Agency may pursue an additional application for the remainder amounts. The remainder application for additional diversions above amounts in the Proposed Project would be the responsibility of Monterey County Water Resources Agency to take forward as a separate project and is not part of the Proposed Project nor are the impacts of those diversions evaluated in this EIR. The application amounts for a remainder permit could be up to 85 cfs in direct diversions and a remainder diversion amount of up to 18,500 AFY that would bring the combined annual diversion amount for all permits up to a limit of 25,000 AFY.

2.7.2 Source Water Types and Diversion Methods

2.7.2.1 Quantity Needed for Injection into the Seaside Basin

The Proposed Project would produce 3,500 AFY of high quality water for injection into the Seaside Groundwater Basin for use by CalAm. In addition, in normal or wet years when the drought reserve is being filled, the Proposed Project would produce an additional 200 AFY for storage in the Seaside Groundwater Basin. The Proposed Project would require more source water than the amount of water to be produced due to the loss of water (reject) from operation of the reverse osmosis system at the Advanced Water Treatment Facility, which is estimated to operate at an 81% product water recovery rate. In this case, to produce 3,700 AFY of treated water, a total of 868 AFY (19% of the AWT Facility influent) of concentrated reject water from the reverse osmosis system would be disposed through the ocean outfall. To produce 3,700 AFY of treated water, the Proposed Project would require a minimum of approximately 4,568

AFY of raw source waters to feed the proposed new AWT Facility in wet and normal years (assumed five years out of six).

2.7.2.2 Quantity for Crop Irrigation

During wet and normal years, approximately 4,500 to 4,750 AFY of additional source water is proposed to be collected to augment recycled water supplies for crop irrigation by distribution through the CSIP. This quantity is within the approved capacity of the Salinas Valley Reclamation Plant of 29.6 mgd. The total maximum amount of recycled water that would be treated and made available to the existing CSIP areas under the Proposed Project would be less than 29.6 mgd which represents:

- The monthly average dry weather flow capacity of the Regional Treatment Plant pursuant to the permits for the plant; and
- The daily design capacity and annual expected maximum "basic demand" of the Salinas Valley Reclamation Plant described on pages 5 and 7, respectively, of the Agreement between the MCWRA and the MRWPCA for Construction and Operation of a Tertiary Treatment System (June 16, 1992).

During drought conditions, when dry season crop irrigation demands within the CSIP area cannot be met by other non-groundwater sources, the Proposed Project would reduce its production for injection into the Seaside Groundwater Basin to as little as 2,600 AFY, allowing the growers served by the Salinas Valley Reclamation Plant and CSIP to use up to 1,000 acre feet more of the available source water (up to as much as 5,900 AFY). The actual dry year AWT Facility production for injection to the Seaside Basin would depend upon the amount of drought reserve water previously injected, so that the CalAm Water supply extraction of GWR water (including production plus the previous reserve "deposits") would continue to total 3,500 AFY in every year. The results and assumptions of this analysis are contained in **Appendix B rev**. Descriptions of the source waters discussed above are summarized in the following descriptions.

2.7.2.3 Unused Treated Wastewater from MRWPCA Regional Treatment Plant

Description and Estimated Yield

Secondary effluent from the Regional Treatment Plant currently is used as influent for the tertiary treatment plant that is referred to as the Salinas Valley Reclamation Plant, which supplies tertiary treated recycled water for agricultural irrigation use via the distribution system that comprises the CSIP. To determine how much and when to treat the secondary effluent to a tertiary level outside of the growing season, the growers submit water orders one to three days before water is needed. This prevents MRWPCA from creating excess tertiary-treated water that would remain too long in the tertiary storage pond creating too much algae to be used by the growers. During the growing season, MRWPCA treats as much recycled water as possible. If the storage pond fills, then MRWPCA slows down or stops creation of recycled water. If the pond water level descends to a specific elevation, Salinas River water stored behind the Salinas River Diversion Facility is pumped, screened, disinfected, and mixed into the pond.

Secondary effluent in excess of the CSIP demands is not sent to the tertiary treatment plant, and instead is discharged to the Monterey Bay through MRWPCA's existing ocean outfall. Under the Proposed Project, effluent that otherwise would be discharged through the ocean outfall would instead be sent to the AWT Facility and treated for injection into the Seaside

Groundwater Basin. In addition, some of the secondary effluent that otherwise would be sent to the ocean outfall during winter months would be used to produce additional recycled water for crop irrigation during low demand periods. The Salinas Valley Reclamation Plant was designed for a minimum daily flow of 8.0 mgd. Facility modifications within the plant would be implemented to lower the minimum daily flow. See **Section 2.8.2** for a description of those improvements.

No new off-site conveyance facilities would need to be constructed to use water from this source.[19] Therefore, use of this source is preferred over other potential new sources.

The quantity of excess secondary effluent that otherwise would be discharged to the ocean outfall each year is highly variable, because the CSIP demands are both weather-dependent, peaking in dry years, and crop dependent, varying by what is planted. Ocean outflows have ranged from 4,600 AFY (water year 2013, record low rainfall) to 12,100 AFY (water year 2006, above average rainfall with a particularly wet spring). Average unused secondary effluent flows are estimated to total 6,242 AFY in 2017 (the anticipated year that the GWR Features would commence operations). Depending upon the water year type and the drought reserve status, the Proposed Project may use from 3,000 AFY to 4,800 AFY from this source, predominantly in the winter months. The methodology for estimating these available flows is found in **Appendix B rev** of this EIR.

Diversion Method and Facilities

As described above, municipal wastewater is conveyed to the Regional Treatment Plant through existing infrastructure, and undergoes primary and secondary wastewater treatment before being either supplied to the Salinas Valley Reclamation Plant for tertiary treatment or discharged through the ocean outfall. To use this treated wastewater, the Proposed Project would include construction of a new diversion structure on the existing secondary effluent pipeline to capture unused secondary-treated effluent. This facility is described as part of the Treatment Facilities at the Regional Treatment Plant in **Section 2.8.1.**

Construction

Construction of the secondary-treated effluent diversion structure and pipeline is discussed as part of the Treatment Facilities at the Regional Treatment Plant in **Section 2.8.1.**

Operations and Maintenance

Operation of the secondary-treated effluent diversion is discussed as part of the Treatment Facilities at the Regional Treatment Plant in **Section 2.8.1.**

2.7.2.4 Agricultural Wash Water

Description and Estimated Yield

Salinas agricultural wash water, 80 to 90% of which is water used for washing produce, is currently conveyed to the Salinas Treatment Facility for treatment (aeration) and disposal by evaporation and percolation.

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[19] Use of wastewater from member agencies would not require construction of new source water delivery infrastructure.

To use water from this source for the Proposed Project, this water would be diverted to the existing Salinas Pump Station using a new diversion structure and new short pipelines connecting the existing agricultural wash water pipeline to the existing municipal wastewater system just prior to the Salinas Pump Station. The agricultural wash water would then mix with the municipal wastewater and be conveyed through the existing 36-inch diameter Salinas interceptor to the Regional Treatment Plant. A temporary connection was installed in April 2014, diverting all agricultural wash water to the Regional Treatment Plant to augment the Salinas Valley Reclamation Plant production of recycled water during the current drought, to provide data regarding treatability of the agricultural wash water (with and without municipal wastewater) using the demonstration facility, and to allow the City of Salinas to perform maintenance on the Salinas Treatment Facility. The new physical facilities proposed to be constructed to divert this source water are described below.

Agricultural wash water influent to the Salinas Treatment Facility totaled 3,228 AF in 2013, and is projected to total 3,733 AF in 2017 (the anticipated year that GWR Features would commence operations) based on data showing that agricultural processing wastewater flows have increased by about 0.25 mgd each year since 2010. The feasibility analysis for the Proposed Project did not assume any continued increases in this source beyond 2017, although development of new or expanded facilities may continue to occur pursuant to the Salinas Agricultural Industrial Center Specific Plan, contributing additional wastewater flows to the Salinas industrial wastewater collection system beyond that year.

Agricultural wash water would be available year-round, with peak flows occurring during the summer harvest season. To maximize the use of all available sources, agricultural wash water would only be diverted directly to the Regional Treatment Plant during the peak irrigation demand months (typically April through October). From November through March, agricultural wash water flows would be sent to the Salinas Treatment Facility for treatment and stored in the existing ponds, which can hold approximately 1,250 acre-feet. From May to October, the incoming flows would be diverted to the Salinas Pump Station, and stored water would be pumped from the Salinas Treatment Facility ponds back to the Salinas Pump Station. Taking into consideration evaporative losses, seepage losses and recovery of stored water, the Salinas Treatment Facility ponds would be empty by the end of each irrigation season. The net yield after accounting for storage losses would be approximately 2,710 AFY. The following section describes the facility modifications that would be needed to achieve this yield.

Diversion Method and Facilities

Salinas Pump Station Diversion Structure and Pipelines

Two of the proposed sources of raw water for the Proposed Project would be captured and diverted from subsurface conveyance structures to the existing MRWPCA Salinas Pump Station: agricultural wash water and City of Salinas urban runoff (described in **Section 2.7.2.3**). Both of these sources would necessitate construction of new diversion structures and short pipelines near the existing Salinas Pump Station, as shown in **Figure 2-21, Salinas Pump Station Source Water Diversion Conceptual Site Plan**. The Salinas Pump Station Diversion site (also referred to as Treatment Plant 1, or TP1) would include several new diversion facilities to redirect flows of agricultural wash water and City of Salinas stormwater and dry weather runoff to the existing Salinas Pump Station for blending with Salinas municipal wastewater and treatment and recycling at the Regional Treatment Plant. The combined storm and waste waters would be conveyed from the existing Salinas Pump Station through the MRWPCA's existing 36-inch diameter interceptor to the Regional Treatment Plant. The diversion facility would also accommodate the routing of agricultural wash water and winter stormwater to the Salinas Treatment Facility for seasonal storage, and would provide a termination point for the pipeline that would carry returned flows of stored waters to the Salinas Pump Station. Key existing and proposed facilities at this site are shown in **Figure 2-21, Salinas Pump Station Source Water Diversion Conceptual Site Plan**. Generally, these facilities include the following:[20]

- A new underground junction structure to be constructed over the existing 48-inch sanitary sewer line, to mix sanitary, agricultural wash water and stormwater flows. This structure would also receive agricultural wash water and stormwater return flow from the Salinas Treatment Facility's Pond 3.
- Modifications to the existing agricultural wash water underground diversion structure, and addition of approximately 150-foot long 42-inch diameter underground pipeline and metering structure between this structure and the new junction structure to be constructed over the existing 48-inch sanitary sewer line.
- An underground stormwater diversion structure (Stormwater Diversion Structure No. 1) and underground pipeline between this new structure and the existing 33-inch agricultural wash water line.
- An underground stormwater diversion structure (Stormwater Diversion Structure No. 2) near the existing stormwater pump station and underground pipeline to divert stormwater flow to the Salinas Pump Station through an existing 30-inch abandoned pipeline.
- Meters, valves, electrical and control systems, and fencing around the diversion structures.

Salinas Treatment Facility Pond Storage and Recovery

The City of Salinas is constructing a new 42-inch industrial wastewater pipeline to replace the existing 33-inch gravity main between the City's TP1 site (the site on which the Salinas Pump Station is located) and the Salinas Treatment Facility. Winter flows of agricultural wash water and Salinas urban stormwater runoff would be conveyed to the ponds using the new 42-inch pipeline. Water within the Salinas Treatment Facility currently moves as gravity overflows from the aeration basin to Pond 1, then Pond 2 and finally, Pond 3.

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[20] As of October 2014, the City's planned new 42-inch industrial wastewater pipeline is under construction. In addition, a separately proposed sanitary sewer overflow structure and pipeline is planned to be built prior to the release of the Draft EIR, independent from the Proposed Project; therefore, these facilities are shown as "planned" on **Figure 2-22, Proposed Salinas Treatment Facility Storage and Recovery Conceptual Site Plan.**

Seasonal storage of agricultural wash water and Salinas urban stormwater runoff at the Salinas Treatment Facility ponds would require construction of a new return pipeline and pump station to return the stored water to the Salinas Pump Station Diversion site. The proposed return pipeline would be an 18-inch pipeline, installed inside the existing, soon to be abandoned 33-inch pipeline. A new return pump station, and a new valve and meter vault would be located within the existing Salinas Treatment Facility site near the existing pump station. The new return pump station would include two variable frequency drive pumps, a primary and a secondary. A new pipeline would be constructed from the lower end of the Pond 3 to the new return pump station. A second new pump station near the lower end of Pond 3 would be needed to lift stored agricultural wash water and stormwater into a pipeline returning to the return pump station. A new short pipeline would also be constructed to convey the treated wastewater from the aeration basin to the pipeline that returns water from Pond 3 or directly to the return pump station. The proposed new pipelines and pumps are shown in **Figure 2-22, Proposed Salinas Treatment Facility Storage and Recovery Conceptual Site Plan**

Construction

Salinas Pump Station Diversion Site

Construction activities at this site would include demolition, excavation, site grading and installation of new junction structures, new meter vault or flow measurement structures and short pipeline segments. Existing pump stations operations would be ongoing during construction due to the uninterruptible nature of conveyance of wastewater (and in some cases, stormwater flows). For this reason, temporary shunts of various waters may be necessary to maintain the collection and conveyance of waters to treatment facilities. Construction may occur up to 24 hours per day, 7 days per week due to the necessity of managing wastewater flows; however, major construction of new facilities would be limited to daytime hours. Approximately 0.75 acres would be temporarily disturbed and up to 0.25 acres of new impervious surfaces would be added to the site. The permanent facilities would be subsurface. The site would be under construction for up to five months.

Salinas Treatment Facility Storage and Recovery

The majority of the construction activity for the Salinas Treatment Facility Storage and Recovery Facilities would occur within the existing 281-acre Salinas Treatment Facility site. New pipelines from Pond 3 and the aeration basin to the return pump station, including precast concrete manholes, would be constructed within the existing unpaved access road and parallel to the existing pipelines. A new lift station would be constructed at Pond 3 to return water to the return pump station. This new lift station would be constructed adjacent to the existing City of Salinas irrigation transfer station in Pond 3. If the work for the new lift station in Pond 3 must be performed while it is full, sheet piling and dewatering equipment will be required. The return pump station would be located near the existing influent pump station at the east end of the site. Return pump station and pipelines construction would include trenching and installation of new pipelines, new pump and lift station, new pumps/pump motors, electrical facilities, valve vaults and flow meter, requiring equipment delivery trucks, loaders, compactors, and backhoes.

The recovery or return pipeline from the Salinas Treatment Facility to the Salinas Pump Station Diversion site would be constructed inside the existing 33-inch influent pipeline, which is scheduled to be abandoned in place in late 2015 after a new 42-inch pipeline is completed. Installing a new pipeline inside the existing pipeline would require excavating access pits every 600-ft to 800-ft along the existing alignment, cutting into the existing pipe, pulling the new assembled pipe into the existing pipe and connecting the new pipe segments before closing the pit. The work area at each pit would be up to 20-ft wide, approximately 60-ft long and up to 10-feet deep. Equipment would include equipment delivery trucks, loaders, backhoes, pipe cutting and welding equipment, pipeline fusing equipment (if fusible pipe is used), and pipeline pulling equipment. If work must occur in an existing street, paving equipment would be required for repairing the site.

Operations and Maintenance

The Salinas Pump Station Diversion site is adjacent to and north of the existing Salinas Pump Station within the City's Treatment Plant 1 site (also called, TP1), and would be maintained by the same MRWPCA operations staff as currently operate the pump station. No additional employee site visits would be required at the Salinas Pump Station site. The facility would operate continually using automated flow metering, gates and valves. Operations would consist of seasonally adjusting the diversion settings to direct flows to the Pump Station or to the Salinas Treatment Facility. Gates and valves would be exercised annually if not operated more frequently. Installed flow meters would require periodic inspection and calibration on a less-than-annual frequency. Power usage at the site would be incidental to the existing pump station and would only be needed for SCADA and metering and controls for the gates and valves. No ongoing materials delivery or solid waste generation would occur.

Similarly, the new storage and recovery facilities at the Salinas Treatment Facility would be managed by the same number of staff that currently operates the Salinas Treatment Facility. During the storage season (November to April), the return pumps would not be operated. The Salinas Treatment Facility aeration pond would continue to operate as it currently does. Volumes in Ponds 1, 2, and 3 would be monitored. If inflows exceed the storage capacity, some flows would be diverted to the existing drying beds, or adjustments may be made at the Salinas Pump Station Diversion to send some agricultural wash water to the Regional Treatment Plant. The return pumps at the Salinas Treatment Facility and the Pond 3 lift station would be inspected during the storage season, and routine mechanical services would be scheduled during this season. Trucks with lifting equipment would be required to pull the pumps out of the wet wells for maintenance.

During the return pumping season (June to October), the return pump station would operate during the period of off-peak electrical rates, at flow rates up to 5 mgd, depending upon the daily volume of new agricultural wash water diverted directly to the Salinas Pump Station. The pumping rate may be reduced during the peak hours of agricultural wash water flows. Stored water in Pond 3 (the westernmost pond at the Salinas Treatment Facility) would be conveyed to the return pump station using a new lift state and gravity pipeline. At the end of this season, the Salinas Treatment Facility ponds would be empty or nearly empty, allowing maintenance to be performed, if needed, on the gates, valves, overflow structures, pump stations and levee banks.

2.7.2.5 City of Salinas Urban Runoff to Salinas River

Description and Estimated Yield

City of Salinas urban runoff and stormwater from the southwest portion of the city is currently discharged into the Salinas River near Davis Road via a 66-inch outfall line. Rain events may occur year-round, but the majority of the flows occur between November and April.

Under the Proposed Project, City of Salinas urban runoff and stormwater would be diverted to the Regional Treatment Plant rather than discharged to the Salinas River. This source is estimated to yield an average raw water supply of 225 AFY, based upon estimated daily runoff from the contributing portions of the city and available capacity at the Salinas Pump Station (see **Table 2-14, Estimated Urban Runoff Available for Capture from the City of Salinas to Salinas River (in AF)**). The memorandum describing the methodology for calculating flows available for, and capable of, diversion to the Regional Treatment Plant is found in **Appendix O rev** (Schaaf & Wheeler, 2015a).

Table 2-14
Estimated Urban Runoff Available for Capture from the City of Salinas to Salinas River (in AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	8	23	47	52	41	34	16	2	0	0	0	2	225

To use water from this source for the Proposed Project, stormwater would be diverted by gravity from the existing city stormwater pipelines to the existing MRWPCA Salinas Pump Station using one or two new diversion structure(s). It would also be diverted into the Industrial Wastewater System for storage at the Salinas Treatment Facility ponds and returned to the Salinas Pump Station for conveyance to the Regional Treatment Plant for recycling and summer use (as discussed under Agricultural Wash Water).

Consistent with existing conditions, excess stormwater during large rain events, which exceeds the available Salinas Pump Station capacity or the conveyance capacity to the Salinas Treatment Facility, would be discharged to the Salinas River through the existing stormwater infrastructure. In extreme storm events, stormwater also could continue to overflow to the Blanco Detention Basin, an existing earthen depression adjacent to the Salinas Pump Station that currently captures excess stormwater runoff that cannot be conveyed to the storm drain pipeline that discharges to the Salinas River.

Diversion Method and Facilities

The Salinas Pump Station Diversion structures and pipelines that are described in **Section 2.7.2.2** would also be used to divert Salinas urban runoff to the Regional Treatment Plant for recycling for crop irrigation demands and use by the AWT Facility.

Construction

Construction of the Salinas Pump Station urban runoff diversion structure is discussed as part of the Agricultural Wash Water facility construction in **Section 2.7.2.~~2~~4.**

Operations and Maintenance

Operation of the Salinas Pump Station diversion structures is discussed as part of the Agricultural Wash Water facility operation in **Section 2.7.2.~~2~~4.**

2.7.2.6 Reclamation Ditch / Tembladero Slough

Description and Estimated Yield

Two source water diversions from the Reclamation Ditch system are proposed as sources of supply for the Proposed Project, requiring water rights permits for diversion and use, which would be pursued through an amendment to a previously-submitted water right application.[21]

The first diversion point would be located on the Reclamation Ditch at Davis Road, where an existing 54-inch City of Salinas sanitary sewer main crosses the Reclamation Ditch. A new diversion structure would be installed in the ditch, and a new pump station, valve and meter vaults would be installed on the southern bank, to divert flows, when available, into the existing 54-inch sanitary sewer main, which conveys wastewater to the MRWPCA Salinas Pump Station. Based on the available conveyance capacity in the gravity sewer system between the point of diversion and the Salinas Pump Station and the historic flows in the Reclamation Ditch, diversions of up to 6 cubic feet per second (cfs) were estimated, assuming an in-stream (by-pass) flow requirement of 0.69 cfs in the months of June to November, and 2.0 cfs during the months of December to May for fish migration. This source would yield an average 1,522 AFY for a 6 cfs water right permit. Monthly yields are presented in **Table 2-15, Estimated Average-Year Diversion from the Reclamation Ditch at Davis Road (acre-feet)**.

Table 2-15
Estimated Average-Year Diversion from the Reclamation Ditch at Davis Road (acre-feet)

Maximum Rate	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
6 cfs	162	143	165	162	97	132	129	121	80	87	98	146	**1,522**

Note: Assumes 0.69 cfs remains in-stream from Jun-Nov, and 2.0 cfs remains in-stream Dec-May

The other diversion point would be located on Tembladero Slough just west of Highway 1, at the MRWPCA Castroville Pump Station. A new diversion structure would be installed in the Tembladero Slough, and a small pump station would be installed on the northern bank, to divert flows, when available, to the existing pump station that feeds the existing MRWPCA Castroville interceptor pipeline. Based on the existing conveyance capacity within the MRWPCA system and the historic flows, diversions up to 3 cfs were estimated, assuming an in-stream (by-pass) flow requirement of 1.0 cfs year-round. This portion of the Reclamation Ditch system is tidally influenced, so the lower bypass flow rate would be needed to maintain the required depth of water in the channel. This source would yield an average of 1,135 AFY as shown in **Table 2-16, Estimated Average-Year Diversion from the Tembladero Slough at Castroville (acre-feet)**.

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[21] SWRCB Permit Application No. A032263, filed by Monterey County Water Resources Agency.

Table 2-16
Estimated Average-Year Diversion from the Tembladero Slough at Castroville (acre-feet)

Maximum Rate	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
3 cfs	131	117	142	154	145	67	66	62	41	45	50	115	**1,135**

Note: Assumes 1.0 cfs remains in-stream and 6.0 cfs is diverted at Davis Road

Based on the availability of other supply sources for the Proposed Project, diversions from these sources may be reduced during the winter months. The proposed diversion facilities would be equipped with supervisory control and data acquisition (SCADA) equipment which allows the diversions to be turned off remotely. If excess treated municipal wastewater is available at the Regional Treatment Plant, these diversions would be shut off rather than diverting surface water while simultaneously discharging treated wastewater to the ocean outfall. The methodology used for estimating available flows is found in **Appendix P** (Schaaf & Wheeler, 2015b).

Diversion Method and Facilities

Reclamation Ditch Diversion Pump Station at Davis Road

The Reclamation Ditch Diversion would consist of a new intake structure on the channel bottom, connecting to a new wet well (manhole) on the channel bank via a new gravity pipeline. The new intake would be screened to prevent fish and trash from entering the pump station. Two submersible pumps would be installed in the wet well, controlled by variable frequency drives. The electrical controls and drives would be in a locked, weatherproof cabinet near the wet well and above flood level. The new pump station would discharge through two new short force mains (approximately 50-ft each), discharging to an existing manhole on the City of Salinas 54-inch sanitary sewer main. Two new underground vaults would be installed along the force main, one to hold the check and isolation valves, and one for the flow meter. The channel banks and invert near the pump station intake would be lined with concrete to prevent scouring and facilitate the management of by-pass flows. Key existing and proposed facilities at this site are shown in **Figure 2-23, Reclamation Ditch Diversion Conceptual Site Plan and Cross Section**

Tembladero Slough Diversion Pump Station at Castroville

The Tembladero Slough Diversion would consist of a new intake structure on the channel bottom, connecting to a new lift station wet well (manhole) on the channel bank via a new gravity pipeline. The new intake would be screened to prevent fish and trash from entering the new pump station. Two submersible pumps would be installed in the wet well, controlled by variable frequency drives. The electrical controls and drives would be in a locked, weatherproof cabinet near the wet well and above flood level. The new pump station would discharge through a new short force main (approximately 100-ft in length), discharging to the existing wet well at the MRWPCA Castroville Pump Station. A new underground valve vault would be installed along the force main to hold the check valves, isolation valves and flow meter. The channel banks and invert near the pump station intake would be lined with concrete to prevent scouring and facilitate the management of by-pass flows. Key existing and proposed facilities at this site are shown in **Figure 2-24, Tembladero Slough Diversion Conceptual Site Plan and Cross Section.**

Construction

Reclamation Ditch Diversion Site

Construction of the Reclamation Ditch diversion would include minor grading, installation of a wet well/diversion structure, modification of an existing sanitary sewer manhole and a short pipeline from the existing manhole to the new pump station. The work would disturb approximately 0.15 acres of land, including the Reclamation Ditch banks and channel bottom. The channel carries flow year-round, so a temporary coffer dam would be required above and below the site, with a small diversion pump to convey existing channel flows past the project construction area. The temporary coffer dams would consist of waterproof tarps or membranes wrapped around gravel fill material, which would be removed when the work is completed.

The new pump station wet well, intake structure and pipelines would be constructed using open-trench excavation. The construction excavation may be as large as 40-feet long by 10-feet wide. Due to the steepness of the banks and depth of the excavation, a tracked, long-arm excavator would be required. The below-grade components may use pre-cast concrete structures, so that the underground work would take less than a week to complete. Once the excavations are closed, the channel protection (concrete or riprap) may be installed and the temporary cofferdams and by-pass pumping system removed. The pumps and controls would be installed in the wet well and valve vault using a large excavator or crane.

During the period the channel is blocked with temporary cofferdams, the work may proceed 7 days a week to minimize the impact and duration. Electrical power used during construction may come from a temporary electrical service by PG&E, from permanent electrical service by PG&E if installed in advance of the site work, or from portable generators. The by-pass pumps would need to operate until the in-channel work is complete, so power would be required 24-hours a day. The site is in an industrial area, so there are no nearby residents to be disturbed by the noise at night.

Tembladero Slough Diversion Site

Construction of the Tembladero Slough diversion would include minor grading, installation of a new wet well/diversion structure, modification of the existing wet well at the Castroville Pump Station and construction of a short pipeline from the wet well to the new pump station. The work would disturb approximately 0.25 acres of land, including the Tembladero Slough banks and channel bottom. The channel carries flow year-round, so a temporary coffer dam would be required around the construction site, with a small channel left open to allow flows past the project site. The temporary coffer dams may consist of geomembrane tubes filled with water or driven sheet piles, depending upon the site conditions. Any cofferdam installed would be removed when the work is completed.

The new pump station wet well, intake structure and pipelines would be constructed using open-trench excavation. The construction excavation may be as large as 100-feet long by 10-feet wide. Due to the steepness of the banks and depth of the excavation, a tracked, long-arm excavator would be required. The below-grade components may use pre-cast concrete structures, so that the underground work would take less than a week to complete. Once the excavations are closed, the channel protection (concrete or riprap) would be installed and the temporary cofferdams and dewatering pumping system removed. The diversion pumps and controls would be installed in the wet well and valve vault using a tracked excavator or crane.

Modification of the existing pump station wet well may require by-pass pumping of the existing wastewater flows within the pump station. A portable electric or engine-driven by-pass pump may be required. The new pipeline connecting the new pump station to the existing wet well would be installed using open trench methods.

During the period the channel is blocked with temporary cofferdams, the work may proceed 7 days a week to minimize the impact and duration.

Electrical power used during construction may come from a temporary electrical service by PG&E, the permanent electrical service by PG&E if installed in advance of the site work, or from portable generators. The dewatering pumps would need to operate until the in-channel work is complete, so power would be required 24-hours a day. The site is in an agricultural area, with only one nearby residence located approximately 1,000 feet north of the site.

Operations and Maintenance

Both the Reclamation Ditch Pump Station and the Tembladero Slough Pump Station would be configured to operate autonomously, based upon diversion and by-pass flow settings. A system operator would visit each site at most once per day to check for alarms and vandalism, and to visually inspect the intake screen for clogging. The Tembladero Slough site is adjacent to the MRWPCA Castroville Pump Station, so those inspections would be performed by the same operator at that pump station, requiring no additional staff or visits. The Reclamation Ditch is assumed to require one employee visit per day at most (two one-way trips). Approximately once per month an operator would need to access the channel bottom to physically clear vegetation or debris from the intake screen. The pumps would require annual inspection and servicing, using a lift truck to remove the pumps from the wet well. The flow meters would require inspection and calibration less than once per year.

2.7.2.7 Blanco Drain

Description and Estimated Yield

Potential flow diversion from the Blanco Drain was analyzed using data from the existing pump station location, based on station operating records. Due to the limited flow data available, the yield was estimated as a percentage of the applied irrigation and rainfall across the watershed. An average annual yield of 2,620 AFY was calculated, which equates to an average return rate of 17%. A water right permit for diversions up to 6 cfs would be required to capture that full amount. The monthly yields are provided in **Table 2-17, Estimated Average-Year Diversion from the Blanco Drain (acre-feet)**. Due to the existing pump station and slide gate operations, poor water quality, and lack of aquatic habitat in this channel, these yield estimates assume that all available flow would be diverted, and none would be required to remain in-stream.

Table 2-17

Estimated Average-Year Diversion from the Blanco Drain (acre-feet)

Rate	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
6.0 cfs	209	223	246	252	225	274	277	244	184	168	133	185	2,620

The Blanco Drain is the only source of supply not located near an existing wastewater collection facility which might be used to convey flows to the Regional Treatment Plant. Development of this source would require not only a new pump station, but also a two-mile pipeline that would cross under the Salinas River.

Diversion Method and Facilities

The proposed new Blanco Drain Diversion pump station would be located adjacent to the existing seasonal pump station operated by Monterey County Water Resources Agency. The new pump station would consist of a new intake structure on the channel bottom, connecting to a new wet well (manhole) on the channel bank via a new gravity pipeline. The intake would be screened to prevent debris and trash from entering the pump station. Two submersible pumps would be installed in the wet well, controlled by variable frequency drives. The electrical controls and drives would be in a locked, weatherproof cabinet above the wet well and above flood level. The new pump station would discharge through a new 18-inch force main running from the pump station to a connection in the existing 36-inch Salinas Interceptor before it discharges into the headworks of the Regional Treatment Plant.[22] The segment of the pipeline crossing the Salinas River would be installed using trenchless methods. A new underground valve vault would be installed adjacent to the pump station to hold the check and isolation valves, and a second vault would hold the flow meter. Due to the high pressure in the pipeline, a new surge tank would be installed at the new pump station. The channel banks and invert near the pump station intake would be lined with concrete to prevent scouring. When the new pump station is operating, the existing slide gate in the channel would be closed to facilitate diversion of all flows to the Regional Treatment Plant. Key existing and proposed facilities at this site are shown in **Figure 2-25, Blanco Drain Diversion Pump Station and Force Main Conceptual Site Plan.**

Construction

Construction of the Blanco Drain Diversion would include minor grading, installation of a new wet well/diversion structure, installation of a new force main by open trench and by trenchless methods. The work would temporarily disturb approximately 0.15 acres of land at the pump station, including the Blanco Drain banks and channel bottom, and approximately 5 acres along the pipeline alignment including the excavation pits for constructing the pipeline under the Salinas River. The channel carries flow year-round, so a temporary coffer dam would be required above the construction site, with a small diversion pump to convey existing channel flows past the project site and the existing slide gate downstream of the adjacent Monterey County Water Resources Agency pump station. The temporary coffer dam would consist of a waterproof tarps or membrane wrapped around gravel fill material, which would be removed when the work is completed. West of the river crossing and south of the landfill site, the new force main would intersect the existing MRWPCA Salinas Interceptor. The new Blanco Drain source water force main would connect to the existing Salinas Interceptor to the Regional Treatment Plant headworks. A hydraulic analysis of the Salinas Interceptor will be conducted during final design to determine the feasibility of the upstream connection from the Blanco Drain source water force main. The EIR analysis in Chapter 4 assumes that the new pipeline would go all the way to the headworks at the Regional Treatment Plant. Any reduction in length of the pipeline that might be achieved through this modification would result in less environmental impacts.

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[22] Two options are currently being considered to connect the Blanco Drain diversion pipeline to the Salinas Interceptor before it enters the headworks. One option connects at the headworks and the other option connects 1,000 feet further upstream. The current proposal for the location of the connection is shown on **Figure 2-25, Blanco Drain Diversion Pump Station and Force Main Conceptual Site Plan**.

The new pump station wet well, intake structure and on-site pipelines would be constructed using open-trench excavation. The construction excavation may be as large as 40-feet long by 10-feet wide. Due to the steepness of the banks and depth of the excavation, a tracked, long-arm excavator would be required. The below-grade components may use pre-cast concrete structures, so that the underground work would take less than a week to complete. Once the excavations are closed, the channel protection (concrete or riprap) may be installed and the temporary cofferdam and by-pass pumping system removed. The concrete deck, pumps and controls would be installed in the wet well and valve vault and hydropneumatic tank installed using a tracked excavator or crane. Some cast-in-place concrete work is expected, requiring concrete trucks accessing the site.

During the period the channel is blocked with temporary cofferdams, the work may proceed 7 days a week to minimize the impact and duration. A portion of the new pipeline must be installed using trenchless methods. That work may require 24-hour operations during the drilling phase. A portion of the pipeline would be installed within the existing Regional Treatment Plant site. That work may be performed at night to minimize impacts to plant operations.

The force main pipeline must cross under the Salinas River. This work would be performed using a trenchless method, most likely directional drilling. The crossing method would be determined during detailed design and permitting. Trenchless construction would require work areas approximately 40-ft by 60-ft on each side of the river. The rest of the pipeline may be installed using open-trench methods. The final portion of the pipeline would cross the existing Regional Treatment Plant site and may require limited bore and jack construction to cross existing utilities which must remain in-service.

Electrical power used during construction may come from a temporary electrical service by PG&E, the permanent electrical service by PG&E if installed in advance of the site work, or from portable generators. Permanent electrical service already exists on-site at the Monterey County Water Resources Agency pump station and Regional Treatment Plant site, so it is anticipated that a temporary construction power service would be available. The by-pass pumps would need to operate until the in-channel work is complete, so power would be required 24-hours a day. The site is isolated from any urban uses within an agricultural area, so there are no nearby residents to be disturbed by nighttime construction.

Operations and Maintenance

The Blanco Drain Pump Station would be similar to the Reclamation Ditch and Tembladero Slough Pump Stations, configured to operate autonomously based upon diversion settings. A system operator would visit the site once a day to check for alarms, vandalism and to visually inspect the intake screen for clogging. The site is adjacent to the Monterey County Water Resources Agency's Blanco Drain Pump Station, and may require separate visits by operators from the two agencies or the two agencies can enter into an agreement for shared maintenance responsibilities. The existing Monterey County Water Resources Agency pump station operates currently and the diversion would operate in a similar way. Consequently the number of daily operator visits would not increase measurably. Approximately once per month an operator would need to access the channel bottom to physically clear vegetation or debris from the intake screen. The pumps would require annual inspection and servicing, using a lift truck to remove the pumps from the wet well. Since the two pump stations are the responsibility of different agencies, scheduled maintenance would be independent of the adjacent pump station. The new station flow meter would require inspection and calibration at a less-than-annual frequency.

The pipeline valves would be inspected and exercised once per year. Any above-grade air-release valves would be inspected quarterly, requiring a system operator to drive the pipeline alignment.

2.7.2.8 Lake El Estero Storage Management Water

Description and Estimated Yield

Monterey Peninsula urban stormwater and dry weather runoff that flows into Lake El Estero is currently stored in the lake and then pumped by the City of Monterey, or allowed to flow by gravity, through storm drain pipelines to Del Monte Beach.

To use water from this source for the Proposed Project, the portion of the Lake El Estero water that currently is pumped or flows onto Del Monte Beach into Monterey Bay would, instead, be diverted via a short new pipeline, using a new pump or by gravity flow, into the municipal wastewater system at a sanitary sewer manhole immediately adjacent to the existing Lake El Estero pump station. After the lake water enters the manhole, it would flow through an existing 21-inch City sanitary sewer main into the existing Pacific Grove interceptor and then to the existing MRWPCA Monterey Pump Station.[23] From there, the water would flow through the existing MRWPCA conveyance system to the Regional Treatment Plant. This new diversion system would capture stormwater which would otherwise be discharged to the Monterey Bay; the average lake level would remain unchanged. The new physical facilities proposed to be constructed to divert this source water are described in **Section 2.6.1.3.**

This source would yield an average raw water supply of 87 AFY, based upon estimated daily runoff into the Lake and available conveyance capacity in the municipal wastewater system. This flow estimate is based on monitoring data collected between November 2013 and March 2014 at the existing 21-inch City of Monterey sanitary sewer gravity main between the Lake El Estero diversion site and the MRWPCA collection system. Monitoring indicated that the gravity main is half full at the daily peak hour, leaving an estimated 2,400 gallons per minute (or 3.5 mgd) of available wet weather capacity.

The memorandum describing the methodology for calculating flows available for diversion to the Regional Treatment Plant is found in **Appendix R** (Schaaf & Wheeler, 2014a).

Diversion Method and Facilities

The Lake El Estero Source Water Diversion System would consist of one of the following options: (1) installation of a new pumping system, consisting of a new column pump installed in the wet well of the existing lake management pump station, upgrades to the existing electric panel, and a new 30-foot long, 12-inch diameter discharge pipe to the sanitary sewer; or (2) installation of a new gravity system, consisting of a new headwall and screened intake pipe on the lake bank, a new 40-foot long, 12-inch diameter discharge pipe to the sanitary sewer, and a

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[23] This Proposed Project component is intended to operate the same as the existing lake management pumping activities conducted by the City except that pumping would occur to the sanitary sewer system in lieu of pumping to Del Monte Beach. The City currently pumps down the lake levels to prevent flooding. That practice would continue but the water would be diverted to the sewer system instead of released to the beach. The City would continue to maintain adequate lake levels to allow the City to irrigate its nearby parks with Lake El Estero water.

new controlled and motorized isolation valve. Both systems would be entirely underground or within existing pump dry and wet well structures and the connecting pipeline would include a flow meter and a check valve to prevent backflow of sewage into the lake. The City and MRWPCA would select the preferred option based upon technical and economic considerations at the time that design plans are prepared. Key existing and proposed facilities at this site are shown in **Figure 2-26, Lake El Estero Diversion Conceptual Site Plan and Cross-Section.** Either of the proposed new diversion systems would require some maintenance and would include controls to prevent overloading the wastewater collection system.

Construction

At the Lake El Estero Diversion site, less than 0.1 acres of disturbance would occur. The disturbance would be entirely within the paved area of the existing pump station at that site. Pavement demolition, trenching and installation of new pumps/pump motors, electrical facilities, and flow meters would all be installed below grade using only equipment delivery trucks, loaders, and backhoes.

Operations and Maintenance

The Lake El Estero diversion pump station would operate autonomously, based upon lake levels and water levels in the receiving sanitary sewer. System operators from the City would visit the site with the same frequency as operators visit the existing pump station, approximately once per week when not operating and multiple times per day while in operation. If a lakeside intake is used, approximately once per month an operator may need to physically clear vegetation or debris from the intake screen. The pumps would require annual inspection and servicing, using a lift truck to remove the pumps from the wet well. This maintenance may be scheduled to coincide with the adjacent pump station. The flow meter would require inspection and calibration less than once per year.

2.8 TREATMENT FACILITIES AT THE REGIONAL TREATMENT PLANT

2.8.1 Overview of Treatment Facilities at the Regional Treatment Plant

Under the Proposed Project, a new AWT Facility would be constructed to receive Regional Treatment Plant secondary effluent for advanced treatment and, ultimately, injection into the Seaside Groundwater Basin.[24] In addition, modifications to the existing Salinas Valley Reclamation Plant are proposed in order to enable increased use of tertiary treated wastewater for crop irrigation during winter months. The proposed new and modified treatment facilities at the Regional Treatment Plant, including the Advanced Water Treatment Facility (or AWT Facility) and the Salinas Valley Reclamation Plant Modifications, would be constructed on approximately 3.5 acres of land within the MRWPCA Regional Treatment Plant (Regional

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[24] As described in previous sections, the Proposed Project proposes to divert additional water sources and convey those waters with municipal effluent to the Regional Treatment Plant, including urban and agricultural runoff, agricultural wash water flows, and excess/unused Regional Treatment Plant secondary-treated wastewater.

Treatment Plant) site west of the existing treatment facilities (see **Figure 2-10, Projected Regional Treatment Plant Flows).** The following is a list of the proposed structures and facilities proposed to be constructed at the Regional Treatment Plant (see **Figure 2-27, Advanced Water Treatment Facility Site Plan**):

- inlet source water diversion structure, an influent pump station, and an approximately 360-foot long, 24-inch diameter pipeline to bring secondary effluent to the AWT Facility;
- advanced treatment process facilities, including
- chloramination,
- ozonation,
- biologically active filtration (if required),
- automatic straining,
- membrane filtration treatment,
- booster pumping of the membrane filtration filtrate,
- cartridge filtration,
- chemical addition,
- reverse osmosis membrane treatment,
- advanced oxidation using ultraviolet light and hydrogen peroxide (advanced oxidation),
- decarbonation, and
- product-water stabilization with calcium, alkalinity and pH adjustment;
- final product storage and distribution pumping;
- brine mixing facilities; and
- modifications to the Salinas Valley Reclamation Plant (see **Section 2.8.2** for a detailed description this Proposed Project component).

The proposed advanced treatment facilities would include several structures as tall as 31 feet and totaling approximately 60,000 square feet. The proposed brine mixing facility would be up to 16 feet tall and totaling approximately 10,000 square feet. New pipes and pumps would be underground. Additional information on each component of the AWT Facility is presented in the following sections. **Figure 2-28, Proposed Advanced Water Treatment Flow Diagram,** provides a simplified AWT Facility process flow diagram illustrating the proposed treatment facilities.

2.8.1.1 AWT Facility Design Flows and System Waste Streams

The proposed new AWT Facility would have a design capacity of 4.0 mgd of product water. As described in **Section 2.7.1**, a range of monthly source water flows has been estimated, depending upon the seasonal availability of source waters. The facility would be operated to produce up to 3,700 AFY of purified recycled water for injection, which equates to an annual production rate of 3.3 mgd. The 4.0 mgd facility size is required to allow for peak seasonal operation and system down time. Similarly, the system components must be sized to allow for losses during treatment such as backwashing and brine disposal. Additional information on the proposed AWT Facility component design is presented in **Tables 2-18 and 2-19.**

Table 2-18
AWT Facilities Design Summary

Component	Design Capacity (See Note a)
Pipeline from secondary treatment system outfall pipe to AWT Facility	N/A
AWT Facility Influent Wetwell	0.2 mg
Influent Pumping (see Note b)	2.7 to 5.9 mgd
Ozone System(see Note b)	5.9 mgd
Biologically Active Filtration (if required) (see Note c)	5.5 mgd
Membrane Filtration System	4.9 mgd
Reverse Osmosis System	2.2 to 4.9 mgd
Advanced Oxidation System, Product Water Stabilization and Pumping	4.0 mgd

Notes:
a. Capacities represent process feedwater flows; units are million gallons (mg) and million gallons per day (mgd).
b. For the case where biological filtration is not included, the range for the influent pumping would be 2.7 to 5.5 mgd, and the ozone system would be sized for 5.5 mgd.
c. The biologically active filtration would be sized to treat up to 80 percent of the process flow; the 5.5 mgd represents the total product flow when combined with the by-pass.

In producing highly purified water, the proposed new AWT Facility would also produce two to three waste streams: biological filtration backwash (if included in the system), membrane filtration backwash, and reverse osmosis concentrate. The biological filtration backwash and membrane filtration backwash would be diverted back to the Regional Treatment Plant headworks. The reverse osmosis concentrate would be piped to a proposed new brine and effluent receiving, mixing, and monitoring facility. The AWT Facility is expected to be able to produce water at up to 90% of design capacity, on average, due to some anticipated down time for membrane “clean in place” practices and repairs. The down time is assumed to be evenly distributed each month, though planned events would be scheduled for times when the least source water is available. The AWT Facility would need to be large enough to produce the required product water during the operational times (90% of each month). The resulting flow quantities for the AWT Facility are shown in **Table 2-19, Proposed Project AWT Facility Process Design Flow Assumptions** below.

Based on these assumptions (including the 90% in-service, 81% reverse osmosis recovery, 90% microfiltration recovery), an AWT Facility design flow rate of 4.0 mgd would be required to provide up to 3,700 AFY of high quality water for groundwater injection.

Table 2-19
Proposed Project AWT Facility Process Design Flow Assumptions

	Annual Flows[1]	Average Flow Conditions[1]	Maximum Flow Conditions[2]
AWT Facility Process	**AFY**	**mgd**	**mgd**
Ozone System Feed	5,496	4.9	5.9
Biologically Active Filtration Feed	4,481	4.0	4.8
Biologically Active Filtration Backwash returned to Regional Treatment Plant Headworks	421	0.4	0.5
Biologically Active Filtration Bypass[3]	1,015	0.9	1.1
Membrane Filtration Feed	5,075	4.5	5.5
Membrane Filtration Backwash retuned to Regional Treatment Plant Headworks	508	0.5	0.6
Reverse Osmosis Feed	4,567	4.1	4.9
Reverse Osmosis Concentrate	867	0.8	0.9
Reverse Osmosis Product Water (AWT Facility Design Size)	3,700	3.3	4.0
Advanced Oxidation Process	3,700	3.3	4.0

Notes:
[1]. Average annual flows reflect 3,700 AFY, typical annual production while building the drought reserve.
[2]. Maximum flow condition reflects design peak production rate.
[3]. 80% of the flow would pass through the Biologically Active Filtration, and 20% may bypass directly to the membrane filtration

2.8.1.2 Inlet Raw Water Diversion Structure and Pump Station

A new diversion structure would be installed on an existing secondary effluent pipeline at the Regional Treatment Plant to divert and convey secondary effluent source water through a new gravity pipeline to the proposed AWT Facility. A new influent pump station consisting of a subgrade wetwell and pumps would accept and equalize the Regional Treatment Plant secondary effluent flow.

2.8.1.3 Raw Water Pretreatment

Before membrane filtration, the secondary effluent would be pretreated using pre-screening and up to three separate subsystems:

- Chloramination
- Ozonation
- Biological filtration (if required)

Chloramination. Chloramines would be used to reduce biofouling of the membrane systems. The chloramination system would include sodium hypochlorite storage, and chemical feed pumps and an inline injection and mixing system. Sodium hypochlorite would be injected upstream of ozonation or upstream of membrane filtration. Sodium hypochlorite reacts with ammonia present in the source water to form chloramine, which is an effective biocide that reduces biological fouling on the membrane filtration and reverse osmosis process membranes.

Ozonation. Ozone treatment is proposed to provide a chemical/pathogen destruction barrier and reduce the membrane fouling. The ozone system would be comprised of several components: liquid oxygen storage and vaporizers or an onsite oxygen generator; a nitrogen boost system; an ozone generator and power supply unit; a cooling water system; a side-stream injection system; ozone contactor; and ozone destruct units. There are two potential approaches for supplying high-purity oxygen for ozone generation: (1) liquid oxygen delivered to onsite cryogenic storage tanks and evaporated through vaporizers, or (2) produce oxygen at the treatment facility using a pressure-swing adsorption oxygen generation system. The liquid oxygen system is included in the 10% design, but an on-site generation system would occupy approximately the same amount of space. Ozone generators would convert oxygen gas into a mixture of oxygen and ozone gas. The mixture of oxygen and ozone gas would be injected into a side stream of feed water flow that would then be recombined with the main supply line after ozone injection. The ozonated water would flow into one or more parallel contactors to provide contact time for disinfection/oxidation, ozone residual decay, and off-gassing. Off-gas would be treated through a catalytic-based ozone destruct system to prevent the release of ozone to the atmosphere. Once dissolved in the process water, ozone reacts with various contaminants in the water, resulting in several treatment benefits, including (1) reduction of organic compounds that cause membrane fouling, (2) reduction of many constituents of emerging concern (CECs),[25] and (3) inactivation of pathogenic microorganisms. A quenching system to eliminate any ozone residual that remains in the water is included at the end of this process step. Quenching would be performed through the addition of sodium bisulfite, hydrogen peroxide or calcium thiosulfate, which would be stored on-site.

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[25] See **Chapter 3. Water Quality Permitting and Regulatory Overview** for more information about the current understanding and regulation of these substances.

Biologically Active Filtration (if required): This process may be used downstream of ozone treatment to reduce the concentration of ammonia and residual organic matter present in the ozone effluent and to reduce the solids loading on the membrane filtration process. The biologically active filtration system would consist of gravity-feed filter basins with approximately 12 feet of granular media, and an underdrain/media support system. Ancillary systems would include an alkalinity addition system for pH control, backwash water basin (also used for membrane filtration backwash), backwash pumps, an air compressor and supply system for an air scour system, an air compressor and supply system for process air, and a wash water basin to facilitate filter backwashing. Depending upon the discharge permitting conditions, this process step may not be required; therefore, it may not be constructed until the AWT Facility completes initial start-up and testing.

2.8.1.4 Microfiltration/Ultrafiltration Membrane Treatment System

The membrane filtration system would remove suspended and colloidal solids, including bacteria and protozoa through hollow fiber membrane modules. Additional components of the membrane filtration system include valve manifolds to direct the flow of feed, filtrate, cleaning system, backwash supply, backwash waste, and compressed air to the corresponding module piping. Feed pumps would draw water from the feed clearwell and supply a pressurized feed to pretreatment strainers and the membrane units. Cleaning chemicals would include acid, caustic, and sodium hypochlorite, which would be stored on-site. Backwash and screening residuals would be adjusted to a neutral pH and returned to the Regional Treatment Plant headworks, along with residuals associated with the cleaning system. The projected recovery of treated water from the membrane filter system is roughly 90%; this recovery accounts for waste residuals associated with backwashing, cleaning, and pretreatment straining.

2.8.1.5 Reverse Osmosis Membrane Treatment System

A reverse osmosis process that employs semi-permeable membranes is proposed to remove dissolved salts, inorganic and organic constituents, and pathogens from the membrane filtration treated water. The proposed reverse osmosis system would consist of a single pass, which separates the membrane filtration filtrate feed water into a purified product stream (permeate) and a concentrated brine stream (concentrate). The proposed reverse osmosis would include a second stage to increase the product water recovery.

The proposed reverse osmosis system would include individual process trains, housing the process membranes in pressure vessels along with connecting piping and valve manifolds for feed, permeate, concentrate, cleaning and flush supplies. The ancillary equipment for the overall reverse osmosis system would include a membrane cleaning system and permeate flush system. Reverse osmosis membrane cleaning chemicals would likely include proprietary anticipant chemicals, acid, and caustic detergent, stored on-site.

Feed to the reverse osmosis system would be delivered from the upstream membrane filtration system through an intermediate equalization tank. Low-pressure booster pumps would move the water into the pretreatment system. Pretreatment would include cartridge filters, followed by the addition of an antiscalant and acid to lower the pH, which would be injected into a low pressure line. High-pressure feed pumps would move the water from pretreatment into the reverse osmosis treatment trains. Concentrate from the reverse osmosis system would be discharged to a new brine mixing structure with final disposal through the existing MRWPCA ocean outfall. Product water would flow to the advanced oxidation system. Separate cleaning and flush system equipment would also be included.

2.8.1.6 Advanced Oxidation Process System

The proposed advanced oxidation system would provide a final polishing step for pathogen disinfection and an additional chemical destruction barrier for the reverse osmosis permeate. The proposed advanced oxidation system would consist of a chemical feed to add hydrogen peroxide and reactors housing arrays of ultraviolet lamps along with ballasts to power the ultraviolet system. Ultraviolet light reacts with hydrogen peroxide to form hydroxyl radicals, which, along with the ultraviolet light, oxidizes, destroys, or inactivates chemicals of concern and pathogens. The system sizing would be driven by the requirement in the California Code of Regulations, Title 22, §60320.200 et seq., "Indirect Potable Reuse: Groundwater Replenishment – Subsurface Application" criteria for advanced oxidation. Support facilities for the reactors would include chemical storage and metering pumps, and ballasts. The advanced oxidation product water would be directed to the post-treatment system for stabilization.

2.8.1.7 Post-Treatment System

Product water from the advanced oxidation process would be sent to the proposed post-treatment system. Due to the high removal of minerals that is achieved through reverse osmosis treatment, post-treatment stabilization of the product water would be needed to prevent corrosion of pipe materials in the product water conveyance system. Stabilization would also be used to reduce the potential for product water to leach minerals and other chemicals from the soils within the Seaside Groundwater Basin upon injection. Reverse osmosis permeate is a soft, low alkalinity water, and the final product water quality would be adjusted to specific goals for hardness, alkalinity, and pH. This adjustment would include decarbonation by air stripping to remove carbon dioxide (CO_2), the addition of calcium and alkalinity, and pH adjustment with CO_2 addition. There are two proposed options for calcium and alkalinity adjustment: (1) the addition of purchased hydrate lime slurry (calcium hydroxide slurry), or (2) addition of sodium hydroxide (NaOH) and calcium chloride ($CaCl_2$). Sodium hypochlorite may be added to the product water for secondary disinfection.

2.8.1.8 Product Water Pump Station

The new Product Water Pump Station would be located at the AWT Facility immediately south of the product water stabilization facilities. This pump station is described in detail in **Section 2.9**, **Product Water Conveyance Facilities**, below.

2.8.1.9 Brine Mixing Facility

As discussed above, the new AWT Facility would produce reverse osmosis concentrate water that would be disposed or discharged via the MRWPCA's existing ocean outfall. In addition to the AWT reverse osmosis reject water, other water that is currently discharged to the outfall includes secondary effluent from the Regional Treatment Plant, and brine waste collected from individual water softeners and private desalination facilities and delivered by truck to the Regional Treatment Plant. Proper disposal of these waste streams to the outfall, and eventually the ocean, requires flow metering and water quality sampling and monitoring. The proposed new brine mixing facility would accomplish the required mixing, metering and sampling, using the following processes and facilities:

- Two (2) cast-in-place concrete vaults on the existing outfall, one to divert secondary treated effluent to the mixing facility and one approximately 170-ft downstream to return the blended flows to the outfall. Both structures would be equipped with two slide gates to control the amount of secondary effluent diverted through the mixing facility and passed through to the outfall

- A cast-in-place concrete mixing structure, configured to receive secondary effluent and brine waste from separate inflow pipes and equipped with a 60-inch (nominal) static mixer in a fiberglass mixing pipe and an air release valve on the upstream end of the static mixer
- A 54-inch pipeline (high density polyethylene) from the diversion vault to the mixing structure and then to the return vault
- 48-inch flow meters on the pipelines entering and leaving the mixing structure, installed below-grade in concrete boxes
- A sampling port in the return vault for access to measure total dissolved solids, pH, dissolved oxygen temperature, and other constituents of the blended effluent as required by permit conditions

Only one new above-grade structure, the Lab and Control Building would be built and would receive architectural treatment similar to the other buildings at the Regional Treatment Plant. The maximum depth of excavation would be 30 to 32 feet. A new cast concrete driveway would extend from the existing road on the north side to the Lab and Control Building delivery door on the north side. A new four-foot wide concrete walkway would extend along the south side. Storm water drainage would be directed through site grading to a new retention basin at the west end of the site for percolation.

2.8.1.10 Power Supply

The AWT Facility power would be supplied through a new PG&E utility connection to the Regional Treatment Plant. The system components would include a utility service, transformers, and switchgear. The major electrical loads would be from the new influent pumping, oxygen generator (if liquid oxygen is not used), ozone generator, biological filtration backwash pumps (if included in the final system), membrane filtration and reverse osmosis feedwater pumping, ultraviolet light reactors, and product water pumping. In the case of a power failure, the AWT Facility would shut down and the secondary treated influent water would bypass the AWT Facility and be discharged to Monterey Bay, if not used first by the Salinas Valley Reclamation Plant. The Regional Treatment Plant has three power supplies: cogeneration, utility connection, and a standby diesel generator. If all three power supplies fail, there are provisions to connect mobile generators to the critical facilities. See **Section 2.6.3** for a summary of the power demands of the proposed Treatment Facilities at the Regional Treatment Plant. (Source: V. Badani, E2 Consulting Engineers; A. Wesner, SPI Engineering; B. Holden' MRWPCA; and T.G. Cole, October 2014)

2.8.1.11 AWT Facility Construction

Construction workers would access the proposed AWT Facility site via Charles Benson Road and existing access roads serving the existing treatment plant. Construction activities would include cutting, laying, and welding pipelines and pipe connections; pouring concrete footings for foundations, tanks, and other support equipment; constructing walls and roofs; assembling and installing major advanced treatment process components; installing piping, pumps, storage tanks, and electrical equipment; testing and commissioning facilities; and finish work such as paving, landscaping, and fencing the perimeter of the site. Construction equipment would include excavators, backhoes, graders, pavers, rollers, bulldozers, concrete trucks, flatbed trucks, boom trucks and/or cranes, forklifts, welding equipment, dump trucks, air compressors, and generators. Mechanical components of the pretreatment, membrane filtration systems, reverse osmosis, advanced oxidation, and post-treatment facilities would be prefabricated and delivered to the site for installation. Approximately 3.5 acres would be disturbed during construction. Construction activities related to the AWT Facility are expected to occur over 18 months, plus three months for testing and start-up.

2.8.1.12 AWT Facility Operation

Regional Treatment Plant secondary effluent that would include a treated mixture of the source waters would be drawn from a new diversion structure on an existing main pipeline. Pumping facilities would be controlled remotely through the AWT SCADA system. The AWT Facility would operate at an overall water recovery rate of 81 percent.[26] Waste residuals would include backwash from the biological filtration system (if included), backwash and cleaning wastes from the membrane filtration treatment system and concentrate and cleaning wastes from the reverse osmosis system. Cleaning wastes from each system would be neutralized and returned to the head of the Regional Treatment Plant, along with backwash waste residuals from the membrane treatment system. Reverse osmosis concentrate would be discharged through a new brine mixing structure to the existing Regional Treatment Plant ocean outfall. The AWT Facility would target an annual production rate of up to 3,700 AFY, requiring an average annual reverse osmosis feed supply of 4,568 AFY and producing waste residuals (reverse osmosis concentrate) of 868 AFY.

2.8.2 Overview of Salinas Valley Reclamation Plant Modifications

The existing Salinas Valley Reclamation Plant produces tertiary-treated, disinfected recycled water for agricultural irrigation within the CSIP service area. The Salinas Valley Reclamation Plant can only operate within the range of 5 to 29.6 mgd. When off-peak irrigation demands fall below the minimum plant capacity, those demands are met using Salinas Valley Groundwater. The Proposed Project includes Salinas Valley Reclamation Plant modifications to allow tertiary treatment at lower daily production rates, facilitating increased use of recycled water during the late fall, winter and early spring months to meet demands as low as 0.5 mgd.

The existing Salinas Valley Reclamation Plant uses a three step chemical and filtration process (**Figure 2-29, Salinas Valley Reclamation Plant Process Flow Diagram**). Secondary treated effluent from the Regional Treatment Plant is pumped to a flocculation basin where an alum polymer is introduced to bind together any remaining dissolved organic matter. This creates tiny clumps called floc. In the second step, the floc is removed in the tertiary filters. Treated water filters through a 6-foot bed of anthracite coal, sand and gravel in which the floc is trapped. After filtration, the water flows to the third step for disinfection in the chlorine contact basins. Disinfection destroys pathogens by maintaining a specific chlorine level in the water for at least one and one half hours. The final product is clear, odorless and safe to use for irrigation of food

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[26] This recovery rate does not include the filter backwash flows routed through the Regional Treatment Plant, as these flows would be recycled through the plant and return as source water, thus not decreasing the system recovery.

crops. The recycled water is temporarily held in an 80 acre-foot storage pond before it is distributed to growers via the CSIP pipelines[27].

The Salinas Valley Reclamation Plant has a design capacity from 8 mgd to 29.6 mgd. Through operational efficiencies, the plant managers can meet irrigation demands as low as 5 mgd, which is still not small enough for winter and wet-year demands. These small irrigation demands are currently met using Salinas Valley groundwater. Under the Proposed Project, the Salinas Valley Reclamation Plant would be enhanced to enable the plant to produce more continuous flows in the winter when demand by the CSIP growers decreases to as low as 0.5 mgd. Proposed improvements would include new sluice gates, a new pipeline between the existing inlet and outlet structures within the storage pond, chlorination basin upgrades, and a new storage pond platform. Instead of holding recycled water in the 80 acre-foot pond, one of the chlorine contact basins would be used as a wet-season storage reservoir, while the second basin would continue to function as the disinfection step. All of the modifications would occur within the existing Salinas Valley Reclamation Plant footprint. This component is expected to facilitate the delivery of up to 1,283 AFY of additional recycled water to the CSIP area.

2.8.2.1 Construction

Modification of the existing Salinas Valley Reclamation Plant would primarily occur within the existing 16-acre plant site. Installation of motorized sluice gates in the chlorine contact basins, installation of a motorized sluice gate and platform at the entrance of the storage pond, installation of a pipeline between the entrance and exit structures within the storage pond, and motorizing the existing sluice gate at the exit of the storage pond all would be within the existing Salinas Valley Reclamation Plant. Construction activities would include cutting, laying, and welding pipelines and pipe connections; pouring concrete footings for foundations, and other support equipment; installing piping, sluice gates and electrical equipment; testing and commissioning facilities; and finish work such as repairing the existing storage pond lining. Construction equipment would include excavators, backhoes, concrete trucks, flatbed trucks, boom trucks and/or cranes, forklifts, welding equipment, dump trucks, air compressors, temporary tanks and generators. Construction activities related to the Salinas Valley Reclamation Plant Modifications are expected to occur over 12 months. Any work requiring a full system shut-down would occur during the winter months when irrigation demands for recycled water are lowest.

2.8.2.2 Salinas Valley Reclamation Plant Facility Operation and Maintenance

Operation of the modified facility would be similar to the current operational method. During the peak irrigation season, the plant would operate at full capacity with both chlorine contact basins used for disinfection and the 80 acre-foot pond used for tertiary-treated product water storage. During the off-peak, low demand months, normal low flow (5 to 8 mgd) volumes of flow would be sent to the plant, one or two coagulation/flocculation tanks would be used, between one and three filters would be active, and only one chlorine contact tank would be used for disinfection, while the other tank would provide product water storage. When the tertiary-treated product water has filled the storage basin, the flow to the Salinas Valley Reclamation Plant could be

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[27] Salinas Valley Reclamation Plant description at: http://www.mrwpca.org/about_facilities_water_recycling.php, accessed October 2014.

reduced or stopped until additional water is needed. This production would reduce the amount of secondary-treated wastewater discharged to the ocean outfall.

Operation of the system year-round would increase the time required for system maintenance, because portions of the treatment train would remain in operation as compared to the current winter shut-down. These operations occur year-round within the overall MRWPCA facility, so this increased maintenance window should not affect the overall daily level of maintenance effort.

2.9 PRODUCT WATER CONVEYANCE FACILITIES

The Proposed Project would include construction of a new pipeline to convey the advanced treated product water from the proposed AWT Facility to the Seaside Groundwater Basin for injection, along one of two potential pipeline alignments. The first alignment option, referred to herein as the RUWAP Alignment, would generally follow what is commonly known as the RUWAP (Regional Urban Water Augmentation Project) recycled water pipeline route through the City of Marina, California State University Monterey Bay, and the City of Seaside. The second alignment option, referred to herein as the Coastal Alignment, would follow in parallel with a portion of CalAm's proposed new Monterey Peninsula Water Supply Project desalination product water pipeline along the eastern side of the Transportation Agency of Monterey County (Transportation Agency) railroad tracks. See **Figure 2-18, Proposed Project Facilities Overview**. The southern portion of the Coastal Alignment would also be located in the former Fort Ord within the cities of Marina and Seaside. These two options for product water pipeline alignments are discussed in more detail below.

The northernmost component of the proposed new product water conveyance system would be the new AWT Product Water Pump Station (hereafter, the AWT Pump Station). As noted previously, the new AWT Pump Station is proposed to be located within the site of the proposed AWT Facility, all of which would be constructed within the current boundary of the MRWPCA's Regional Treatment Plant. The new AWT Pump Station would pump the AWT product water into the product water conveyance pipeline.

Farther down the new pipeline, either of the two alignments for the conveyance pipeline system would also require a new approximately 2,100 square foot and up to 25 feet tall Booster Pump Station to provide adequate pressure to convey the AWT product water to the proposed new Injection Well Facilities.

For the RUWAP Alignment, the 2,100 square-foot Booster Pump Station is proposed to be located on the east side of 5th Avenue, just south of 3rd Street in Marina. For the Coastal Alignment, the Booster Pump Station is proposed to be located at the southwest corner of the intersection of Divarty Street and Second Avenue, within the City of Seaside. The exact location for the Booster Pump Station at this intersection is yet to be determined; however, for the purposes of environmental analysis in this EIR, the location is assumed to be immediately adjacent to the intersection to minimize conflicts with future plans for development of that site. Each pipeline alignment option would also require new flow control valves, isolation valves, blow down structures for maintenance, air and vacuum release valves, and other appurtenant below ground facilities within the pipeline conveyance alignment. The proposed Booster Pump Station sites are shown on **Figure 2-18, Proposed Project Facilities Overview**.

2.9.1 Design Criteria of Product Water Conveyance

The proposed new Product Water Conveyance system is designed to convey a total of up to 3,700 AFY of product water to the proposed new injection wells. The conveyance system design would accommodate an average monthly flow of 3.3 mgd and a peak daily flow rate of 4.0 mgd. The AWT Facility may operate at daily rates as low as 1.3 mgd during periods when water is being “withdrawn” from the drought reserve. Several factors are expected to affect the actual daily flow rates through the conveyance system: seasonal variations; source water supply variations; down-time for maintenance of mechanical equipment of pumping systems and the AWT Facility; and maintenance of the wells. Hence, it is necessary and prudent to size facilities, particularly the conveyance pipeline, to handle these flow variations to enable the project to meet the annual recharge target volume of 3,700 AFY in a variety of conditions. Using this design flow criterion, the pipeline size would be 24 inches in diameter. A maximum daily flow of 4.0 mgd was used for the design criteria for the pump stations.

Other product water conveyance facility design provisions include standby pumping units for pump stations; in-line isolation valves on the pipeline approximately every 2,000 feet, in case an unforeseen leak occurs or subsequent construction activities result in damage to the pipeline; compliance with pipeline separation requirement by the SWRCB Division of Drinking Water; and remote monitoring of the Booster Pump Station performance and pipeline pressure via SCADA system. The design of any buildings associated with the booster pumps shall consist of Monterey/Mission style architecture to match the design of the structures that have been built on the Santa Margarita ASR site and the Seaside Middle School ASR Site, per the City of Seaside’s comments.

2.9.1.1 RUWAP Product Water Alignment

The RUWAP Alignment would follow a portion of the recycled water pipeline alignment of Marina Coast Water District’s previously approved and partially-constructed Regional Urban Water Augmentation Program Recycled Water Project. The proposed new product water conveyance pipeline would be located primarily along paved roadway rights-of-way within urban areas. The Recycled Water Project was approved by the Marina Coast Water District in 2005; however, only portions of the recycled water distribution system have been built and no recycled water has been delivered to urban users. MRWPCA and the Water Management District may pursue a shared easement to accommodate both pipelines in some portions of the alignment (i.e., leaving space for completion of the planned separate RUWAP pipeline). It is also possible that in the future these agencies may decide to jointly use a single pipeline for both the Product Water Conveyance and the RUWAP Recycled Water Project ~~agreements and permits to use a portion or portions of the pipeline originally proposed and/or constructed for the Recycled Water Project~~ by Marina Coast Water District (i.e., converting the purpose of the pipeline for use by both the Proposed Project to convey advanced-treated Product Water from the AWT Facility to the Injection Well Facilities as well as to convey water to MCWD pursuant to the 2009 RUWAP MOU) ~~or they may pursue a shared easement to accommodate both pipelines in some portions of the alignment.~~ However, joint use of a shared pipeline is beyond the scope of the Proposed Project. MCWD has stated that it appreciates MRWPCA's inclusion of the Project Water Conveyance RUWAP Alignment Option in the Draft EIR and remains willing to discuss potential mutually beneficial options for use of the RUWAP facilities and/or alignment by the Proposed Project. That said, MCWD notes that such options must ensure that MCWD can meet its contractual obligations to provide water supplies to the Ord Community.

If the RUWAP Alignment is selected, the new product water conveyance pipeline would begin at the AWT Facility and run southeast along its western boundary and then depart the Regional Treatment Plant site in a southeasterly direction before turning southwest across the open country of the Armstrong Ranch and then entering the City of Marina street system. The alignment would follow Crescent Avenue south for about 4,000 feet, and then through several other streets, including California Avenue and 5th Avenue, until eventually intersecting General Jim Moore Boulevard (General Jim Moore). The pipeline route would be in the northbound lanes of General Jim Moore approximately 2 miles, past the developed, military housing area (called Fitch Park), through the open land around a water reservoir used by the nearby golf courses, connecting to Eucalyptus Road, then southerly to the Injection Well Facilities area. The portion of conveyance system from Normandy Drive south is common to both the Coastal and RUWAP Alignments. These alignments are shown on **Figure 2-18, Proposed Project Facilities Overview**.

Construction drawings prepared by Carollo Engineers, (90% design, dated December 2006) show the details of this RUWAP alignment up to Normandy Road. Portions of the pipeline within this alignment have been constructed by Marina Coast Water District, which reported that a segment in General Jim Moore from Normandy Road south to a point just north of Eucalyptus Road/Coe Avenue was constructed using 20-inch diameter pipe, and the pipeline continues south in General Jim Moore using 16-inch diameter pipe all the way to South Boundary Road.

If the RUWAP Alignment for the GWR product water conveyance pipeline is selected, the ~~pipeline may be constructed by Marina Coast Water District in accordance with the currently designed RUWAP or~~ MRWPCA may construct a separate pipeline parallel to the currently designed pipeline. **Figure 2-30, Product Water Conveyance Options near Regional Treatment Plant,** shows the location of the AWT Pump Station and the beginning portions of both product water alignment options.

2.9.1.2 Coastal Product Water Alignment

The Coastal Alignment would follow a portion of CalAm's proposed new Monterey Peninsula Water Supply Project desalination product water conveyance pipeline alignment that is currently the subject of CalAm's CPUC Application A.12-04-019.

If the Coastal Alignment is selected, the GWR product conveyance pipeline would depart from the Regional Treatment Plant site and run along its western boundary northerly to the Marina interceptor right of way.[28] From there, it would turn southwesterly along the Marina interceptor right of way to Del Monte Boulevard. The pipeline would turn south on Del Monte Boulevard and be located within land owned by the Transportation Agency for Monterey County (Transportation Agency) adjacent to the roadway. If the Coastal Alignment is selected, SWRCB Division of Drinking Water would require that MRWPCA and CalAm provide adequate separation between the existing MRWPCA wastewater interceptor in this area, the new GWR product water pipeline and CalAm's Monterey Peninsula Water Supply Project desalination product water pipeline.

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[28] Use of the MRWPCA easement for the land portion of the ocean outfall alignment was also considered as an option for a portion of the Coastal Alignment of the product water pipeline between the Regional Treatment Plant and Del Monte Boulevard and is discussed and analyzed as a component alternative in Chapter 7, Alternatives to the Proposed Project.

The Coastal Alignment would continue south, under the Highway 1 overpass, past MRWPCA's Fort Ord Pump Station. The Fort Ord gravity interceptor is farther away from the proposed alignments of both CalAm's Monterey Peninsula Water Supply Project desalination product water pipeline and the GWR product water pipeline than the separation distance required by SWRCB Division of Drinking Water. Hence, pipeline separation distance is not a concern in this area. The pipeline would continue south in the Transportation Agency's land to the Seaside city limit. From this point, the Coastal Alignment would cease to parallel CalAm's Monterey Peninsula Water Supply Project proposed desalination product pipeline alignment. For more information about CalAm's desalination product pipeline, see the relevant California Public Utilities Commission website at: www.cpuc.ca.gov/Environment/info/esa/mpwsp/index.html.

The GWR Project Coastal Alignment would cross under Highway One at the Divarty Street underpass. The pipeline would follow Divarty Street to Second Avenue, where the new Booster Pump Station would be located. This portion of the alignment and the Booster Pump Station site were recommended by the City of Seaside, Fort Ord Reuse Authority, and Marina Coast Water District representatives at a meeting on 13 November 2013. **Figure 2-31, Proposed Booster Pump Station Options,** shows the proposed location of, and conceptual site plan for, the Booster Pump Station for the Coastal Alignment.

From the proposed Booster Pump Station site, the pipeline would turn south and follow on the west side of Second Avenue to Lightfighter Drive within CSUMB property. At the intersection of Second Avenue and Lightfighter Drive the pipeline would be constructed under Lightfighter Drive by either directional drilling or bore and jack techniques to avoid disruption to this main thoroughfare. From this intersection the alignment would turn eastward and would be constructed on the south side of the Lightfighter Drive roadway, but off the pavement, up to the intersection with General Jim Moore. The pipeline would follow the southbound ramp from Lightfighter Drive onto General Jim Moore where it would merge to the same alignment as the RUWAP alignment. **Figure 2-18, Proposed Project Facilities Overview** shows the remainder of the proposed Product Water Pipeline alignment in General Jim Moore to a cut-off route through open space to the Injection Well Facilities site. This portion is coincident with the RUWAP Alignment option.

Booster Pump Station

The proposed new Booster Pump Station would receive flow from the first "leg" of the Product Water Conveyance Pipeline. The product water would flow under pressure to the pump(s) in the Booster Pump Station. The pipeline supplying the Booster Pump Station would have residual pressure (about 5 to 10 psi) available to "prime" the booster pumps. The Booster Pump Station would pump the product water into one of the two proposed alternative alignments that merge to a single alignment along General Jim Moore.

Because of noise considerations, the pump motors and discharge piping would be housed in a split-faced block, or similar building measuring approximately 30 feet by 70 feet and up to 25 feet tall with architectural treatment consistent with nearby facilities subject to approval by the City of Seaside and California State University Monterey Bay. In addition to the pumps and motors, the building would include electrical power equipment and HVAC, instrumentation and control equipment. Maintenance access would be provided to and around the building. Electrical supply transformer and a pressurized surge tank for the pump system would be located outside the pump station building. **Figure 2-31, Proposed Booster Pump Station Options** presents conceptual site plans for the Booster Pump Station for both the RUWAP and Coastal Alignments.

2.9.2 Construction of Product Water Conveyance

2.9.2.1 Pipeline Construction

To implement the Proposed Project, workers would install approximately 10 miles of Product Water pipelines primarily within existing roads and infrastructure easements. Pipeline installation would generally progress by 250 feet per day within or along roadways. For some pipelines in open (undeveloped) areas, work could progress at up to 400 feet per day. Progress at intersections or major utility crossings may be slower. Most pipeline segments would be installed using conventional open-trench technology; however, where it is not feasible or desirable to perform open-cut trenching, trenchless methods would be used.

Typical construction equipment for pipeline installation would include flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, Baker tanks, pickup trucks, arch welding machines, generators, air compressors, cranes, drill rigs, and skip loaders. Pipeline segments would typically be delivered and installed in 6- to 40-foot-long sections. Soil removed from trenches and pits would be stockpiled and reused, to the extent feasible, or hauled away for offsite disposal. Expected soil haulage quantities are provided in **Table 2-21, Proposed Project Construction Assumptions.**

Under typical circumstances, the width of the disturbance corridor for pipeline construction would vary from 50 to 100 feet, depending on the size of the pipe being installed. Trenchless technologies could require wider corridors at entry and exit pits. Pipeline installation would be ongoing throughout the entire 18-month construction period for the Proposed Project, with multiple pipe segments being installed simultaneously. Pipeline installation would be sequenced to minimize land use disturbance and disruption to the extent possible.

Open-Trench Construction

For pipeline segments to be installed using open-trench methods, the construction sequence would typically include clearing and grading the ground surface along the pipeline alignments; excavating the trench; preparing and installing pipeline sections; installing vaults, manhole risers, manifolds, and other pipeline components; backfilling the trench with non-expansive fills; restoring preconstruction contours; and revegetating or paving the pipeline alignments, as appropriate. A conventional backhoe, excavator, or other mechanized equipment would be used to excavate trenches. The typical trench width would be 6 feet; however, vaults, manhole risers, and other pipeline components could require wider excavations. In addition, much of the project construction area is underlain by sandy soils that may require a laid-back trench cross-section due to considerations such as duration of construction, efficiency, and safety. In these cases, trench widths may be up to 12 feet wide. Work crews would install trench boxes or shoring or would lay back and bench the slopes to stabilize the pipeline trenches and prevent the walls from collapsing during construction. After excavating the trenches, the contractor would line the trench with pipe bedding (sand or other appropriate material shaped to support the pipeline). Construction workers would then place pipe sections (and pipeline components, where applicable) into the trench, connect the sections together by welding or other applicable joining methods as trenching proceeds, and then backfill the trench. Most pipeline segments would have 4 to 5 feet of cover. Open-trench construction would generally proceed at a rate of about 150 to 250 feet per day. Steel plates would be placed over trenches to maintain access to private driveways or public recreation areas. Some pipeline installation would require construction in existing roadways and could result in temporary lane closures or detours.

Trenchless Technologies

Where it is not feasible or desirable to perform open-cut trenching, trenchless methods such as jack-and-bore, drill-and-burst, horizontal directional drilling, and/or microtunneling would be employed. Pipeline segments located within heavily congested underground utility areas would likely be installed using horizontal directional drilling or microtunneling. Jack-and-bore methods would also be used for pipeline segments that cross beneath highways, major roadways, or drainages.

Jack-and-Bore and Microtunneling Methods. The jack-and-bore and microtunneling methods entail excavating an entry pit and receiving pit at either end of the pipe segment. A horizontal boring machine or auger is used to drill a hole, and a hydraulic jack is used to push a casing through the hole to the opposite pit. As the boring proceeds, a steel casing is jacked into the hole and pipe is installed in the casing.

Drill-and-Burst Method. The drill-and-burst method involves drilling a small pilot hole at the desired depth through a substrate, and then pulling increasingly larger reamers multiple times through the pilot hole until the hole reaches the desired diameter. The pipe is then installed through the drilled hole.

Horizontal Directional Drilling. Horizontal directional drilling requires the excavation of a pit on either end of the pipe alignment. A surface-launched drilling rig is used to drill a small horizontal boring at the desired depth between the two pits. The boring is filled with drilling fluids and enlarged by a back reamer or hole opener to the required diameter. The pipeline is then pulled into position through the boring. Entry and receiving pits would range in size depending on the length of the crossing, but typically would have dimensions of approximately 50 by 50 feet.

2.9.2.2 Pump Station Construction

Two pump stations would be constructed: the AWT Product Water Pump Station and the Booster Pump Station (the latter would be located in one of two potential locations based upon the Product Water Conveyance alignment selected, either Coastal or RUWAP). Construction crews would prepare the pump station sites by removing vegetation and grading the sites to create a level work area. Construction activities would include excavations for wet wells, installing shoring and forms, pouring concrete footing for foundations; assembling and installing piping, pumps, and electrical equipment; constructing concrete enclosures and roofs; and finish work such as paving, landscaping, and fencing the perimeter of the pump station sites. Construction access would be provided via existing access roads and roadways.

The AWT Product Water Pump Station would be constructed on a new concrete pad adjacent to the new product water stabilization facilities at the Regional Treatment Plant. It is assumed that the entire 3.5-acre AWT Facility site could be disturbed during project construction activities. Construction of either Booster Pump Station would result in approximately 2,400 square feet of temporary disturbance and permanent facility (including driveways and fenced areas).

2.9.3 Operation and Maintenance

It is assumed that the proposed pump stations and pipelines could operate continuously for up to 24 hours a day. Although pump stations would typically be operated remotely via SCADA, facility operators would conduct routine visits to the pump station sites approximately once daily to monitor operations, conduct general maintenance activities, and service the pumps.

General operations and maintenance activities associated with pipelines would include annual inspections of the cathodic protection system and replacement of sacrificial anodes when necessary; inspection of valve vaults for leakage; testing, exercising and servicing of valves; vegetation maintenance along rights-of-way; and repairs of minor leaks in buried pipeline joints or segments. Above-grade surge tanks would require periodic inspection (once every five years) and recoating (once every twenty years).

2.10 INJECTION WELL FACILITIES

Under the Proposed Project, product water would be injected into the Seaside Groundwater Basin using new injection wells. The proposed new Injection Well Facilities would be located east of General Jim Moore Boulevard, south of Eucalyptus Road in the City of Seaside, including a total of eight injection wells (four deep injection wells, four vadose zone wells), six monitoring wells, and back-flush facilities. Space would be included within the Injection Well Facilities area to accommodate the future construction of replacement injection wells which would be built only if the adjacent deep injection well fails, which typically would occur after the well's estimated 20 to 30 year life. The proposed site plan for the new injection wells and back-flush facilities are shown in **Figure 2-32rev, Injection Well Site Plan**. As shown on Figure 2-32rev, the injection wells, backflush facilities, and connecting driveway with pipelines and electrical conduits below it, would be located within a 150-foot wide corridor along the City of Seaside's eastern border. This area is also referred to as the Borderland development area adjacent to the Natural Resources Management Area owned by the U.S. Bureau of Land Management in the Fort Ord Habitat Management Plan (USACOE, Sacramento District, 1997).The proposed new deep injection wells are numbered DIW-1 through DIW-4 and the proposed new vadose zone wells are numbered VZW-1 through VZW-4, going from north to south, in the order of anticipated sequence for construction of the wells. DIW-1 and VZW-1 would be built in close proximity to each other to share electrical, motor control, pumps, and site building pad infrastructure. Similarly, DIW-2 and VZW-2, would be constructed in close proximity to one another, as would each successive pair of wells. Each site is referred to as a well cluster. Each well cluster would include concrete pads at each well head, approximately 10-ft by 10-ft, a back-flushing pump and motors for the deep well, above and below grade injection and back-flush wash pipelines, valves and flow meters, and a small building (approximately 16-ft by 24-ft) to hold the electrical and control equipment in a fenced area measuring up to 7,000 square feet. Suitable paint colors, materials, and screening landscape around each fenced enclosure would be provided subject to approval of the City of Seaside. **Figure 2-33, Injection Well Cross-Section,** shows a cross-section of the proposed injection wells in relation to the groundwater basins and other facilities. **Figure 2-34, Conceptual Injection Schematic,** shows the relationship between the proposed and existing facilities, underground water flow paths, and the groundwater basin. **Figure 2-35, Conceptual Site Plan and Schematic of Typical Well Cluster,** is an example of the details of one of the four proposed well clusters.

2.10.1 Design of Injection Well Facilities

2.10.1.1 Injection Wells

Wells within the same target aquifer are proposed to be spaced from 800 to 1,000 feet apart to minimize well interference. Separate turnouts with isolation valves would be provided to each individual well site from the product water conveyance pipeline. Proceeding southwesterly, the pipeline would step down in size after the third well. Each deep injection well would have an isolation valve, flow meter and an air release shutoff valve at the well head to prevent air from entering the well during injection operations.

Four deep injection wells and four vadose zone wells are proposed so that the product water could readily be allocated among the two well types and aquifers. With water levels below sea level in both the Paso Robles Aquifer, the uppermost aquifer that is unconfined, and the Santa Margarita Aquifer, the deeper confined aquifer, it has been determined by the Watermaster that recharge into both aquifers would be beneficial for protection against seawater intrusion and for water supply. However, most of the basin production is from the Santa Margarita aquifer where water levels are below sea level throughout the northern coastal subarea and more than 40 to 60 feet below sea level down-gradient and adjacent to the Injection Well Facilities site (see **Figure 2-4 rev, Seaside Groundwater Basin Groundwater Levels).** Groundwater modeling was performed to identify the optimal allocation of recharge to the two aquifers to minimize both: (1) water outflow from the basin, and (2) changes in storage in the basin (Hydrometrics WRI, 2013).

Based on the modeling performed for the Proposed Project, the Santa Margarita aquifer is targeted to receive 90% of the product water from the Project and the Paso Robles aquifer is targeted to receive 10% of the product water. Injection to the Paso Robles aquifer would be through vadose zone wells (relatively shallow and less expensive to construct and operate than deep injection wells). This project configuration would provide maximum flexibility for well operation and for managing short-term production benefits with the benefits of long-term storage.

Deep injection well design capacity (or maximum volumetric flowrate of water that can be injected in the well for a short period) is conservatively estimated at 1,000 gpm, based on nearby Aquifer Storage and Recovery wells operated by Water Management District (see **Figure 2-17, Aquifer Storage and Recovery Project Location Map** for location of Aquifer Storage and Recovery wells). Using an additional conservative factor of 80% capacity to account for occasional time offline for maintenance (including well back-flushing), four wells would have an operational injection capacity of about 3,200 gpm of water. A preliminary design for the deep injection wells is shown on **Figure 2-36, Deep Injection Well Preliminary Design;** this design is based on the design and functional capability of the nearby Santa Margarita Aquifer Storage and Recovery wells.

Vadose zone well capacity is less certain, but a preliminary analysis by Todd Groundwater indicates that 500 gpm would be a reasonable estimate of capacity (Todd Groundwater, 2015). Using this estimated rate, a total of four vadose zone wells would provide an additional capacity of about 2,000 gpm. A conceptual vadose well diagram is shown on **Figure 2-37, Vadose Zone Well Preliminary Design.** The design is based, in part, on details provided by the City of Scottsdale, Arizona, where several hundred similar vadose zone wells have been successfully operated for many years.

Collectively, the four shallow and four deep injection wells represent a maximum injection capacity of about 6,000 gpm. This capacity is well above the Proposed Project design flows of 3,700 AFY (with an anticipated maximum daily flow rate of 2,780 gpm with no downtime), and thus would allow for backup of pumping capacity if one or more wells are not functioning, well maintenance, and other operational benefits. In addition, GWR product water could readily be re-allocated among the two well types and aquifers as basin conditions change in the future and to ensure compliance with SWRCB Division of Drinking Water requirements (i.e., response retention time).[29] In addition, if there are future changes in the daily flow rates, sufficient number and total capacities of wells would be available to accommodate peak flows. Wells may be installed in a phased approach (from north to south) as actual well capacity and required peak flow rates are more clearly defined. This EIR assumes all eight injection wells would be built. The design of the buildings associated with the Injection Well Sites would consist of Monterey/Mission style architecture to match the design of the structures that have been built on the Santa Margarita ASR site and the Seaside Middle School ASR Site, as requested by the City of Seaside.

2.10.1.2 Back-flush Facilities

Over time, injection well capacity can decrease because of several factors, including air entrainment, filtration of suspended or organic material, bacterial growth, and other factors. To regain "lost capacity," the deep injection wells are planned to be pumped periodically, a process referred to as back-flushing. For back-flushing, wells are usually pumped at an extraction rate that is twice the injection rate. Each deep injection well would be equipped with a well pump to back-flush the well. The back-flushing rate would be approximately 2,000 gallons per minute (gpm) and would require a well pump and motor. Pump speed would be variable by inclusion of a variable frequency drive, so that back-flushing can be ramped up (manually or with an automated program) from initial lower flow to full flow. The shallow vadose zone wells would not be equipped with back-flushing pumps as the bottom of those wells would be over one hundred feet above the aquifer.

Based on the experience of the Water Management District in the operation of its nearby Aquifer Storage and Recovery wells, back-flushing of each deep injection well would occur about weekly and would require discharge of the back-flush water to a percolation basin (basin), with a storage capacity of about 240,000 gallons. Water percolated through the basin would recharge the Paso Robles aquifer. **Figure 2-32 rev, Injection Well Site Plan** shows the proposed basin in the middle of the injection well facilities site. The operational size of the basin would be approximately 50-feet wide by 180-feet long by 3-feet of water depth. The overall basin depth would be five feet (three feet water depth plus two feet free board). The embankment of the basin would have 3:1 side slopes and 12-foot wide perimeter access road. The basin would be located in an area between the middle two injection well clusters.

Each well would have a flow meter to monitor the amount of water applied for recharge. A separate pipeline would measure rate of flow and convey the back-flushed water to the Basin. Each deep injection well would have a back-flush pump and motor. The estimated motor size for each pump is approximately 400 hp. Electrical cabinets would be located at each well for electrical supply, monitoring and supervisory control and data acquisition (SCADA) connections.

2.10.1.3 Monitoring Wells

Monitoring wells would be used to monitor project performance and compliance with State Board Division of Drinking Water regulations. Because the Proposed Project would recharge

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[29] This concept is defined in more detail in **Chapter 3, Water Quality Permitting and Regulatory Overview.**

two separate aquifers (Paso Robles and Santa Margarita aquifers), monitoring wells would be installed in both. The monitoring wells would also be used to satisfy regulatory requirements for monitoring of subsurface travel time, tracer testing, and other requirements for a groundwater replenishment project. The City of Seaside has indicated that its approval of the proposed Injection Well Facilities monitoring wells and roadway/pipeline alignments would be conditioned to require that the project owner relocate any monitoring well within the interior lands of the Injection Well Facilities site that would create a substantial interference with future development opportunities in the City of Seaside. Based on current State Board regulations, a minimum of four monitoring wells would be required: two for each of the two aquifers. One set of monitoring wells would be located approximately 100 feet from the injection wells between the injection wells and the nearest down-gradient water supply wells. The second set of monitoring wells would be located between the project wells and the nearest down-gradient water supply wells. **Figure 2-32rev, Injection Well Site Plan** shows the approximate location of the monitoring wells whose locations are subject to discretionary approval by the City of Seaside and the State Water Resources Control Board and Regional Water Quality Control Board.

2.10.1.4 Electrical Power Supply and Instrumentation for Injection Wells

Injection wells would require a new permanent power supply to the site, including electrical equipment, electrical control buildings for back-flush pumps, external electrical control cabinets at the well clusters, wiring and connections of electrical power and instrumentation and control facilities. Power supply capability by the utility company, PG&E, must be confirmed prior to final design of the electrical power supply facilities. There are high-voltage (21 kV) overhead power lines in close proximity to the Injection Well Facilities Site; therefore, it is likely that the PG&E power at 4.16 kV would be brought to each cluster site from offsite overhead power poles. However, the locations for connections and conveyance are unknown at this time. From this location, the power line would likely be in a buried conduit, encased in concrete, routed to the locations of the power demand, namely near the motor control and electrical building at each of the four well sites (discussed in **Section 2.10.1.1** above) The proposed electrical control buildings would each house the SCADA and electrical controls and pump drive and adjacent to each building would be a transformer (approximately 400 to 450 kVA), located such that it would step down the line voltage from 4.16 kV to 3-phase, 60 Hz, 480-volt power for the well pumps. Further step down from 480-volt to 220 and 120 volt would be required for power supply to instrumentation and SCADA equipment, site lighting, building lighting and ventilation and other small, miscellaneous needs. In addition to incidental power requirements (instrumentation and monitoring equipment, site lighting, isolation valve motor operators, etc.), major power supply would be required to drive only one back-flush pump motor at a time.

Step-down transformers would be outdoor type units located near the electrical buildings. Adequate clearance would be provided around the transformer to meet electrical code requirements.

An electrical building would house the motor control center and variable frequency drive unit at each cluster site and would be located near the transformer. The electrical building would measure approximately 400 square feet and would be up to 15 feet tall. The material of construction would be brick-faced concrete block with architectural treatment of the buildings subject to review and approval by the City of Seaside.

2.10.2 Construction

2.10.2.1 Well Construction

Installation of any of the wells (deep injection, vadose zone and monitoring wells) typically follows a three-step process: drilling and logging, installation, and testing and equipping. This section describes these three processes.

Drilling and Logging

The deep injection well would be drilled with rotary drilling methods. The method would be customized to minimize borehole impacts from drilling fluids and may incorporate air rotary methods or specialized drilling fluids (such as polymers). Cuttings from the borehole would be logged by a California Certified Hydrogeologist. Open-hole geophysical logging would also be conducted.

It is anticipated that one of the deeper, Santa Margarita monitoring wells would be installed prior to the installation of the first deep injection well. This would provide site-specific information and inform details of injection well design. The well would also provide a critical monitoring point during injection well testing. The direct rotary drilling method would likely be used for the monitoring wells.

Installation

The deep injection well design would be based on the Aquifer Storage and Recovery wellfield design and would incorporate 18-inch to 20-inch diameter production casing and a wire-wrap stainless steel screen. Based on downhole velocity logs completed following construction of the downgradient Aquifer Storage and Recovery project wells and the first GWR monitoring well north of the proposed Injection Well Facilities, the lower 200 feet of the aquifer has been found to be the most productive section of the Santa Margarita and would be targeted for the injection zone screen. Screen selection and filter pack design would be developed using both cuttings from the adjacent monitoring well (to be drilled as part of the Proposed Project) in addition to data collected from nearby Aquifer Storage and Recovery wells. Mechanical and pumping techniques would be used to develop the well after installation.

Testing and Equipping

Both constant discharge and constant injection testing would be completed in the injection well following well drilling. Test details have not yet been developed but an 8-hour test for each test is assumed. Constant rate tests would be preceded by step tests, as appropriate, to identify preferred rates for each test. Flowmeter surveys would be conducted following pumping and injection testing to identify water movement within the wellbore. Depending on the objectives of the test, both static and dynamic flow testing may be recommended.

At the end of the constant rate discharge test, a water quality sample would be collected to confirm local groundwater quality. Constituents targeted for analysis would be based on compliance with the Drinking Water regulations and Engineering Report as well as ambient groundwater quality in the Santa Margarita aquifer in the area. The Aquifer Storage and Recovery wells had some power constraints from PG&E and incorporated a 400-horsepower, variable speed pump. For planning and cost purposes, a similar pump is envisioned for each proposed deep injection well.

2.10.2.2 Back-flush Pipeline Facilities Construction

As described above, the back-flush facilities at each injection well site would include a flow meter, a back-flush pump and 400-hp motor, and an electrical cabinet, monitoring and SCADA. A main electrical power supply/transformer and motor control building would be built for PG&E power supply. In addition to incidental power requirements (instrumentation and monitoring equipment, site lighting, etc.), major power supply would be required to drive only one injection pump motor at a time. To construct the back-flush pipeline and basin, the contractor would excavate pipe trenches, retain the spoilage on site, import and install bedding material, and lay pipe, backfill & compact trench.

Estimated construction time for this component is approximately 4 months. The temporary construction area along the alignment of the 14-inch diameter back-flush water pipeline would be approximately 25 to 50 feet wide, for its approximate 3,000-foot length. Hence, the ground surface disturbance area would be between 1.75 and 3.5 acres. The construction area width is to provide space for a backhoe, trucks for hauling excess soil material and imported bedding material. The depth of the pipeline trench would be approximately five feet to allow for bedding of the pipe and about three to four feet of cover material.

2.10.2.3 Pump Motor Control/Electrical Conveyance Construction

A main electrical power supply/transformer and motor control building would be built at each injection well facility site for PG&E power supply. In addition to incidental power requirements (instrumentation and monitoring equipment, site lighting, etc.), major power supply would be required to drive only one injection pump motor at a time. The following activities would be required to construct the pump motor control and electrical conveyance facilities:

- excavation, spoilage handling, import and install bedding material, building foundation, trench, place concrete, backfill & compact trench, finish concrete floor of electrical building;
- install exterior electrical control cabinets on the paved area at the four clusters of vadose and deep injection wells; and
- for electrical buildings, construct block walls, doors, louvers, roof and appurtenances, then interior finishes, lighting and HVAC; and electrical equipment and wiring.

The estimated construction period for these facilities is approximately 6 months. The temporary construction area would be approximately 25 to 50 feet wide within the alignment of the 14-inch diameter back-flush water pipeline, which is approximately 3,000 feet long.). There would be no additional surface disturbance for construction of electrical conduits beyond that for the 14-inch back-flush water pipeline, described in the previous section. Construction activities would include a buried electrical power conduit and instrumentation conduits, all of which would be underground and encased in a concrete ductbank, which would run in parallel and near the 14-inch back-flush pipeline. The depth of the ductbank trench would be approximately 4.5 to 5 feet to allow for about 3 feet of cover material. The electrical control building that would house the electrical and instrumentation (SCADA) transmission equipment would be approximately 16 feet by 24 feet. Its foundation construction would be slab-on-grade; hence, excavation would be only about 3 feet deep. The construction surface area would be about 600 square feet.

2.10.3 Operation and Maintenance

Injection wells and associated electrical and mechanical systems would operate 24 hour per day, 7 days per week throughout the year, although it is unlikely that all eight wells would be actively injecting at the same time for any length of time. Operations and maintenance staff would visit the Injection Well Facilities site most likely once daily Monday through Friday nearly every week. In addition to operation and maintenance of the wells, the workers would inspect above ground valves and appurtenances to assure they are properly functioning and to conduct and monitor the back-flush operations.

For the purposes of evaluating the injection impacts on groundwater basin, MRWPCA has evaluated the availability and amounts of source waters, capacity of the AWT Facility, minimum delivery targets, and operational guidelines in order to develop potential delivery schedules for recharge to the Seaside Basin. Based on this analysis, there are eight potential delivery schedules that could occur, based on two water management decision points made in each year of GWR operation. These eight delivery schedules were presented in **Table 2-9, Proposed Project Monthly Flows for Various Flow Scenarios.** The two management decisions that determine appropriate deliveries to the Seaside Basin are described below.

The first management decision would be made by October 1, the beginning of the water year,[30] and would dictate which of two delivery schedules is followed during October through March of that water year. The decision would be based on whether or not the drought reserve account is full. If the account is full (1,000 AF), the project would deliver monthly amounts from October through March based on average annual deliveries (highlighted in purple on **Table 2-9**, **Proposed Project Monthly Flows for Various Flow Scenarios**; for example, see October through March deliveries for Schedule 2 and Schedule 8). If the account balance is 800 AF ~~of~~ or less on October 1, then an additional 200 AF would be delivered from October through March (highlighted on **Table 2-9, Proposed Project Monthly Flows for Various Flow Scenarios** in blue; for example, see October through March delivery schedules 1, and 3 through 7). For wet or normal years, these two recharge schedules would produce a total of 3,700 AFY (Schedule 1) or a total of 3,500 AFY (Schedule 2) (**Table 2-9, Proposed Project Monthly Flows for Various Flow Scenarios**).

Based on the experience of the Water Management District in the operation of its nearby Aquifer Storage and Recovery wells, back-flushing of each injection well would occur for about four hours weekly and would require discharge of the back-flush water to the percolation basin. The Water Management District conducts manual back-flushing and visual checks and field-tests the back-flush water discharge to confirm adequate flushing time has been provided. Approximately once per year, a disking machine would be used to scarify the bottom of the pond to increase/restore the percolation rate.

Monitoring wells would be used to monitor project performance and compliance with State Board – Drinking Water Division regulations. Because the Proposed Project would recharge two separate aquifers (Paso Robles and Santa Margarita Aquifers), monitoring wells would be sampled to satisfy regulatory requirements for monitoring of subsurface travel time, tracer testing, and other requirements for a groundwater replenishment project.

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[30] A Water Year is defined as October 1 through September 30, and is based on the annual precipitation pattern in California. The Water Year is designated by the calendar year in which it ends.

2.11 CALAM DISTRIBUTION SYSTEM

CalAm would use existing Seaside Groundwater Basin wells, in addition to existing treatment facilities and existing pipelines in its Monterey District Service area, to recover, treat and deliver potable water from the Seaside Groundwater Basin to its customers; the water that CalAm extracts would include some of the Proposed Project product water along with other groundwater from the Basin.

In addition to using existing wells, treatment facilities, and pipelines, CalAm would need to construct additional pipeline segments to deliver the full amount of product water to its customers. Because the CalAm system was initially built to deliver water from Carmel Valley to the Monterey Peninsula cities, a hydraulic trough currently exists in the CalAm peninsula distribution system that prevents water delivery at adequate quantities from the Seaside Groundwater Basin to most of Monterey, and all of Pacific Grove, Pebble Beach, Carmel Valley, and the City of Carmel areas. The hydraulic trough is an area of the CalAm distribution system with very small pipe diameters and very low elevation such that the required high flow rates of water and high pressures needed to convey water from the north between two pressure zones of the system cannot be achieved with the current infrastructure. This system deficiency would need to be addressed regardless of whether the Proposed GWR Project is implemented by itself, CalAm's Monterey Peninsula Water Supply Project with the full-size desalination plant is implemented without the GWR Project, or the variant to the Monterey Peninsula Water Supply Project that includes both a smaller desalination plant and the GWR Project is implemented. Under all three of these scenarios, for CalAm to be able to deliver increased quantities of water extracted from the Seaside Groundwater Basin to its customers, the company would need to construct pipeline improvements to bridge this trough. In CalAm's Monterey Peninsula Water Supply Project, CalAm is proposing to construct two new pipelines--the Transfer and Monterey pipelines--to bridge this trough. In addition, CalAm is proposing to construct a new Terminal Reservoir to add storage and pressure equalization within the water supply system; however, MRWPCA understands that the Terminal Reservoir would not be needed if the GWR Project is implemented by itself. Therefore, the Transfer and Monterey Pipelines are the only CalAm Distribution System components proposed to be built by CalAm and included in the analysis of impacts of the Proposed Project.

While MRWPCA would not be approving, constructing or operating the CalAm distribution improvements, the improvements would be needed for a stand-alone GWR Project, and therefore they are included in the environmental evaluation of the Proposed GWR Project. These same CalAm improvements are also included in the Monterey Peninsula Water Supply Project as a component of that project. The proposed alignment of these pipelines is shown in **Figures 2-38, CalAm Distribution System Pipeline: Eastern Terminus**, and **2-39, CalAm Distribution System Pipeline: Western Terminus**.[31]

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[31] Alternative routes for the Monterey and Transfer Pipelines have been submitted to the California Public Utilities Commission by CalAm. The alternative routes are addressed in this EIR within Chapter 7, Alternatives to the Proposed Project.

2.11.1 Transfer Pipeline

The new three-mile-long, 36-inch-diameter Transfer Pipeline would allow for flows to be conveyed in either direction and would be used to convey potable water extracted from the Seaside Groundwater Basin to CalAm customers by conveying the water to the Monterey Pipeline.[32] From the intersection of Del Monte Boulevard/La Salle Avenue, the proposed Transfer Pipeline would be routed east along La Salle Avenue for approximately 0.9 mile to Yosemite Street, turn south and continue for approximately 1 mile to Hilby Avenue, and then continue east for approximately 0.4 mile along Hilby Avenue to General Jim Moore Blvd (see **Figure 2-38, CalAm Distribution System Pipeline: Eastern Terminus**).

2.11.2 Monterey Pipeline

The new 5.4-mile-long, 36-inch-diameter Monterey Pipeline would allow for bi-directional flows and would convey potable water supplies from the new Transfer Pipeline to the Monterey Peninsula. The Monterey Pipeline would utilize the pressure (called “hydraulic head”) provided by CalAm extraction operations to convey water to the Monterey Peninsula cities. The Monterey Pipeline would connect two pressure zones in the CalAm system (one in the area of the City of Pacific Grove and one in the area of the City of Seaside). With implementation of this pipeline, water stored in Forest Lake Tanks could flow via gravity to the lower Carmel Valley or be pumped to the upper Carmel Valley.

The eastern terminus of the new Monterey Pipeline would be connected to the new Transfer Pipeline[33] at the intersection of Del Monte Boulevard/La Salle Avenue. The Monterey Pipeline would be routed southwest on the west side of Del Monte Boulevard, generally following the Monterey Peninsula Recreational Trail and Transportation Agency right-of-way. The alignment would pass under Highway 1, and adjacent to the Naval Postgraduate School and El Estero Park. East of El Estero Park, the pipeline would turn south on Figueroa Street and west along Franklin Street. At High Street, the alignment would bear north and traverse the Presidio of Monterey by paralleling an existing CalAm pipeline in an existing CalAm easement. At the western boundary of the Presidio of Monterey, the alignment would continue on to Spencer Street. The alignment would then turn from Spencer Street southwest on Eardley Street and terminate near the existing Eardley Pump Station (see **Figure 2-39, CalAm Distribution System Pipeline: Western Terminus**).

2.11.3 Construction of CalAm Extraction / Distribution System

Construction of CalAm’s Transfer Pipeline and Monterey Pipeline would use similar equipment and methods as those described in **Section 2.9.2** for the Product Water Conveyance Pipeline, and are omitted here for brevity. Pipeline installation would generally progress at a rate of 150 to 250 feet per day. The Transfer Pipeline construction is anticipated to take 6-months, and

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[32] If the Monterey Peninsula Water Supply Project is approved and implemented, the Transfer pipeline would also be used to: convey desalinated product water from the Transfer Pipeline east to the Terminal Reservoir for storage; convey Aquifer Storage and Recovery product water west to the Monterey Pipeline; and convey water stored in the Terminal Reservoir west to the Monterey Pipeline.

[33] In the case of the proposed Monterey Peninsula Water Supply Project, the Monterey Pipeline would also connect with the Transmission Main at this location.

construction of the Monterey Pipeline is anticipated to take 12-months. Construction of the pipelines may be performed concurrently under one or separate contracts.

2.11.4 Operation of CalAm Extraction / Distribution System

Unlike the injection period for Aquifer Storage and Recovery supplies, which is limited to periods of high flow between December and May in the lower stretches of the Carmel River, GWR product water would be injected into the Seaside Groundwater Basin year-round. GWR product water would typically be pumped from the groundwater basin during summer months and periods of peak demand. Operation of the existing Aquifer Storage and Recovery wells and groundwater wells for extraction and delivery of GWR Project water from the Seaside Groundwater Basin would match the current CalAm operational practices.

It is assumed that the distribution system pump stations could operate continuously for up to 24 hours a day. Although pump stations would typically be operated remotely via SCADA, facility operators would conduct routine visits to the pump station sites to monitor operations, conduct general maintenance activities, and service the pumps.

General operations and maintenance activities associated with the new Transfer and Monterey pipelines would include annual inspections of the cathodic protection system and replacement of sacrificial anodes when necessary; inspection of valve vaults for leakage; testing, exercising and servicing of valves; vegetation maintenance along rights-of-way; and repairs of minor leaks in buried pipeline joints or segments.

2.12 PROPOSED PROJECT CONSTRUCTION SUMMARY

The Proposed Project construction activities would include site preparation, grading, and excavation; pavement demolition; concrete and paving; installation of prefabricated components (e.g., pretreatment and advanced treatment processes, storage tanks, etc.); construction of buildings to house electrical, pump motors, and chemicals; construction of pipelines; well drilling and development; installation of overhead and underground powerlines; and disposal of construction waste and debris. Construction equipment and materials associated with the various components of the Proposed Project would be staged and stored within the respective construction work areas. Construction equipment and materials associated with pipeline installation would be stored along the pipeline alignments and at nearby designated staging areas. Staging areas would not be sited in sensitive areas such as riparian areas or critical habitat for protected species. To the extent feasible, parking for construction equipment and worker vehicles would be accommodated within the construction work areas and on adjacent roadways.

Before construction mobilization for the source water diversion facilities, AWT Facility, pipeline installation, and the proposed injection wells, the contractors would clear and grade construction areas (including temporary staging areas), and remove vegetation and debris as necessary, to provide a relatively level surface for the movement of construction equipment. Workers would clear the construction work areas in stages as construction progresses to limit soil erosion. In addition to grading the ground surface, the contractor might need to mow or place gravel over staging areas for fire prevention. Upon completion of construction activities, the construction contractor would remove any added gravel, contour the construction work areas and staging areas to their original profile, and hydro-seed or repave the areas, as appropriate.

A preliminary construction schedule is provided in **Figure 2-40, Proposed Project Construction Schedule** to show the general timeframes, durations, and overlap of construction activities of the various components of the Proposed Project. As shown, the Proposed Project is anticipated to require approximately 18 months to construct, plus 3-months of testing and start-up, and is planned for initial operation by late 2017. MRWPCA is currently evaluating the use of alternative construction approaches, such as design-build, to expedite the construction schedule. **Table 2-20, Construction Area of Disturbance and Permanent Footprint** summarizes the construction areas of disturbance and permanent footprint for each of the Proposed Project construction sites. General construction activities, equipment, and hours are summarized in **Table 2-21, Proposed Project Construction Assumptions**. In the sections following the table, the construction activities at each site are described in more detail.

Table 2-20
Construction Area of Disturbance and Permanent Footprint

Project Component	Construction Boundary (feet)		Permanent Component Footprint (feet)			
	Length	Width	Length	Width	Maximum Height (above ground surface)	Maximum Depth (below ground surface)
Source Water Diversion and Storage Sites						
Salinas Pump Station Diversion (several discrete trenches and pits totaling 0.75 acres)	175	175	30	25	0	20
Salinas Treatment Facility Storage and Recovery						
Recovery Pump Station	50	50	30	15	10	10
Recovery Pipeline (Note 1)	500	20	7,700	<6	0	10
Pond 3 pump station and inlet structure	50	50	15	30	10	20
Pipeline from Pond 3	6,000	20	6,000	<6	0	10
Reclamation Ditch Diversion	120	50	80	20	10	20
Tembladero Slough Diversion	200	50	50	20	10	20
Blanco Drain Diversion						10 (trenched sections); 25 (trenchless sections and pits)
Diversion Pump Station	50	50	50	20	10	
Force Main and Gravity Pipeline (including pipelines located at the Regional Treatment Plant)	8,500	20	8,500	<6	0	
Lake El Estero Diversion	50	50	20	2	0	15
Treatment Facilities at Regional Treatment Plant						
AWT Facility	600	450	500 (triangular)	350	31	10
Brine Mixing Facility					16	31
Pipelines, AWT product water pump station					0	15
Salinas Valley Reclamation Plant modifications	700	400	600	300	25	10
Salinas Valley Reclamation Plant pipeline	900	20	900	<6	0	10
Product Water Conveyance Facilities						
Product Water Pipelines (Note 2)						10 (trenched sections); 25 (trenchless sections and pits)
RUWAP AWT to Booster Pump Station	*28,000*	*10 – 15*	*28,000*	<6	*0*	
RUWAP Booster Pump Station to Injection Wells	*18,900*	*10 – 15*	*18,900*	<6	*0*	
Coastal AWT Facility to Booster Pump Station	*29,100*	*10 – 15*	*29,100*	<6	*0*	
Coastal Booster Pump Station to Injection Wells	*15,100*	*10 - 15*	*15,100*	<6	*0*	
Booster Pump Station (one of two optional sites)	*100*	*60*	*80*	*60*	*25*	10

Table 2-20
Construction Area of Disturbance and Permanent Footprint

Project Component	Construction Boundary (feet)		Permanent Component Footprint (feet)			
	Length	Width	Length	Width	Maximum Height (above ground surface)	Maximum Depth (below ground surface)
Project Component	**Construction Boundary (feet)**		**Permanent Component Footprint (feet)**			
	Length	**Width**	**Length**	**Width**	**Maximum Height (above ground surface)**	**Maximum Depth (below ground surface)**
Injection Well Facilities						
Well cluster, including: one Deep Injection Well, one Vadose Zone Well, motor control building, transformer, and space for replacement wells (4)	100	100	85	90	15	1,050 (Deep) 600 (Vadose)
Back-flush basin	280	150	225	125	2-3 for pipe outlet only	10
Monitoring wells, including: up to six well clusters with two wells at each site (6)	100	100	3	3	0	900
Access Roads to Injection Wells, including: underground pipeline & electrical	4200	40	4200	20	0	10
Electrical conduit along Eucalyptus Rd.	1200	10	1200	3	0	6
Access roads to monitoring wells	1000	20	1000	10	0	2
CalAm Distribution System Improvements						
Transfer Pipeline	13,000	30–80	13,000	Note 3	0	15 (trenched sections); 25 (trenchless sections, pits)
Monterey Pipeline	28,700	30–80	28,700	Note 3	0	

Note 1: The existing 33-inch industrial wastewater conveyance pipeline would be slip-lined with the new 18-inch recovery pipeline. This would require the excavation of up to 12 sending/receiving pits measuring approximately 60-feet long by up to 20-feet wide.

Note 2: The Product Water Conveyance Pipeline between the Regional Treatment Plant and the General Jim Moore Boulevard /Lightfighter Rd intersection would be built within either the RUWAP or the Coastal Alignment, not both.

Note 3: Pipeline trenches would generally be no more than seven (7) feet wide, except in areas with sandy soils and lack of constraints to a wider trench. Constraints include known sensitive or protected resources, geography such as steep slopes, existing utilities, buildings, or other facilities that restrict the construction area. A trench section with a ground surface width of up to approximately 10 to 15 feet would be potentially used in some soil types to increase efficiencies related to shoring the trench.

Table 2-21
Proposed Project Construction Assumptions

Project Component	Excess Spoils/Debris to Off-Haul (cubic yards)	Construction Equipment (see Appendix E. Air Quality and Greenhouse Gas Technical Analysis for more details)	Construction Shifts and Work Hours (see Table 4.17-4 in Section 4.17, Traffic and Transportation, for assumed construction worker and truck trip information)
Source Water Diversion and Storage Sites			
Salinas Pump Station Diversion 1) wet well/diversion structures (up to 4) 2) pipelines totaling 100 linear feet 3) electrical/SCADA box	100	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, 80-ton crane, skip loader, pavers and rollers	Two daytime shifts: Shift 1 from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday; some workers may have to be on-site at night to ensure continual operations of the wastewater conveyance facilities.
Salinas Treatment Facility Storage and Recovery Recovery Pump Station, flow meter and valves, electrical/SCADA cabinet, approximately 7,700 linear feet of pipeline from the site to Salinas Pump Station site, inlet pump station at Pond 3, approximately 6,000 linear feet of pipeline from Pond 3 to recovery pump station, approximately 50 linear feet of gravity pipeline from aeration basin to connect with pipeline from Pond 3 to recovery pump station	1,200	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, skip loader, pavers and rollers, directional drilling equipment	Two daytime shifts: Shift from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday
Reclamation Ditch Diversion 1) wet well/diversion structure 2) flow meter, valves and approximately 60 linear feet of pipelines 3) electrical/SCADA cabinet 4) concrete lining of channel banks and invert at intake	20	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, 80-ton crane, skip loader, pavers and rollers	One daytime shift from 7 AM -6 PM Monday through Saturday
Tembladero Slough Diversion 1) wet well/diversion structure 2) flow meter, valves and approximately 100 linear feet of pipelines 3) electrical/SCADA cabinet 4) concrete lining of channel banks and invert at intake	20	Same as above, plus crane and vibratory driver for cofferdam to work within the tidal portion of the Tembladero Slough	One daytime shift from 7 AM to 6 PM Monday through Saturday
Blanco Drain Diversion 1) wet well/diversion structure 2) flow meter, valves and on-site surge tank 3) electrical/SCADA cabinet 4) concrete lining of channel banks and invert at intake 5) approximately 8,500 linear feet of force main and gravity pipeline from the site to the Regional Treatment Plant	1,500	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, 80-ton crane, skip loader, pavers and rollers, directional drilling equipment	One daytime shift: from 7 AM to 6 PM Monday through Saturday).

Table 2-21
Proposed Project Construction Assumptions

Project Component	Excess Spoils/Debris to Off-Haul (cubic yards)	Construction Equipment (see Appendix E. Air Quality and Greenhouse Gas Technical Analysis for more details)	Construction Shifts and Work Hours (see Table 4.17-4 in Section 4.17, Traffic and Transportation, for assumed construction worker and truck trip information)
Lake El Estero Diversion pipeline, valves, flow meters, and new pumps in existing pump station at the northwest corner of lake and,	10	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, 80-ton crane, skip loader, pavers and rollers	Two daytime shifts: Shift 1 from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday.
Treatment Facilities at the Regional Treatment Plant			
AWT Facility Inlet source water diversion structure and influent pump station to bring secondary effluent AWT Facility, prescreening, ozonation, upflow biologically active filtration (optional), chemical addition, membrane filtration treatment, booster pumping of the membrane filtration filtrate (potentially with intermediate storage), cartridge filtration (optional), chemical addition, reverse osmosis membrane treatment, advanced oxidation using ultraviolet light and hydrogen peroxide (advanced oxidation), decarbonation (optional), product-water stabilization with calcium, alkalinity and pH adjustment, product water pump station (AWT Pump Station), brine mixing facilities.	510	Excavators, backhoes, air compressors, loaders, boom trucks, cranes, pavers and rollers, concrete transport trucks, concrete pump trucks, flatbed trucks, generators, pickup trucks, trucks for materials delivery	Up to four (4) shifts with construction occurring 24-hours per day, 7 days per week
Salinas Valley Reclamation Plant Modifications New sluice gates, chlorination basin upgrades, a new platform in the 80AF pond and a pipeline connecting the existing inlet and outlet structures in the 80AF pond.	150	Flatbed trucks; backhoes; pipe cutting and welding equipment; trucks for materials delivery; compaction equipment; pickup trucks; arc welding machine; generators; air compressors; skip loader, specialty equipment for cutting and seaming the pond liner	One daytime shift from 7 AM to 6 PM Monday through Saturday). Pipeline installation would occur during the winter months when the 80 AF pond is dewatered.
Product Water Conveyance (Either RUWAP or Coastal would be built, but not both. The product water pump station at the AWT/Regional Treatment Plant is included above)			
RUWAP Pipeline Alignment		Flatbed trucks ; backhoes; excavators; pipe cutting and welding equipment; haul trucks for spoils transport; trucks for materials delivery; compaction equipment; baker tank(s); pickup trucks; arc welding machine; generators; air compressors; 80-ton crane; skip loader; pavers and rollers	**RUWAP Pipeline Alignment**
Regional Treatment Plant to Booster Pump Station	5,090		Two daytime shifts: Shift 1 from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday
Booster Pump Station to Injection Well Facilities	3,580		
Coastal Pipeline Alignment			**Coastal Pipeline Alignment**
Regional Treatment Plant to Booster Pump Station	5,290		Two daytime shifts: Shift 1 from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday
Booster Pump Station to Injection Well Facilities	2,890		

Table 2-21
Proposed Project Construction Assumptions

Project Component	Excess Spoils/Debris to Off-Haul (cubic yards)	Construction Equipment (see Appendix E. Air Quality and Greenhouse Gas Technical Analysis for more details)	Construction Shifts and Work Hours (see Table 4.17-4 in Section 4.17, Traffic and Transportation, for assumed construction worker and truck trip information)
Booster Pump Station (applies to either Coastal or RUWAP alignment option location)	180	Excavator, backhoe, air compressor, boom truck or small crane, generator, concrete pump truck, paving equipment, flatbed truck, pavers and rollers, welding equipment, baker tank	Two daytime shifts, Shift 1 from 7 AM to 3 PM and Shift 2 from 12 PM to 8 PM Monday through Saturday
Injection Well Facilities			
1) Deep Injection Wells (4) 2) Vadose Zone Wells (4) 3) Monitoring Wells (12)	600 320 320	Loader backhoe, bucket auger drill rig, reverse rotary rig, forklift (reverse rotary support), truck-mounted pump rig, generator, concrete delivery and pumper trucks	Up to four shifts because construction would occur for up to 24-hour/day, 7 days/week
Back-flush Water Pipeline and Basin	4,000	Tractor/loader/backhoe, excavators, dumper trucks, rubber tired dozers	
Roadways, pipelines and electrical conduit	3,500		
Proposed Project Total Excess Construction Spoils (without CalAm Distribution System Pipelines)	21,080	See above	Overall Construction Schedule: mid summer 2016 through Mar. 2018, including 3 months of testing/start-up
Cal-Am Distribution System Pipelines			
a) Monterey Pipeline b) Transfer Pipeline	a) 10,680 b) 3,330	Flatbed trucks, backhoes, excavators, pipe cutting and welding equipment, haul trucks for spoils transport, trucks for materials delivery, compaction equipment, baker tank(s), pickup trucks, arc welding machine, generators, air compressors, 80-ton crane, skip loader, pavers and rollers	To the extent feasible, pipeline installation and associated construction activities would occur during daytime hours (with some nighttime construction at certain locations to expedite pipeline installation schedule)
CalAm Total Excess Spoils and Debris	Approx. 14,010		Monterey and Transfer Pipelines proposed construction Schedule July 2016 to December 2017 (18 months)
Combined Excess Spoils and Debris to Off-Haul	35,090 cubic yards		

2.13 PERMITS AND APPROVALS

This EIR is intended to inform decision-makers of the environmental consequences associated with implementation of the Proposed Project. In addition, the Proposed Project would be subject to various regulations and would require discretionary permits from federal, state, and local jurisdictions. **Table 2-22, List of Permits and Authorizations** lists the permits and authorizations that would likely be required to construct, operate, and maintain the Proposed Project.

Table 2-22
List of Permits and Authorizations

Agency /Entity	Permitting Regulation/Approval Requirement	Discussion
Federal Agencies		
U.S. Environmental Protection Agency (EPA)	Class V Underground Injection Control Program (Part C, Safe Drinking Water Act) Registration	The EPA Underground Injection Control program requires, at a minimum, that the disposed fluid will not endanger the groundwater and that the operator submit the proper inventory information to the permitting authority.
Monterey Bay National Marine Sanctuary (MBNMS)	Review and coordination of all Regional Water Quality Control Board (RWQCB) 404, Section 10, and National Pollutant Discharge Elimination System permits	Authorization by the Monterey Bay National Marine Sanctuary's superintendent is required for any permit, lease, license, approval, or other authorization issued or granted by a federal, state, or local agency for activities within the sanctuary. This authorization indicates that the Monterey Bay National Marine Sanctuary Advisory Council does not object to issuance of the permit or other authorization, including the terms and conditions deemed necessary to protect sanctuary resources and qualities.
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act (ESA) compliance Section 7 consultation	MRWPCA may be required to consult with the USFWS to determine whether the proposed action is likely to adversely affect a federally listed terrestrial or freshwater animal or plant species under USFWS jurisdiction, or the designated critical habitat for such species; jeopardize the continued existence of such species that are proposed for listing under ESA; or adversely modify proposed critical habitat. To make this determination, the project applicant prepares a Biological Assessment, the outcome of which determines whether the USFWS will conduct "formal consultation" and issue a Biological Opinion concerning the effects of the project. If the USFWS finds that the project may jeopardize the species or destroy or modify critical habitat, reasonable and prudent alternatives to the action must be considered.
	Fish and Wildlife Coordination Act (16 USC 661-667e; Act of March 10, 1934; ch. 55; 48 stat. 401)	Under Fish and Wildlife Coordination Act, a proposed water resource development project that receives federal funds or permits and that may impact to fish and wildlife is required to consult with National Oceanic and Atmospheric Administration (NOAA) Fisheries and USFWS.
National Oceanic and Atmospheric Administration (NMFS)	Endangered Species Act compliance Section 7 consultation	The need for a federal permit requires the project applicant to consult with NMFS to determine whether the proposed action is likely to adversely affect a federally listed marine species or designated critical habitat for such species, jeopardize the continued existence of such species that are proposed for listing under ESA, or adversely modify proposed critical habitat. To make this determination, the project applicant prepares a Biological Assessment, the outcome of which determines whether NMFS will conduct "formal consultation" with the agency and issue a Biological Opinion concerning the effects of the proposed action. If NMFS finds that the action may cause jeopardy or critical habitat destruction or modification, it will propose reasonable and prudent alternatives to the action. Alternatively, if no jeopardy is found, then the action can proceed.
Army Corps of Engineers (USACE)	Nationwide or Individual Section 404 Permit (Clean Water Act, 33 USC 1341)	Projects that would discharge dredged or fill material into waters of the United States, including wetlands, require a USACE permit under Clean Water Act Section 404.
	Section 10, Rivers and Harbors Act Permit (33 U.S.C. 403)	Any obstruction or alteration of any navigable water requires a Section 10 permit. This includes work that affects the course, location or condition of the water body.
Federal Aviation Administration (FAA)	Form SF 7460-1 Notice of Proposed Construction & Alteration for Airport Airspace Aeronautical	14 CFR Part 77.9 requires that a project proponent submit notification of proposed construction at least 45 days prior notification of construction or alteration within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet.
State Agencies		
California Public Utilities Commission (CPUC)	Monterey Peninsula Water Supply Project (MPWSP) Certificate of Public Convenience and Necessity (Application No. 12-04-019)	The CPUC has the authority to issue a Water Purchase Agreement to CalAm for purchase of water produced by the GWR Project.
State Water Resources Control Board (SWRCB), Regional Water Quality Control Board (RWQCB)	National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (99-08-DWQ)	Any discharge of stormwater to surface waters of the United States from a construction project that encompasses one (1) acre or more of soil disturbance requires compliance with the General Permit: Development and implementation of a stormwater pollution prevention plan that specifies best management practices to prevent construction pollutants from contacting stormwater, with the intent of keeping all products of erosion from moving offsite into receiving waters;

Table 2-22
List of Permits and Authorizations

Agency /Entity	Permitting Regulation/Approval Requirement	Discussion
		Elimination or reduction of non-stormwater discharges to storm sewer systems and other waters of the U.S. and inspection of all best management practices.
	Water rights permit for development of new surface water diversions (Water Code Section 1200 et seq) and wastewater point of discharge change application/approval (Water Code Section 1211 et seq)	A water right permit is an authorization to develop a water diversion and use project. , including for diversions proposed at the Reclamation Ditch, Tembladero Slough, Blanco Drain, and Lake El Estero. A wastewater point of discharge change application would also be needed for the diversions of agricultural wash water to the Regional Treatment Plant.
	Waste Discharge Requirements (Water Code 13000 et seq.)	Any activity that results or may result in a discharge of waste that directly or indirectly impacts the quality of waters of the state (including groundwater or surface water) or the beneficial uses of those waters is subject to waste discharge requirements.
	401 Water Quality Certification (Clean Water Act Section 401)	Under Section 401 of the Clean Water Act, the RWQCB must certify that actions receiving authorization under Section 404 of the Clean Water Act also meet state water quality standards. Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into navigable waters, must provide the licensing or permitting agency a certification that the activity meets state water quality standards.
	National Pollutant Discharge Elimination System (NPDES) Permit (Clean Water Act Section 402)	Discharges of effluent into surface waters of the United States, including wetlands and MBNMS, requires NPDES permit approval. It is assumed that the MRWPCA Waste Discharge Requirements Order No. R3-2008-0008 NPDES Permit No. CA0048551 would be revised to include the Proposed Project reverse osmosis reject water (concentrate or brine).
State Water Resources Control Board – Division of Drinking Water	Permit to Operate a Public Water System (California Health and Safety Code Section 116525)	The State Board has permitting authority over the operation of a public water system and provides oversight with respect to the quality of the product water produced.
	Approval for Recharge of Purified recycled Water	Approval of Engineering Report (see Chapter 3 for discussion).
California State Lands Commission	Right-of-Way Permit (Land Use Lease) (Public Resource Code Section 1900); Lease amendment	Issuance of a grant of right-of-way across state lands allows the permittee to conduct work or construction on public lands.
California Department of Fish and Wildlife (CDFW)	Incidental Take Permits (California Endangered Species Act Title 14, Section 783.2 (potential)	The take of any endangered, threatened, or candidate species may be allowed by permit if it is incidental to an otherwise lawful activity and if the impacts of the authorized take are minimized and fully mitigated. No permit may be issued if the activity would jeopardize the continued existence of the species.
	Streambed Alteration Agreement (California Fish and Wildlife Code Section 1602) (potential)	In order to substantially divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds, the CDFW must first be notified of the proposed activity.
California Coastal Commission (CCC)	Coastal Development Permit (Public Resources Code 30000 et seq.)	Development proposed within the Coastal Zone requires a Coastal Development Permit from the CCC, except where the local jurisdiction has an approved Local Coastal Program (LCP) in place. If an approved LCP is in place, primary responsibility for issuing permits in coastal areas shifts from the CCC to the local government, although the CCC will hear appeals on certain local government coastal development decisions. Regardless of whether a Coastal Development Permit must be obtained from a local agency in accordance with an approved Local Coastal Program, the CCC retains coastal development permit authority over new development proposed on the immediate shoreline, including intake and outfall structures on tidelands, submerged lands, and certain public trust lands, and over any development that constitutes a “major public works project.” (Public Resources Code Sections 30601, 30600[b][2]).
California Department of Transportation (Caltrans)	Encroachment Permit (Streets and Highway Code Section 660)	Caltrans has permitting authority over encroachments in, under, or over any portion of a state highway right-of-way.
California State Historic Preservation Officer (SHPO)	National Historic Preservation Act (NHPA) Section 106 Consultation (16 USC 470)	The NHPA requires federal permitting agencies to consider the effects of proposed federal undertakings on historic properties. Federal agencies are required to initiate consultation with the SHPO and give the Advisory Council on Historic Preservation a reasonable opportunity to comment as part of the Section 106 review process.
California State University	Right of Way Agreements and/or Easements	A right-of-way agreement with the State of California for access across state lands around

Table 2-22
List of Permits and Authorizations

Agency /Entity	Permitting Regulation/Approval Requirement	Discussion
Monterey Bay (CSUMB)		CSUMB.
Regional/Local Agencies		
Cities of Seaside and Marina, Sand City, Monterey, Salinas	Use Permits, encroachment/easement permits, grading permits and erosion control permits may be required pursuant to local city/county codes.	The Cities of Seaside, Marina, Sand City, Monterey, and Salinas may require discretionary permits for encroachment, tree removal or trimming, building permits, grading or variances. Note: City of Marina does not allow trenchless construction under an encroachment permit; the project must comply with Marina Municipal Code section 12.20.100. Excavations greater than 10 cubic yards within an Ordinance Remediation District, in the Former Fort Ord areas, require a permit in compliance with Chapter 15.34, Digging and Excavation, on the Former Fort Ord Ordinance (“Seaside’s Ordinance”). Permit approval is subject to requirements placed on the property by an agreement executed between the city, the city’s ~~redevelopment~~ successor agency, Fort Ord Reuse Authority, and California Department of Toxic Substances Control. In the event that the project proponents do not pursue a consolidated permit as discussed in the above line item of this table related to the Coastal Commission’s permitting authority, local agency approvals of one or more Coastal Development Permits may be required for one or project components in areas that are: (1) in the Coastal Zone, and (2) governed by Coastal Commission-approved Local Coastal Programs/Land Use Plans. The potential components/areas that may require local approval are: (1) the Tembladero Slough diversion and a short segment of the Coastal alignment option of the Product water Conveyance pipeline in the Monterey County North Land Use Plan area, (2) the Coastal alignment option of the Product Water Conveyance pipeline in the City of Marina, and (3) the Monterey Pipeline component of the CalAm Distribution System in Monterey, Sand City, and Seaside. Agreements would be required with the County of Monterey for surface water diversions from the Reclamation Ditch, Tembladero Slough, and Blanco Drain, with the City of Salinas for diversion of agricultural wash water and urban runoff, and with the City of Monterey for diversion of Lake El Estero water. See Appendix C rev and Section 4.18 of the Draft EIR for more information.
Fort Ord Reuse Authority	Coordination with Fort Ord Reuse Authority for right of entry	In order to access specific sites during construction and operations, MRWPCA will be required to coordinate with Fort Ord Reuse Authority.
Marina Coast Water District	Ownership/easements of RUWAP pipeline and its alignment and recycled water rights per Third Amendment to the 1992 Agreement between Monterey County Water Resources Agency, MRWPCA, and Marina Coast Water District	Possible lease agreement for use of RUWAP pipeline or easement and possible agreement to utilize a portion of secondary effluent for which Marina Coast Water District has rights
Monterey Bay Unified Air Pollution Control District	Authority To Construct (Local district rules, per Health and Safety Code 42300 et seq.) and Permit To Operate (local district rules)	An authorization to construct permit is required for projects that propose to build, erect, alter, or replace any article, machine, equipment, or other contrivance that may emit air contaminants from a stationary source or may be used to eliminate, reduce, or control air contaminant emissions. Applicable to gas-powered generators.
Monterey County Health Department, Environmental Health Division	Well Construction Permit (Monterey County Code, Title 15 Chapter 15.08, Water Wells)	Construction of new water supply / monitoring wells requires written permit approval from Monterey County’s health officer, whose decisions may be appealed to the Board of Supervisors.
	Hazardous Materials Business Response Plan (Health and Safety Code Chapter 6.95)	Hazardous Materials Management Services is designated as the local Certified Unified Program Agency in Monterey County and is responsible for inspecting facilities in the county to verify proper storage, handling and disposal of hazardous materials and hazardous wastes. A Materials Business Response Plan is required during specific types of construction.
	Hazardous Materials Inventory (Health and Safety Code Chapter 6.95)	A Hazardous Materials Inventory and Certification form will have to be submitted to the Monterey County Environmental Health Division.
	Review/approval of Injection Well Operations/Discharges	MRWPCA may need to submit an application to the Monterey County Environmental Health Department for review of Waste Discharge Requirements and/or Injection Well Facilities operations.
	Variance from Monterey County Noise Ordinance (MCC 10.60.030)	The Proposed Project may require a noise ordinance permit if operation or equipment noise levels exceed 85dBA at 50 feet.

Table 2-22
List of Permits and Authorizations

Agency /Entity	Permitting Regulation/Approval Requirement	Discussion
Monterey County Public Works Department	Encroachment Permit (Monterey County Code (MCC) Title 14 Chapter 14.040)	Designated activities within the right-of-way of a county highway require encroachment permit approval by the director of the Public Works Department.
Monterey County Resource Management Agency	Use Permit (MCC Chapter 21.74 Title 21) may be required pursuant to County codes.	A Use Permit is either issued by the zoning department of the Planning Commission, depending on the specific zoning and intended use; this permit may be needed for the Product Water Conveyance Pipeline (both options) between the Regional Treatment Plant and the City of Marina.
	Coastal Development Permit. (Public Resources Code 30000 et seq.)	A Coastal Development Permit is a document required by the California Coastal Act to permit construction of certain uses in a designated Coastal Zone. Any project in the Coastal Zone, which requires discretionary approval, may require a Coastal Permit.
	Grading Permit (Grading and Erosion Control Ordinance, Monterey County Code 16.08 – 16.12)	Grading, subject to certain exceptions, may require a permit from the Monterey County Planning and Building Inspection Department..
	Erosion Control Permit (Grading and Erosion Control Ordinance, Monterey County Code 16.08 – 16.12)	An Erosion Control Permit from the Director of Building Inspection may be required for any project development and construction activities (such as site cleaning, grading, and soil removal or placement) that is causing or is likely to cause accelerated erosion.
Monterey County Water Resource Agency	Ownership of flood control waterways and SWRCB water rights application for diversions from surface water bodies	Coordination/agreements for Proposed Project components within Monterey County Water Resources Agency-controlled waterways, including agreements to assign/transfer water rights to allow diversion, and involving the Castroville Seawater Intrusion Project and Salinas Valley Reclamation Project..
Monterey Peninsula Water Management District	Water System Expansion Permit (Monterey Peninsula Water Management District Board of Directors Ordinance 96)	A permit is required for any project activity that would expand the water delivery system within the Monterey Peninsula Water Management District jurisdiction.
	Water purchase agreement	The Proposed Project will require a water purchase agreement that describes the arrangement between MRWPCA, Monterey Peninsula Water Management District, and CalAm for the purchase of GWR product water or the rights to pump it from the Seaside Groundwater Basin.
Monterey Regional Waste Management District	Electric Power Purchase Agreement	A power purchase agreement between Monterey Peninsula Water Management District and MRWPCA and PG&E for a specific amount of time and cost.
Seaside Basin Watermaster	Permit for Injection/Extraction/Storage	Injection/extraction/storage activities that would affect the Seaside Groundwater Basin require approval of the Seaside Groundwater Basin Watermaster.
Transportation Agency of Monterey County	Easement/ encroachment permit	An encroachment permit may be necessary to conduct investigations and to install a conveyance pipeline across this agency's property.
Monterey Peninsula Airport District//Airport Land Use Commission	Consistency determination	Lake El Estero Diversion site is within Monterey Airport Influence Area; construction may require a Consistency Determination by the Airport Land Use Commission
Private Entities		
Landowners	Land lease/sale; easements and encroachment agreements	Construction that may occur on private lands may require lease agreements and easements for access.
California American Water Company (CalAm)	Water purchase agreement	The Proposed Project will require a water purchase agreement that describes the arrangement between MRWPCA, Monterey Peninsula Water Management District, and CalAm for the purchase of GWR product water or the rights to pump it from the Seaside Groundwater Basin.
Pacific Gas and Electric	Electric Power Will-Serve Letter/Purchase Agreement	New construction and/or commercial additions will need an "ability to serve" letter stating that Pacific Gas and Electric can serve power from existing (or if necessary, upgraded) infrastructure.

2.14 REFERENCES

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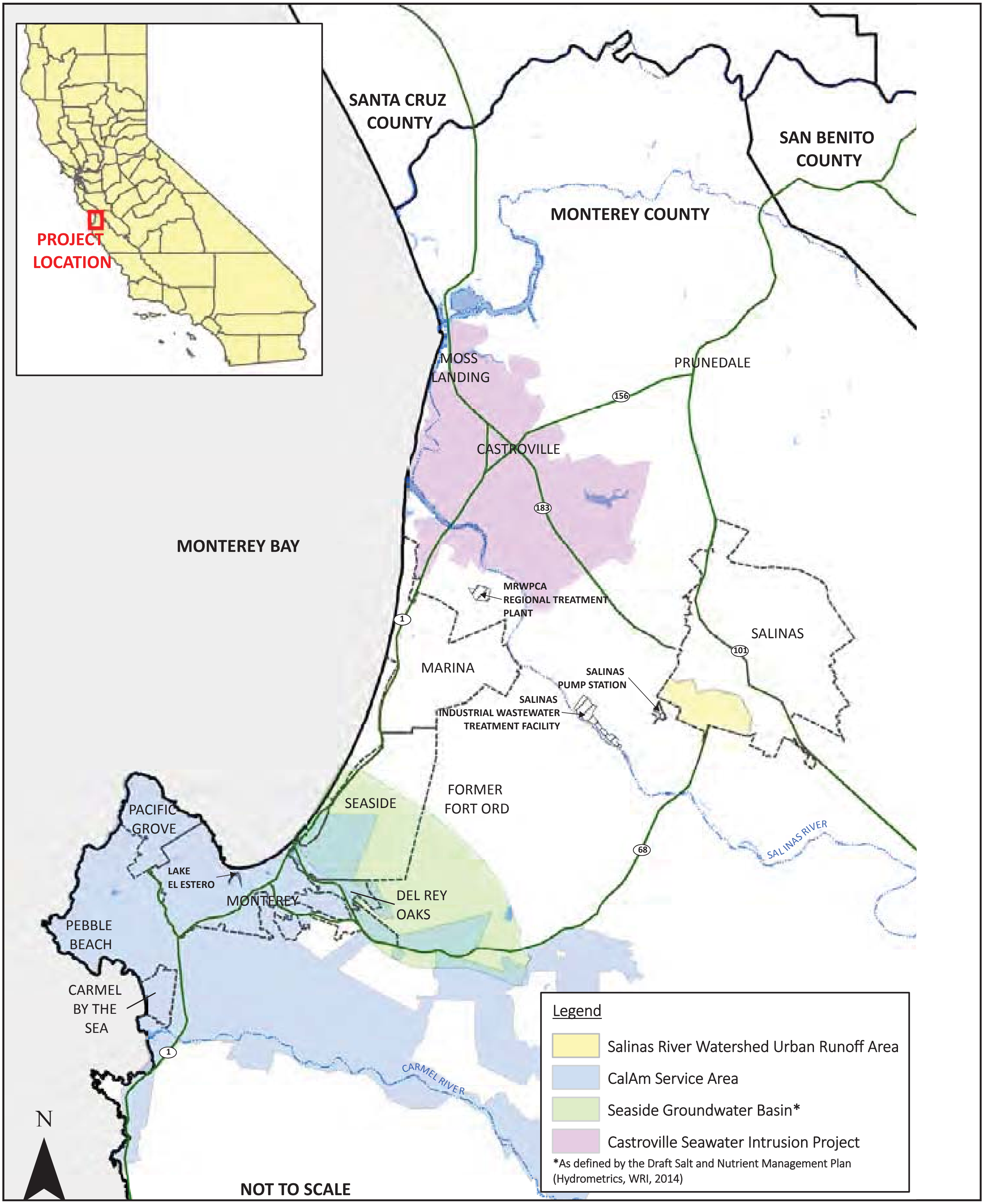


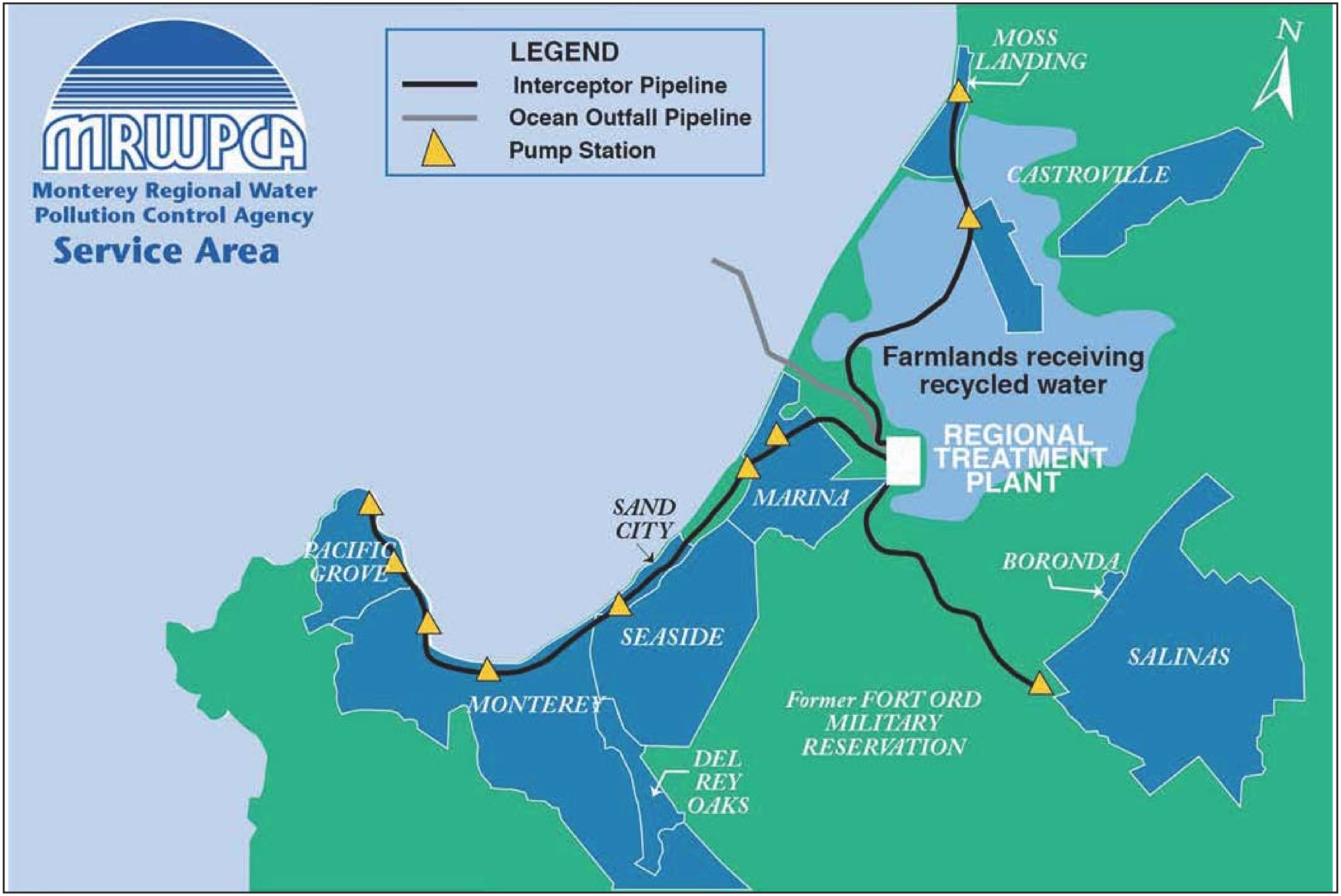
DD&A

Project Location Map

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-1

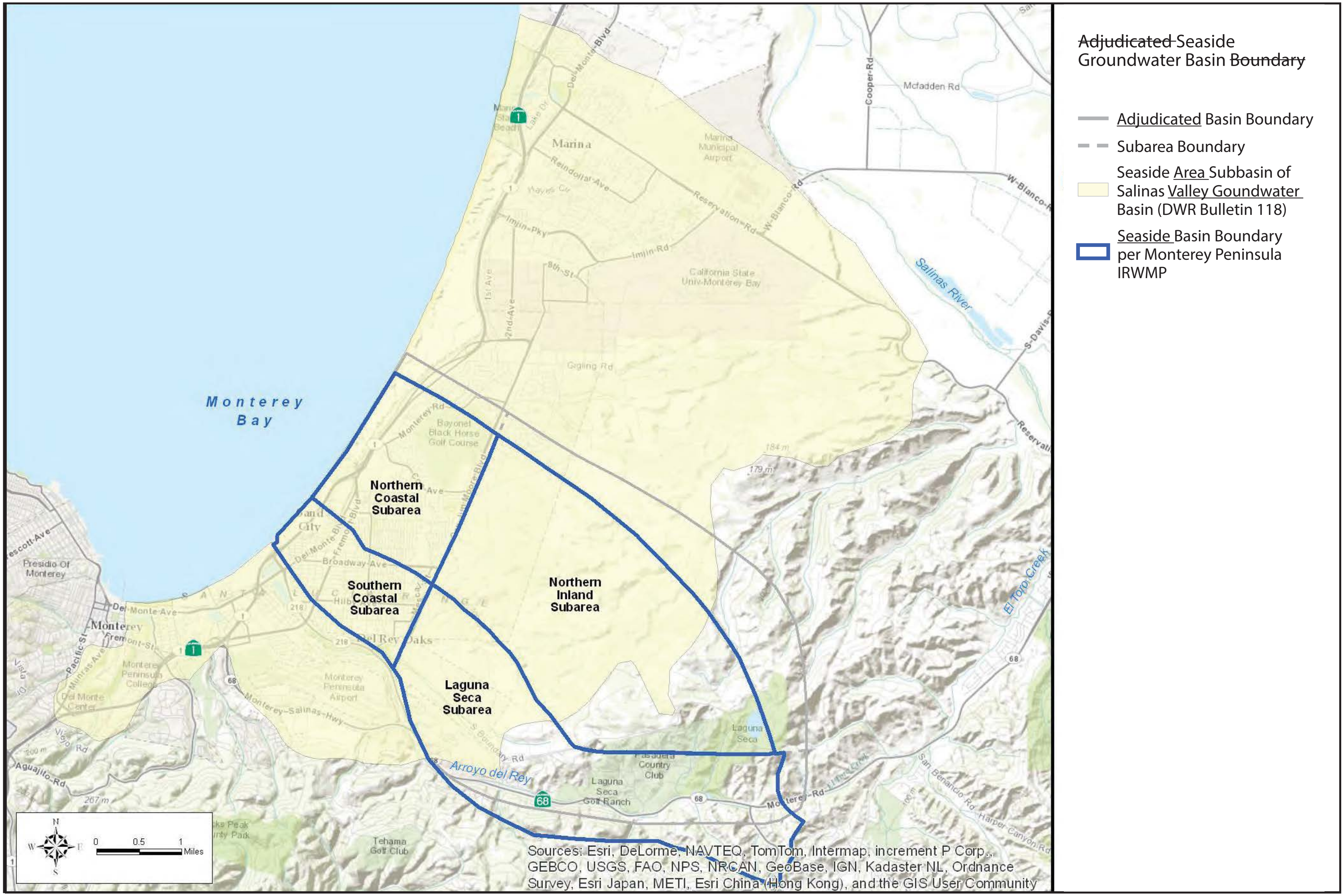


MRWPCA Service Area Map

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-2



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

DD&A

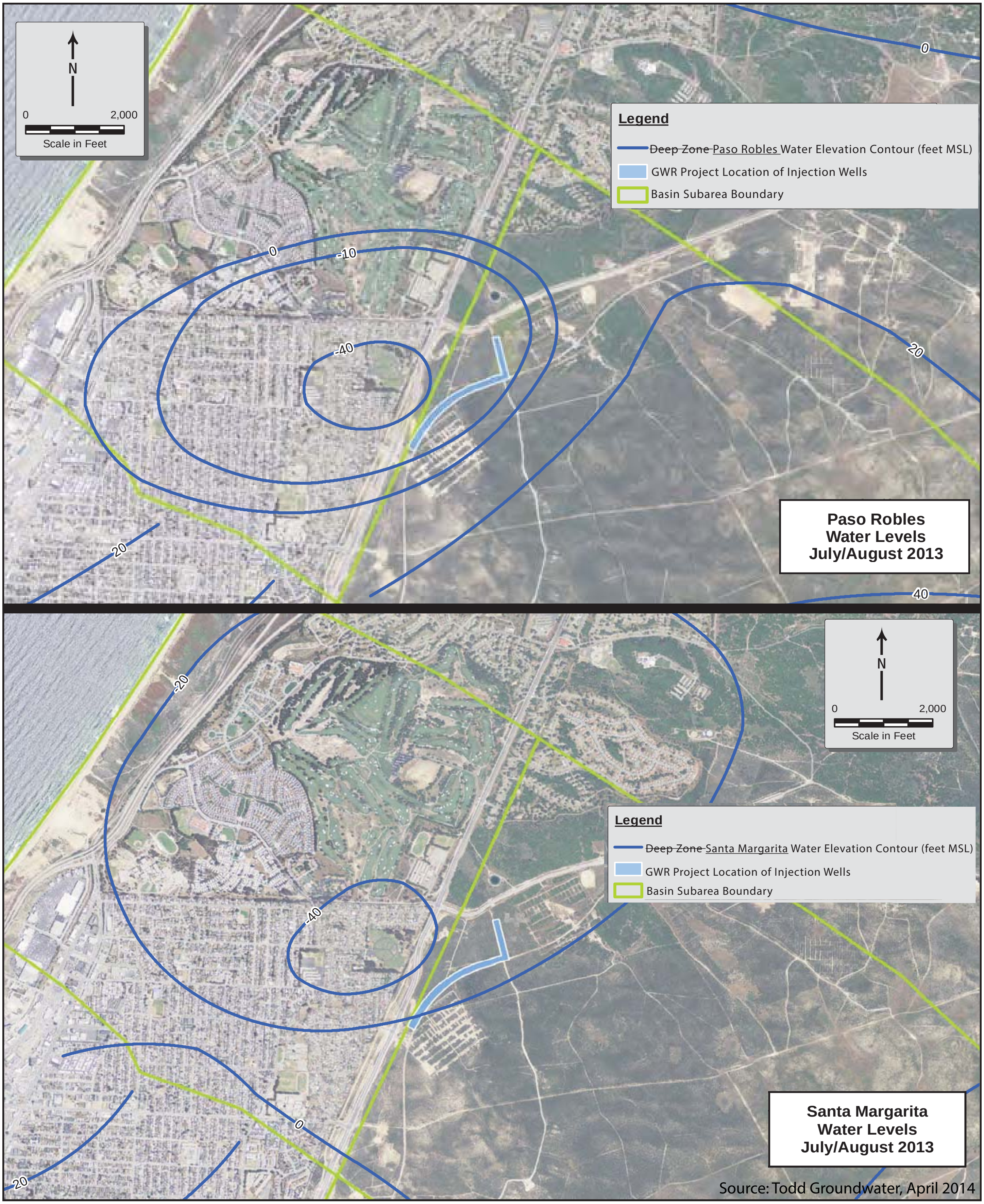
Seaside Groundwater Basin Boundaries

This figure has been revised in response to comment N-6.

September 2015

Pure Water Monterey GWR Project
Final EIR

Figure
2-3 rev



Source: Todd Groundwater, April 2014

DD&A

Seaside Groundwater Basin Groundwater Levels

This figure has been revised in response to comment N-7.

September 2015

Pure Water Monterey GWR Project
Final EIR

Figure
2-4 rev

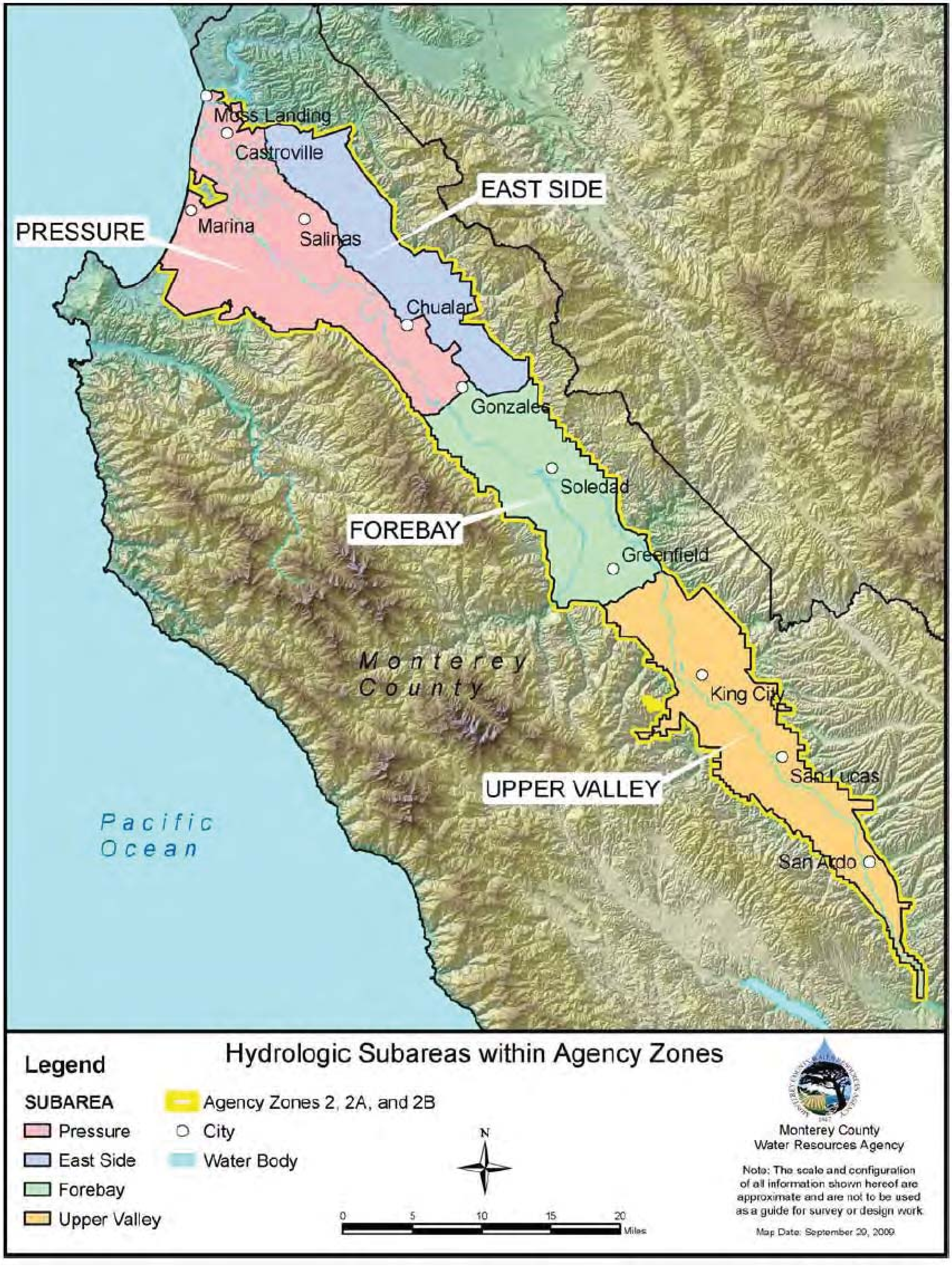
Source: Schaaf & Wheeler Consulting Civil Engineers, 2014

Salinas River Basin

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-5



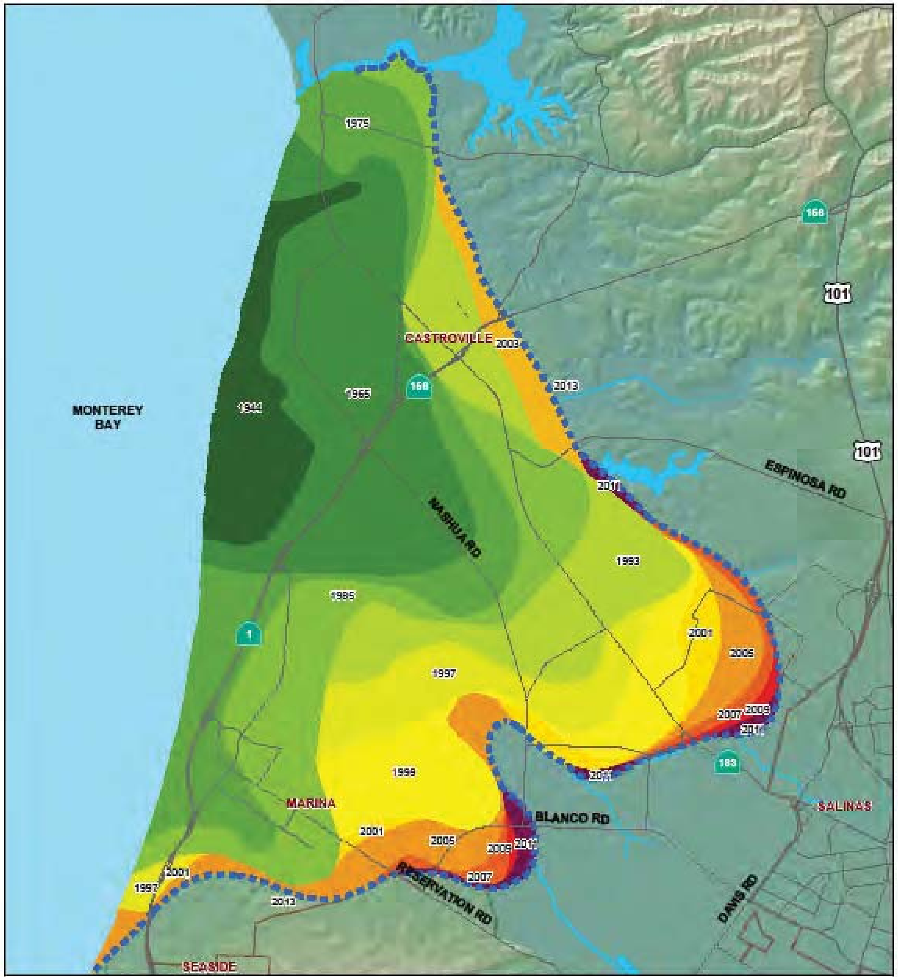
Source: Schaaf & Wheeler Consulting Civil Engineers, 2014

Salinas Valley Groundwater Basin

April 2015

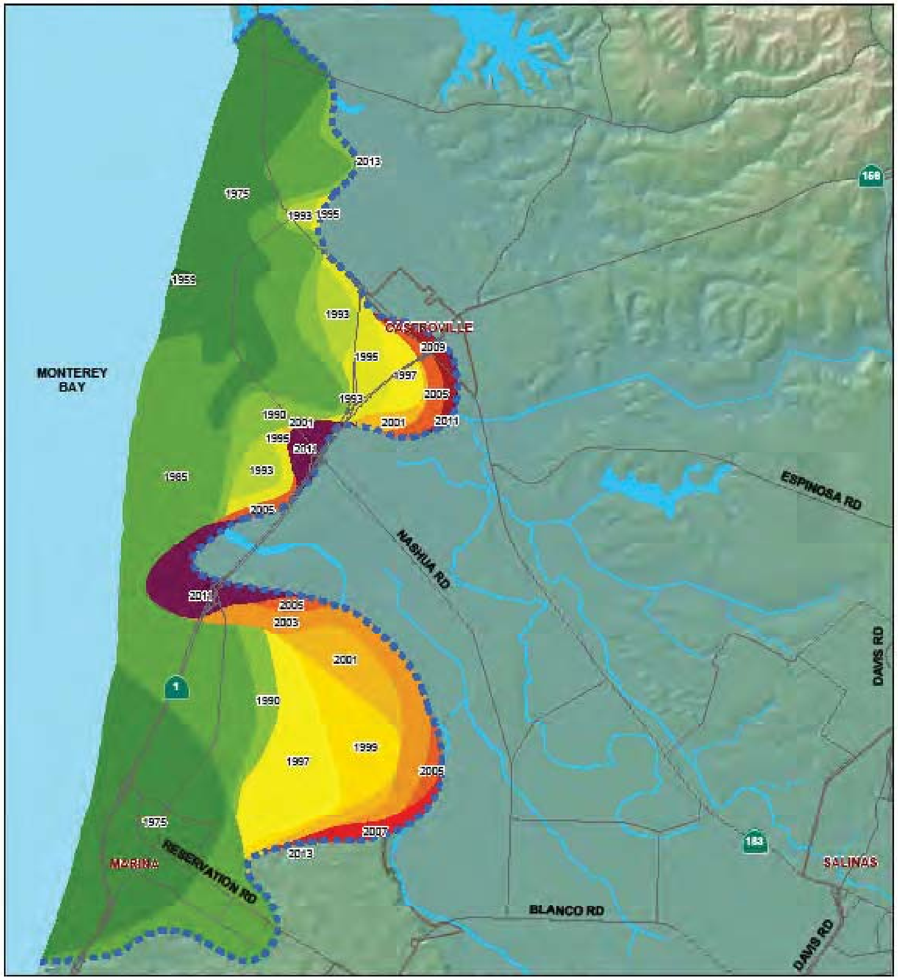
Pure Water Monterey GWR Project
Draft EIR

Figure
2-6



Historic Seawater Intrusion Map

Pressure 180 Foot Aquifer - 500 mg/L Chloride Areas



Historic Seawater Intrusion Map

Pressure 400 Foot Aquifer - 500 mg/L Chloride Area

Legend

Seawater Intrusion Levels by Year

☐ Cities	🟩 1993	🟧 2005
■ 1944	🟩 1997	🟧 2007
🟩 1965	🟨 1999	🟥 2009
🟩 1975	🟨 2001	🟪 2011
🟩 1985	🟧 2003	■ ■ 2013

0 0.5 1 1.5 2 Miles

Map Date: December 16, 2014

DD&A

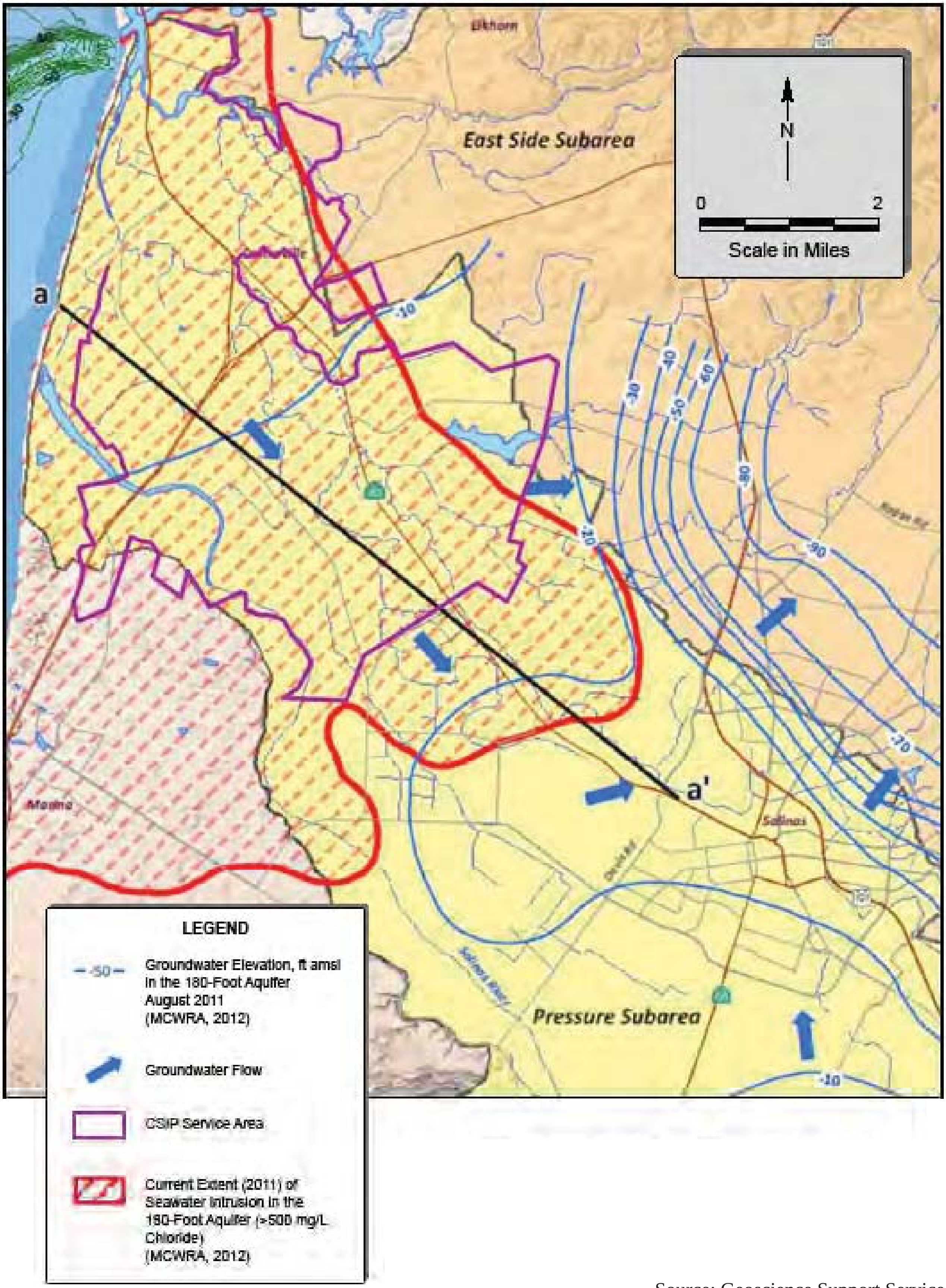
Salinas Valley Groundwater Basin Seawater Intrusion

This figure has been revised in response to comment H-40.

September 2015

Pure Water Monterey GWR Project
Final EIR

Figure
2-7 rev



Source: Geoscience Support Services, 2013

Salinas Valley Groundwater Levels and Flow Directions

This figure was added in response to comment H-39.

September 2015

Pure Water Monterey GWR Project
Final EIR

Figure
2-7a new

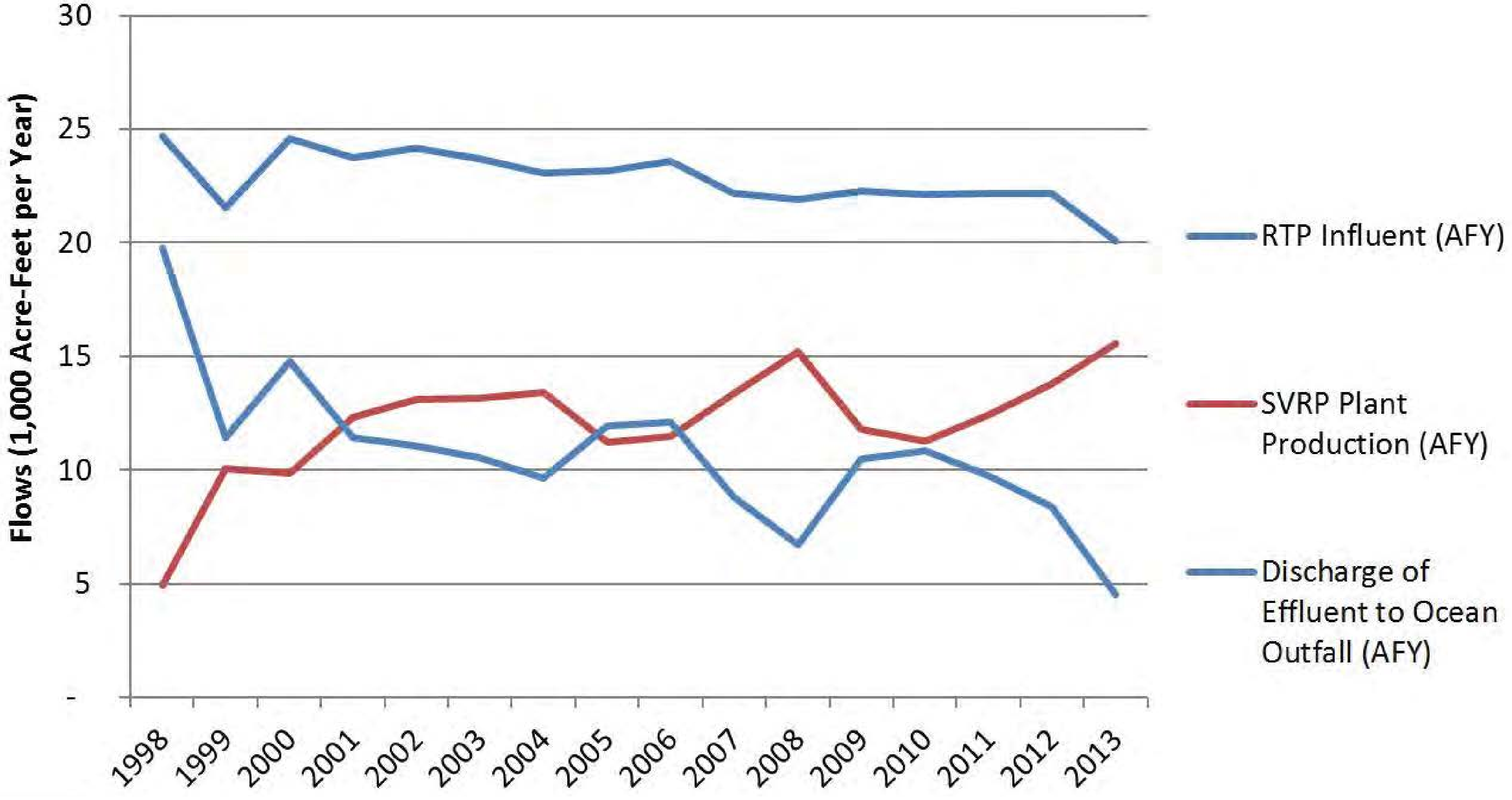
Existing Regional Treatment Plant Facilities Map

DD&A

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-8



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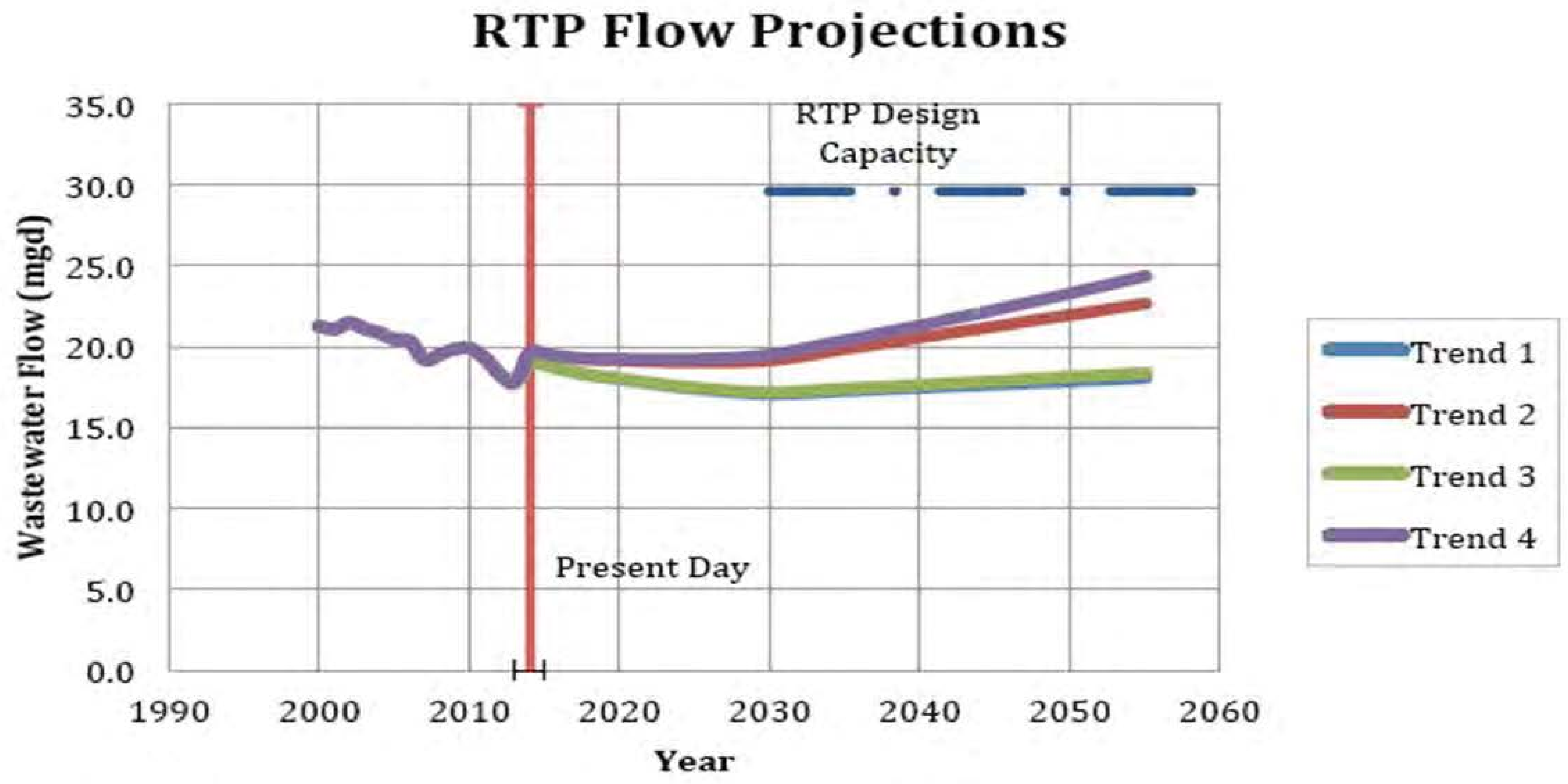
Historic Regional Treatment Plant Flows

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-9



Source: MRWPCA 40-Year Flow Projections Report, Brezack & Associates, 2014

Legend	Description
Trend 1	A linear curve is fitted to data from year 2000 to 2012
Trend 2	A linear curve is fitted to data from year 2006 to 2012
Trend 3	An exponential curve is fitted to data from year 2000 to 2012
Trend 4	An exponential curve is fitted to data from year 2006 to 2012

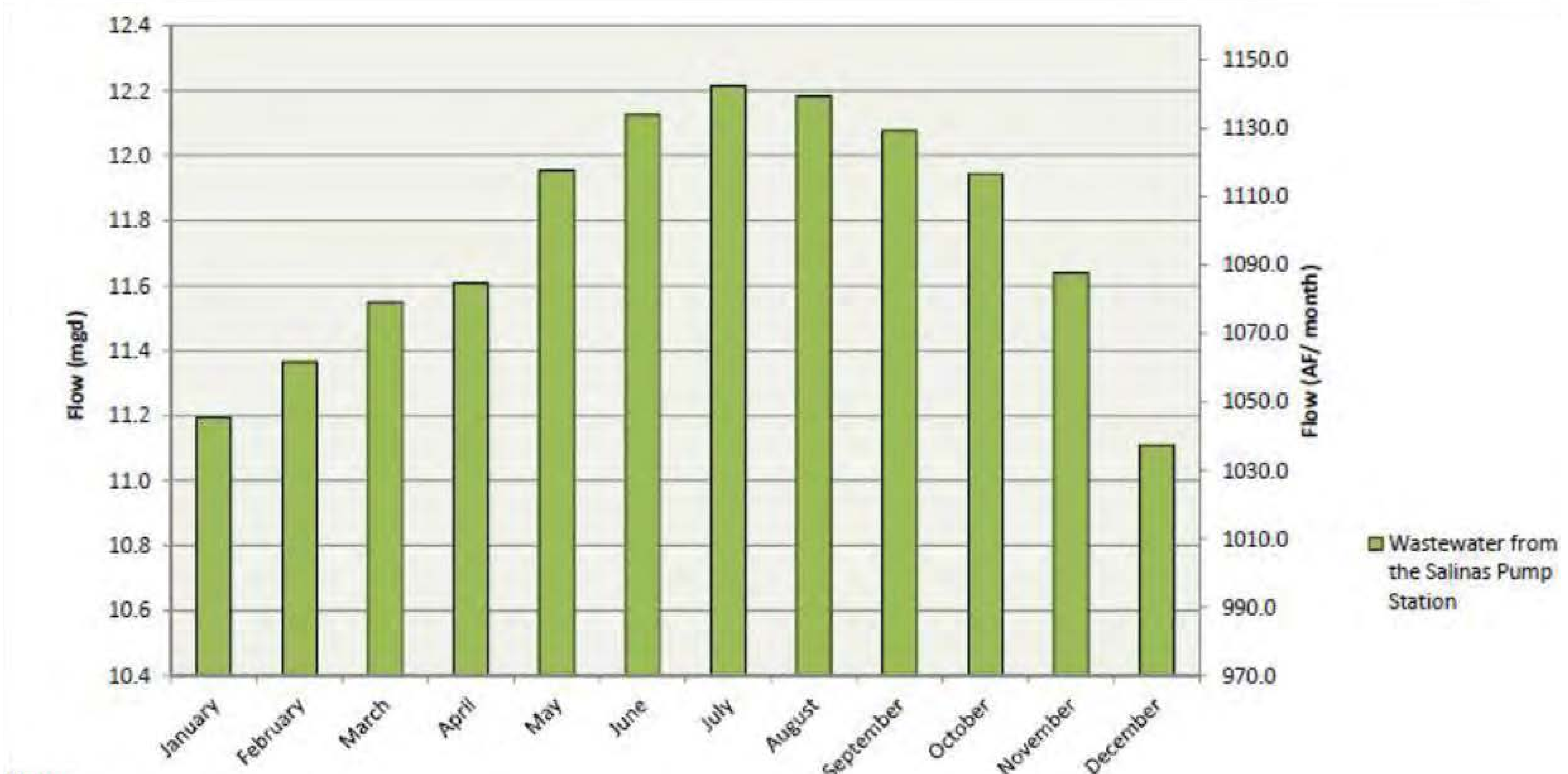
DD&A

Projected Regional Treatment Plant Flows

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-10



Notes:

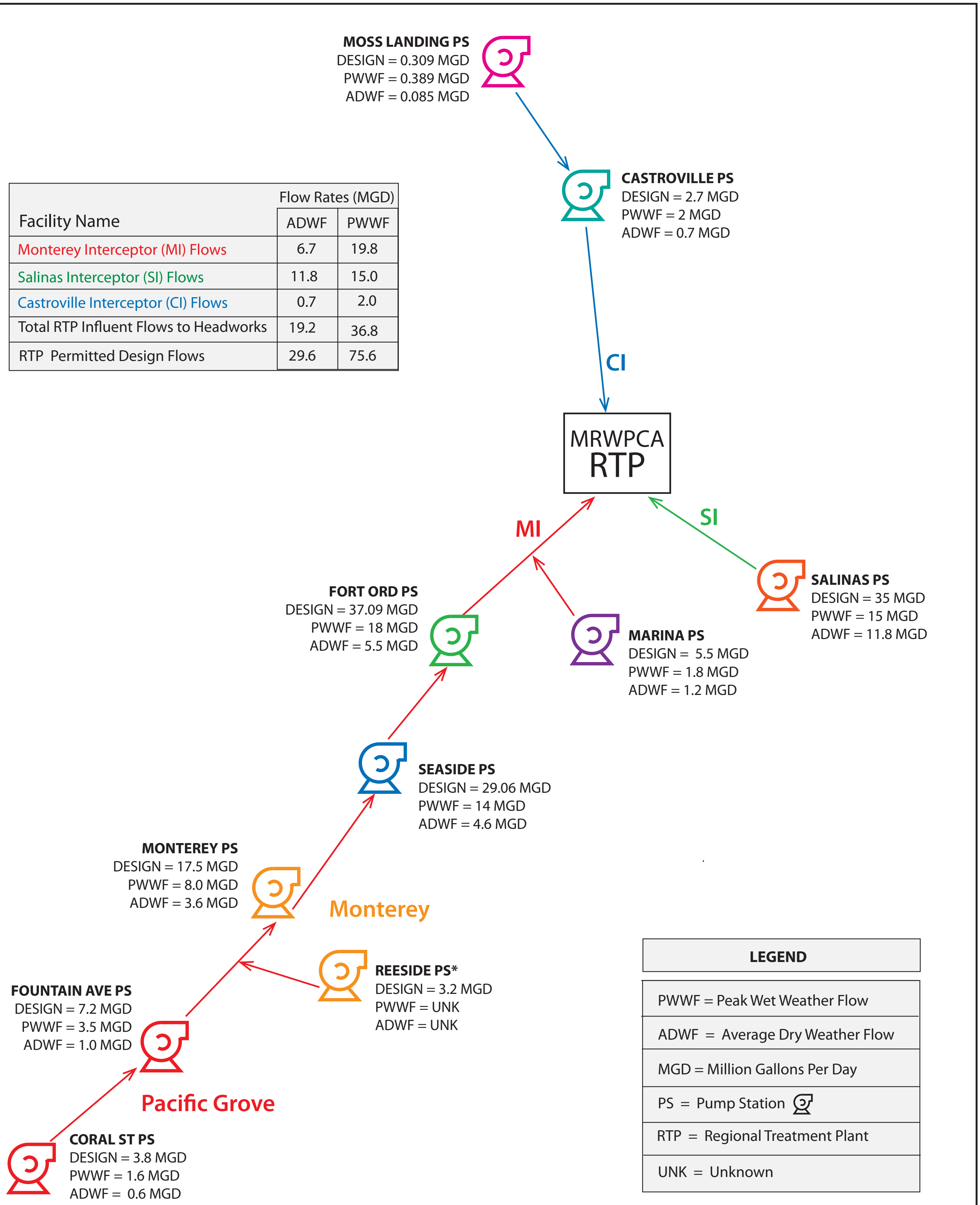
1. Scale expanded to show differences in monthly flow rates.

Salinas Pump Station Monthly Average Discharge

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-11



Facility Name	Flow Rates (MGD)	
	ADWF	PWWF
Monterey Interceptor (MI) Flows	6.7	19.8
Salinas Interceptor (SI) Flows	11.8	15.0
Castroville Interceptor (CI) Flows	0.7	2.0
Total RTP Influent Flows to Headworks	19.2	36.8
RTP Permitted Design Flows	29.6	75.6

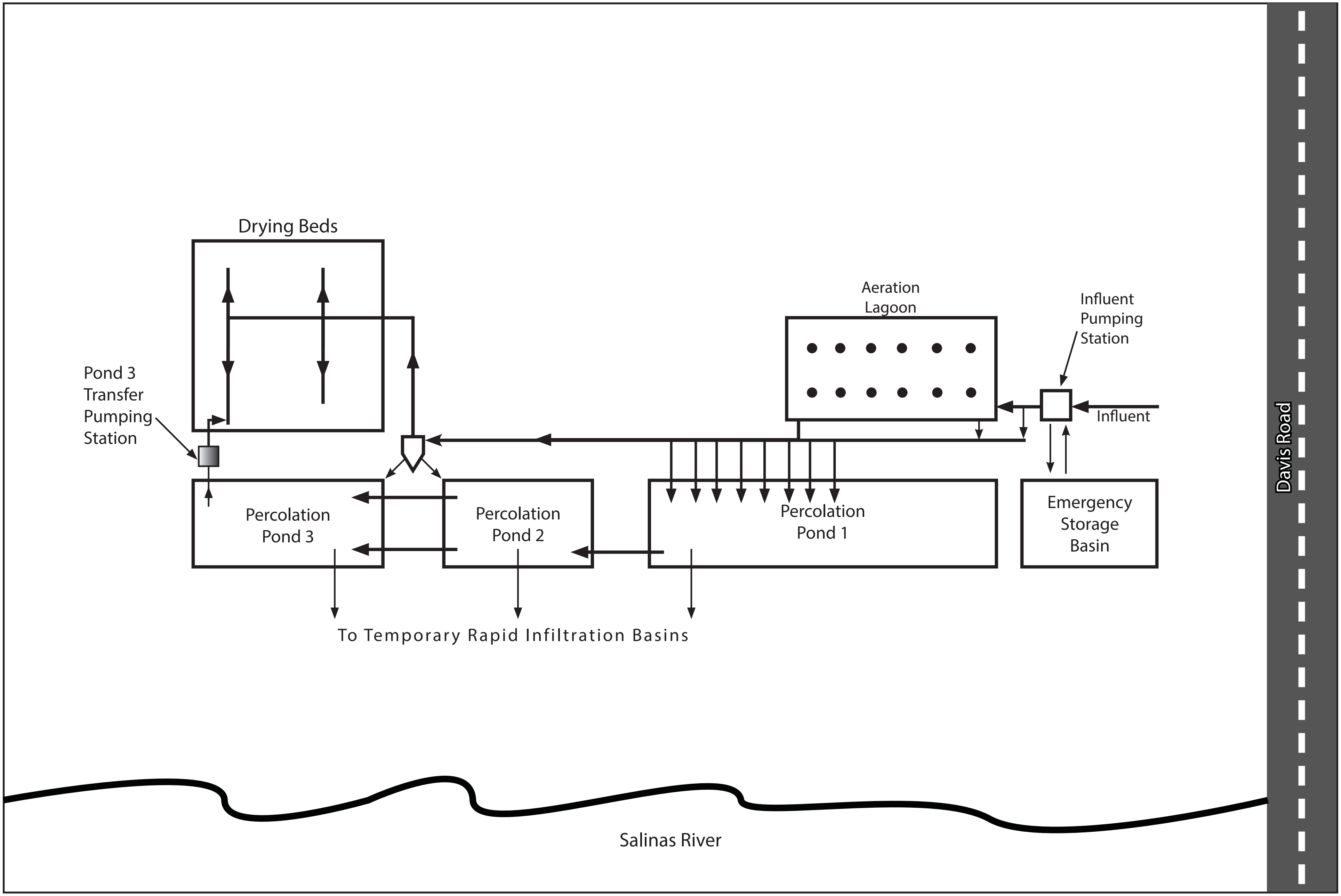
LEGEND

PWWF = Peak Wet Weather Flow
ADWF = Average Dry Weather Flow
MGD = Million Gallons Per Day
PS = Pump Station
RTP = Regional Treatment Plant
UNK = Unknown

Source: Brezack & Associates, September 2013

MRWPCA Wastewater Collection System Network Diagram and Pump Station Flows
April 2015

Figure
2-12

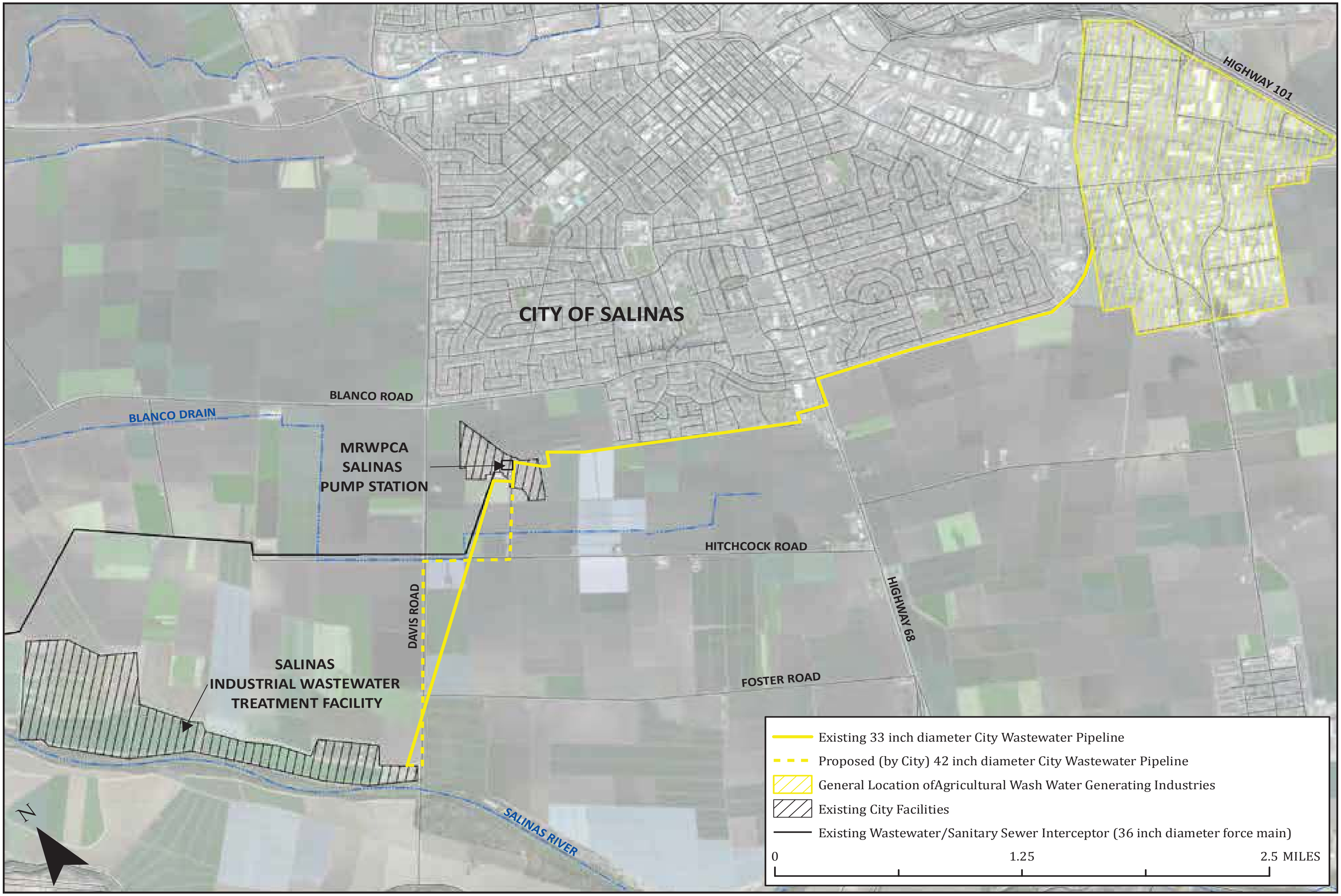


Salinas Industrial Wastewater Treatment Facility Process Flow Schematic

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-13

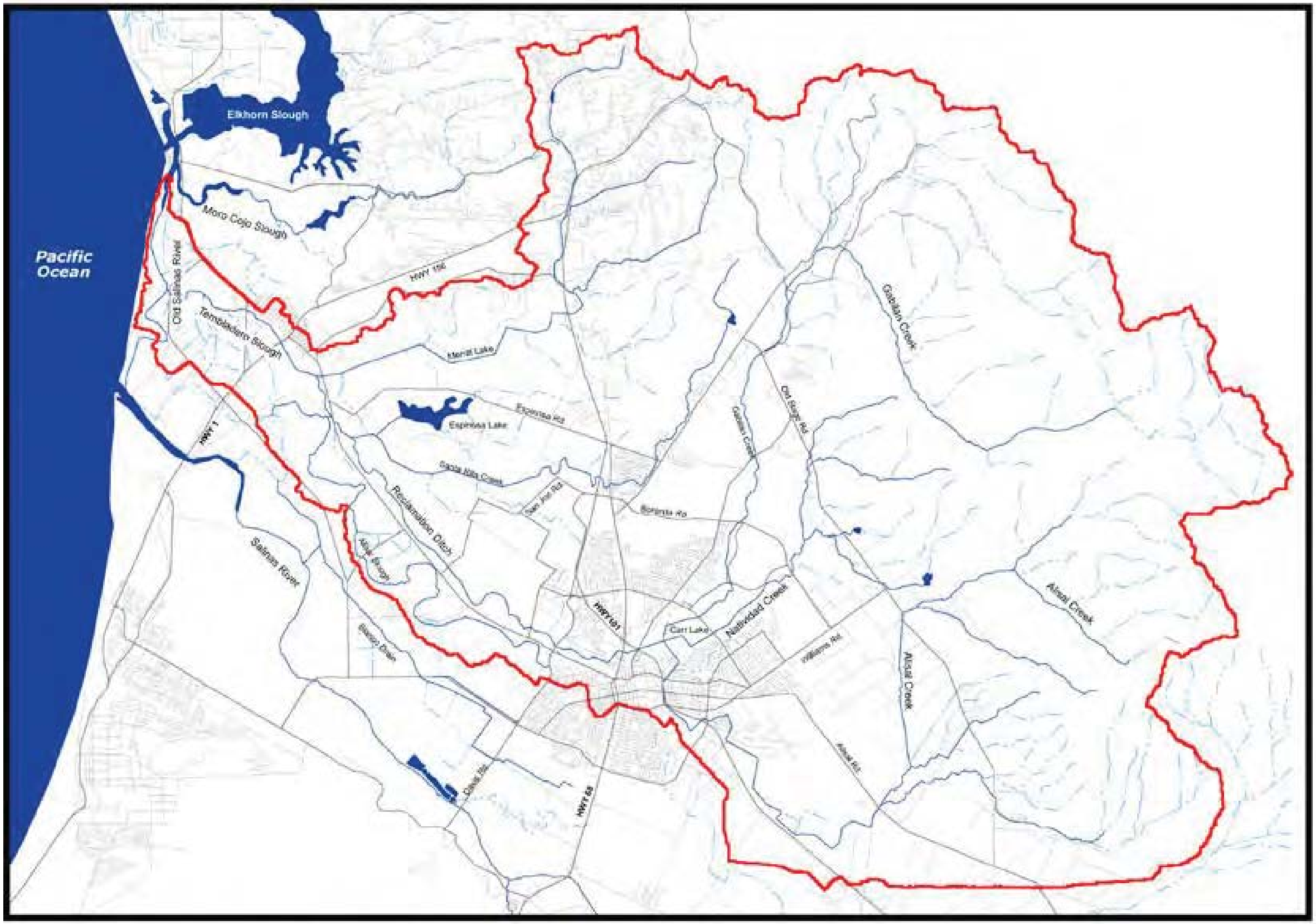


Salinas Industrial Wastewater System Location Map

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-14



Source: Central Coast Watershed Studies, Monterey County Water Resources Agency - Reclamation Ditch Watershed Assessment and Management Strategy, undated

DD&A

Reclamation Ditch Watershed Boundary

April 2015

Pure Water Monterey GWR Project
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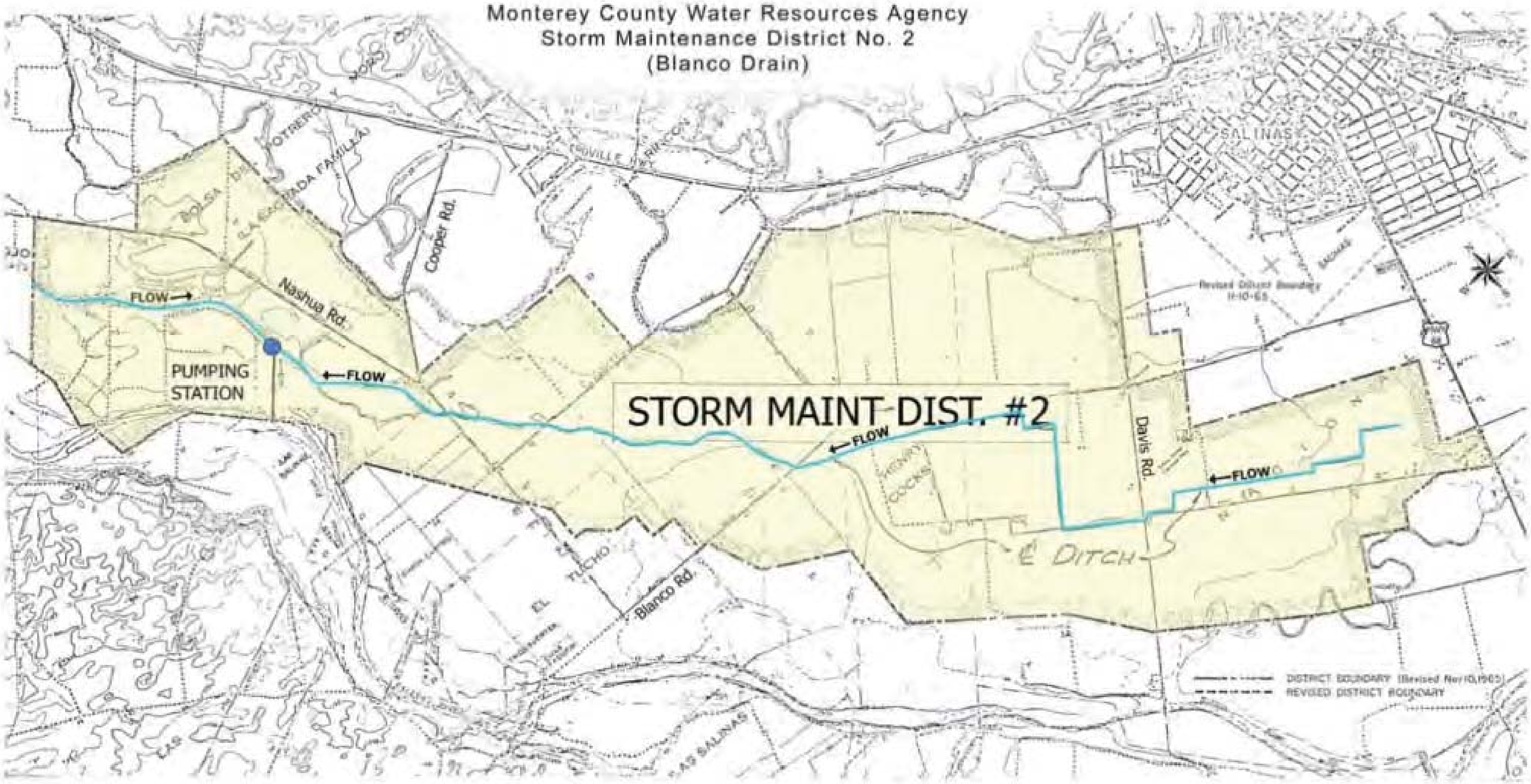
Figure
2-15



The pump station shown has been replaced with a new one that is shown on Figure 2-25a.

Source: Schaaf & Wheeler Consulting Civil Engineers, 2014

DD&A

Blanco Drain Storm Drain Maintenance District

This figure has been revised in response to comment M-8.

September 2015

Pure Water Monterey GWR Project
Final EIR

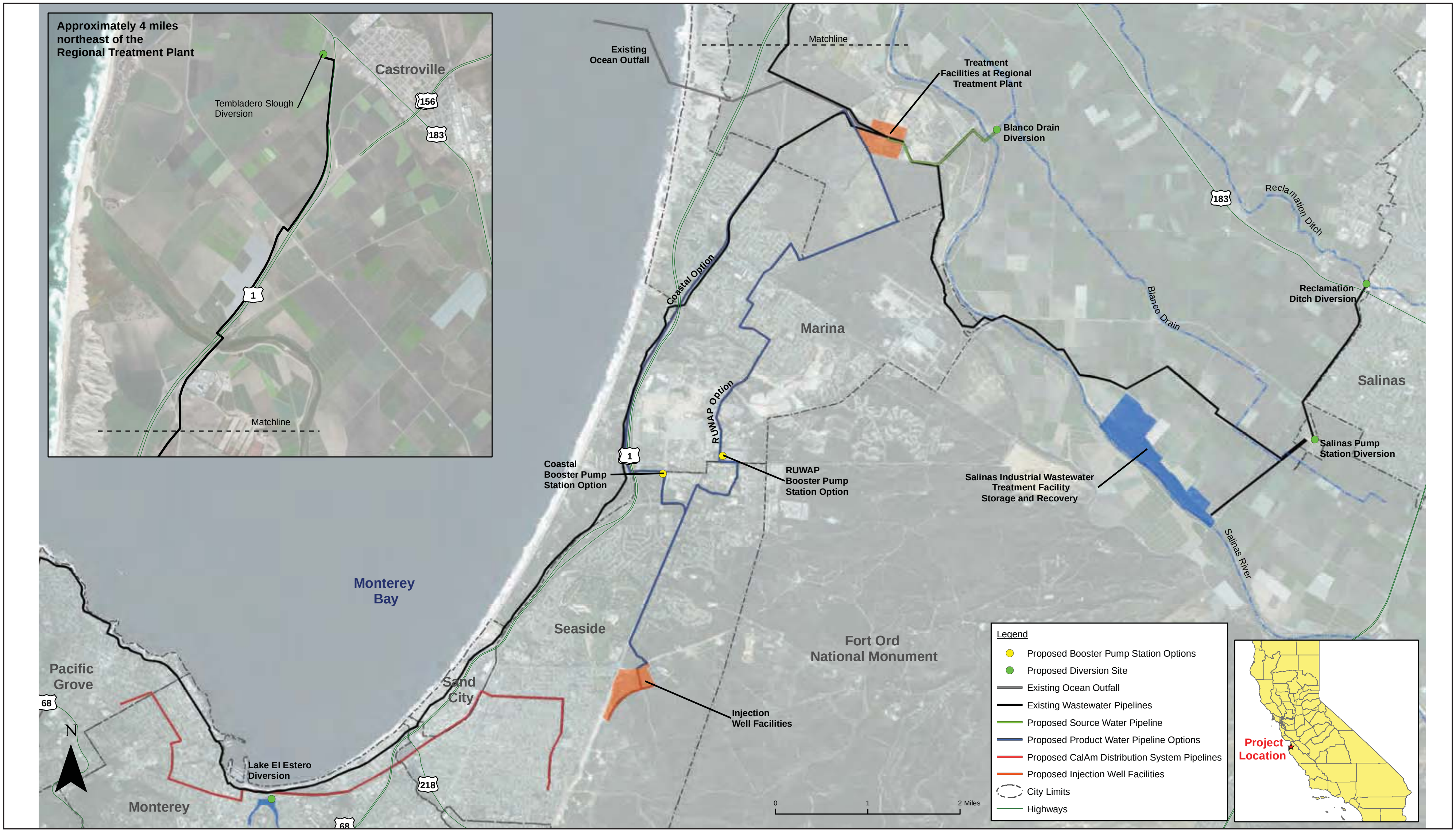
Figure
2-16 rev

Aquifer Storage and Recovery Project Location Map

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-17



Proposed GWR Project Facilities Overview

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-18

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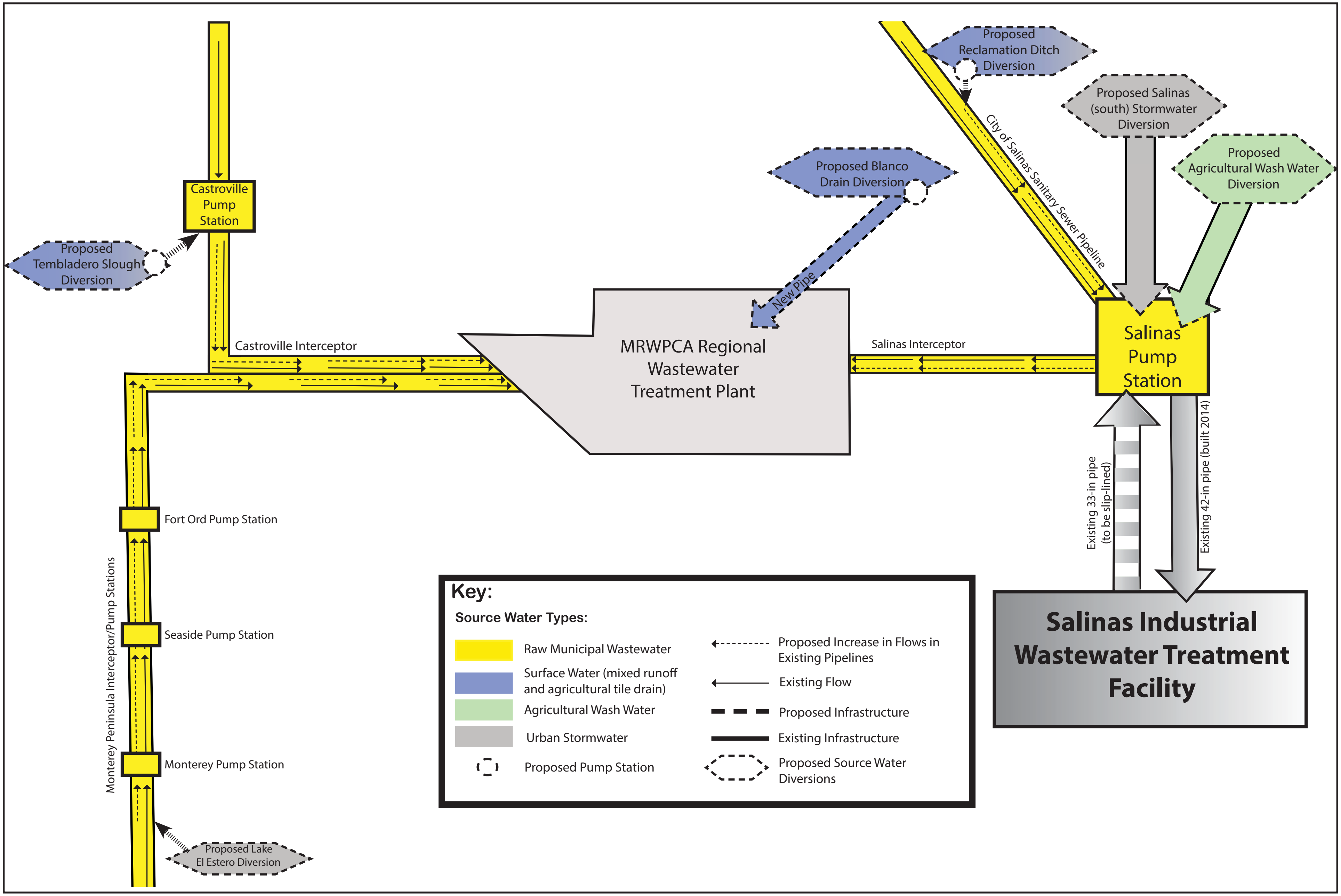


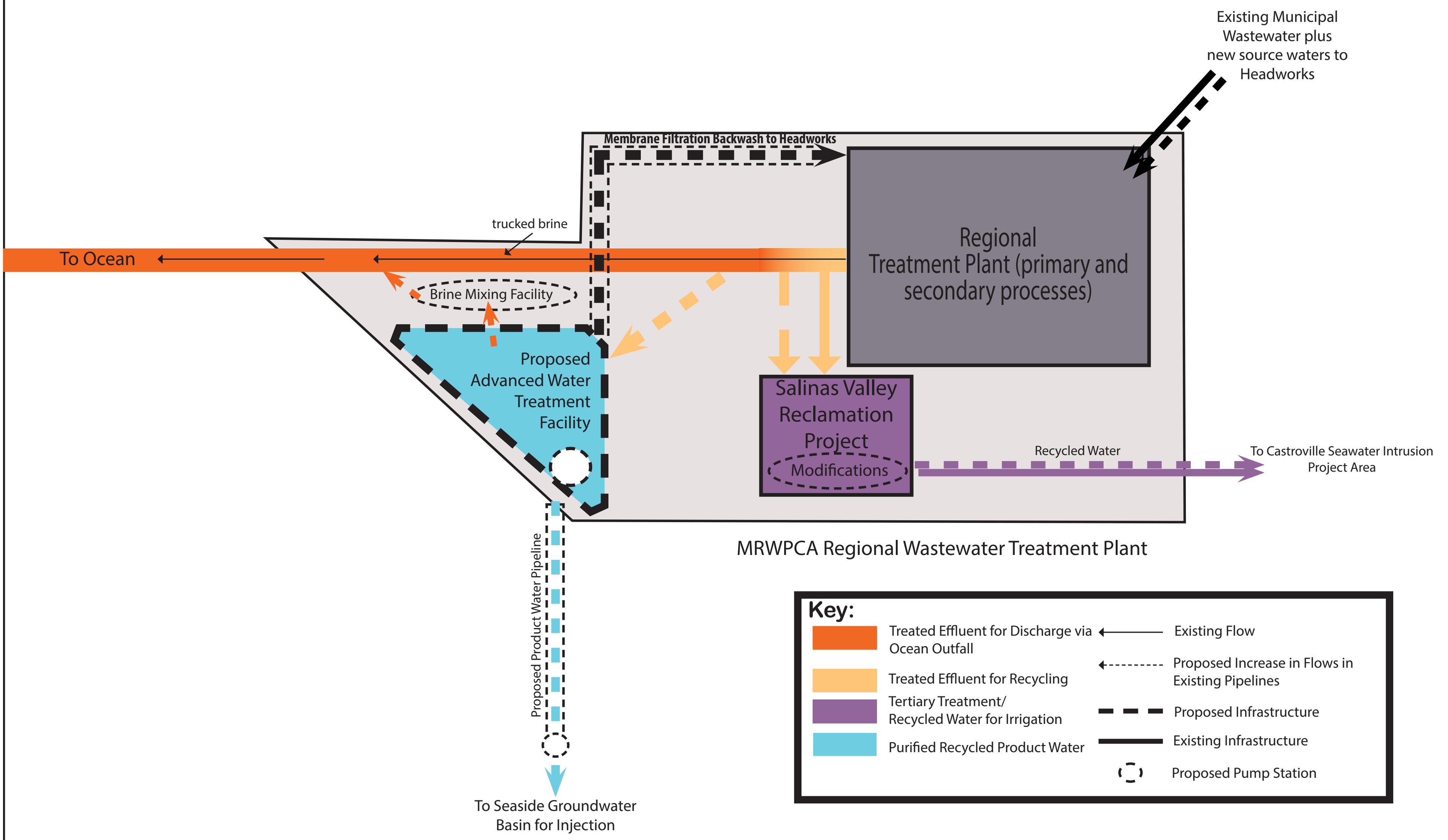
DD&A

Proposed Project Flow Schematic - Source Water to Treatment

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-19



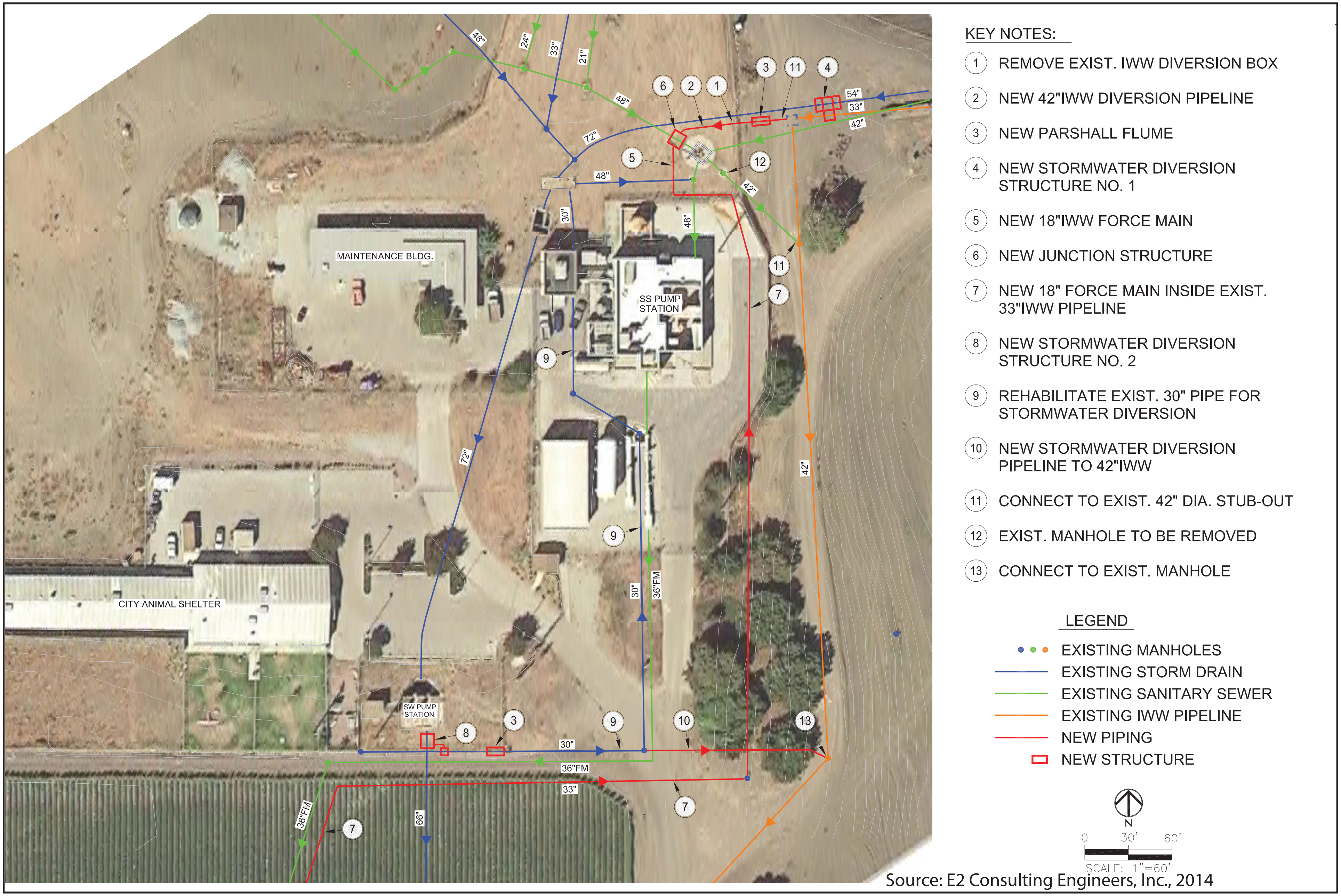
DD&A

Proposed Project Flow Schematic - Regional Treatment Plant

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-20



KEY NOTES:

1. REMOVE EXIST. IWW DIVERSION BOX
2. NEW 42"IWW DIVERSION PIPELINE
3. NEW PARSHALL FLUME
4. NEW STORMWATER DIVERSION STRUCTURE NO. 1
5. NEW 18"IWW FORCE MAIN
6. NEW JUNCTION STRUCTURE
7. NEW 18" FORCE MAIN INSIDE EXIST. 33"IWW PIPELINE
8. NEW STORMWATER DIVERSION STRUCTURE NO. 2
9. REHABILITATE EXIST. 30" PIPE FOR STORMWATER DIVERSION
10. NEW STORMWATER DIVERSION PIPELINE TO 42"IWW
11. CONNECT TO EXIST. 42" DIA. STUB-OUT
12. EXIST. MANHOLE TO BE REMOVED
13. CONNECT TO EXIST. MANHOLE

LEGEND

● ● ●	EXISTING MANHOLES
—	EXISTING STORM DRAIN
—	EXISTING SANITARY SEWER
—	EXISTING IWW PIPELINE
—	NEW PIPING
▭	NEW STRUCTURE

Source: E2 Consulting Engineers, Inc., 2014

Proposed Salinas Pump Station Site Plan

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-21

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KEY NOTES:

① NEW POND 3 PUMP STATION INLET BOX

② NEW POND 3 PUMP STATION WET WELL

③ NEW 18" FORCE MAIN

④ NEW DIVERSION STRUCTURE NO. 3

⑤ EXISTING PRESSURE M.H. ON 30" LINE

⑥ NEW 30" GRAVITY MAIN

⑦ RETURN PUMP STATION WET WELL

⑧ RETURN PUMP STATION VALVE VAULT

⑨ NEW FLOW METER VAULT

⑩ NEW 18" FORCE MAIN INSIDE EXIST. 33" IWW PIPELINE TO SALINAS P.S.

⑪ EXIST. 42" IWW PIPELINE

⑫ EXIST. IWW PUMP STATION

⑬ EXIST. 24" IWW INLET PIPELINE

⑭ EXIST. 18" IWW OUTLET PIPELINE

⑮ EXIST. 30" IWW DISTRIBUTION PIPELINE

⑯ EXIST. INLET TO POND

⑰ EXIST. RISER MANHOLE

⑱ EXIST. 24" IWW DISTRIBUTION PIPELINE

⑲ EXIST. POND INLET STRUCTURE

⑳ EXIST. POND 3 PUMP STATION

㉑ EXIST. IRRIGATION BEDS DISTRIBUTION STRUCTURE

㉒ EXIST. DISTRIBUTION PIPELINES TO IRRIGATION BEDS

LEGEND

● ● ● EXISTING MANHOLES
— EXISTING STORM DRAIN
— EXISTING SANITARY SEWER
— EXISTING IWW PIPELINE
— NEW PIPING
▭ NEW STRUCTURE

N

0 300' 600'

SCALE: 1"=600'

Source: E2 Consulting Engineers, Inc. 2014

Industrial Wastewater Treatment Plant Conceptual Site Plan

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-22

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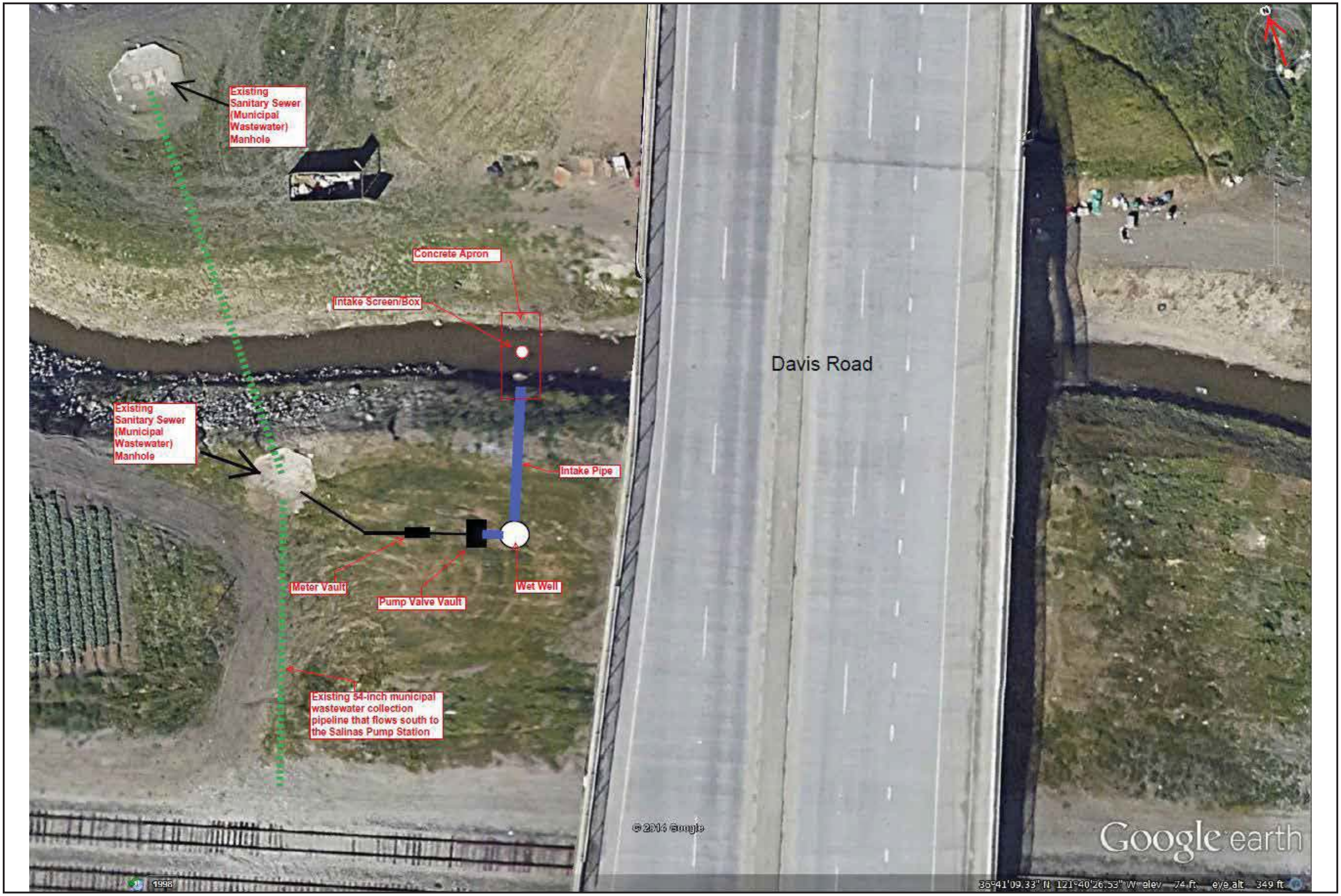


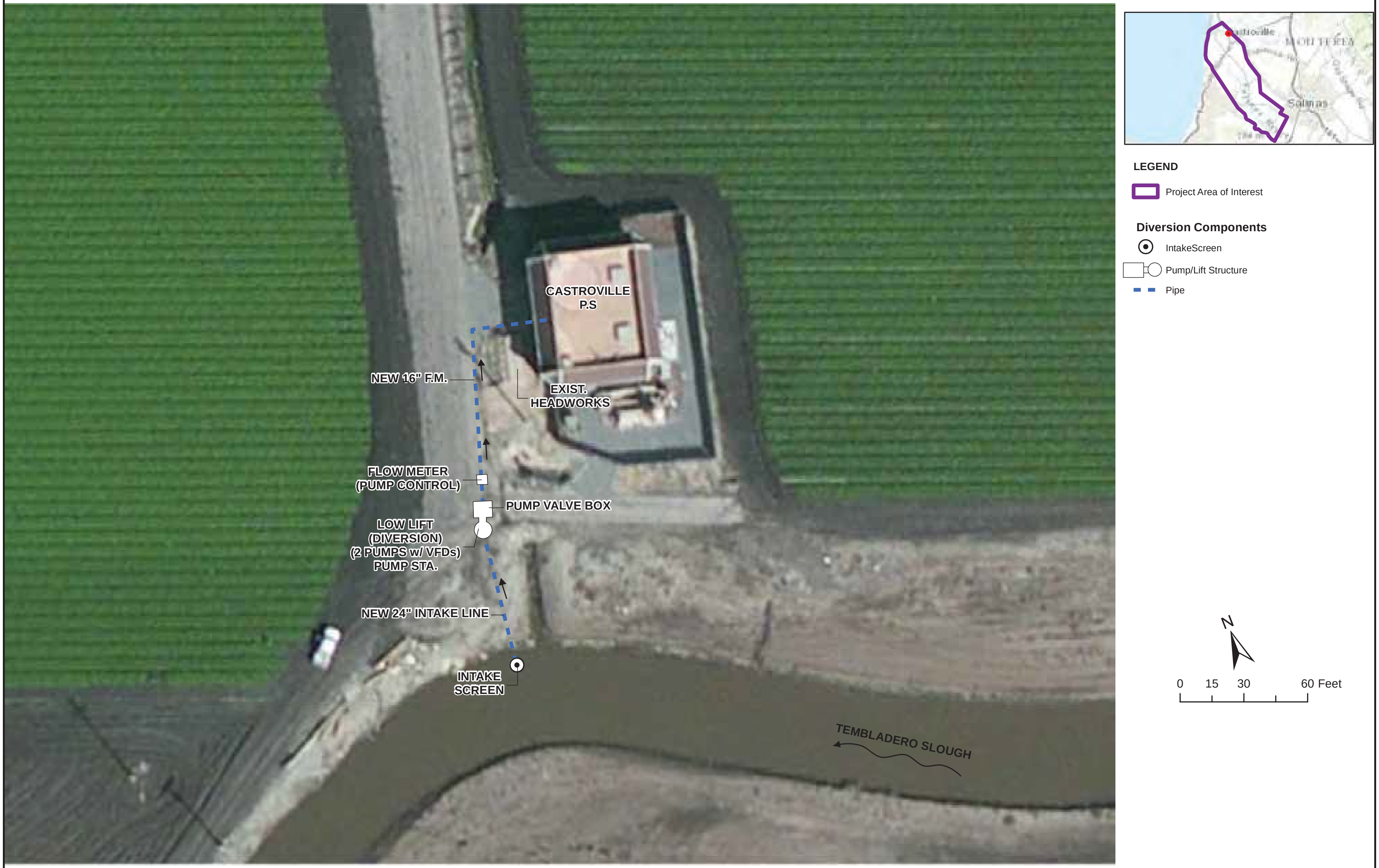
Proposed Reclamation Ditch Diversion Conceptual Plan

DD&A

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-23

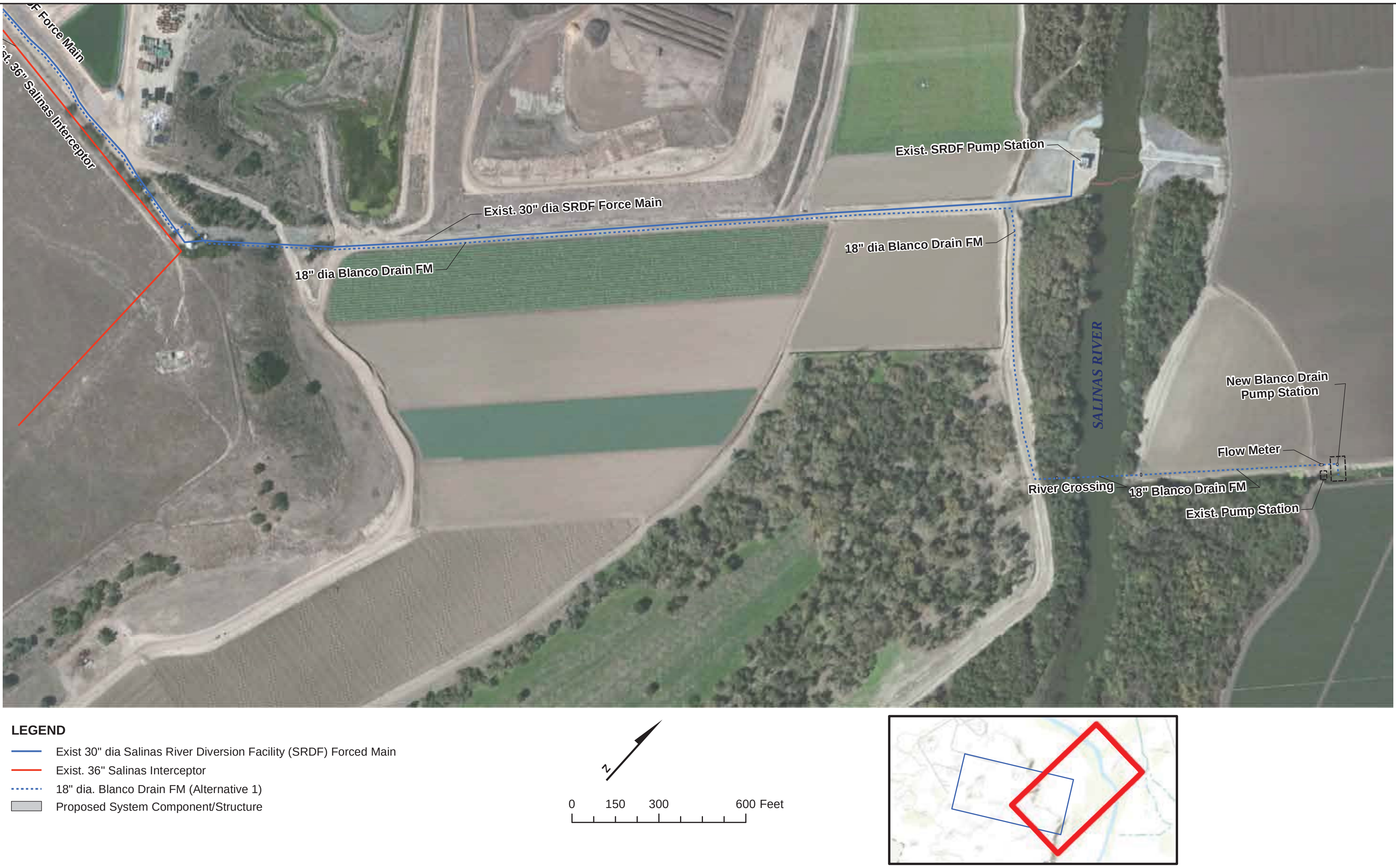


Proposed Tembladero Slough Diversion Conceptual Site Plan

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-24



DD&A

Blanco Drain Diversion Conceptual Site Plan - Eastern Portion

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-25a

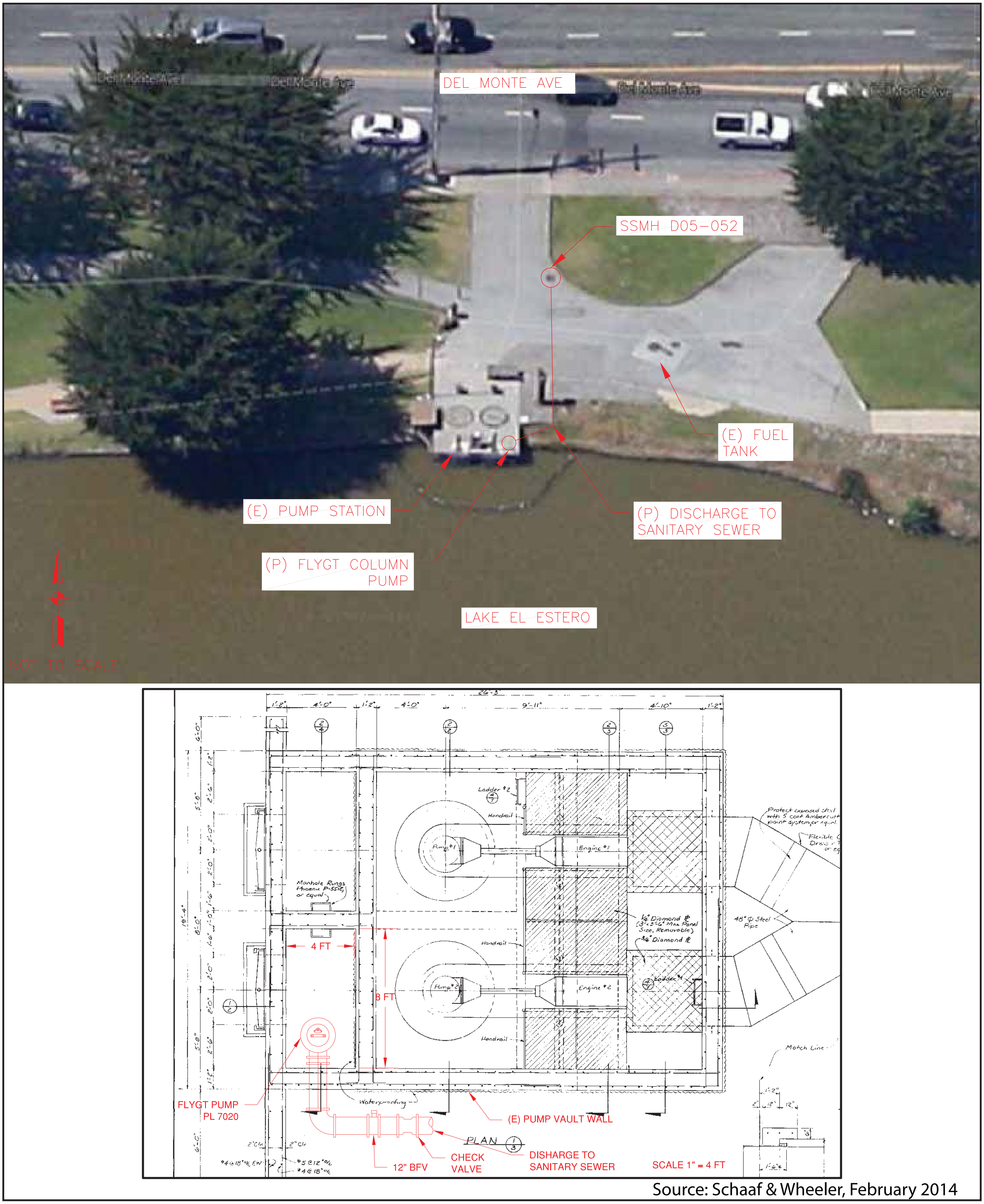
DD&A

Blanco Drain Diversion Conceptual Site Plan - Western Portion

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-25b



Source: Schaaf & Wheeler, February 2014

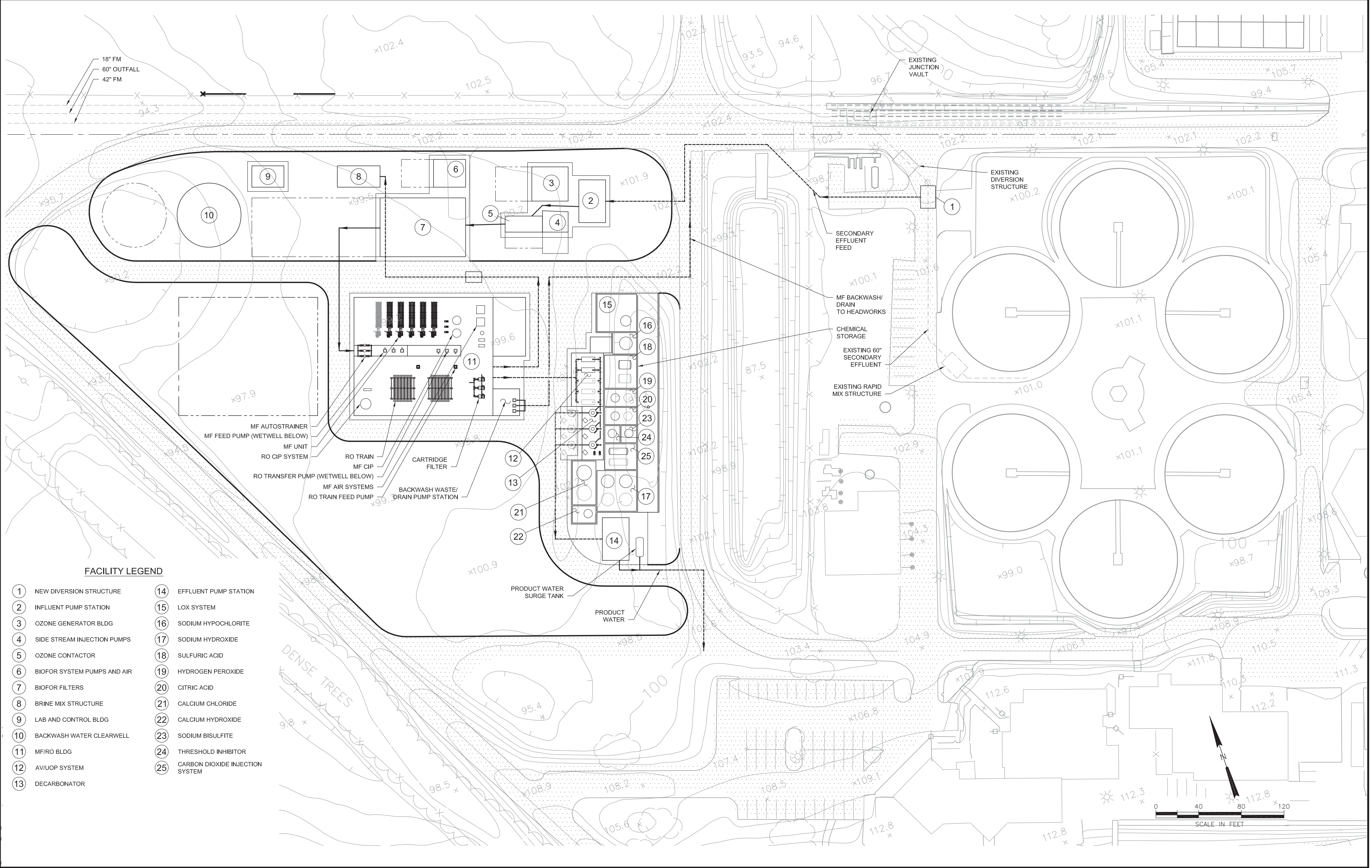
DD&A

Lake El Estero Diversion Conceptual Site Plan and Cross-Section

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-26

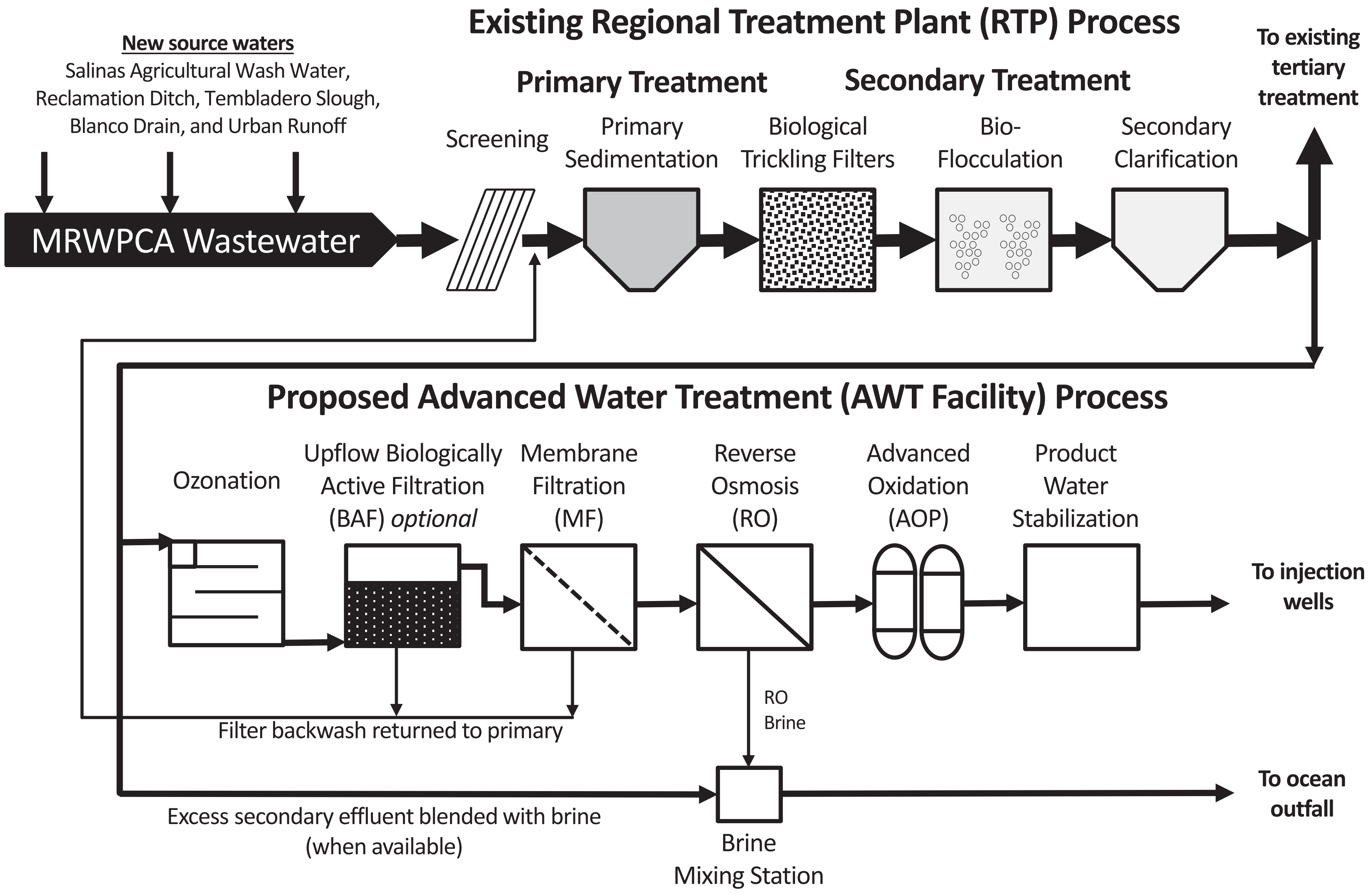


Advanced Water Treatment Facility Conceptual Site Plan

April 2015

Figure 2-27

Pure Water Monterey GWR Project
Draft EIR

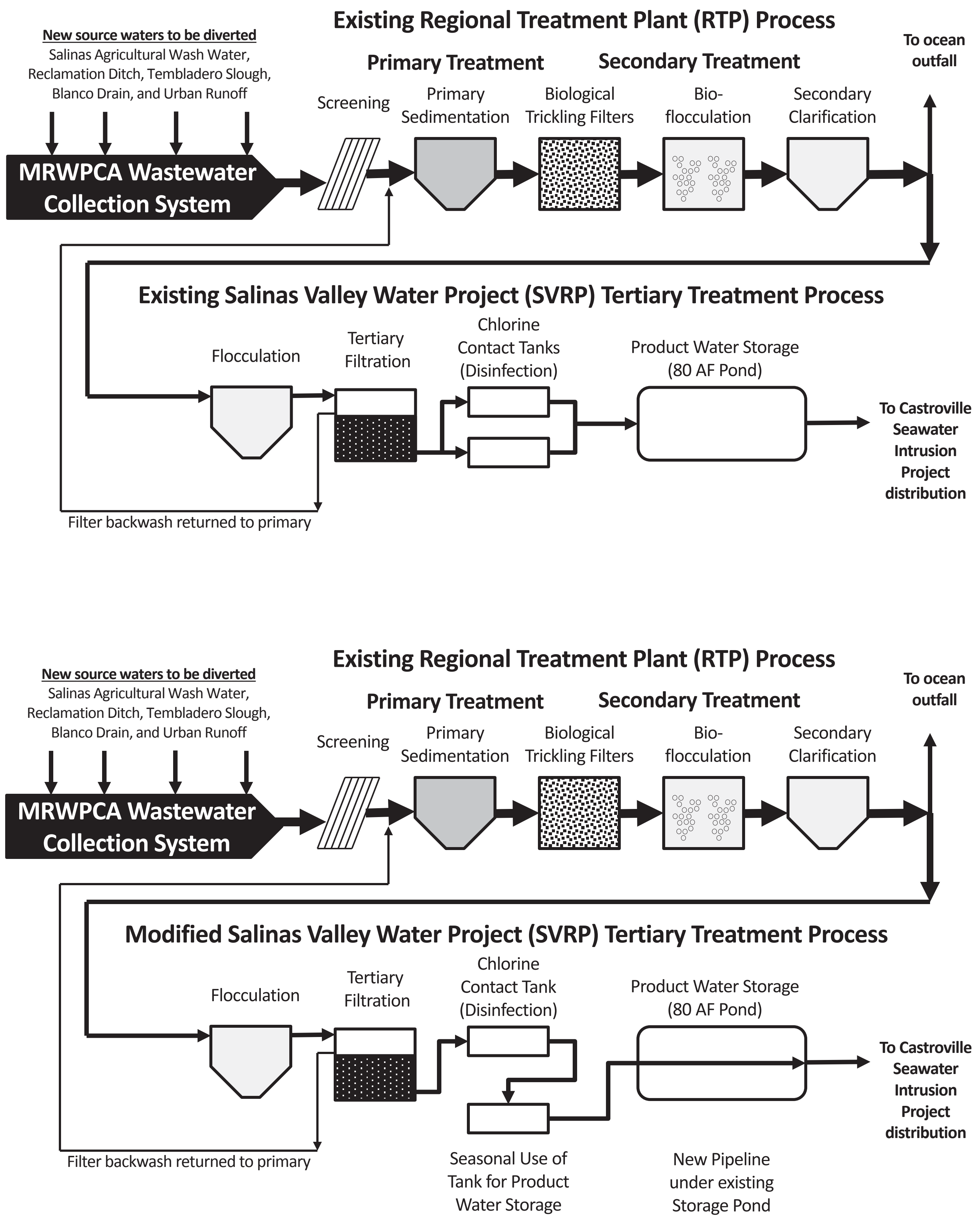


Proposed Advanced Water Treatment Flow Diagram

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-28



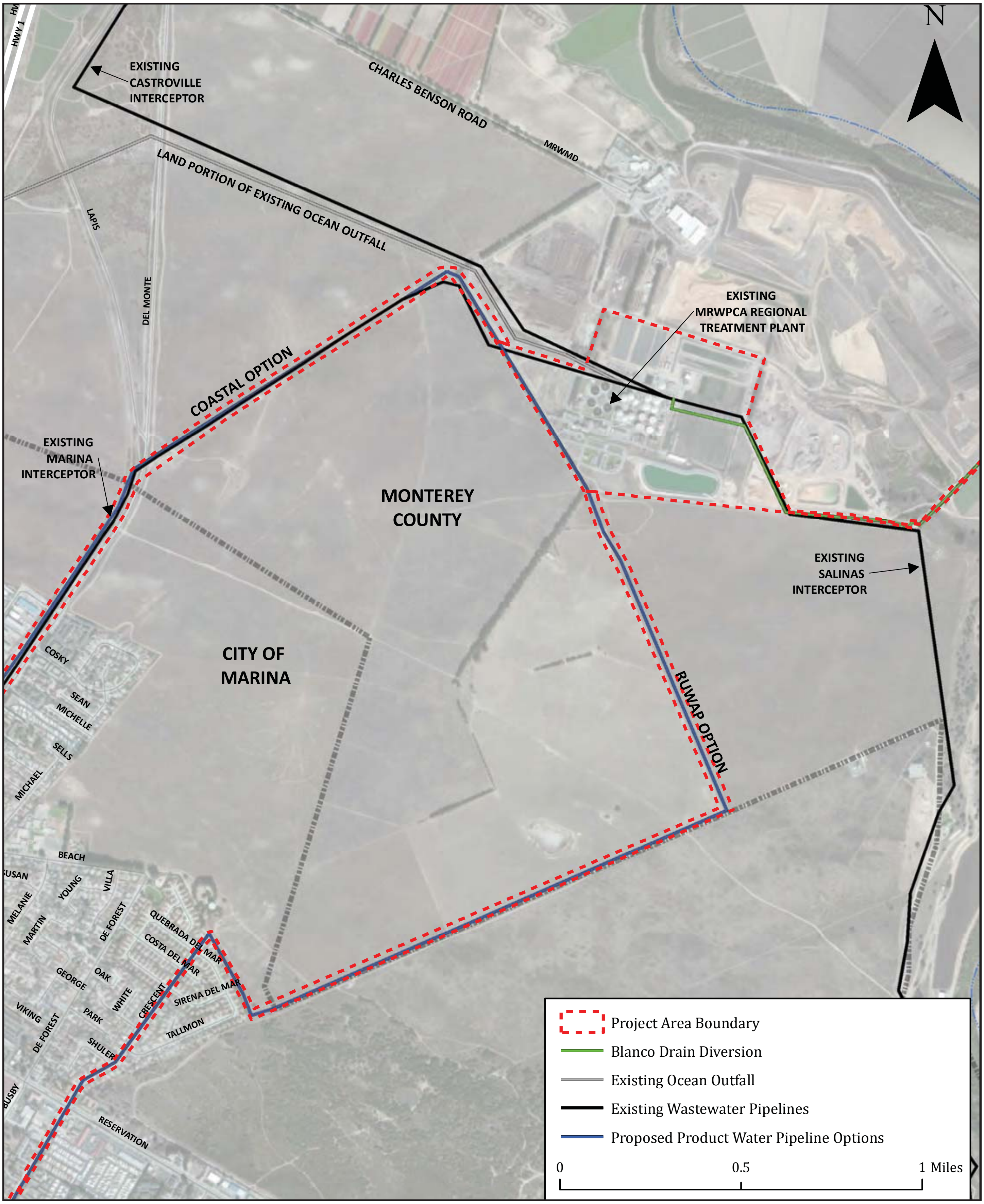
DD&A

Existing and Proposed Salinas Valley Reclamation Plant Process Flow Diagrams

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-29



Proposed Product Water Conveyance Options Near Regional Treatment Plant

April 2015

Pure Water Monterey GWR Project
Draft EIR

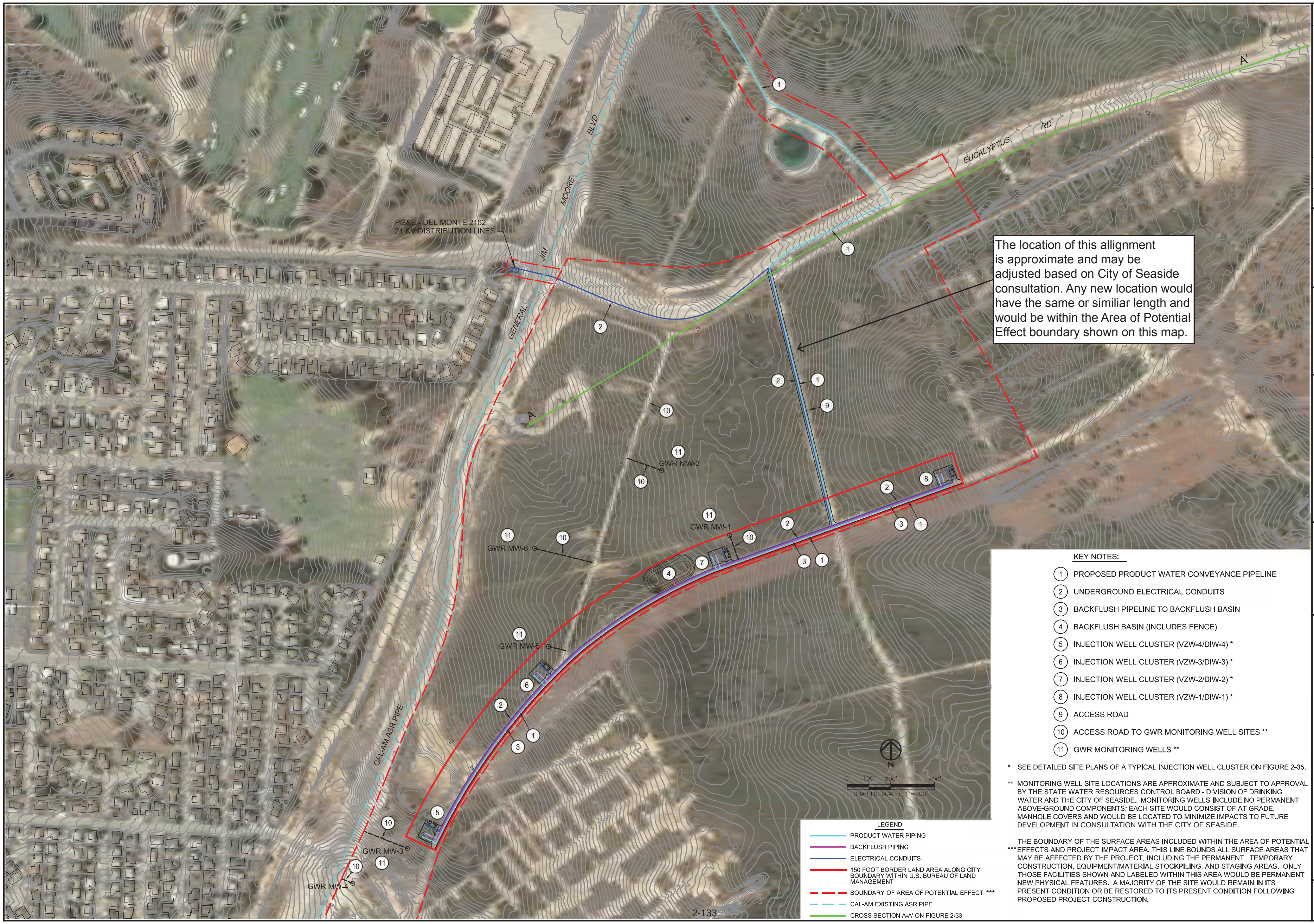
Figure
2-30

Proposed Booster Pump Station Options Conceptual Site Plans

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-31



The location of this allignment is approximate and may be adjusted based on City of Seaside consultation. Any new location would have the same or similiar length and would be within the Area of Potential Effect boundary shown on this map.

KEY NOTES:

① PROPOSED PRODUCT WATER CONVEYANCE PIPELINE
② UNDERGROUND ELECTRICAL CONDUITS
③ BACKFLUSH PIPELINE TO BACKFLUSH BASIN
④ BACKFLUSH BASIN (INCLUDES FENCE)
⑤ INJECTION WELL CLUSTER (VZW-4/DIW-4) *
⑥ INJECTION WELL CLUSTER (VZW-3/DIW-3) *
⑦ INJECTION WELL CLUSTER (VZW-2/DIW-2) *
⑧ INJECTION WELL CLUSTER (VZW-1/DIW-1) *
⑨ ACCESS ROAD
⑩ ACCESS ROAD TO GWR MONITORING WELL SITES **
⑪ GWR MONITORING WELLS **

* SEE DETAILED SITE PLANS OF A TYPICAL INJECTION WELL CLUSTER ON FIGURE 2-35.

** MONITORING WELL SITE LOCATIONS ARE APPROXIMATE AND SUBJECT TO APPROVAL BY THE STATE WATER RESOURCES CONTROL BOARD - DIVISION OF DRINKING WATER AND THE CITY OF SEASIDE. MONITORING WELLS INCLUDE NO PERMANENT ABOVE-GROUND COMPONENTS; EACH SITE WOULD CONSIST OF AT GRADE, MANHOLE COVERS AND WOULD BE LOCATED TO MINIMIZE IMPACTS TO FUTURE DEVELOPMENT IN CONSULTATION WITH THE CITY OF SEASIDE.

*** THE BOUNDARY OF THE SURFACE AREAS INCLUDED WITHIN THE AREA OF POTENTIAL EFFECTS AND PROJECT IMPACT AREA. THIS LINE BOUNDS ALL SURFACE AREAS THAT MAY BE AFFECTED BY THE PROJECT, INCLUDING THE PERMANENT , TEMPORARY CONSTRUCTION, EQUIPMENT/MATERIAL STOCKPILING, AND STAGING AREAS. ONLY THOSE FACILITIES SHOWN AND LABELED WITHIN THIS AREA WOULD BE PERMANENT NEW PHYSICAL FEATURES. A MAJORITY OF THE SITE WOULD REMAIN IN ITS PRESENT CONDITION OR BE RESTORED TO ITS PRESENT CONDITION FOLLOWING PROPOSED PROJECT CONSTRUCTION.

LEGEND

—	PRODUCT WATER PIPING
—	BACKFLUSH PIPING
—	ELECTRICAL CONDUITS
—	150 FOOT BORDER LAND AREA ALONG CITY BOUNDARY WITHIN U.S. BUREAU OF LAND MANAGEMENT
– – –	BOUNDARY OF AREA OF POTENTIAL EFFECT ***
– – –	CAL-AM EXISTING ASR PIPE
—	CROSS SECTION A-A' ON FIGURE 2-33

Rev	Date	Description	By

Job No. WW-PEB-1182
Designed by VMB
Drawn by WTH
Checked by VMB
Approved VMB

REGISTERED PROFESSIONAL ENGINEER
VINOD M. BADANI
C-041281
EXP. DATE 3/31/15
CIVIL
STATE OF CALIFORNIA

E2 Consulting Engineers, Inc.
1900 Powell Street, Ste. 250
Emeryville, CA 94608
(510) 652-1164
444 Airport Blvd., Suite 201
Watsonville, CA 95076
(831) 728-3232

MRWPCA

Injection Well Site Plan

This figure has been revised in response to comment L-17

Final EIR

September 2015

Figure
2-32 rev

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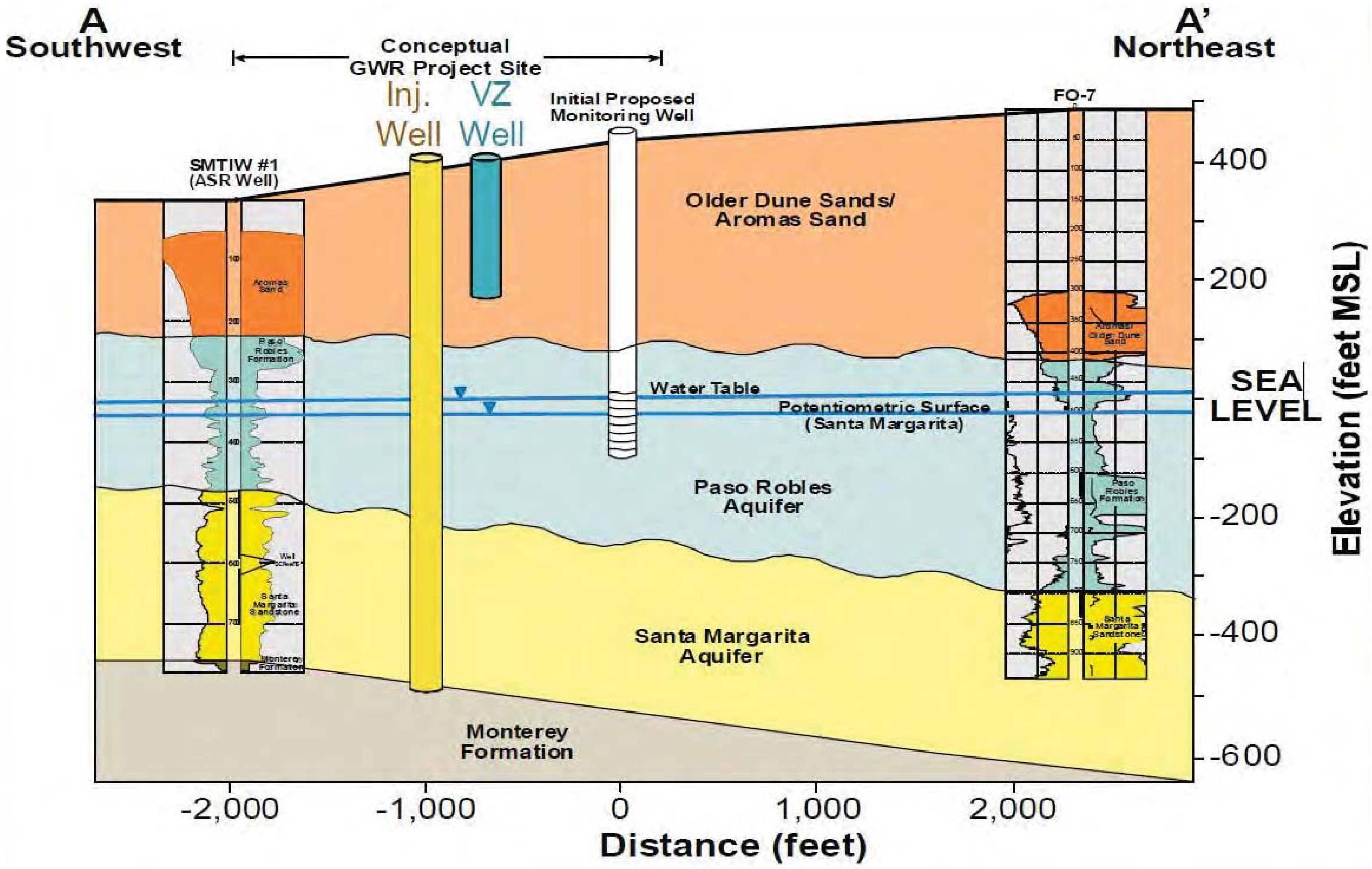


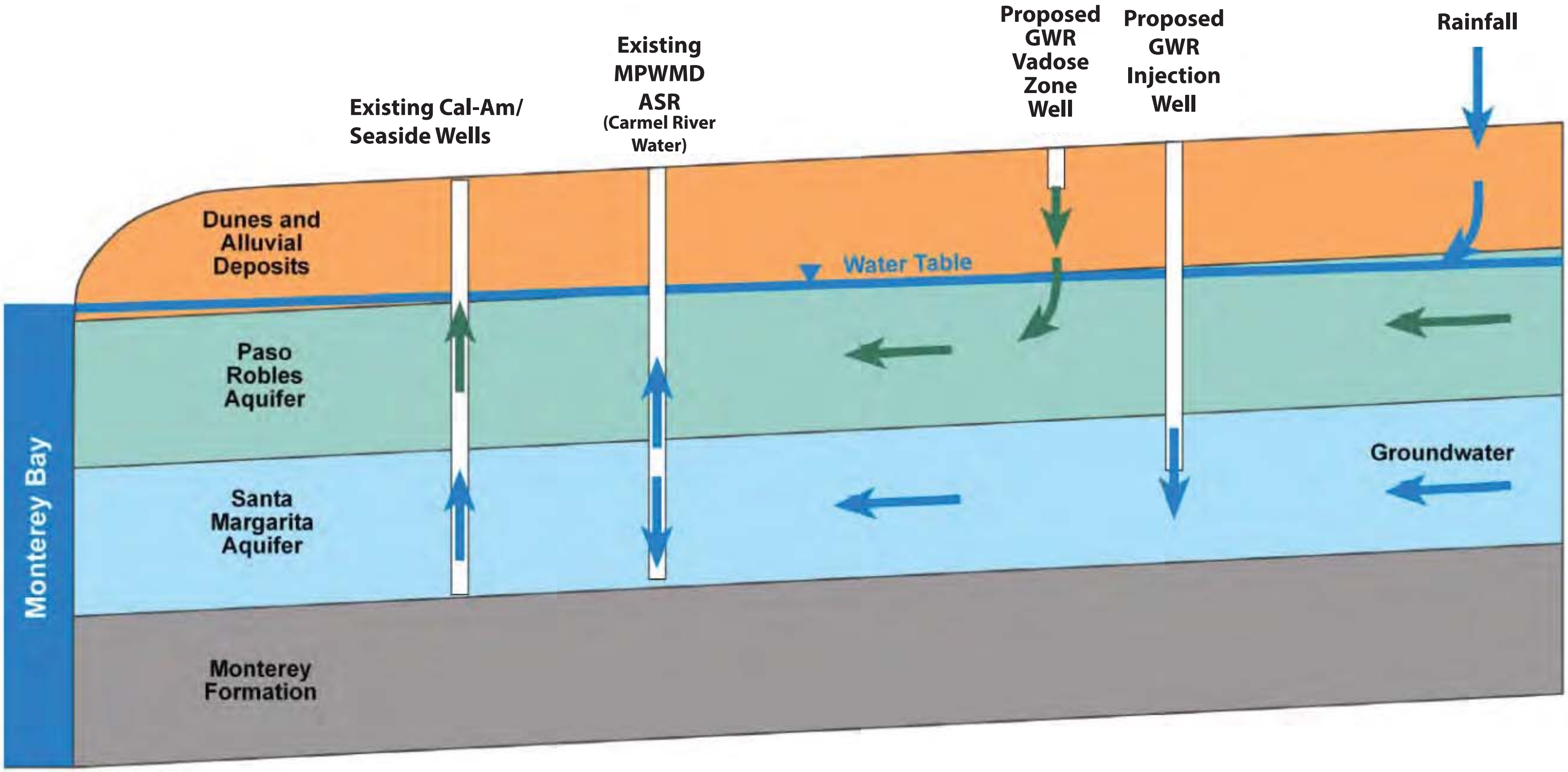
DD&A

Injection Well Cross Section

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-33

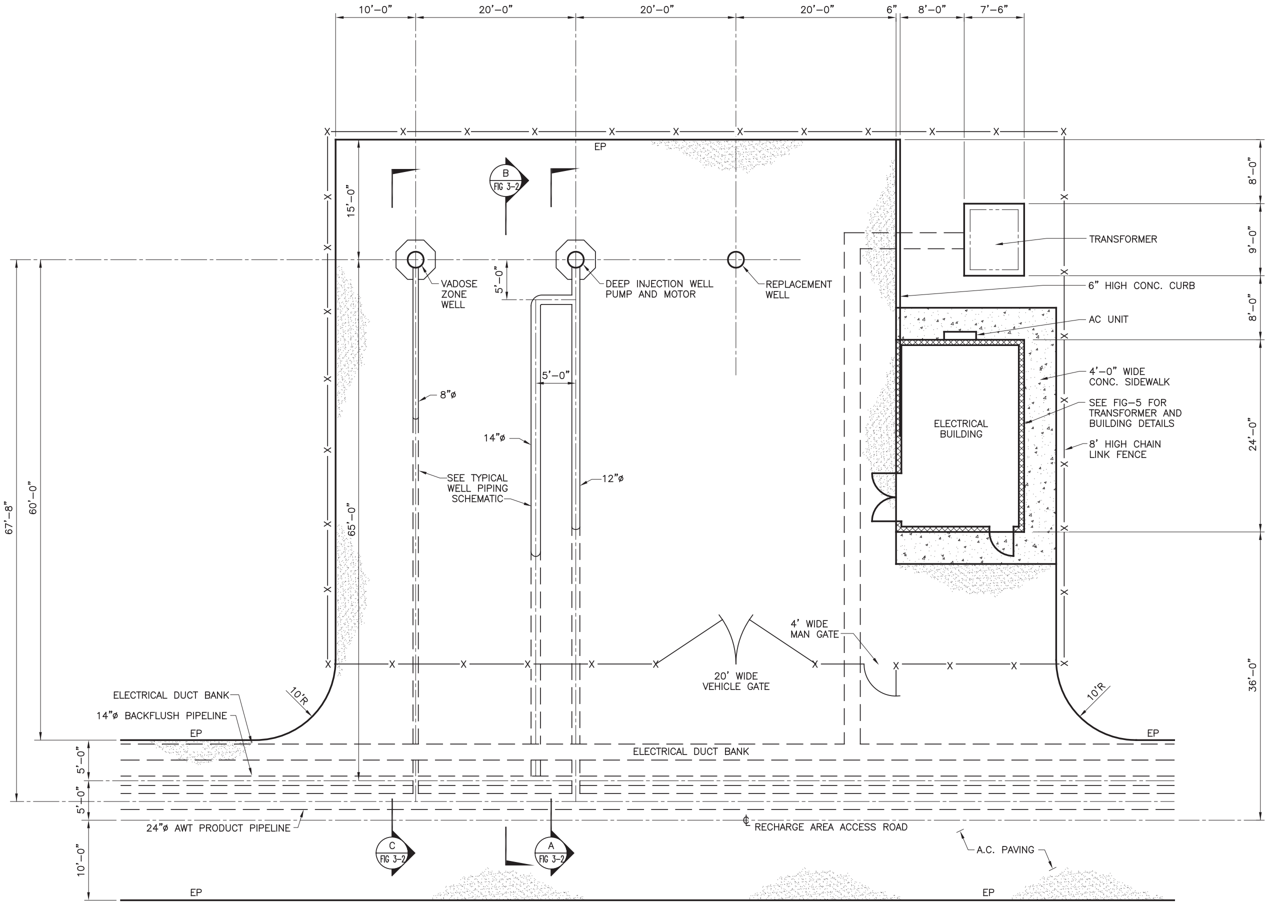


Conceptual Injection Schematic

April 2015

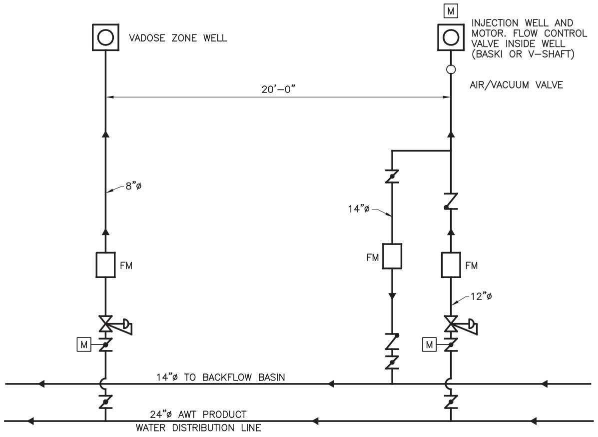
Pure Water Monterey GWR Project
Draft EIR

Figure
2-34



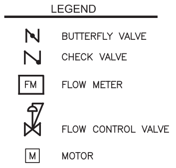
TYPICAL WELL SITE PLAN

1/8" = 1'-0"



TYPICAL WELL PIPING SCHEMATIC

N.T.S.

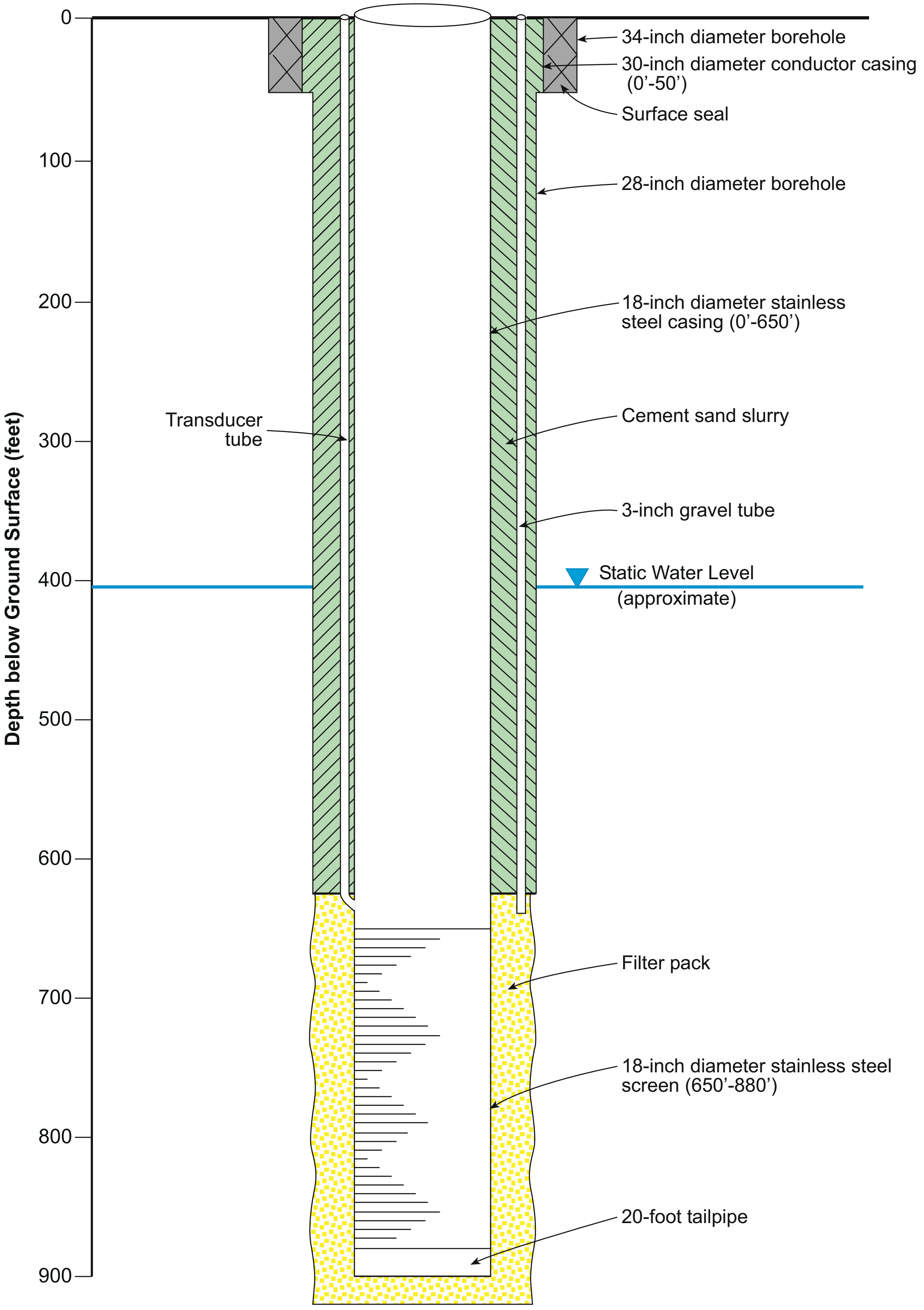


Conceptual Site Plan and Schematic of Typical Well Cluster

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-35



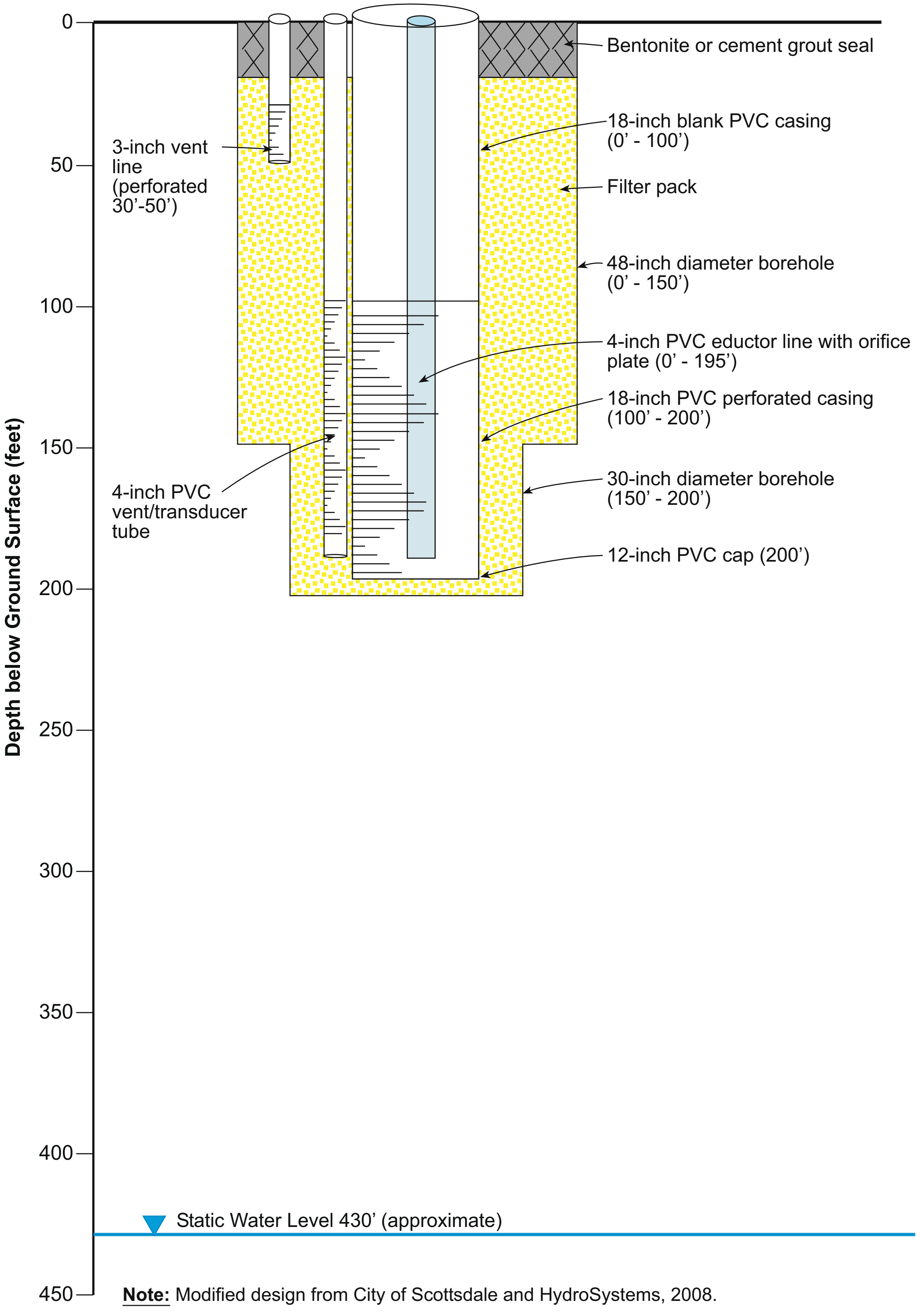
Source: Todd Engineers, October 2014

Deep Injection Well Preliminary Design

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-36



Note: Modified design from City of Scottsdale and HydroSystems, 2008.

Source: Todd Engineers, May 2013

Vadose Zone Well Preliminary Design

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-37

DD&A

CalAm Distribution System Pipeline: Eastern Terminus

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-38

CalAm Distribution System Pipeline: Western Terminus

DD&A

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-39

Project Component	General Construction Activities	2016							2017												2018		
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Salinas Pump Station Site																							
including pipes, wet wells/diversion structures, valves, SCADA	Site preparation and Demolition		■																				
	Underground vaults and pipes			■	■	■																	
	Valves, controls and site finishing					■	■																
Salinas Industrial Wastewater Treatment Facility																							
Return Facilities - Sliplining of new Force Main inside existing 33-inch IWW pipeline, on-site piping from Aeration Basin at IWTP to new Reture PS at IWTP and Return PS with Valve and Meter Vaults.	Site preparation and Demolition	■																					
	On-site Underground vaults and pipes	■	■	■																			
	Valves, pumps, controls and site finishing			■	■																		
	Install FM in to Existing 33-inch IWW pipeline to Salinas PS	■	■	■	■	■	■	■															
Storage and Recovery Additions: New Pump station at Pond 3, Pipeline at IWTP to Return PS, and SCADA.	Site preparation and Demolition											■											
	Underground vaults and pipes											■	■	■	■	■							
	Valves, pumps, controls and site finishing														■	■	■						
Reclamation Ditch at Davis Road																							
including pipes, pumps, wet wells/diversion structures, valves, and SCADA	Site Preparation												■										
	Underground work, vauts and pipelines												■	■	■	■							
	Valves, controls and site finishing															■	■						
Tembladero Slough at Castroville Site																							
including pipes, pumps, wet wells/diversion structures, valves, and SCADA	Site Preparation												■										
	Underground work, vauts and pipelines												■	■	■	■							
	Valves, controls and site finishing															■	■						
Blanco Drain Pump Station & Pipeline Site																							
including pipes, wet wells/diversion structures, valves, SCADA	Force main pipeline to RTP											■	■	■	■	■	■	■					
	Pump station site prep															■							
	Pump Station underground work, vauts and pipelines															■	■	■	■				
	Valves, controls and site finishing																		■	■			
Lake El Estero Diversion Site																							
including new pumps in existing dry well structure, pipeline, valves, SCADA	Site preparation and Demolition																■						
	Underground work, vauts and pipelines																■	■					
	Valves, controls and site finishing																	■	■				
RTP site (all new / modified facilities)																							
AWT Facility (incl. pipelines, diversion structures pretreatment, MF/RO/UV AOP, Brine Mixing Station, Product Water Pump Station)	Site Preparation		■	■																			
	Underground pipelines, vaults, utilities			■	■	■	■	■	■	■	■	■	■	■	■	■							
	Building construction				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Equipment installation, elevtrical and controls						■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Final Facility Testing																			■	■	■	■
SVRP Modifications (incl. new pipelines, sluice gates, contact basin mods and controls)	Underground pipelines and structures						■	■	■	■													
	Gates, valves and controls									■	■	■	■	■	■								
Product Water Conveyance (southern border of RTP to Injection Well Facilities Site)																							
Product Water Conveyance Pipeline	Pipeline Installation					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
Booster Pump Station (Coastal or RUWAP)	Building Site Preparation											■											
	Underground site piping and vaults												■	■									
	Building Construction													■	■	■	■	■	■				
	Equipment installation, elevtrical and controls																■	■	■	■			
	Final Facility Testing																			■	■	■	■
Injection Well Facilities																							
Access Road and Preliminary Grading	Soil stabilization for rig access			■																			
Monitoring well (GWR-MW-1 thru GWR-MW-4)	Drill, install, develop, sample				■	■	■	■															
Deep injection well (GWR-DIW-1 thru GWR-DIW-4)	Drill, install, develop,aquifer/injection testing					■	■	■	■	■													
Vadose zone well (GWR-VZ-1 thru GWR-VZ-4)	Drill, install, test								■	■	■	■	■										
Motor/Electrical Control Buildings (1 thru 4)	Underground piping, building, equipment install								■	■	■	■	■	■	■	■	■	■					
Backwash Pumps	Install pumps/motors/pipes at wells									■	■	■	■	■	■								
Backwash Basin	Grading, compaction, piping, concrete and paving									■	■	■	■	■	■	■	■	■	■	■			
Pipelines and Conduits	Trenching, pipe installation, backfilling and road surfacing												■	■	■	■	■						
System test	Final Testing and Clean-Up																		■	■	■	■	■
CalAm Transfer and Monterey Pipelines																							
Transfer Pipeline	Pipeline Installation (150 - 250 feet/day)														■	■	■	■	■	■			
Monterey Pipeline	Pipeline Installation (150 - 250 feet/day)		■	■	■	■	■	■	■	■	■	■	■	■									

Proposed Project Construction Schedule

April 2015

Pure Water Monterey GWR Project
Draft EIR

Figure
2-40

APPENDIX I1

Open-Water and Subsurface Intakes

Open-Water Intakes

Open-water intakes can be installed in a variety of locations and built in a range of sizes. In the United States, open-water intakes are often used by coastal power plants that require large quantities of ocean water for cooling. Sometimes, power plant intakes provide opportunities for the conversion of existing infrastructure to, or co-location with, desalination plant intakes.

The chief environmental concern associated with open-water intakes is entrainment and impingement of marine organisms.[1] Where subsurface intakes are infeasible, proposals for open-water intakes must include entrainment and impingement studies to determine impacts to marine resources. To be considered adequate, an entrainment and impingement study must be prepared in accordance with default protocols under Clean Water Act Section 316(b) (CCC, 2004).[2] Apart from the impacts of the intake process itself, the impacts to marine resources associated with the offshore portion of the intake pipeline must also be evaluated, particularly if the pipeline would be supported on the ocean floor or in the water column.

Consistent with the findings of an expert review panel convened by the SWRCB, *Desalination Plant Entrainment Impacts and Mitigation* (finalized October 9, 2013), and SWRCB's 2014 proposed Desalination Amendment to the California Ocean Plan (SWRCB, 2014b), this EIR assumes that all open-water intake options would be equipped with a passive, cylindrical wedge-wire screen at the western terminus of the intake pipeline with slot openings sized to meet regulatory and/or permitting requirements[3] and would have a design velocity of 0.5 feet per second unless otherwise noted.

Construction of Open-Water Intakes

There are several possible construction methods for installing open-water intakes beneath the ocean floor. All of the new open water intakes described below would be constructed using either horizontal directional drilling (i.e., drilling a boring between two pits and either using a barge to pull the pipe through the boring or deploying the pipe on the ocean floor and pulling it through the boring from the onshore pit) or microtunneling (i.e., pushing the pipe behind a microtunnel boring machine). Both of these methods require the use of drilling fluids. Under both methods, the intake pipe would be fused in advance of drilling/tunneling and laid out in a linear manner near the entry pit. The boring for the intake pipeline would tunnel under the beach/onshore portion and ocean floor to the point it "daylights" (emerges) on the ocean floor, where the screened intake structure (attached to the end of the intake pipe) would be mounted on a riser approximately 3 feet off the

---

[1] In this context, entrainment refers to marine organisms entering the desalination plant intake, being drawn into the intake system, and passing through to the treatment facilities. Impingement would occur if organisms were sufficiently large to avoid going through the intake screens but were trapped against them by the force of the flowing water.

[2] In some cases, different study parameters may be proposed, and in some cases, a recently completed 316(b) study for a nearby site may be used if applicable to the proposed desalination intake site (CCC, 2004).

[3] The SWRCB is considering an amendment to the 2012 Ocean Plan to address issues associated with desalination facilities. According to the 2014 proposed Desalination Amendment to the California Ocean Plan (Section L(2)(d)(1)(c)(ii)), the SWCRB intends to select a single slot size but is soliciting comments on whether 0.5 millimeter (0.02 inch), 0.75 millimeter (0.03 inch), 1.0 millimeter (0.04 inch), or some other slot size is most appropriate to minimize intake and mortality of marine life.

ocean floor. This analysis assumes approximately 0.25 acre of land disturbance on the ocean floor for construction of the screened riser. The permanent footprint of a screened riser on the ocean floor is approximately 20 square feet. Unless otherwise specified, it is assumed that the construction methodology for all new open-water intakes would be generally consistent with these techniques.

Operations and Maintenance Considerations for Open-Water Intakes

As noted, the primary environmental impact associated with open-water intakes is entrainment and impingement. The SWRCB, California Coastal Commission, and Monterey Bay National Marine Sanctuary require proponents of open-water intakes to include entrainment and impingement studies in the corresponding permit applications, and to implement (or fund through fee-based mitigation) compensatory mitigation for operation of the intakes. The mitigation fees would be used for habitat creation, restoration projects that replace the lost production, or other projects viewed equivalent by the SWRCB (SWRCB, 2014b). Additionally, the funding could be used to create marine-protected areas or to clean up or abate environmental contaminants. The fee would be based on a broad range of organisms impacted at the intakes.

Maintenance of open-water intake screens would occur at least annually. Maintenance activities would include mechanical cleaning, air blasting and hand-scraping of the intake screens by divers, to remove organic matter and debris. The intake pipeline would need to periodically “pigged.”

Subsurface Intakes

Subsurface intakes -- which include vertical wells, infiltration galleries, horizontal wells, slant wells, and Ranney collectors -- can avoid or minimize some of the environmental effects associated with open-water intakes. Specifically, subsurface intakes can avoid or minimize direct impacts to the ocean floor and benthic[4] organisms during construction, and impingement and entrainment during operations. Subsurface intakes can avoid impingement because they collect source water through the ocean bottom and coastal aquifer sediments. Subsurface intakes are generally considered a low-impact technology with respect to impingement and entrainment. However, the magnitude of potential entrainment of marine species into the bottom sediments caused by continuous subsurface intake operations has not been systematically and scientifically studied to date (WateReuse, 2011).

Subsurface intakes generally have the following advantages compared to open water intakes:
(1) the potential to reduce or eliminate the impingement or entrainment of marine organisms;
(2) natural water filtration and pretreatment provided by ocean floor sediments, which in some cases can reduce the need for some treatment chemicals during the desalination process; and
(3) minimal growth of marine organisms that occurs inside the intake pipeline (Kennedy/Jenks, 2011). In general, source water derived from subsurface intakes requires significantly less filtration when compared to raw seawater (SGD, 1992). However, if not appropriately sited,

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[4] Relating to the bottom of an ocean, sea or lake, or to the organisms that live there.

subsurface intakes can adversely affect coastal aquifers and increase the risk of saltwater intrusion in freshwater aquifers (CCC, 2004).

Key factors that determine whether a subsurface intake is technically feasible and practical include: the transmissivity/productivity of the geologic formation/aquifer; the thickness of the production aquifer deposits; and the existence of nearby freshwater source aquifers.

The following subsections describe each subsurface intake type, including typical suitable locations, examples of existing technology, general construction methodology, operation and maintenance, and capabilities and limitations of each technology.

Vertical Wells

Vertical wells are shallow intake wells that make use of beach sand or other geologic mediums to filter water. A vertical beach well consists of a casing, well screen, and vertical turbine pump. The suitability of a site for vertical wells is determined by drilling test wells and conducting a detailed hydrogeologic investigation to ascertain the formation transmissivity and substrate characteristics. Source water yield from a vertical well can range between 0.1 and 1.5 mgd (Hunt, 2008). It is preferable to locate beach wells as close to the coastline as possible to minimize impacts on inland aquifers. Four vertical beach wells (two active, two standby) are used to draw brackish source water for the 300-afy Sand City Coastal Desalination Plant (Water Technology, 2012). Vertical wells are typically constructed with a track-mounted drill rig and require an area of approximately 100 feet by 100 feet at each well location (SGD, 1992). Like subsurface slant wells, vertical wells require dewatering during well development, and the effluent produced during well development is discharged either directly to the ocean or to temporary onsite settling basins (SGD, 1992; Feeney, 2002). This analysis assumes that the wellhead and associated electrical box for a vertical well would be buried below grade, and that submersible pumps would be used. Each wellhead would result in approximately 400 square feet of permanent disturbance and a permanent easement would be required for maintenance access (SGD, 1992). Vertical wells are typically spaced approximately 300 feet apart from each other to reduce well interference (SGD, 1992). Maintenance of vertical wells is limited to replacing the submersible pumps; however, the small-diameter pumps used in vertical wells have a shorter service life and must be replaced more frequently than other types of well pumps. Since the wells would be buried, pump replacement would require excavation around the wellhead to allow service access.

To provide the 24 mgd of source water needed for the 9.6-mgd desalination plant proposed under the proposed project, a large number of vertical wells spaced over a wide area of beach would be required. Although the total number of vertical wells needed would depend on the underlying hydrogeologic characteristics of the intake site, based on a best-case scenario in which each well has 1.0 mgd of capacity, at least 24 vertical wells would be needed over a linear distance of at least one mile. This analysis assumes that other alternative subsurface intake technologies would have a smaller construction footprint and permanent footprint because other subsurface intakes would require fewer wells to generate the same volume of source water. The sheer number of vertical wells that would be needed to provide a reliable source water flow to the desalination plant is considered infeasible, both from a construction and operational perspective and in terms of economic, legal (permitting) and environmental factors. Therefore, vertical wells are not considered further.

Infiltration Galleries

Infiltration galleries consist of a series of submerged slow sand media filtration beds located beneath the ocean floor. Multiple collector screens and intake pipes within the filtration beds draw seawater to a single intake well located onshore. Water is pumped through onshore intake pumps. Infiltration galleries are most appropriately implemented in locations where geologic conditions are relatively impermeable or of insufficient thickness and depth to support groundwater extraction (Pankratz, 2008).

Infiltration galleries require construction on the beach as well as on the ocean floor. The design surface loading rate of the sand filter media is typically between 0.05 to 0.10 gallons per minute (gpm) per square foot. Using a 42 percent recovery rate, an infiltration gallery for a 9.6-mgd desalination plant would need to draw at least 24 mgd (16,650 gpm) of source water. Based on a loading rate of 0.075 gpm per square foot, approximately 222,000 square feet (or 5 acres) of the seabed in Monterey Bay would need to be excavated at a depth of 6 to 8 feet to install an active infiltration bed for the MPWSP Desalination Plant. Once constructed, periodic removal or replacement of the surface layer of the filtration beds is needed to maintain intake capacity (WateReuse, 2011). Based on the extent of temporary and permanent disturbance that an infiltration gallery would have on the sand dunes and sensitive marine habitat in the Monterey Bay National Marine Sanctuary, this technology is considered infeasible based upon environmental, social and legal factors and is not discussed further.

Horizontal Wells

Horizontal wells, which are installed using HDD technology, draw seawater from shallow offshore aquifers. Horizontal wells would be constructed in clusters of three or four wells, each well equipped with a well pump and extending horizontally approximately 2,400 feet and at a depth of roughly 180 feet below sea level. Approximately 10 to 12 horizontal wells would be needed to provide sufficient source water for the 9.6-mgd MPWSP Desalination Plant. The source water collected by each horizontal well cluster would be pumped from each well to a common caisson and then from the caisson to the MPWSP Desalination Plant.

The Neodren™ HDD intake technology is patented by the Spanish company Catalana de Perforacions. This technology has been used for over ten years in several small and medium-size seawater desalination plants in Spain, but does not have any applications in the United States. One of the largest seawater desalination plants using HDD wells in operation is the New Cartagena Canal (San Pedro de Pinatar) plant. It is located in Almeria, Spain and has a capacity of 17 mgd. The individual intake wells are between 1,650 and 1,980 feet long and are 14-inches in diameter. Each well produces between 2.3 and 3.1 mgd and the desalination plant operates at 45 percent recovery. The water is collected in a large wet well (located under a parking lot to reduce visual impacts) located underground and pumped to the plant using submersible pumps.

Experience with the use of HDD wells at this plant, indicates that the plant intake has encountered significant “technical issues and limitations” causing the plant’s owner to switch to an open water intake system for the plant’s Phase-2 expansion[5]. Four of the wells lost over 40 percent of their production capacity within the first nine months of plant operation; furthermore, the capacity of the other wells has continued to diminish over time. Such productivity reduction triggered the need to install additional intake wells and ultimately to build open intake for the second phase of the plant expansion.

When HDD wells were introduced on the market in late 1998, they initially received acceptance in Spain and have been considered a viable intake alternative for a number of other countries. However, after five years of operational experience, many of the plant intakes have faced production reliability challenges (loss of productivity due to blockage of the perforated piping). As a result, HDD wells have not been used for full-scale desalination projects worldwide since 2010. An HDD intake system that would be capable of collecting source water needed for the MPWSP desalination plant would consist the same number of wells proposed by the MPWSP, and would collect water into a common wet well located inland from the beach.

Based on experience with other forms of infiltration galleries, HDD intake maintenance maybe challenging due to their historical tendency to clog. Furthermore, experience shows that once the intake collectors become plugged and the productivity of the individual collectors' decreases, it is impossible to recover the original full capacity[6].

The construction of HDD intake systems would involve the use a drill rig launched from an onshore location to drill a pilot bore. The drill rig would be positioned over the bore hole centerline a sufficient distance behind the entry point to allow the drill bit to enter the ground at the correct location and angle. Depending on the rig size and entry angle, this distance may be 3 feet to 20 feet behind the entry point. The entry angle usually is between eight degrees and 16 degrees, although entry angles of up to 20 degrees have been used on some large diameter projects. A small pit is usually excavated over the entry point, using a backhoe or shovel. When performing HDD in an unconsolidated media like sand, it will be necessary to pressurize the bore hole and stabilize the walls by coating them with drilling mud (e.g., bentonite) or another similar drilling fluid. Because of the pressure involved to coat the hole walls with mud, frac-out of the drilling mud has occurred in other HDD operations. Such a prospect would result in the potential release of drilling fluid into the ocean environment.

The pilot bore would be enlarged by one or more back reamers to the size required for the intake pipe; the pipes would be assembled on barges, lowered to the sea floor and pulled back through the borehole (float-and-sink method) during the final reaming process. Daylighting the drill offshore could result in the release of drilling fluid to the ocean. Neodren™ claims that they have a new technique that avoids daylighting the drill offshore (“push” method) and this was the

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[5] Andy Shea, USA Development Director at Acciona Agua Corporation; November 15, 2007; California Coastal Commission CDP application E-06-013, public hearing video at 6:00:00; http://cal-span.org/unipage/?site=cal-span&owner=CCC&date=2007-11-15#

[6] Rachman, R., S. Li, T. Missimer (2014) SWRO water quality improvement using subsurface intakes in Oman, Turks and Caicos Island, and Saudi Arabia, Desalination 31, pp. 88-100.

technique assumed for the MPWSP. However, as of late 2015, the push method of construction has yet to be demonstrated successfully for an intake well. The area required for construction and the associated impacts will likely be similar to slant wells (but for the off-shore support services, e.g. barges, that would be associated with the float-and-sink method.

Horizontal wells are not evaluated further for the following reasons: (1) the amount of pipeline that would be pushed under the seafloor (upwards of 2,500 feet) would be challenging in terms of physical limitations; and (2) HDD would not avoid or minimize any of the impacts associated with the proposed action.

Ranney Wells

A Ranney well is a radial well comprised of a vertical caisson (a large diameter shaft where the water is collected from each well and then pumped) extending below the water table from which horizontally placed perforated screens are extended (SGD, 1992). The use of multiple horizontal laterals means that production of each radial well is greater than a single vertical well (Feeney, 2002). A single Ranney well can yield between 0.1 to 25 mgd, which is five to ten times the yield of a vertical well (Hunt, 2008). Examples of Ranney wells in marine environments include three Ranney wells at the Salina Cruz Power Plant in Mexico that draw between 9 and 14 mgd of seawater, and one at the Steinhart Aquarium at the California Academy of Sciences in San Francisco (Hunt, 2008; Feeney, 2013).

Construction of Ranney wells involves excavating a large shaft for the central caisson, then installing the horizontal laterals outward from the vertical shaft. The central caisson may range from 8 to 20 feet in diameter (SGD, 1992). The laterals are advanced by either jacking outward (seaward) from the vertical shaft under hydraulic pressure, or by jetting them into place (Geoscience, 2008). This analysis assumes that the central caisson would be approximately 16 feet in diameter, be buried at a depth of approximately between 90 to 260 feet, and have a permanent aboveground electrical control building to house pumps and other associated headworks (SGD, 1992).

Ranney wells must be spaced approximately 350 to 500 feet apart to reduce interference between adjacent Ranney wells. Although the final footprint for a Ranney well intake system can be relatively small compared to other types of wells (e.g., vertical), the construction area can be larger (Geoscience, 2008). Construction of a large caisson on the beach, even though the caisson would ultimately be buried, would require a large footprint for construction activities and dewatering operations. This analysis assumes each Ranney well would result in 1 acre of temporary construction disturbance. Conventional construction equipment, including a 60-ton crane, concrete trucks, and assorted support vehicles, would be used for excavation, forming, pouring and setting of the vertical concrete caisson, dewatering of the caisson, advancement of the laterals, development, and test pumping. During dewatering, lateral advancement development, and test pumping, water would need to be discharged to a portable holding tank to settle out suspended solids and the decanted effluent subsequently percolated into the ground in the beach area (SGD, 1992; Feeney, 2002). With the exception of electrical controls, this analysis assumes Ranney wells would be buried below grade. Each Ranney well would be constructed over approximately 6 to 9 months and could involve 24-hour construction (Geoscience, 2008).

Ranney well maintenance includes periodic cleaning of the screened laterals to prevent clogging, and repairs and/or replacement of the submersible pumps. Assuming Ranney wells would be buried in the beach, the sand around the pumps would need to be excavated to allow maintenance staff to access the caisson and screened laterals. Ranney well laterals are mechanically cleaned using a high-pressure rotating water jet blaster; a mechanical packer/surge-block device that surges water or air in isolated sections of the laterals; and/or a bore blast where a small quantity of nitrogen is used to create a pressure pulse down the length of the laterals. This analysis assumes that Ranney well laterals would require cleaning every 5 to 10 years; however, ongoing monitoring of Ranney well performance would be conducted to determine the frequency of cleaning and maintenance.

The submersible pumps for Ranney wells would be housed in the central caisson, which means that large pumps, even turbines, could be used. Larger infrastructure has larger electrical windings and typically requires less maintenance. The submersible pumps would be repaired or replaced approximately every 10 years (SGD, 1992; Feeney, 2002).

The restricted lateral lengths of Ranney wells, as well as issues related to construction in a beach environment, could place limitations on the use of this technology to provide desalination plant feed water supply. The length of the laterals is currently limited to approximately 127 to 240 feet for the traditional Ranney-type collector well, and 350 to 375 feet for collector wells using the Sonoma method[7] of construction (Geoscience, 2008). When used for water supply, the maximum length of the horizontal laterals is typically limited to 150 feet. There may also be limitations on the depth of installation (for example, the maximum depth of the caisson is dependent on the geologic substrate), in which case the laterals would need to be installed and operated within the shallow Dune Sands Aquifer. Ranney wells would occupy roughly the same physical area as slant wells (approximately 10 acres), and Ranney wells are further evaluated as an intake option in this EIR.

Slant Wells

Slant wells are installed at an angle below the sea floor using vertical well drilling technology. The yield from a slant well depends on the underlying geology. When compared to vertical wells and Ranney wells, slant wells can be screened at greater distances offshore and can result in fewer impacts on coastal groundwater aquifers. Slant wells can be drilled from behind sand dunes or from the active beach area (i.e., between the toe of the dunes and the open ocean). The wellheads can be buried beneath the sand or installed flush with the ground surface. Multiple slants wells can be grouped into clusters to extend from a single “pod.” Consistent with the slant wells proposed as part of the MPWSP, it is assumed that construction of each slant well pod (consisting of up to 4 wells) would result in 1 acre of temporary disturbance.

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[7] The Sonoma method is a different configuration of a Ranney well that has been implemented on the Russian River in Sonoma County, California.

Slant wells would require maintenance every 5 years. During maintenance, the wellheads are excavated and exposed, and mechanical brushes are lowered into the wells to mechanically clean the screens. Ground disturbance associated with periodic maintenance is assumed to be similar in extent to construction disturbance (i.e., approximately 1 acre of disturbance for each well pod).

Slant well construction and maintenance requirements are described in greater detail in Chapter 3, Project Description. Any intake options that include slant well technology are assumed to be consistent with the slant wells proposed as part of the MPWSP, although the location and number of wells could vary.

APPENDIX I2

Component Screening Results – Component Options Not Carried Forward

Intake Option #1 – Subsurface Slant Wells at North CEMEX

This intake option was described in CalAm's Application for a Certificate for Public Convenience and Necessity (CPCN) for the MPWSP, as amended in CalAm's Supplemental Testimony dated January 2013.[1] This intake option would locate up to ten subsurface slant wells in the northern portion of the 376-acre CEMEX property, approximately 0.5 mile north of the CEMEX active mining area, and between 1.25 and 1.75 miles south of the Salinas River (see **Figure 7-1**). This site is referred to as the "north CEMEX site."

The slant wells would be designed as gravity wells that would passively receive seawater. A 0.2- to 0.3-mile-long pipeline would collect the combined source water from the slant wells and convey it to a 0.5-mile-long intake tunnel. The intake tunnel would convey the source water beneath the dunes to an intake pump station located on the inland side of the dunes. The pump inlet lines would be below sea level. The elevation difference between the ocean surface and the pump inlet lines would create the differential pressure (i.e., hydraulic head) needed to convey seawater via gravity through the collector pipeline and intake tunnel to the pump station. The intake pump station would then pump seawater through a source water pipeline to the 9.6-mgd MPWSP Desalination Plant. Because the slant wells would rely on differential pressure to collect seawater (i.e., they would be gravity-fed), the wellheads would not be equipped with pumps.

Construction activities associated with the slant wells would occur within the swash zone (the zone of wave run-up between normal and high tides). A temporary precast-concrete barrier system and sheet piling would be installed to protect equipment and personnel from wave action during construction. For each well cluster, approximately 120 linear feet of temporary barrier would be placed parallel to the shoreline at 1 to 3 feet below mean sea level (msl). A temporary enclosure made of sheet piling would be constructed on the inland side of the barrier.

To install the slant wells, construction personnel would excavate a hole and place the wellhead vault structures (precast) into the ground; drill and develop the slant wells; spread drill cuttings or haul them offsite; and remove the precast-concrete barrier system and sheet piles. The slant wells would be constructed using large drilling machinery modified for angle (slant) wells. The collector pipeline and intake tunnel would likely be constructed using jack-and-bore and/or drill-and-burst methods. It is assumed that the following construction equipment would be used to install the slant wells: a dual-wall, reverse-circulation "Barber"–type drilling rig; sheet-pile drivers; pipe trailers; portable drilling fluid tanks; portable holding tanks; haul trucks; flatbed trucks; pumps; and air compressors. Construction activities would temporarily disturb approximately 10 acres of critical habitat for sensitive biological resources (California western snowy plover and Smith's blue butterfly, coast buckwheat, Yadon's wallflower, Monterey spineflower, and sand gilia)[2] in the active beach area and 0.25 acre of prime farmland on the inland side of the dunes. In addition, the

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[1] In June 2013, in response to input from resource agencies, the location of the proposed MPWSP seawater intake system was moved approximately 0.5 mile south to the CEMEX active mining area.

[2] See Section 4.6, Terrestrial Biological Resources, for information regarding these species.

footprint of the intake pump station would permanently disturb approximately 3,000 square feet of prime farmland.

Access to this intake site is limited due to the presence of critical habitat as well as property ownership of the adjacent parcels to the east (on the inland side of the dunes). To minimize disturbance in the active beach area, construction vehicles would access the coastal dune area via Del Monte Boulevard and existing access roads in the CEMEX active mining area. From the western terminus of the CEMEX access road, construction trucks would travel north along the beach area below the mean high tide elevation to access the slant well construction areas. In an effort to further reduce disturbance in sensitive areas/areas of critical habitat, some construction equipment and most construction materials would be delivered directly to the slant well site via barge.

Slant well construction (as well as construction of the collector pipeline and intake tunnel) at the north CEMEX site would occur between October and February over 2 years (10 months total) to avoid the nesting season for western snowy plover. Multiple slant wells would be constructed simultaneously. Construction activities would occur 24 hours a day, 7 days a week. Each well would be pumped continuously for 6-week periods during slant well completion and initial well testing, and the extracted water would be returned to the ocean via a temporary pipeline.

The north CEMEX slant well site is currently undeveloped and sufficient space is available to accommodate slant wells in this location. In the active beach area (between the toe of the dunes and the open ocean), CEMEX owns the coastal land above mean high tide; the California State Lands Commission owns the land below mean high tide. The City of Marina has jurisdiction over this land, which is subject to the *City of Marina General Plan* and *Local Coastal Land Use Plan*. This land is designated for Habitat Preserve and Other Open Space la*n*d uses and zoned Coastal Conservation and Development (City of Marina, 2000; City of Marina, 1982). Construction of the slant wells within the swash zone would also be subject to California State Lands Commission jurisdiction. The north CEMEX intake pump station site is located in unincorporated Monterey County and therefore subject to provisions of the *North County Land Use Plan* of the *Monterey County General Plan*. The site is designated as prime farmland.

Access to the north Cemex location could impact environmentally sensitive and/or critical habitat along the beach. Construction activities on the beach would require the installation of sheet pile enclosures to work in the dry. Extreme wave runup at the temporary coffer dam could have a mean total water level (TWL) of 14.6 feet NAVD (11.6 MSL), but a maximum or 100-year TWL of approximately 32 feet NAVD (29 MSL), suggesting the sheet piles as sized in the swash zone would likely be overtopped by wave action, and the overtopping during an extreme winter storm would be substantial. Scour at the sheetpile enclosure could also be substantial, and could require the sheetpile enclosure to be inserted deeper into the sand than anticipated. Based on ongoing discussions and coordination with regulatory agencies regarding site conditions and construction techniques, this option was determined to be fatally flawed and was eliminated from future analysis due to permitting issues regarding impacts on biological resources.

Screening Results: Eliminated from further consideration.

Intake Option #5 – Ranney Wells at Moss Landing Harbor (Modify Existing Intake System at National Refractories site)

This intake option was proposed for the People’s Moss Landing Water Desal Project by the Moss Landing Business Park, LLC[3] and would involve the conversion of an existing intake system into a Ranney well subsurface intake system. The existing open-water intake system of the former National Refractories and Minerals Corporation (National Refractories) site is located in Moss Landing Harbor in the area where the Moro Cojo Slough and the Old Salinas River converge, immediately west of the National Refractories site and Dolan Road (see **Figure 7-2**) (MLBP LLC, 2013; Mickley, 2012). The existing intake system was constructed in the 1940s to provide seawater for industrial processes at the Kaiser Refractories Moss Landing Magnesia Plant[4] and, subsequently, for the National Refractories plant and the Moss Landing Cement Company. The existing intake system consists of a screened open water intake and 60-mgd intake pump station in Moss Landing Harbor, and two 36-inch-diameter pipelines extending from the intake pump station under Highway 1 (through two 72-inch-diameter corrugated-steel conduits) to the National Refractories site. One of the intake pipelines is steel over its entire length; the other is steel where it’s buried (west of Highway 1) and redwood staved piping east of Highway 1. The intake pump station is currently equipped with five vertical turbine pumps with individual capacities of 15 mgd (MLBP LLC, 2013). The existing intake system is not currently used. Welded repairs have reportedly been made at several locations along the existing intake pipelines. A 2012 structural evaluation indicates both pipelines are structurally adequate to serve as intake pipelines (Miller, 2012).

This intake option would involve replacing the existing open water intake system with a subsurface system consisting of one or more Ranney wells at the Moss Landing Harbor location. Each Ranney well caisson would be 50 to 100 feet deep, and would be equipped with screened laterals projecting below the harbor bottom at various depths. The total number of Ranney wells would depend on the characteristics of subsurface deposits. Existing structures would be modified as needed to connect the new subsurface intake with the existing steel intake pipeline; only the full-length steel pipeline would be used to convey source water to the desalination plant (MLBP LLC, 2013). In addition, the existing intake pumps would be replaced. The intake pump system design, including the number of pumps, would be defined as part of the intake site studies (MLBP LLC, 2013a).

This intake option would require construction in the Moss Landing Harbor and could require access via barge for both construction and maintenance. A general description of Ranney well construction and maintenance is provided in Section 7.6.1.2. The *Monterey County General Plan* designates the National Refractories site as a Heavy Industrial Coast Dependent use. Construction of the Ranney wells and associated intake system modifications within Moss Landing Harbor

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[3] The sponsor of the People’s Moss Landing Water Desal Project and current owner of the former National Refractories site is alternatively identified in some documents as the Moss Landing Commercial Park, LLC, and some documents use both names.

[4] The seawater was used for calcium and magnesium removal during magnesia production.

would also be subject to California State Lands Commission jurisdiction. This intake option would require coordination with the site owner, Moss Landing Business Park, LLC, to avoid conflicts with existing and future operations.

Between September 2013 and January 2014, approximately six boreholes were drilled in the Moss Landing area for the purposes of collecting hydrogeologic information to support groundwater modeling efforts and evaluating the feasibility of various conceptual intake options for the MPWSP. The borehole data indicate that the individual sand and sand and gravel lenses in the Moss Landing area are not vertically or laterally extensive and that the permeable deposits were not thick enough for a subsurface intake system in this area to be capable of providing a reliable source of seawater for the MPWSP Desalination Plant (Geoscience, 2014). As a result, this intake option is considered fatally flawed and was eliminated from further consideration.[5]

Screening Results: Eliminated from further consideration.

Intake Option #7 – Disengaging Basin at Moss Landing Power Plant (Water from Spent Cooling System)

This intake option is presented as Intake Contingency Option #5 in the MPWSP Contingency Plan. This option would divert spent cooling water from the disengaging basin at the Moss Landing Power Plant (MLPP) for use as source water at the MPWSP Desalination Plant. The disengaging basin receives spent cooling water from MLPP's power generating Units 1 and 2; the water used to cool Units 1 and 2 is drawn from Moss Landing Harbor via the power plant's northern intake[6] and circulated through Units 1 and 2 before entering the disengaging basin. From the disengaging basin the spent cooling water currently is directed to the existing MLPP outfall and discharged to Monterey Bay. This option would modify the disengaging basin to divert the spent cooling water, with the use of new vacuum-actuated siphons, to the desalination plant. Physical space is available at the power plant for this modification. Access to the new facilities would be via Dolan Road through the MLPP complex (with appropriate easement).

The MLPP is owned by Dynegy Moss Landing, LLC, and located in the unincorporated community of Moss Landing. The *Moss Landing Community Plan* (MCRMA, 2012), a chapter of the *Monterey County General Plan North County Land Use Plan*, designates land use in this area as Coastal Heavy Industrial.

The California Energy Commission permitted an upgrade of the power plant's existing northern intake in October 2000, when new Units 1 and 2 were also approved (replacing five older units). Impingement and entrainment controls at the existing northern intake include inclined vertical traveling screens, initial bar racks, a relocated intake structure, and operation practices to minimize the operation time of the intake pumps (Dynegy, 2011). The northern intake has a

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[5] Later in 2014 the Peoples Moss Landing Water Desal Project indicated it was considering an open water intake in Monterey Bay.

[6] The power plant's southern intake, also located in Moss Landing Harbor, serves the plant's other two power generating units, Units 6 and 7.

maximum intake flow capacity of 360 mgd; together the plant's two intakes have a maximum intake capacity of 1.2 billion gallons per day. Assuming that the power plant would circulate at least 23 mgd or more of seawater each day to the disengaging basin, even if Units 1 and 2 were not generating power, this alternative would not increase the amount of cooling water currently drawn into the northern intake by the Moss Landing Power Plant.

This intake option relies on the continuation of MLPP's once-through-cooling (OTC) system, about which there is current uncertainty due to federal and state requirements for cooling water structures at power plants.[7] The federal Clean Water Act Section 316(b) requires the location, design, construction, and capacity of cooling water intake structures to reflect the best technology available for minimizing adverse environmental impact. In 2010 the SWRCB adopted a statewide "Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling" (SWRCB policy) (SWRCB, 2010) establishing technology-based standards to implement Clean Water Act Section 316(b) and reduce the harmful effects associated with cooling water intake structures on marine and estuarine life. The SWRCB policy, which applies to 19 existing power plants that use OTC systems, including MLPP, requires that power plant owners or operators bring their facilities into compliance by either (1) reducing intake flow rates by at least 93 percent ("Track 1") or (2) reducing impingement mortality and entrainment of marine life for the facility to a comparable level that would be achieved under Track 1, using operational or structural controls or both ("Track 2"). (Track 1 must be infeasible for the Track 2 option to be taken.) The SWRCB policy, which establishes a compliance schedule for each power plant, requires that the plant owner or operator prepare an implementation plan indicting the specific measures that will be undertaken to achieve compliance. To prevent disruption of the state's electrical power supply, the SWRCB convened a Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS), to review implementation plans and schedules and provide recommendations to the SWRCB at least annually. The SWRCB policy calls for the MLPP to comply by December 31, 2017.

In its April 2011 implementation plan for MLPP, Dynegy proposed a compliance date of 2032 for Units 1 and 2 and to implement Track 2 retrofit measures for Units 6 and 7. In a November 2013 letter to SWRCB about the implementation plan, however, Dynegy stated its intention to implement Track 2 retrofit measures for Units 1 and 2 as well as Units 6 and 7 (SACCWIS, 2014). The 2014 SACCWIS report to SWRCB stated that the California Independent System Operator (ISO)[8] intended to model Units 1 and 2 as offline after 2017 and would provide the results of those studies to SACCWIS. At the time of its 2014 report SACCWIS did not recommend changing the compliance dates for the units at MLPP (SACCWIS, 2014).

Through a settlement agreement executed on October 9, 2014 between the SWRCB and Dynegy, the MLPP must reduce its intake of cooling water to meet an 83.7 percent or greater reduction in mortality from entrainment and impingement impacts beginning with reductions on December 31, 2016 and achieving full compliance by December 31, 2020 to meet the 83.7 percent reduction in mortality. Dynegy has indicated its intention to retrofit the power plant's four generating units to

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[7] The federal requirements also apply to other industrial facilities that use large amounts of cooling water.

[8] The California ISO is responsible for maintaining the reliability of the state's power grid, and is also represented on SACCWIS.

reduce entrainment and impingement impacts in compliance with the OTC policy. Compliance with the OTC policy would dramatically reduce the amount of cooling water discharged through the MLPP outfall, and the cooling water that was discharged is expected to have much higher concentrations of minerals (because the minerals in the original seawater would be concentrated due to evaporation during the retrofitted cooling process), compared to current discharges from the power plant.

To reduce intake volume, it is assumed that the power plant's cooling system would be retrofitted to allow recirculation of the cooling water thorough cooling towers (or similar equipment) and the power units multiple times before the water is discharged to the disengaging basin. After multiple passes, not only would the volume of water discharged to the disengaging basin be substantially reduced compared to the amount drawn from the harbor but, also due to evaporation, the minerals that were in the source water (such as calcium, magnesium, and chloride) would be concentrated in the spent cooling water (U.S. Department of Energy, 2014). This would make the spent cooling water from a retrofitted cooling system less suitable (or unsuitable) for use as desalination source water. Therefore, once the power plant is in compliance with the OTC policy, the plant's cooling water system would provide less volume and lower quality source water for use by the MPWSP for desalination.

The Track 2 approach Dynegy proposes to pursue to comply with the SWRCB policy is not expected to result in an actual 93 percent reduction in intake flow (which is the Track 1 requirement). However, absent information about Dynegy's retrofit plans and the amount or quality of cooling water that would be available at the disengaging basin after such a retrofit, and given the uncertainty associated with Dynegy's actions to meet the settlement agreement, intake flows could be substantially reduced or interrupted for long periods of time needed for necessary operations and critical system construction and maintenance required to meet the reduced pumping rates. Therefore, due to uncertainties regarding the reliability, quality, and quantity of this potential source water supply, this alternative is eliminated from further consideration.

Screening Results: Eliminated from further consideration.

Intake Option #10 – Open Deepwater Intake in PG&E Fuel Oil Pipeline at Moss Landing

Intake Option 10 would use the existing carbon-steel pipeline previously used by PG&E for offloading fuel oil for the Moss Landing Power Plant. The pipeline consists of a 24-inch segment that extends under Moss Landing Harbor to Moss Landing Beach and an 18-inch submarine section that extends from the beach approximately 3,000 feet into Monterey Bay. While most of the 24-inch segment is underground, a section of it is exposed at Moss Landing Beach. Information provided by Dynegy in conjunction with an inspection of the exposed portion of pipeline (Longitude 123 Inc., 2011) suggests that the pipeline may not have been pigged or flushed out before being capped when the offshore terminal to which it connected was decommissioned, and therefore may contain large quantities of fuel (light oil or diesel fuel) (Longitude 123 Inc., 2011).

This intake option is fatally flawed for several reasons: (1) the existing fuel line likely contains a substantial amount of fuel residue, which could present a public health issue; (2) the 18-inch-diameter of the offshore section of the pipeline would be too small to support a 9.6-mgd facility, especially if it were sliplined with a smaller pipeline to address the public health issued noted in (1) above; and (3) no impingement and entrainment studies have yet to be performed for this option. (Use of this pipeline is also being considered for an outfall, discussed in Section 7.6.3.7.)

Screening Results: Eliminated from further consideration.

Intake Option #11 – Ranney Wells in Seaside/Sand City

Intake Option 11 emerged from earlier investigations conducted by the MPWMD and would involve the installation of three Ranney wells at two sites in the former Fort Ord coastal area in Seaside and Sand City. This intake option is also included in response to public comments received during the MPWSP EIR scoping process requesting that the CPUC consider subsurface intakes located outside of the Salinas Valley Groundwater Basin; a constraints analysis was attached to the comment. The earlier investigations provided by the commenter, and conducted by the MPWMD are summarized below, followed by the preliminary screening results.

The *Monterey Peninsula Water Management District 95-10 Project Constraints Analysis* (referred to herein as the 2008 Constraints Analysis) (ICF et al., 2008) investigated the feasibility of utilizing the shallow Dune Sand Aquifer as a source of feedwater for a 8,400-afy desalination plant for the Monterey Peninsula. The 2008 Constraints Analysis identified 25 individual well locations for using HDD (e.g., slant wells), radial wells (e.g., Ranney collector wells), or conventional wells. Each well location and type was ranked considering drilling and siting complexity, policy and regulatory restrictions, and feedwater system costs. The 2008 Constraints Analysis then proposed combinations of wells, locations, and technologies that would result in a production capacity of 8.7 mgd (or 6,042 gallons per minute [gpm]) of desalinated product water, the volume considered necessary at that time. The 2008 Constraints Analysis identified alternatives at three sites that could be paired up to provide the desired production capacity:

- **Fort Ord Bunker Site** (Seaside Groundwater Basin) – Two radial or eight vertical wells in the Dune Sands/Aromas Aquifer with a 6,000- or 4,000-gpm production capacity, respectively.
- **Former Fort Ord Waste Water Treatment Site (Salinas Valley Groundwater Basin)** – Two conventional vertical wells in the 180-Foot Aquifer with a 4,000-gpm production capacity.
- **Former Stillwell Hall Site (Salinas Valley Groundwater Basin)** – One 3,000-gpm radial well in the Dune Sands/Aromas Aquifer or four conventional wells with a production capacity of 2,000 gpm in the Dune Sands/Aromas Aquifer or two conventional wells in the 180-Foot Aquifer with a 4,000-gpm combined production capacity.

The “preferred” wells identified in the 2008 Constraints Analysis are located within the Salinas Valley Groundwater Basin, since they are north of the northernmost extent of the divide between the Seaside and Salinas Valley Groundwater Basins. Additionally, it is estimated that these wells could only supply feedwater for up to 8.7 mgd (6,042 gpm) of product water, not the 9.6 mgd (or 6,667 gpm) of product water identified for the proposed project.

As such, for this analysis, the options presented in the 2008 Constraints Analysis have been reevaluated to identify a potential combination of well options that could better meet the project objectives as well as the intent of the comments received during public scoping. The 2008 Constraints Analysis identified two combinations of well alternatives that could meet the project objectives:

- **Alternatives 5 and 14** – One Ranney well on private property in Sand City and two radial wells at the SNG Development Corporation site, each pumping at 3,000 gpm for a combined capacity of 9,000 gpm. All of the wells would be located in the Seaside Groundwater Basin and would draw from the shallow Dune Sands/Aromas Aquifer, thus avoiding any pumping from the policy-restricted 180-Foot Aquifer. The pipeline required to connect the three wells together would be about 3,000 feet long. However, this option is not considered further because it would require the purchase of private property.
- **Alternatives 17 and 19** – Two Ranney wells at the former Fort Ord bunker site and one radial well at the former Fort Ord MW-1 site, each pumping at 3,000 gpm for a combined capacity of 9,000 gpm. All of the wells would be located in the Seaside Groundwater Basin and would draw from the Dune Sands/Aromas Aquifer, thus avoiding any pumping from the policy-restricted 180-Foot Aquifer. The pipeline required to connect the three wells together would be about 4,000 feet long.

  The wells would be spaced a minimum of 100 feet apart (ICF et al., 2008). The footprint of each well would be approximately 1 acre; wellheads would be buried below grade.

The Fort Ord Bunker Site, formerly used to store ammunition supplies, is located immediately west of Gigling Road at the approximate northern extent of Seaside Groundwater Basin. The Fort Ord MW-1 site is located west of Highway 1, and south of the bunker site. There are existing dirt access roads to each of the sites. In a 2004 study, Camp Dresser & McKee developed geologic boring data for the MW-1 site (ICF et al., 2008).

Under this option, wells would be located within unincorporated Monterey County on former Fort Ord lands, now part of Fort Ord Dunes State Park. California State Parks manages all former Fort Ord lands west of Highway 1. The lands are still under U.S. Army ownership, but are set to be transferred in the future (ICF et al., 2008). Currently, any proposed third-party actions within the park would require Army review and approval.

Drawing water from these wells (Alternatives 17 and 19) could provide the required production capacity and would conform with the export policy that groundwater should not be pumped from the 180-Foot Aquifer in the Salinas Valley Groundwater Basin. However, the two wells are about 5.5 miles south of the proposed MPWSP desalination plant and would therefore require the additional expense of constructing a source-water pipeline.

Implementation of wells in this location could also require a Permit for Injection and Extraction from the Seaside Groundwater Basin Watermaster, and the potential drawdown relative to the amount allowed under the current adjudication would need to be reviewed. The Dune Sands Aquifer is in direct hydraulic connection with the ocean and is only saturated along the coastal margin; consequently, there is unlikely to be a defined flow boundary between the Salinas Valley and Seaside Groundwater Basins. However, because this extraction would occur within the legally recognized Salinas Valley Groundwater Basin, approval from the Monterey County Water Resources Agency to export groundwater from the Dune Sands Aquifer could be required. Additional work would be necessary to define boundary between the Salinas Valley and Seaside Groundwater Basins for the Dune Sands Aquifer.

It should be noted that the extraction of brackish water from this unit could assist in mitigating saltwater intrusion into the aquifer through the development of a groundwater depression; however, technical, legal, and political challenges to using this water source necessitated early collaboration with the Monterey County Water Resources Agency. Discussions with Monterey County Water Resources Agency representatives (ICF et al., 2008) indicated that extracting groundwater from the 180-Foot Aquifer in the Salinas Valley Groundwater Basin for export outside of the Salinas Valley Groundwater Basin for municipal use would be precedent-setting and would therefore have significant institutional and policy ramifications for Salinas Valley Groundwater Basin users. Although extraction from the 180-Foot Aquifer would be more politically sensitive, extraction from the Dune Sands Aquifer could also be controversial, and CalAm would need to demonstrate that the proposed project would extract seawater only and would not affect brackish groundwater.

California State Parks raised a policy concern regarding the installation of permanent infrastructure within parkland, specifically third-party infrastructure that could be abandoned in the future. California State Parks also discourages the placement of facilities outside of defined development zones; however, the proposed well locations are in conformance with approved development zones (ICF et al., 2008).

The construction methodology for this option is generally discussed in Section 7.6.1.2. The Ranney well construction would include installation of a caisson to a depth of approximately 50 feet below sea level, and horizontal drilling or jacking wells in a radial formation.

Specific information on facility maintenance (type, frequency, access) has not been developed; however, maintenance is expected to be similar to that described in Section 7.6.1.2.

The operation of a subsurface seawater intake system that produces groundwater from the shallow dune sand aquifer would, by intent and design, induce seawater intrusion into the shallow aquifer system. Thus, the presence of low-permeability materials between the shallow aquifer system and the underlying aquifers would protect the underlying aquifers from infiltration of seawater from the shallow aquifer system.

Because both the former Fort Ord Wastewater Treatment Plant site and former Stillwell Hall site are in the Salinas Valley Groundwater Basin, the Phase II hydrogeologic investigation focused on the Bunker site, which is located in the Seaside Groundwater Basin and believed to be less politically challenging than the other two sites. Subsurface investigation of the Bunker site revealed the presence of clay layers in some of the borings and not in others. Low-permeability strata encountered were really discontinuous and occurred at differing elevations. The Phase II investigation concluded that even if there were evidence of an extensive low-permeability layer between the shallow aquifer system and the underlying aquifers, the siting constraints of both the CCC and the CA State Parks, combined with the relatively low-permeability sands at this site limit the potential amount of feedwater that could be developed from a subsurface intake at the Bunker site to about 2,000 afy (Feeney, 2009).

Screening Results: Eliminated from further consideration.

Intake Option #12 – Subsurface Slant Wells at Reservation Road

This intake option would locate at least nine subsurface slant wells at the western terminus of Reservation Road on the inland side of the Marina State Beach parking lot. Slant well construction activities and periodic maintenance would involve earthwork and other ground disturbance in the paved beach parking lot, but there would be no disturbance in the active beach or dune areas. All other aspects of construction, operation, and maintenance are assumed to be consistent with those of the proposed project, as described in Chapter 3.

The parking lot is part of Marina State Beach, which is owned and operated by California State Parks. This land lies within the City of Marina and is subject to the *City of Marina General Plan* and *Local Coastal Land Use Plan*. This area is designated for Parks and Recreation uses and is zoned Coastal Open Space (City of Marina, 2000; City of Marina, 1982). Physical space is available to accommodate the subsurface slant wells. Site access is available via Reservation Road and the paved state beach parking lot. Well construction would require full closure of the parking lot for the duration of the construction period. Adequate physical space is available; however, easements with California State Parks would be required.

General construction methods and considerations, as well as operation and maintenance assumptions, are assumed to be consistent with the proposed MPWSP methodology for slant well implementation.

A potential constraint to the implementation of slant wells at this location is Marina Coast Water District’s existing 300 acre-foot/year desalination (currently non-operational) and associated intake well, as well as MCWD’s plans for developing a future 1.5-mgd (or larger) desalination facility that would include development of a subsurface seawater intake system on nearby/adjacent property. Implementation of subsurface slant wells for the MPWSP at this same location could result in well interference. In addition, the geometry of the beach profile is not favorable for slant well installation since the target aquifer is shallow, and the limit on a slant well angle would not allow the well screen to be completed in the Dune Sands aquifer.

Screening Results: Eliminated from further consideration.

Desalination Plant Site Option 1 – North Marina Armstrong Ranch Property

Under this site option, the MPWSP Desalination Plant would be located on approximately 10 acres of the 320-acre Armstrong Ranch parcel, which is situated south of and adjacent to the MRWPCA Regional Wastewater Treatment Plant and the Monterey Regional Environmental Park. The Marina Coast Water District currently owns this site, which was evaluated in the Coastal Water Project EIR as the location for the desalination plant for the North Marina and Regional Project alternatives.

This undeveloped site is used for grazing land. It lies within the City of Marina Sphere of Influence (which is governed by the *City of Marina General Plan*) and in unincorporated Monterey County (which is subject to the *Greater Monterey Peninsula Area Plan*). The land is designated for public facility uses and permanent grazing under the respective land use plans. The site is accessible via existing unpaved access roads in the Monterey Regional Environmental Park. Dirt access roads at the proposed site would require improvement from existing access points for the construction and operation of a desalination plant.

Given that Marina Coast Water District currently owns the property, and that CalAm already owns the 46-acre Charles Benson Road site which is located approximately 0.75 mile to the north, and since Site Option 1 does not provide any advantage over the Charles Benson Road site, it was not carried forward.

Screening Results: Eliminated from further consideration.

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APPENDIX J1

Coastal Water Project EIR Analysis: MPWMD 2006 Estimate of Long-Term Water Needs Compared with Growth Anticipated in Jurisdictions General Plans

[This appendix reproduces Section 8.2.4.1 (pages 8-11 to 8-40) of the *CalAm Coastal Water Project Final Environmental Impact Report*, as certified December 17, 2009. The section presents an analysis of consistency between the level of growth anticipated in the general plans of service area jurisdictions and water for growth proposed to be provided by the Coastal Water Project.]

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8.2.4 Demand Projections and Consistency with General Plans in the Areas Served

8.2.4.1 CalAm Service Area

Future Demand Projections

The CalAm service area component of the Phase 2 Project would provide approximately 4,500 afy to meet projected future demands. MPWMD prepared estimates of future demand for the jurisdictions and unincorporated county land within MPWMD boundaries based on information provided by the jurisdictions. In addition to water needed for anticipated growth, the future demand estimates include water to meet anticipated demand for residential remodeling projects that have been deferred due to restrictions imposed in response to Order 95-10 (such as restrictions on bathroom additions) and a 20 percent contingency factor to address unanticipated water needs or the expected relaxation of current conservation practices and water use restrictions (required to comply with Order 95-10 until a replacement supply is provided) when additional water supply becomes available (MPWMD, 2006b). MPWMD's Technical Advisory Committee, which includes representatives of the affected jurisdictions, recommended, and the MPWMD Board of Directors approved, using build-out of the adopted general plans of the jurisdictions within the MPWMD boundary as the basis for estimating future water needs. To collect the general plan information, MPWMD asked each jurisdiction to provide the following information (MPWMD, 2004):

- A breakdown of potential new single-family and multi-family dwelling units; new non-residential square footage; an estimate of new irrigated park acreage; an estimate of the number of fixture units anticipated for use in remodels, and the amount (in percent) of contingency requested.
- An explanation of the rationale used for calculating the figures submitted in response to the above request.
- General plan information, including the year of the last general plan update and duration and the year the general plan housing element was updated, its duration, and the number of housing units it projects to be built.

The information submitted by the jurisdictions varied considerably, perhaps due to the variability of the general plans and the information presented in them. Most jurisdictions included information on expected number of new single family units, multifamily units, secondary units, and residential remodels for their residential demand and information on the area available for non-residential development. Information on non-residential development sometimes included a breakdown of demand for commercial, industrial, public, and other land uses. Based on the development information provided by the jurisdictions, MPWMD prepared water demand projections using water use factors for the various types of anticipated water uses. The use factors were developed and agreed upon by the MPWMD's Water Demand Committee based on current usage data.

Table 8-5 summarizes MPWMD's estimates of additional long-term water needs by jurisdiction. **Table 8-6** presents current consumption information for each jurisdiction as well as estimates of total current production with which to compare the jurisdictions' projected additional demands. The

TABLE 8-5
ESTIMATED LONG-TERM WATER DEMANDS BY JURISDICTION (afy[a])

Jurisdiction	Future Single Family Residential Demand (afy[a])	Future Multi-Family Residential Demand (afy[a])	Future Second Units Demand (afy[a])	Subtotal: Future New Residential Demand (afy[a])	Future Residential Remodels (afy[a])	Future Non-Residential Demand (afy[a])	Other Future Demand[b] (afy[a])	Total Additional Future Demand (afy[a])
City of Carmel	19	56	25	100	120	20	48	**288**
City of Del Rey Oaks	5	0	0	5	5	30	8	**48**
City of Monterey	46	426	0	472		123	110	**705**
City of Pacific Grove	73	376	298	747	43	260	214	**1,264**
City of Sand City	48	68	0	116		210	60	**386**
City of Seaside	133	21	44	298	4	283	97	**582**
Monterey County (Unincorporated)	892	0	0	892	37	10	196	**1,135**
Monterey Peninsula Airport District	0	0	0	0	0	115	23	**138**
Total				**2,530**	**209**	**1,051**	**755**	**4,545**

[a] afy = acre-feet per year.
[b] Other demand consists of a 20 percent contingency applied to each jurisdiction and residential retrofit credit repayments for several jurisdictions.

SOURCE: MPWMD, 2006b.

TABLE 8-6
ESTIMATED CURRENT AND FUTURE WATER DEMANDS BY JURISDICTION (afy[a])

	A	**B**	**C**	**D**	**E**	**F**
Jurisdiction	**Current Consumption[b] (afy[a])**	**Current Unaccounted -For-Water[c] (afy)**	**Current Production[d] (afy[a])**	**Total New Future Demand[e] (afy[a])**	**New Demand as Percent of Current Production) (%)**	**Jurisdiction New Demand as Percent of Total New Demand (D/4,545) (%)**
City of Carmel	760	95	854	288	34%	6%
City of Del Rey Oaks	158	20	178	48	27%	1%
City of Monterey	3,922	488	4,411	705	16%	16%
City of Pacific Grove	1,564	195	1,758	1,264	72%	28%
City of Sand City	107	13	121	386	319%	8%
City of Seaside	1,866	232	2,098	582	28%	13%
Monterey County (Unincorporated)	4,218	525	4,743	1,135	24%	25%
Monterey Peninsula Airport District	See note f	See note f	See note f	138	See note f	3%
Total	**12,595**	**1,568**	**14,163**	**4,545**	**32%**	**100%**

[a] afy = acre-feet per year.

[b] Existing consumption for CalAm jurisdictions is the annual average based on consumption data for water years 2003 through 2007 provided by CalAm to MPWMD. Consumption refers to the total water *delivered* to CalAm's customers; it does not include unaccounted-for water.

[c] Unaccounted-for water is typically defined as the difference between total water produced and total water billed (or consumed), and includes water delivery system leaks, water not billed or tracked in the system, such as water used for fire fighting and system flushing, and any unauthorized use. The estimated unaccounted-for water shown in this table is based on the average percent unaccounted-for water for the CalAm main Monterey water system as a whole for water years 2003 through 2007 (11.1 percent) applied to each jurisdiction.

[d] Jurisdiction production was calculated based on the jurisdiction-specific consumption estimates shown here and an assumed uncounted for-water factor of 11.1 percent of total production.

[e] From Table 8-5.

[f] Background documentation used for this analysis do not show separate consumption information for the Monterey Peninsula Airport District; the airport district's existing demand is included with Monterey County (Unincorporated).

SOURCE: CalAm, 2006; CalAm, 2007, MPWMD, 2006b. MPWD,2007.

current consumption estimates are the average of the past five years of consumption data (the most recent for which data are available, for water years 2003 through 2007)[1]. Unaccounted-for- water[2] shown in Table 8-6 is based on the average percent unaccounted-for water for the CalAm main Monterey water system as a whole for water years 2003 through 2007 (11.1 percent) applied to each jurisdiction. The portion of new demand that would be used by each jurisdiction is also shown.

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[1] Based on consumption data provided by CalAm to MPWMD.

[2] Unaccounted-for water is the difference between total water produced and total water billed to customers (water consumed) and typically includes fire fighting use, maintenance requirements, system flushing, leaks, and any unauthorized use.

Jurisdiction Projections

This section presents a summary of each jurisdiction's projected demand and compares the information on development potential submitted to the MPWMD for development of water demand projections with information contained in the jurisdiction's general plan or related planning documents.

Table 8-7 summarizes the estimates of existing and projected population and housing units presented in the jurisdictions' planning documents. As shown, few included projections of future population; the documents (especially the Housing Elements) provided more specific information on existing and planned housing within the jurisdictions. Since the plans vary in age and not all provide estimates of existing population and housing, that data from the 2000 census is also provided, for informational purposes.

TABLE 8-7
GENERAL PLAN EXISTING AND PROJECTED POPULATION AND HOUSING ESTIMATES AND 2000 CENSUS INFORMATION

Jurisdiction	U.S. Census 2000	General Plan Existing	General Plan Buildout	Percent Change from Existing: General Plan Estimates
POPULATION				
City of Carmel	4,081	4,081	N/A	See note e
City of Del Rey Oaks	1,650	1,692 [a]	N/A	See note e
City of Monterey	29,674	30,350	34,658	14%
City of Pacific Grove	15,522	N/A	N/A	See note e
City of Sand City	261	261	1,295	396%
City of Seaside	31,696	31,696	N/A	See note e
Monterey County (Unincorporated)	101,414	21,813 [b]	N/A	See note e
HOUSING UNITS				
City of Carmel	3,334	3,433	N/A	See note e
City of Del Rey Oaks	727	N/A	N/A	See note e
City of Monterey	13,383	13,420	15,555	16%
City of Pacific Grove	8,032	7,702	13,133	71%
City of Sand City	87	90	587	552%
City of Seaside	11,005	11,005	15,483 [c]	41
Monterey County (Unincorporated)	37,139	10,706 [d]	25,439 [d]	138%

N/A = Not available: not specified in general plan or general plan CEQA document.

[a] Del Rey Oaks population in 1996 according to the 1997 General Plan.

[b] 1980 population for the unincorporated portion of the Monterey Peninsula subarea of the 1982 General Plan (the currently adopted general plan for the County). According to the 1982 plan, the 1980 population for the entire unincorporated area of the county was 84,497; the population for the Monterey Peninsula subarea (unincorporated land only) was 21,813, and the population of the North County subarea (unincorporated) was 29,163. (The General Plan also provides population estimates for six other subareas that are outside the project vicinity.)

[c] Number of housing units in Seaside at buildout is based on the 2000 census estimate of 11,005 units plus buildout for the total city of 4,478 (maximum potential for North Seaside and Seaside Proper shown in Housing Element Technical Appendix Table 33); potential additional buildout in Seaside Proper, the part of the City served by CalAm, is 415. Information on existing units for Seaside Proper only is not provided.

[d] General Plan existing and projected housing units are not comparable to the 2000 census estimate, which is for the entire unincorporated area of the County; the General Plan existing and projected housing units shown here are for the unincorporated area of the Monterey Peninsula, from the 1984 Greater Monterey Peninsula Area Plan (a component of the General Plan).

[e] Cannot be calculated from information in the General Plan.

SOURCES: City of Carmel, 2003a; City of Del Rey Oaks,1997; City of Monterey, 2004; City of Pacific Grove, 1994; City of Sand City, 2002; City of Seaside, 2003; Monterey County, 1982; U.S. Census Bureau, 2000; California Department of Finance, 2008.

Each jurisdiction summary provides the following:

- The date of the general plan and general plan housing element and their respective build-out or planning horizon years

- A summary of the information on development potential based on general plan buildout submitted by the jurisdiction to MPWMD (the basis for the projected water demands)

- Revisions, if any, to the submitted information reflected in MPWMD's final demand estimates. The discussion is based on a comparison of the buildout estimates submitted by the jurisdiction, MPWMD's June 2005 draft estimate of long-term water needs (which includes MPWMD's assumptions about residential and non-residential development; water use factors; and other components of demand) (MPWMD, 2005) and MPWMD's final demand estimate (Exhibit 1-C at the May18, 2006 MPWMD Board workshop and presented in Table 8-5, above) (MPWMD, 2006b), which shows only the water demand estimate for each demand component. The purpose of this discussion is to disclose any changes in assumptions regarding expected future development that may be reflected in MPWMD's water demand estimates compared to the development assumptions submitted by the jurisdiction. Any revisions made subsequent to the jurisdictions submittal resulted from communications between the jurisdictions and MPWMD (Pintar, 2009),

- The estimated total new (future) demand and the subtotal of future demand for new residential and new non-residential development

- A discussion of the consistency of the submitted information with information presented in the jurisdiction's general plan, housing elements, and other related general plan documents and CEQA analyses.

- Recognizing the critical role of water in development considerations on the Monterey Peninsula in recent years, a summary of the existing constraints on planned development posed by existing water supplies as described in the general plan is also included.

City of Carmel

General Plan and Housing Element dates and planning periods

- Carmel's General Plan was adopted June 3, 2003 and has a planning period of 20 years.[3]
- The Housing Element was last updated July 2003 and covers the planning period of July 2002 through June 2007.

Buildout information submitted by City (City of Carmel, 2004)

- Potential new single-family dwellings: 69 units
- Potential new multi-family dwellings: 257 units, including:
    - 165 units in the city's multifamily residential district (35 units) and three commercial districts (130 units)
    - 92 units potentially constructed on city-owned property
- Second units: None indicated

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[3] Specifically, the General Plan states (p. I-10) "Twenty years is a reasonable time horizon for the General Plan but it should be reevaluated in detail after ten years. This General Plan has been developed as a working Plan and its evaluation should be a continuing process." The City's submittal to MPWMD indicates a planning period of 20 years.

- Non-Residential square footage: 292,351 square feet (sf); including:
  - 268,946 sf (total) in Central Commercial and Service Commercial Districts
  - 23,405 sf in Residential and Limited Commercial District
- Remodels: 13,277.5 fixture units (1 bathroom per dwelling, 2,825 dwellings, 4.7 fixture units per bathroom)
- Carmel suggested a 10 percent contingency factor; ultimately 20 percent was used for all jurisdictions.

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

- The demand estimate includes 25 afy for approximately 282 second units, which were not shown in Carmel's submittal.
- Assumes 2,543 existing dwelling units for purposes of calculating remodel demand; Carmel's submittal indicated that there were 2,825 dwelling units in the R-1 District and assumed one new bathroom for each.

Demand summary

- The estimated future (additional) demand for Carmel is 288 afy, including 100 afy for new residential development, 120 afy for remodels, and 20 afy for new non-residential development.

Consistency of Growth Assumptions with General Plan

- Residential development potential. The estimate of 69 single family units is consistent with the General Plan Housing Element, which indicates the potential development of 69 additional single family residences (City of Carmel, 2003b). The estimate of 165 multifamily units in the multi family and commercial districts is consistent with the General Plan Housing Element, City of Carmel, 2003b) which shows development potential of 165 units within the element's 2002-2007.Although the Housing Regarding multi-family units within the housing element timeframe (2002-2007), the Housing Element shows development potential of 165 units of multi-family housing, which is 92 fewer units than the 257 units indicated in the City's submittal to MPWMD. This difference is due, however, to the element's short time horizon. The element indicates that existing zoning allows for the theoretical development of 2,002 additional multi-family units, but that several practical considerations necessitate the reduction of this estimate, resulting in the figure of 165 considered feasible within the housing element timeframe. The largest reduction was by 589 units to account for sites "that were unlikely to be redeveloped or have significant additions within the [Housing Element's] five-year planning horizon." Among these sites are ones that are currently occupied by essential public services and sites occupied by relatively new structures that are unlikely to be redeveloped at higher densities in the near term. The City's submittal to MPWMD states that "staff has identified the potential for 92 additional housing units that could be located on City-owned properties (Sunset Center, Public Works, etc.)" consistent with the housing element characterization of some of the parcels identified as having redevelopment potential. The housing element also includes a policy (Policy P3-35) and program (Program 7) to consider use of surplus public land for opportunities to develop low-cost senior housing, although the potential development of such sites is not quantified. Therefore, the City's submittal appears to be consistent with relatively long term development potential anticipated in the General Plan. It should be noted, however, that the Housing Element acknowledges that previous Housing Element also included policies calling for development of housing on surplus public land, but that such development did not occur in the timeframe of the previous housing element. Nevertheless it is reasonable to assume 92 of 589 units (16 percent of the units considered to have longer term development potential) could in fact be developed or redeveloped within the timeframe of general plan buildout.

- *Second units*: Although Carmel's submittal to MPWMD did not indicate development potential for second units, MPWMD includes 25 afy for second units in Carmel. The City has an ordinance that allows second units on larger parcels (City of Carmel, 2003b) and the Housing Element discusses the potential for development of subordinate housing, which includes second units and guest housing on parcels with an existing dwelling. However, the Housing Element estimates far less potential for developing second units -- a total of 45 (25 subordinate units and 20 guest units) compared with MPWMD's estimate. Based on MPWMD's water use factor for second units (0.087), the District's estimate of 25 afy would allow for development of up to 287 units[4].

- *Remodels*. The City's submittal estimates that each of the 2,825 dwelling units in the City's R-1 (single-family residential) district will add a new bathroom. MPWMD's estimate revises the estimated number of dwellings to 2,543 (MPWMD, 2005). Both estimates are generally consistent with information in the Housing Element and AMBAG's estimate of the number housing units in Carmel. According to the Housing Element, 83 percent of Carmel's households are in the R-1 district, AMBAG estimates that Carmel had a total of 3,349 housing units in 2005. Eight-three percent of 3,349 is 2,780 units that would be in the R-1 district, based on the foregoing information, which is fairly close to both estimates, though somewhat closer to that submitted by the city than to MPWMD's (approximately 2 percent lower than the City's and 9 percent higher than MPWMD's).

- *Non-residential future development*: Information on commercial development potential in the General Plan is much less specific than the information on residential development contained in the Housing Element discussed above. The City's submittal to the MPWMD, which states that there are approximately 40 acres in the City's three commercial districts is consistent with the Land Use and Community Character Element which indicates that the City's commercial area occupies 39 acres. The General Plan discusses the types of development included in the commercial districts, the importance of limiting the extent of the total commercial district to its 1982 boundaries, and the importance of the districts surrounding the core commercial (CC) district in providing a buffer and transition between the commercial core and the residential neighborhoods. The plan also recommends review of the current uses in these "buffer" districts (designated residential/commercial [RC] and R-4 districts), and states that future development in these areas should be used to achieve a smooth transition to the R-1 districts in both design and land use. However, the discussion does not indicate how much land in the commercial districts may be underdeveloped or otherwise available for future development. The City's submittal indicates that the development areas identified (approximately 0.54 acres in the RC district and 6.5 acres of floor area in the CC and Service Commercial [SC] Districts) are limited to the existing commercial districts and do not assume the expansion or change of the commercial district boundaries, consistent with general plan policy. The submittal indicates that the estimate is based on detailed staff assessment of the commercial districts, likely utilizing background information that would not be expected in a general plan. However, because the general plan does not specifically indicate the potential for new development in these districts, the submittal's estimate of nonresidential development could potentially be inconsistent with general plan buildout.

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[4] MPWMD's May 2005 draft estimate indicates 282 second units; the May 2006 final estimate does not indicate number of units.

Water

The General Plan clearly acknowledges that the existing water shortage is a constraint on planned development. The Housing Element states that "[t]he City is primarily built out and is severely constrained by the lack of water to accommodate new development," and that "[t]he primary environmental constraint to the development of housing in Carmel is the lack of water. In the August 2002 surveys of property owners in the commercial and residential districts, the lack of water was identified as the greatest impediment to the development of housing. This lack of an available water supply has limited growth in Carmel and throughout the Monterey Peninsula region over the last ten years."

The plan's Open Space and Conservation Element state the following under the topic, Water Resources:

> A major concern in Carmel is the availability of water for current land use and growth as defined in this Plan. The conservation, development and utilization of water resources is essential to Carmel and its environs….

The element outlines City policies to protect and conserve its water resources. The per capita consumption data presented, which includes information on other cities on the peninsula, is for 1980 and 1981, and therefore may not reflect current consumptions rates which would likely be more efficient today due to state plumbing code requirements and regional and/or local conservation programs.

City of Del Rey Oaks

General Plan and Housing Element dates and planning periods

- Del Rey Oaks' General Plan is dated January 1997 and has a planning period of approximately 20 years (City of Del Rey Oaks, 1997).
- A draft update of the Housing Element was prepared in August 2006; however, as of October 2008 it has not been adopted; therefore the applicable planning document for the City is the 1997 General Plan.

Buildout information submitted by City (City of Del Rey Oaks, 2005)

The City submitted the following buildout information:

- Potential new single-family dwellings: 17 lots of record for residential housing
- Potential new multi-family dwellings: None specifically indicated (see single family information above)
- Non-Residential: 300 room hotel and mixed use development on City-owned 17 acre parcel and revitalization of City-owned 10-acre golf driving range
- Remodels: 100 residential remodels - bathroom units
- Other: None indicated
- Del Rey Oaks suggested a 10 percent contingency factor; ultimately 20 percent was used for all jurisdictions.

The submittal expressly excludes development on lands located within the former Fort Ord army base, which has another water supply source (MCWD).

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b

- None (although specific assumptions for commercial demand are not shown).

Demand summary

- The estimated future (additional) demand for Del Rey Oaks is 48 afy, including 5 afy for new residential development and 30 afy for new non-residential development.

Consistency of Growth Assumptions with General Plan

- Residential development potential. The submittal estimate of 17 lots of record for residential housing is inconsistent with the 1997 General Plan, which indicates the potential for developing 5 additional single family residential units (City of Del Rey Oaks, 1997). It is noted that the estimate is more consistent with the Final Review Draft of the Del Rey Oaks Housing Element, dated August 10, 2006, which indicates the potential for 23 additional residential units to be developed within Del Rey Oaks (Del Rey Oaks, 2006). However, the draft Housing Element has not been adopted and therefore is not a valid, adopted plan; the 1997 General Plan is the currently adopted land use planning document for the City.

- Remodels. The City's estimate of 100 residential remodels (bathroom units) would represent about 14 percent of the total of 727 housing units in Del Rey Oaks, according to the 2000 census.

- Non-residential future development. Information regarding the 300-room hotel and mixed use development on a 17-acre City-owned parcel is generally consistent with the General Plan. The section of land between Highway 218 and North South Road designated general commercial -visitor-serving is approximately 17 acres[5] and is assumed to be the parcel referenced in the submittal. The general commercial visitor serving districts accommodate motels, hotels and restaurants among other commercial land uses. Table 1 of the General Plan lists two potential hotels, one of which (with 316 rooms) would be on Fort Ord Reuse Authority (FORA) land the City is planning to annex; since FORA lands have another water supply source it would not be included in the submittal to MPWMD. (As noted, the submittal explicitly states that development on FORA parcels is not included.) The other hotel development listed in General Plan Table 1, for a parcel within the existing City boundary (i.e., not part of FORA lands), is part of an office park/hotel development which indicates a 205-room hotel. While the submittal's hotel and mixed use land uses are generally consistent with the office park/hotel designation, the general plan indicates a 205-room hotel rather than a 300-room hotel. Thus, while the mixed use development indicated in the submittal is assumed to be equivalent to the office park development indicated in General Plan Table 1, the City's submittal to MPWMD reflects a more intensive hotel development (111 more rooms with the estimated 316-room hotel, compared with the 205-room hotel indicated in the 1997 general plan).

  The submittal does not elaborate on what is meant by revitalization of the 10-acre driving range on City-owned parcel but MPWMD appears not to have allocated water for it; the commercial demand of 30 afy presumably reflects 300 hotel rooms (consistent with the City's submittal) times the MPWMD's water use factor for hotel rooms of 0.10 af per room.

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[5] Estimate of size is based on the Final Review Draft Housing Element, which includes a figure showing the size of parcels; the parcel between Highway 218 and North-South Road is shown as 16.09 acres.

Water

> The 1997 General Plan addresses the need for water to support future growth, stating that “[w]ater is a paramount concern for all jurisdictions on the Monterey Peninsula. The recent drought led to water conservation measures throughout the Monterey Peninsula. Although 1994/1995 and 1005/1996 were relatively wet years, other events [voter rejection of a ballot measure to construct a desalination plant and issuance of SWRCB Order 95-10] have magnified concern regarding the availability of water to support additional growth.”

City of Monterey

General Plan and Housing Element dates and planning periods

- Monterey’s General Plan was adopted in January 2005 and has a long-range planning period of 10 to 20 years.[6]
- The Housing Element is included as part of the General Plan (adopted January 2005) and, based on the implementation schedule of its goals and programs, its planning period extends through 2007.

Buildout information submitted by City (City of Monterey, 2005a)

- Potential new single-family dwellings: 163 units
- Potential new multi-family dwellings: 500 units in areas designated for multi-family dwellings and 1,302 units in areas designated for mixed use
- Potential new military quarters at the Defense Language Institute and Naval Postgraduate School: 170
- Non-Residential square footage: 398,574 sf, combined total for the Downtown/East Downtown, North Fremont, Lighthouse/Wave, and Cannery Row districts; assumes
    - 60 percent in each district would be low water use (MPWMD Group I category of non-residential use)
    - 40 percent would be high water use (MPWMD Group II category of non-residential use)
- Remodels: None indicated
- Other: None indicated
- Monterey suggested a 20 percent contingency factor, which was ultimately adopted for all jurisdictions.

Buildout information submitted by Department of the Army for the Presidio of Monterey (U.S. Department of the Army, 2005)

- The Presidio submitted a separate estimate of future growth at the facility, as follows (summary of detailed listing):
    - New non-residential: 23.03 afy
    - Net demand for new barracks (new demand minus demand for barracks planned for demolition)[7]: 25.19 afy

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[6] The General Plan states (p. 4) that it includes both intermediate (5 to 10 years) and long range (10 to 20 years).

[7] Demand for barracks included in the Presidio’s submittal is included in MPWMD’s estimate of nonresidential demand for the City.

- Total new demand: 48.22 afy

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

None pertaining to residential development potential; new military quarters for Defense Language Institute and Naval Postgraduate School included in the City's submittal are combined with Monterey multifamily dwellings for a total of 1,972 units. (Monterey had included different water use factors for residential uses that were lower than the standard factors used by MPWMD to calculate demand.[8])

The City estimated that additional nonresidential demand would be 49 afy, whereas MPWMD estimate is 75 afy[9]. This may but does not necessarily reflect a change in nonresidential development assumptions from those in the City's submittal. The City's estimate that 49 afy would be needed for future non-residential development was based on the assumption of a 60 percent - 40 percent split between low- and high-water-use commercial land uses on 398,574 square feet available for future commercial development, and use of MPWMD's standard water use factors (0.00007 af/sf for low-use[10] and 0.0002 af/sf for high use[11]). As noted, the final MPWMD demand estimate indicates non-residential use of 75 afy for the City. Assuming the same total area of new commercial development estimated by the City (398,574sf), MPWMD's estimate implies an average water use factor of 0.0002 -- MPWMD's use factor for Group II - high-water-use land uses. MPWMD's list of Group II land uses consists of the following: bakery, pizza, dry cleaner, deli, coffee house, supermarket and convenience shop, and sandwich shop. While it is reasonable to assume that some of these types of land uses would be developed, no rationale is provided to explain why other lower water-use development would not also be expected to occur in part of the remaining area (as the City's submittal suggests).

Demand summary

- The estimated future (additional) demand for Monterey is 705 afy, including 472 afy for new residential development and 123 afy for new non-residential development.

Consistency of City of Monterey Growth Assumptions with General Plan

- <u>*Residential Development Potential*</u>. The estimate of 163 single family units is consistent with the estimate shown for single family use in the General Plan (City of Monterey, 2005b) and General Plan Final EIR (City of Monterey, 2004). The estimate of 500 units in designated multi-family areas and 1,302 multi-family units in designated mixed-use areas is consistent with the estimates shown in the General Plan and General Plan Final EIR. The estimate of 170 units for the Defense Language Institute and Naval Postgraduate School is consistent with estimate shown in the General Plan and General Plan Final EIR.

- <u>*Non-residential future development*</u>. There is no quantitative information on non-residential area or development potential in the General Plan or General Plan EIR by which to verify that the City assumes its commercial districts are 90 percent developed (or, conversely, that

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[8] The MPWMD's Technical Advisory and Water Demand committees worked to develop the approach to estimate future demands (which was then approved by the Board of Directors), which included use of standard water use factors for all jurisdictions for different types of water use. Therefore, jurisdictions were not asked to submit water use factors with their build-out estimates, although some (including Monterey) did.

[9] Based on background materials (MPWMD's May 20, 2005 draft demand estimates) this analysis assumes that MPWMD's final estimate of 123 afy for non-residential use for Monterey includes 48 afy for the Presidio of Monterey and 75 afy for the City.

[10] This is MPWMD's standard water use factor for low-to-moderate (Group I) non-residential water uses (Regulation II, Rule 24, Table 2).

[11] This is MPWMD's standard water use factor for high (Group II) non-residential water uses (Regulation II, Rule 24, Table 2).

about 10 percent of the total commercial development potential remains and would be developed in either the General Plan or CWP planning horizons) as implied by the calculations submitted by the city (described below). Qualitative discussion of development potential in both the General Plan and General Plan EIR focuses on residential development potential. The General Plan EIR states that "[c]ommercial development will continue to occur in the City's existing areas…," indicating that some additional commercial development is expected (City of Monterey, 2004).

The City's estimate of new development in its commercial areas was estimated based on (1) the total area of each of four commercial districts (Downtown/East Downtown, North Fremont, Lighthouse/Wave, and Cannery Row); (2) the lot coverage standard for the districts (50 percent for three districts and 100 percent for one); and (3) the assumption that new (future) development represents 10 percent of total allowable development within the four districts. The City's estimate includes "anticipated development," which refers to total development area (calculated from the total area times the allowable lot coverage), and "anticipated new development" which is 10 percent of the total anticipated development. By this approach, total new development for the four districts combined was estimated to be 398,574 square feet, the basis for the City's estimate of water demand. The City estimated that 60 percent of the new development would be low-water uses (use factor of 0.00007) and 40 percent would be high water uses (use factor of 0.0002), resulting in total new non-residential demand of 48 afy. As discussed above, MPWMD's final estimate, 75 afy, suggests that the higher water use factor was applied to the entire area.

The City's estimate of the total size of its districts is assumed to be factual. However, the City's basis for assuming that 10 percent of its commercial districts are yet to be developed is not indicated in the submittal and is neither supported nor contradicted by information in the General Plan, since there is little specific information on development or development potential in the commercial districts. Given that some additional non-residential development is expected, although the City is largely built out, an estimate of 10 percent is reasonably conservative for purposes of estimating future water demands. As noted above, MPWMD revised the estimate of future nonresidential demand from that included in the City's submittal. Although the basis for this revision is not indicated in memoranda and background materials (provided in Board of Directors and Committee meeting packets and presentations) on the future demand estimates, the revised estimate is consistent with an assumption of the same area of new nonresidential development estimated by the City but with Group II (water use rate) land uses. While it may be reasonable to expect that at least some of the new nonresidential development would include low water-use (Group I) land uses (as the City's submittal indicated), the difference between the two estimates (26 afy) relative to Monterey's size and overall water demand is minor (less than 1 percent of the City's current consumption) and would not constitute excess capacity that could substantially fuel growth that is unforeseen in the City's estimate.

Consistency of Presidio of Monterey Growth Assumptions with Presidio Master Plan

The last adopted master plan for the Presidio was adopted in 1982. The development and future water needs estimate provided to MPWMD was based on a water supply assessment that had been prepared prior to the submittal. Planning at the facility is not currently operating under an approved or adopted land use plan, and projects have been required to receive approval by headquarters "on an exception basis … based on draft development plans (which can evolve fairly rapidly)" (Elliott, 2008a). Presidio staff are currently working on a new Master Plan, which cannot be approved prior to completion of an environmental impact statement (EIS) on the draft plan. The EIS is expected to be completed within 19 to 24 months (Elliott, 2008a).

In addition, the Presidio's recent planning efforts have resulted in a revised estimate of development at the Presidio and future water needs from that included in the submittal to MPWMD. The Presidio's current "working" estimate is 67 afy [compared to the 48.22 afy estimate submitted to MPWMD in 2005] which includes a 25 percent reserve for unforeseen projects (Elliott, 2008a). The Army has existing water rights at the former Fort Ord Army Base and is considering what potential there may be, if any, to tap some portion of those rights to meet new demands at the Presidio (Elliott, 2008b).

Water

According to the General Plan Conservation Element (City of Monterey, 2005b), "[l]ack of available water is a primary obstacle to meeting General Plan goals; therefore, it must be the goal of the City of Monterey and this Plan to obtain a long-term, sustainable water supply, including evaluation of water supply options outside the present Monterey Peninsula Water Management District (MPWMD) framework…. Monterey has reached the limits of its allocation and has very little water available to meet housing, economic, and public facility goals. The MPWMD has not provided a stable, long-term source of water, and many of the alternatives proposed by the District would provide only enough water for short-term needs. This Plan requires actions to provide adequate water supplies…."

City of Pacific Grove

General Plan and Housing Element dates and planning periods

- Pacific Grove's General Plan was adopted in 1994 and has a planning horizon of 2010 (City of Pacific Grove, 1994).
- The Housing Element was adopted in December 2003; based on timeline information for its goals and programs it appears to cover the period 2003 through 2007. AMBAG's housing needs estimate included in the element are for the period 2000 to 2007 (City of Pacific Grove, 2003).

Buildout information submitted by City (City of Pacific Grove, 2005)

- Potential new single-family dwellings: 262 units, including:
    - 133 units on building sites on multiple lot parcels
    - 61 units in new subdivisions
    - 68 units on vacant sites
- Second units: 3,426 units
- Potential new multi-family dwellings: 1,743 units, including
    - 1,128 units in commercial districts
    - 566 units on under-utilized multi-family sites
    - 12 units on building sites derived from multi-family sites in R-2 districts
    - 37 units on vacant sites
- Non-Residential square footage: 1,270,000 sf of commercial use and 318 rooms for visitor accommodation, including
    - 635,000 sf in low to moderate water use commercial uses
    - 635,000 sf in high water use commercial uses

  - visitor accommodation includes 270 rooms for one downtown block occupied by the Holman Building and a net gain of 48 motel rooms on four site in the R-3-M zone

- Remodels: 924 including
  - 362 residences adding one full bath
  - 362 residences adding two full baths
  - 200 demolition/rebuild projects between 2005 and 2025
- Other: 25 acre feet for public water requirements
- Pacific Grove suggested a 20 percent contingency factor, which was ultimately adopted for all jurisdictions.

  In its submittal, the City emphasized that its estimates were based on the General Plan and subject to change, and that the City assumed the requested information was for purpose of estimating long term need and not as a basis for future allocations (City of Pacific Grove, 2005).

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

None pertaining to residential development. With respect to non-residential land uses, MPWMD does not show a separate listing for Pacific Grove's stated public water requirements of 25 afy, which is assumed to be included in the estimate for future non-residential demand of 260 afy. This is slightly lower than the City's combined estimate for non-residential and public water use totaling 263. The City used MPWMD Group I and Group II use factors for its estimates of demand for low-to-moderate and high water use demand. The assumptions underlying MPWMD's estimate of 260 afy are not shown, but are minor and assumed roughly the same level of nonresidential development indicated in the City's submittal.

Demand summary

- The estimated future (additional) demand for Pacific Grove is 1,264 afy, including 747 afy for new residential development and 260 afy for new non-residential development.

Consistency of Growth Assumptions with General Plan

- **Residential Development Potential.** The estimate of 262 new single family units -- including the breakdown shown above -- is consistent with information on residential development potential (maximum potential additional units) presented in Figure 2-4 of the General Plan (City of Pacific Grove, 1994). The estimate of 3,426 second units also is consistent with the information presented in Figure 2-4. With respect to construction of second units, the General Plan states that second units are being added at a slower pace than the total permitted potential suggests, as follows:

  > Of the 5,431 new units possible in the theoretical build-out projection for Pacific Grove, 3,426 are new secondary units on sites with existing single-family dwellings. However, over the past 10 years during which zoning has allowed secondary units, only 42 have been built. Leaving aside the lack of water, this experience suggests that there will be a steady trickle of new secondary units, but not a flood of thousands. All other sources of new units—intensification of use on current sites, subdivision of lots, development of buildable lots, and vacant lots—would produce at most 2,000 units, and again, past trends lead to the conclusion that new development will occur at a measured pace (City of Pacific Grove, 1994).

- The estimate of 1,743 multi-family units -- including the breakdown shown above -- is consistent with information on development potential presented in Figure 2-4 of the General Plan.

- *Non-residential future development*. The estimate of 1,270,000 square feet of additional commercial development is consistent with information presented in the General Plan. (City of Pacific Grove, 1994). The estimate of 48 new motel rooms in the R-3-M zone is consistent with the General Plan, which states that "replacing existing motels with motels developed to the maximum density allowed in the R-3-M district would result in a net gain of 48 units on four sites" (City of Pacific Grove, 1994). Development of the Holman Building for hotel use is consistent with the General Plan information, which indicates that City voters passed a ballot measure in 1994 to allow condominium and hotel use in the Holman's block of Downtown (City of Pacific Grove, 1994) and with General Plan Policy 18, which states: "Support hotel development in the former Holman's block of the Downtown, as allowed by adoption of an initiative measure by city's voters in June 1994" (City of Pacific Grove, 1994).

- *Additional considerations*. Although the City's estimates of future residential and non residential development submitted to the MPWMD are in fact consistent with information presented in the adopted general plan, several points should be noted:

  First, the new development estimates presented in General Plan Figure 2-4 -- which are the same as those included in the City's submittal -- are estimates of "maximum potential additional" development. As the text on residential development excerpted from the general plan above indicates, rather than development at the maximum potential allowed under planning and zoning, development rates in the City suggest that the maximum development potential may not be reached, suggesting in turn that the new development estimates in the submittal are higher than would reasonably be expected.

  Second, although the City's General Plan was adopted in 1994, the 2005 submittal to MPWMD does not make any adjustments to account for the development foreseen in 1994 that subsequently occurred over the ensuing 10 years. That is, all the future development anticipated in 1994 is still assumed to be future additional development in the City's 2005 submittal. Ordinarily it would be reasonable to assume that some of the development foreseen 10 or 11 years earlier would have already occurred, in which case such development would already be served by existing water supplies and should be excluded from current estimates. However, the General Plan states that additional water would be needed to support much of the growth anticipated in the plan (see discussion under Water, below). Given the constraints on supply and the effect this has had in limiting development potential, the 1994 plan would remain a reasonable source for future demand projections.

- Remodels. According to the City's submittal, the estimate of the number of residential remodels is based on the average annual rate for the preceding four years, applied to the next 20 years (2005 to 2025), a reasonable approach to take for this estimate. (MPWMD applied the standard remodel water use factor to the estimated number of remodels, which revised the suggested use factors included in the City's submittal. As noted previously, use factors were not requested by MPWMD, and common use factors were used for all jurisdictions.)

Water

The General Plan summarizes the constraints placed by the existing water supply limitations on the level of development envisioned in the plan as follows: "The theoretical build-out

> projections, while necessary to define the maximum development potential of this General Plan, point to much greater development than can be supported by recent trends. The Monterey Peninsula Water Management District's moratorium on new construction in response to the prolonged drought of 1987 through 1992 curtailed new construction in the city. Because there are few sources of new water for development on the Monterey Peninsula, the limited water supply will continue to shape land use in this area in the future…. Realistically, the potential for new development in Pacific Grove will not be realized unless additional new sources of water become available" (City of Pacific Grove, 1994).

City of Sand City

General Plan and Housing Element dates and planning periods

- The Sand City General Plan 2002-2017 was adopted in 2002 and covers the planning period shown in the title[12].
- The Housing Element was adopted April 1, 2003 and covers the period from 2002 to 2007.

Buildout information submitted by City (City of Sand City, 2005):

- Potential new residential dwellings: a total of 587 dwellings would eventually exist in Sand City, all small, at small-lot residential/multi-family densities; the City does not differentiate between single-family and multi-family dwellings
- Non-Residential square footage: commercial buildout of 3 million sf
- Remodels: None indicated
- Other: None
- Sand City suggested a 20 percent contingency factor, which was ultimately adopted for all jurisdictions.

The City's submittal to MPWMD includes a memo (to the City's mayor and city council from the director of the community development department) outlining four potential buildout scenarios that had been prepared by City staff for consideration. The buildout estimates summarized above reflect a combination of two scenarios that was selected by the City Council to submit to MPWMD. The memo outlining the buildout scenarios notes that Sand City's planned desalination plant will have a design capacity of 300-acre feet per year (City of Sand City, 2005).

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

Although MPWMD's estimate of water demand does not indicate the specific growth assumptions that underlie it, based on the standard water use factors that were used to calculate future demand, the estimate is consistent with the stated assumptions in the City's submittal that "a total of 587 dwellings would eventually exist in Sand City." The MPWMD demand estimate includes 48 afy for new single family residential land uses; 68 afy for new multi-family residential uses; and 210 afy for new nonresidential land uses. Based on MPWMD's single family and multi-family water use factors (0.28 and 0.216 respectively), the resulting final demand figures for these categories indicate that 171 new single family and 315 new multi-family units, or a total of 486 new housing units, are

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[12] The circulation element covers the planning horizon years 2015 to 2020 (City of Sand City, 2002).

assumed at buildout. Given that there are approximately 100 existing housing units[13] in Sand City, the MPWMD estimate of 486 new units is consistent with the expectation of a total of 587 housing units in the City at buildout.

It is noted that the attachment included with the City's submittal (the memo cited above to the mayor and city council outlining four buildout scenarios) suggests that 587 *new* units are expected -- i.e., in addition to existing units-- in which case the MPWMD demand estimate would differ from the City's estimate by the approximately 100 existing housing units. It must also be noted, however, that this memo contains several anomalies (e.g., the number of housing units and water factor shown are inconsistent with the estimated water demand shown). Further, because the City's letter to MPWMD (quoted above) unambiguously states that 587 refers to the total number of housing units in the City, and this, in turn, is consistent with the City's General Plan, this analysis assumes that the City considers 587 the total number of existing and projected additional units, consistent with MPWMD's demand estimate.

Regarding future non-residential land uses, MPWMD's estimated demand for non-residential use is 210 afy. Assuming a use factor of 0.00007 acre-feet per square foot (af/sf), MPWMD's standard ("Group I") use factor for low-to-moderate water-use non-residential land uses, MPWMD's estimate is consistent with the City's submittal: 210 afy would serve 3,000,000 commercial square feet, which is the City's estimate. (The City included an estimate of future nonresidential demand that is higher than MPWMD's because the City assumed a higher use factor than the .00007 cited here, the apparent basis for MPWMD's estimate.) Given that the use factors used by MPWMD were agreed upon by all the participating jurisdictions, it is reasonable to rely on MPWMD's estimate.

Consistency of Growth Assumptions with General Plan

- **Residential development potential.** The submittal estimate of a total of 587 housing units at buildout is consistent with the information presented in the General Plan, which also indicates residential buildout totaling 587 units (City of Sand City, 2002, p. 2-9).
- **Non-residential future development.** The buildout estimate of 3 million additional square feet is the high-end estimate of the range of nonresidential buildout potential (1 to 3 million square feet) estimated by City staff that the City Council selected as the estimate to submit to MPWMD. According to the submittal, approximately one third of this buildout is expected to result from intensification of existing uses or new nonresidential uses. The additional buildout potential is expected to result from an evolution of nonresidential land uses, with some older industrial uses leaving the area over the planning period and being replaced by higher density commercial uses consistent with current land use designations (Pooler, 2008). The General Plan includes a table showing the holding capacity allowed by the general plan for various land use designations;[14] this table indicates that more than 9.2 million square feet (which excludes space needed for parking) would be allowed for commercial and nonresidential land uses. The General Plan does not quantify information on existing levels of non residential development against which to evaluate the City's submittal.

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[13] Sand City had a total of 87 housing units in 2000 according to the U.S. Census, and approximately 106 units in 2006, the year MPWMD finalized its demand estimates, according to the California Department of Finance (DOF, 2008 http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/documents/E-5_2008%20 Internet%20Version.xls]

[14] The table is presented on pp. 2-29 and 2-30 of the General Plan; p. 2-26 refers to it as Table 2-4, General Plan Holding Capacity.

Water

Regarding the existing constraints on water supply, the General Plan Circulation and Public Facilities Element states the following:

> Due to the shortage of water on the Monterey Peninsula, the availability of water for new development is limited. This condition will continue until a long-term source of water is developed for the region or desalination plants are constructed. As of 2001, Sand City had essentially allocated all of its presently available water supply to specific development parcels.

The discussion of the water supply shortage states that Sand City has initiated a program to investigate ways to augment its limited water supply and that the primary option under investigation is construction of a reverse osmosis desalination plant within the City limits. The plant could initially produce 300 acre-feet of potable water per year and would be expandable to 450 acre-feet of annual capacity….(City of Sand City, 2002, p. 3-27). Sand City has continued to pursue construction of the desalination plant, which is taken into account in estimates of supplies to meet water demands in the CalAm service area.

City of Seaside

General Plan and Housing Element dates and planning periods

The Seaside General Plan was adopted August 5, 2004, and covers a planning period of approximately 20 years,[15] except for the Housing Element, which covers the period 2002-2007.

Buildout information submitted by City (City of Seaside, 2005)

- Potential new single-family dwellings: 475 net new
- Potential new multi-family dwellings[16]: 565 net new
- Non-Residential square footage: 2,760,000 sf, including:
  - Community Commercial: -104,000 sf
  - Regional Commercial: 971,000 sf
  - Heavy Commercial: 853,000 sf [this includes net of -236,000 for heavy commercial presented on a row separate from group I or II with no other identifier]
  - Recreational Commercial: -36,000 sf
  - Vacant/Underutilized Mixed Use Commercial: 1,076,000 sf
- Seaside also provided itemized information for MPWMD Group III commercial uses totaling 10 mgd[17].
- Remodels: 3.67 af. The submittal indicates that this estimate for remodels is based on Exhibit E-10 of MPWMD Board of Directors packet for the September 20, 2004 Board meeting. The relevant table in that exhibit, however, shows the seven-year average of all MPWMD jurisdictions for residential remodels is 3.67 *percent* of total average demand. The average water usage for remodels for all jurisdictions over this seven-year period was

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[15] The estimated General Plan planning period is based on information in the Land Use Element (City of Seaside, 2004, pp. LU-21 and LL-39).

[16] The City's submittal does not use the term "multi-family" to describe its housing categories. Based on water use factors used in the City's submittal, as well as MPWMD's estimates, this analysis assumes that the housing categories other than "low density single family" and "medium density single family" are multi-family housing.

[17] Water demand for Group III uses are calculated based on per unit water use factors for such units as restaurant seats, laundry washers, and gas station pumps rather than on a square footage basis. The City used MPWMD Group III use factors.

5.91 af. Based on information presented in this table, Seaside's seven-year average for remodels was 2.72 af.

- Other:
  - Public Institutional: -148,000
  - Parks Open Space: 5,000
- Seaside suggested contingency included 26.417 af reflecting the difference between the current water usage factor for various land uses and water usage without conservation totaling 216.68 af; anticipated system losses and water for fire fighting totaling 26.417 af; and a contingency factor of 10 percent of its projected residential and non-residential development. Ultimately, 20 percent was used as the contingency factor for all jurisdictions.

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

The MPWMD retains the number of single family and multi-family dwelling units assumed in the City's submittal and also uses the same estimates of water demand for nonresidential land uses and remodels that were submitted by the City. Because the MPWMD's residential water use factors are slightly different from those included in the City's submittal, however, MPWMD's estimate of residential demand is slightly lower (9.5 af) than the City's.[18] MPWMD excludes both the City's contingency estimates of 216.68 af relating to the potential loss of savings from conservation measures and 26.417 af for system losses, and uses a 20 percent contingency factor, rather than the 10 percent suggested in the City's submittal.

Demand summary

- The estimated future (additional) demand for Seaside is 582 afy, including 154 afy for new residential development and 283 afy for new non-residential development.

Consistency of Growth Assumptions with General Plan

For the most part, the estimate of buildout in the City's submittal to MPWMD is not directly comparable to development estimates in its General Plan (City of Seaside, 2004a) because the submittal estimates do not include North Seaside, the part of the city that was formerly part of the former Fort Ord army base and is not served by CalAm[19] (City of Seaside, 2004a). Consequently, the development levels submitted are equal to or less than the levels anticipated in the General Plan. The estimates of existing development for the city as a whole presented in the January 2004 General Plan FEIR, and for the part of the city served by CalAm presented in the MPWMD submittal (i.e., excluding North Seaside) are shown in **Table 8-8**.

The technical appendix for the General Plan housing element provides, for the component to development expected to occur on vacant/underutilized lands, a breakdown for "North Seaside" and "Seaside Proper" (City of Seaside, 2003), which allows a direct comparison

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[18] MPWMD used the factor 0.28 to calculate single-family residential demand, compared to 0.30 used by the City, resulting in a demand estimate that is 9.5 af lower than the City's. MPWMD used the factor 0.216 to calculate all categories of multi-family demand, compared to 0.22 and 0.20 used by the City for different categories, resulting in a demand estimate that is 4.3 af higher than the City's. Overall, MPWMD's estimate of 154 af for new residential demand is about 5.2 af lower than the City's estimate.

[19] The Del Monte Heights area of the central core of the city is served by the Seaside Municipal System from three existing wells. The buildout estimates in the city's submittal are limited to the area served by CalAm.

TABLE 8-8
EXISTING SEASIDE DEVELOPMENT ESTIMATES: ENTIRE CITY AND AREA SERVED BY CalAm

Land Use	General Plan Final EIR Existing Land Uses	Submittal to MPWMD Existing Land Uses (Excludes North Seaside)	Difference
Open Space and Recreation	(sf)	(sf)	(sf)
Parks and Open Space	19,000	19,000	0
Recreational Commercial	1,450,000	53,000	-1,397,000
Residential Designations	(dwelling units)	(dwelling units)	(dwelling units)
Low Density Single Family	5,992	3,655	-2,337
Medium Density Single Family	1,023	1,023	0
Medium Density Multi-Family	187	187	0
High Density Multi-Family	3,120	1,892	-1,228
Mixed Use Residential	3	0	-3
Total Residential Units	10,325 [a]	6,757	-3,568
Commercial Designations	(sf)	(sf)	(sf)
Community Commercial	1,951,000	772,000	-1,179,000
Regional Commercial	3,107,000	2,907,000	-200,000
Heavy Commercial	313,000	312,000	-1,000
Public/ Institutional Designations	(sf)	(sf)	(sf)
Public/Institutional	6,178,000	992,000	-5,186,000
Special Designations	(sf)	(sf)	(sf)
Mixed Use Commercial	16,000	0 [b]	-16,000

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[a] The Housing Element Technical Appendix cites the 2000 U.S. Census determination there were 11,005 housing units in City in 2000. Information from the FEIR is used here, however, because the breakdown of housing types in the FEIR analysis is comparable to the breakdown submitted by the City to MPWMD.

[b] The City's submittal indicates area within the mixed use commercial designation as existing use; however it is under the category of "vacant/underutilized" land. Therefore it is assumed to be expected future development and is included.

SOURCE: City of Seaside 2004b; City of Seaside, 2005.

with the City's submittal to MPWMD for that component, and indicates the two projections are consistent. Specifically, estimated buildout of vacant/underdeveloped presented in the City's submittal includes a total of 415 new residential units, which is shown for "Seaside Proper" in the technical appendix (Table 33), and a total of 1,076,000 sf of new commercial development in mixed-use district (861,000 sf in the Group I water-use category and 215,000 sf in the Group II water-use category), which can be derived from information presented for "Seaside Proper" in the technical appendix (Table 33) and the City's assumed 80 percent-20 percent split of Group I and Group II water users. New non-residential development in the vacant/underdeveloped areas accounts for 103 afy of Seaside's total estimate of 283 afy for future non-residential demand, and new residential development in vacant/underdeveloped areas accounts for approximately 96 afy of the City's total estimate of 160 afy for new residential development. No other projected development information that includes a breakdown for Seaside Proper and North Seaside is provided in the General Plan or the General Plan EIR.

The differences between overall buildout projected in the Seaside General Plan and the buildout projections submitted by the City to MPWMD are shown in **Table 8-9**.

TABLE 8-9
FUTURE SEASIDE DEVELOPMENT ESTIMATES: SEASIDE GENERAL PLAN BUILDOUT AND MPWMD SUBMITTAL

	A	B	C	D	E	F
Land Use	**General Plan: Projected Non-Residential Area (sf [a])**	**Submittal to MPWMD: Total Buildout (sf [a])**	**Difference (B-A) (sf [a])**	**General Plan: Projected Dwelling Units (dwelling units)**	**Submittal to MPWMD: Total Buildout (dwelling units)**	**Difference (E-D)**
Open Space and Recreation						
Parks and Open Space	59,000	24,000	-35,000			
Recreational Commercial	1,913,000	17,000	-1,806,000			
Residential Designations						
Low Density Single Family				4,648	2,468	-2,180
Medium Density Single Family				3,381	2,685	-696
Medium Density Multi-Family				1,246	630	-616
High Density Multi-Family				2,825	983	-1,842
Commercial Designations						
Community Commercial	838,000	668,000	-170,000			
Regional Commercial	6,298,000	3,878,000	-2,420,000			
Heavy Commercial	90,000	1,165,000	1,075,000			
Subtotal: Commercial Designations	7,226,000	5,711,000	-1,515,000			
Public/ Institutional Designations						
Public/Institutional	5,985,000	844,000	-5,141,000			
Special Designations						
Mixed Use	4,332,000	1,076,000	-3,256,000	937	897	40

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[a] sf = square feet

SOURCE: City of Seaside 2004a; City of Seaside, 2005.

The differences between the general plan and MPWMD submittal are assumed to result primarily from the differences in the area served by CalAm and the area as a whole, although some differences will inevitably result from the concentration of different kinds of land use development in different areas. Substantially more heavy commercial development, for example, is expected within the area served by CalAm compared to the City as a whole, as Table 8-8 indicates. The buildout estimates in the City's submittal to MPWMD reflect extensive field work by City staff to assess the types and intensity of current development within the area served by CalAm and the assessment of future development in the area based on the anticipated evolution of land use types and increase in development intensity consistent with general plan designations (Ingersoll, 2008).

Water

Regarding water supply, the Seaside General Plan states that “[h]istorical use of the area’s groundwater resources has exceeded safe yield and resulted in lowering of water levels and in saltwater intrusion. Constrained water supply will continue to be a significant factor in the growth locally and regionally (City of Seaside, 2004a), and includes the following Land Use Goal: “Goal LU-5: Collaborate with local and regional water suppliers to continue to provide water supply and treatment capacity to meet community needs.”

Monterey County

General Plan and Housing Element dates and planning periods

- Monterey County’s currently adopted General Plan was adopted in 1982 and has a planning horizon of 20 years (Monterey County, 1982). The County is currently updating the plan, a process that has been underway since 1999 and produced four draft plan updates between 2002 and 2006; the current draft update (“GPU5”) was released for public review in November 2007 and the draft environmental impact report for it was issued in September 2008.
- The Greater Monterey Peninsula Area Plan (Monterey County, 1984a), a part of the General Plan, was adopted in 1984.
- The Carmel Valley Master Plan (Monterey County, 1986), a part of the General Plan, was adopted in 1986 and has a 20 year planning horizon.
- The Del Monte Forest Local Coastal Program Land Use Plan (Monterey County, 1984b), a component of the General Plan, was adopted by the County Board of Supervisors in 1984.
- The Housing Element was adopted in October 2003 and covers the planning period 2002 to 2008 (Monterey County, 2003).

Buildout information submitted by County (Monterey County, 2004)

- Potential new single-family dwellings: 2,115 units, including:
  - 1,231 undeveloped residential parcels
  - 884 major pending residential projects, including
    - 75 parcels - approved tentative maps, final maps not recorded
    - 562 parcels - subdivision applications in various stages of the planning process
    - 247 affordable housing units, including
      - 229 units/parcels with applications in various stages of the planning process and
      - 18 rental units not yet constructed
- Second units: none indicated
- Potential new multi-family dwellings: 9 existing undeveloped multifamily residential parcels
- Existing Undeveloped Commercial Parcels: 300 (size of parcels not indicated), including
  - 120 parcels with various commercial designated land uses including general commercial, mixed use, medical office, visitor-serving, service station/car wash, public utilities, religious institution, schools, convalescent home and mining or quarries
  - 180 publicly owned parcels that are assumed to continue in passive recreational use

- Non-Residential square footage: 211,600 sf classified as major pending commercial (or similar projects) including:
    - projects totaling 90,000 sf are described as exempt from MPWMD water allocation
    - projects totaling 51,600 sf are described as having no net increase in water use
    - one project totaling 70,000 sf, for a self-storage facility, which does not indicate an exemption or no net increase in water
- Non-residential acreage: 239.95 acres for golf-related uses including
    - 213.95-acre golf course
    - 17-acre driving range
- Remodels: 250 fixture units per year resulting in water use of 2.5 afy (information provided by MCWRA)
- Monterey County suggested a 15 percent contingency factor; ultimately 20 percent was used for all jurisdictions.

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

- MPWMD shows a total of 2,124 single family units and no multi-family units (i.e., the 9 multi-family units indicated in the County's submittal are combined with the 2,115 single family units).
- MPWMD shows a total of 145,000 sf of commercial land use with a water use factor of 0.00007. (This is slightly more than twice the area of the only nonresidential component in the County's submittal (70,000 sf) that the County characterizes as constituting new water demand for CWP/MPWMD planning purposes.)
- MPWMD shows 795 remodels, with the use factor (used for all jurisdictions) of 0.047 for a total of 37 af.

Demand summary

- The estimated future (additional) demand for unincorporated Monterey County within the CalAm service area is 1,135 afy, including 892 afy for new residential development and 10 afy for new non-residential development.

Consistency of Growth Assumptions with General Plan

The County's submittal to MPWMD does not indicate the location of the parcels and projects listed, except to state that they are located in the part of the county within the MPWMD boundary. Three area plans of the Monterey County General Plan address land use planning for unincorporated areas lying partly or entirely within the MPWMD boundary: the Greater Monterey Peninsula Area Plan (Monterey County, 1984a), the Carmel Valley Master Plan, (Monterey County, 1986) and the Del Monte Forest Local Coastal Program Land Use Plan (Monterey County, 1984b). This analysis therefore focuses on the information in these components of the general plan. Because the Monterey County General Plan itself (Monterey County 1982) covers a much larger area of the county than the MPWMD boundary, its growth assumptions would not be comparable to the County's submittal except insofar as the plan addresses applicable subareas of the County.

<u>*Greater Monterey Peninsula Area Plan*</u>. The Greater Monterey Peninsula Area Plan encompasses the Monterey Peninsula (which separates Monterey and Carmel Bays), Carmel Valley, and a portion of the Salinas Valley in the northernmost corner of the

planning area (Monterey County, 1984a). The planning area overlaps the area served by MPWMD and CalAm, extending somewhat south of the MPWMD boundary in Carmel Valley and slightly north of MPWMD boundary along the coast north of Marina. The planning area encompasses the incorporated cities of Monterey, Carmel, Seaside, Pacific Grove, Marina, Sand City, and Del Rey Oaks and the former Fort Ord military reservation[20]. The Greater Peninsula Area Plan provides information on population trends at the time the plan was prepared; information on land uses within the unincorporated part of the planning area; and an estimate of the combined existing development and potential development allowable under the Monterey County General Plan. The plan defines the combined existing and potential development as the plan area's holding capacity.

According to the Area Plan, the incorporated cities within the planning area grew dramatically in the 1940s (61 percent) and 1950s (40 percent) and slowed somewhat in the 1960s to about 5 percent by the 1970s. For the planning area as a whole, the population growth rate was about 19 percent in the 1960s declining to -0.03 percent between 1970 and 1980. The plan cites an AMBAG projection of 183,293 people within the planning area by the year 2000. This would represent an average annual growth rate of 1.84 percent per year, a forecast that the plan indicates was not necessarily accepted by a citizens' advisory group. Based on recent growth trends, the plan suggested that growth was likely to be slower.

Land uses within the planning area include public and quasi-public land uses; vacant/unimproved land; agricultural, grazing, and range land; residential uses; roadways and railroads; and commercial uses. About 5,029 acres of the area's residential development is located in the unincorporated area. The unincorporated area had about 10,706 existing housing units and a holding capacity of 25,439 total units, a difference of 14,733 units. Based on 1980 census data on population per household, the population in the unincorporated area at General Plan buildout was estimated to be about 66,000. The plan acknowledges that this estimate represents a maximum holding capacity that could be reduced as a result of environmental constraints and General Plan policies (such as a slope density policy).

The Area Plan indicates that the unincorporated area includes 511 acres designated for commercial development, and that, although the cities had much more existing commercial development than the unincorporated area, the unincorporated area had about twice the cities's potential for future commercial development in terms of land planned and available for commercial uses (Monterey County, 2004a).

Carmel Valley Master Plan. The 1986 Carmel Valley Master Plan (amended through 1996) covers a 28,000-acre planning area and has a 20 year planning horizon. Land uses consist primarily of rural residential development and small-scale agriculture, with several more concentrated residential areas that include condominiums or visitor accommodation facilities. About 6,900 acres, or one-fourth of the valley, has been developed. The population for the area covered by the master plan in 1986 was estimated to be 10,600, and there were approximately 5,300 dwelling units. The Carmel Valley Master Plan establishes residential development potential of 1,310 existing and newly created vacant lots for the 20-year life of the plan. Of the 1,310 lots, 572 buildable vacant lots of record could be built at any time, and for the remaining 738 lots an annual allocation of 37 lots per year (738 divided by 20) was established for the purpose of regulating residential building activity.

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[20] At the time the plan was prepared Fort Ord was an active military base.

Thus, the plan provides for the development of all identified new and potential lots within the expected 20-year life of the plan.

According to the master plan, which cites 1970 and 1980 Census data, the population for Carmel Valley grew at a rate of about 4 percent per year while the housing inventory grew at the rate of about 8 percent per year, indicating decreasing family size. The master plan also notes that Monterey County Transportation Studies and background studies for the Carmel Sanitary District Areawide Facilities Plan found that projections indicated declining rates of growth for both housing and population, with trends of housing starts and population at about 3 percent per year in the sanitary district study and just under 4 percent in the transportation study. The master plan notes that that state and regional growth trends are likely to bring increased demand for housing in the valley. The 1990 and 2000 Census data for Carmel Valley Village (which is located within the Carmel Valley planning area) indicates a more recent annual population growth rate of 0.6 percent and a household growth rate of 1.7 percent.

According to the draft environmental impact report prepared for the update of the General Plan currently underway, creation of new lots in the Carmel Valley area is capped at 266 new lots (Monterey County, 2008). This information is presented for informational purposes only since the current update is not an adopted plan.

Regarding commercial development, master plan policy favors expansion of existing hotels, motels, and lodges over development of new projects, and specifies that new visitor accommodations not exceed 175 units in the area west of Via Mallorca and not exceed 250 new units in the area east of Via Mallorca.

Del Monte Forest Area Land Use Plan – Monterey County Local Coastal Program. The Del Monte Forest Area Land Use Plan, a Monterey County Local Coastal Program, includes policies that are intended to provide for orderly development balanced with resource conservation. Land use planning proposals for the Del Monte Forest are guided by goals of the California Coastal Act to protect, maintain, and, where feasible, enhance and restore the overall quality of the Coastal Zone environment; assure orderly, balanced utilization and conservation of Coastal Zone resources; maximize public access to and along the coast and maximize public recreation consistent with sound resource conservation principles and constitutionally protected rights of private property owners; and assure priority for coastal-dependent and coastal- related development over other development on the coast. The basic categories of land use designated in the Del Monte Forest are residential, commercial and open space.

The plan establishes densities for residential land uses in the eight planning areas within the Forest and specifies that units in excess of the density allocated by the plan for each planning area shall not be approved.

The plan includes three commercial use designations: visitor-service commercial, general commercial, and institutional. The open space category encompasses all areas considered critical to maintenance of the natural systems of the Forest, including environmentally sensitive habitat areas, the sites of endangered species, riparian areas, wetland areas, and sensitive coastal strand areas.

According to the LUP, the long-term historic rate of residential development in the Del Monte Forest Area is about 60 dwelling units per year; the LUP attributes this modest growth rate (as characterized in the LUP) in part to the attitude of the Pebble Beach Company toward land management and in part to market demand. The plan considers an overall growth rate control or phasing program necessary to meet Coastal Act criteria with respect to residential uses within the Del Monte Forest Area. The plan provides for the continuation of residential development in a manner compatible with the normal availability and extension of utility and public service facilities, and as housing market demand requires, within the constraints of available water allocations, sewerage capacity and the County growth management policy. According to the plan the capacity of the Carmel Sanitary District's (CSD) treatment plant was, at the time the plan was prepared, a greater constraint to development in the Del Monte Forest than was water availability through the CalAm Water Service Company. Therefore, sewerage capacity is recognized as the primary constraint on the amount of new development in this area.

The remaining uncommitted water allocation (1,228.83 af at the time the land use plan was prepared) of the total 6,501 AF allotted by MPWMD to the County, provided the basis for six levels of priority for use of the uncommitted water adopted by the Board of Supervisors. The Del Monte Forest Area LCP/LUP adopted priorities for water use within the Forest consistent with and included in the Board’s area-wide priority levels. The LUP provides a breakdown of residential units in the different planning areas for priority levels 1 through 5. The breakdown does not distinguish between private residential single family and multi-family dwelling units and visitor accommodation (e.g., hotel and motel) units; the term units is assumed here to refer to these three types of units. The first priority for the water use is for existing legal lots of record, of which there were 341 in forest area at the time of the allocation. The second priority is for visitor serving facilities including recreation, namely the NCGA golf course and the Spanish Bay Complex; the second priority level includes 542 units. The third and fourth priorities are for commercial and residential development; these levels include 307 and 157 units, respectively. Priorities one through four allocate all of the water allotted by the MPWMD. The fifth and sixth priorities are for additional residential development in Del Monte Forest, for which no water was available in the foreseeable future. The fifth priority level includes 482 units; no specific breakdown of units is provided for the sixth priority level. Given that the fifth priority level development was not covered by existing allocation, it is reasonable to assume that this level of future development (i.e, 482 units) would be served by additional supply provided by the CWP-Plus-Future alternative, and that the other units, for which water was assumed to be available, have been developed in the 24 years since the LUP was adopted.

The LUP provides very little quantified information on commercial development, indicating only that current commercial development projects that would be permitted if water were the only infrastructure constraint include a combined total of 163 units in developments in three of the forest’s planning areas.

Conclusion based on the three Area Plans. Only the Greater Monterey Peninsula Area Plan covers generally the same unincorporated area encompassed by the CalAm service area and the MPWMD. The Carmel Valley Master Plan and Del Monte Forest Land Use Plan cover much smaller areas. Because the Greater Monterey Peninsula Area Plan was prepared in 1984, it does not provide a current estimate of the housing units within the planning area, to which the number of units in the County’s submittal to MPWMD might be added to compare with the plan’s estimated holding capacity. However, existing residential development in the plan area (and by extension the MPWMD and CalAm service area) can be estimated based on the number of units in the plan area in 1980 presented in the 1984 plan and an estimated average annual growth rate. Census information for unincorporated Monterey County for the years 1980, 1990, and 2000 indicates an average annual growth rate between 1980 and 2000 of 1 percent. Assuming 10,706 units in 1980 (as stated in the Area Plan) and a continued 1 percent annual growth rate, in 2008 the plan area would have 14,146 existing residential units. Based on a total holding capacity of 25,439, this level of development would easily accommodate the 2,115 new single-family units and 9 multi-family units included in the County's submittal. Even if some of the theoretically potential units assumed under maximum buildout could not be developed due to environmental or policy constraints, it appears that the County's residential submittal is consistent with (or less than) the level of growth anticipated in the Greater Monterey Peninsula Area Plan.

Combined Carmel Valley and Del Monte Forest Area planned future development. Based on development planned in the adopted Carmel Valley Master Plan, if development proceeded at the annual rate that was assumed in the plan, there would currently be no remaining residential development potential. If, on the other hand, only existing lots of record have been developed, 738 additional residential parcels would remain to be developed. Based on the priority levels established in the Del Monte Forest Area LUP, it is likely that 482 units foreseen in that plan remain undeveloped. Together, assuming none of the potential parcels identified in the Carmel Valley Master Plan and none of the parcels identified in fifth priority level in the Del Monte Forest Area have been developed these plans allow for development of 1,220 additional units. This does not, of course, include potential development on other unincorporated lands within the MPWMD boundary.

Monterey Peninsula Airport District

Master Plan and planning periods

- The Monterey Peninsula Airport Master Plan Update Final Report (Master Plan) (MPAD, 1992) is the applicable land use planning document covering the airport development activities (Stuth, 2008). The goals of the Master Plan are to address airport requirements over a 20 year planning period; 2010 is cited as the horizon year for specific aspects of the plan including projected airport activity and facility requirements.

Buildout information submitted by Airport District (MPAD, 2004)

- Non-residential building square-footage only:
  - North Side Business Park (Group I water-use category): 1,108,602 sf (approximately 25 acres)
  - Aviation Hanger Storage (Group III water-use category): 1,780,664 sf (approximately 41 acres)
  - Non-Aviation Self Storage (Group III water-use category): 75,000 sf (approximately 2 acres)

Revisions reflected in the MPWMD demand estimate (MPWMD, 2005; 2006b)

The MPWMD estimate for the Airport District -- 115 afy in the nonresidential category and 23 afy based on the 20 percent contingency factor, for a total demand of 138 afy (MPWMD, 2005; 2006b) -- does not indicate the underlying assumptions regarding square footage, types of non-residential uses, or water use factors that might indicate any divergence from the development assumptions submitted by the Airport District. As indicated in the demand buildout summary above, the Airport District's submittal indicates that the business park would have Group I water usage (which has a use factor of 0.00007 af per square foot) and that the other two components are in the Group III water use group. Based on the Group I water use factor, water demand for the 1,108,602 square-foot North Side Business Park area would amount to 77.6 afy. The MPWMD's Group III covers miscellaneous uses and provides specific use factors for the listed land uses. However, the list of Group III uses (available via the Rules and Regulations link at MPWMD's website) does not include airport hangars or hangar storage, and only provides a use factor per-storage unit (rather than per square foot) for self-storage facilities. Based on MPWMD's estimate of 115 afy for the entire Airport District and the estimate of 77.6 afy needed for the business park, 37.4 afy would be needed for the aviation hangar storage and non-aviation self-storage components of the anticipated development, indicating an (implied) average water use factor of 0.00002 for these land uses. Therefore, the Airport District's assumptions about future growth appear to have been retained in the MPWMD estimate.

Demand summary

- The estimated future (additional) demand for the Airport District is 138 afy, consisting of 115 afy for non-residential land uses and 23 afy for the 20 percent contingency.

Consistency of Growth Assumptions with Master Plan

The North Side Business Park and hangar storage components of the Airport District's submittal are consistent with planned development included in the Monterey Peninsula Airport Master Plan Update (Master Plan Update) (MPAD, 1992). The Master Plan identifies aviation facility requirements, considers three concepts or alternatives (A, B, and C) for the terminal area, the west end of the airport, and the northside of the airport, and recommends adoption of Concept C for each of these three components.

The submittal estimate of 1,780,664 square feet (roughly 40 acres) for aviation hangar storage is reasonably consistent with the estimates contained in the Master Plan as additional area needed for general aviation, which includes conventional hangars, executive hangars, and related general aviation facilities (including ramp/tie downs, fixed base operator facilities, and other aviation tenants) totaling 38.7 acres (MPAD, 1992, Table 6-1). Each of the three Northside concepts included in the Master Plan designate part of the Northside area as office/research and development (office/R&D) space; Concept A calls for 45 acres to be devoted to office/R&D, Concept B calls for 64.5 acres to be devoted to this type of land use, and Concept C development similar to that outlined in Concept B (with some elements reconfigured). The Airport District's submittal indicating development of an approximately 25-acre business park in the Northside is within the parameters of each of the concepts considered in the Master Plan. The third component included in the Airport District's submittal, approximately 1.7 acres for non-aviation self storage is not specified in the Master Plan.

Overall, therefore, the submittal is consistent with provisions of the Master Plan. Although non-aviation self-storage is not specified in the plan, this is a very minor part (2.5 percent by area) of the development assumed in the Airport District's submittal, and a small area for non-aviation self storage is not inconsistent with the land uses specifically anticipated in the plan.

Conclusion: CalAm Service Area Jurisdictions' Growth Projections

The decision by MPWMD and its constituent jurisdictions to use the jurisdictions' adopted general plans as the basis for future growth by which the water supply projections were estimated is consistent with state law summarized in Section 8.1, above, requiring coordination between land use and water supply planning agencies.

As the forgoing jurisdiction summaries indicate, there is considerable variation in the submittals and the degree to which the applicable general plans contain comparable specific information. With a few exceptions the estimates of residential growth are consistent with that contained in the general plans or general plan housing elements. By contrast, in most cases the nonresidential build-out information needed to project water demand (provided by the jurisdictions to MPWMD) is more specific than that presented in the general plans. In many cases the jurisdictions' assessments of future growth potential entailed considerable field work and/or record research to assess existing levels of development, potential for infill and densification of existing land uses, and the potential for the evolution of nonresidential land use types, as well as densities, to occur consistent with adopted land use plans.

In considering the indirect impacts of potential growth related to the Phase 2 Project, it is important to consider that the jurisdictions' approved planning documents have already been subjected to environmental review under CEQA. In adopting the applicable general plans and general plan elements, the local decision-making bodies have adopted measures to mitigate adverse impacts associated with the growth that will occur under the plans and have adopted statements of overriding considerations associated with impacts that cannot be reduced to an insignificant level.

Chapter 8 Reference Section

8.3 References

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APPENDIX J2

Secondary Effects of Growth

Summary of Secondary Effects of Growth

Table J2-1 summarizes the secondary effects of growth in the CalAm Service area. The information presented in Table J2-1 is derived from the following environmental documents:

- City of Del Rey Oaks, *Final Environmental Impact Report for the General Plan Update Project*, May 16, 1997.
- City of Monterey, *City of Monterey General Plan Update Draft Environmental Impact Report* and *Final Environmental Impact Report, SCH 2003081011*, October 11, 2004.
- City of Sand City, *Expanded Environmental Impact Study and Proposed Negative Declaration, General Plan Update 2001-2016*, October 12, 2001.
- City of Seaside, *Final Seaside General Plan EIR*, January 2004.
- Monterey County, *Monterey County General Plan Final Environmental Impact Report, SCH No. 2007121001*, March 2010a, and *Revised Supplemental Materials to the Final EIR (October 15, 2010)*, October, 2010b.
- U.S. Department of the Army, *Final Environmental Impact Statement, Real Property Master Plan, Presidio of Monterey, California*, February 2013a and *Record of Decicion*, signed September 20, 2013b.

TABLE J2-1
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

	City of Del Rey Oaks	**City of Monterey**	**City of Sand City**	**City of Seaside**	**Monterey County**	**U.S. Department of the Army**
Impact / Mitigation	**City of Del Rey Oaks General Plan Update EIR**	**City of Monterey General Plan Update EIR**	**Sand City General Plan Update MND**	**City of Seaside General Plan EIR**	**Monterey County General Plan EIR [To 2030 / To 2092][a]**	**Presidio of Monterey Real Property Master Plan EIS[b]**
Aesthetic and Visual Resources						
Impacts						
Adverse effects on scenic vistas.		S		S		
Adverse effects on scenic or historic resources within a state scenic highway.		S		S		
Degradation of visual character or quality of the area and surroundings.		S		S	U / U	S
Creation of substantial new sources of light and glare.					U / U	
Cumulative impacts on aesthetics, light, and glare.					CC	
Mitigation Measures						
Implement General Plan Urban Design Element and Open Space Element policies that call for protection and/or enhancement of vistas and visual resources and preservation of greenbelts.		X				
Implement General Plan Urban Design Element policies that establish performance standards, design requirements and development guidelines that protect scenic corridors.		X				
Implement General Plan Land Use Element polices that require development and implementation of design concepts and development guidelines to ensure that new development blends with and enhances the visual quality of neighborhoods.		X				
Implement policies of Conservation/Open Space and Urban Design Elements of the General Plan that support programs to enhance visual character.				X		
Require project site redesign, landscaping, or reduced building heights to avoid obstruction of private views.				X		
Enforce ordinances that preserve public viewsheds.				X		
Establish guidelines for quality, scale, and design.				X		
Minimize the removal of mature healthy Monterey pines, use attractive landscaping, plant native vegetation as a visual buffer, select compatible natural exterior colors, and install decorative fencing. Shield outdoor utility equipment to minimize visual and aesthetic effects.						X

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

	City of Del Rey Oaks	**City of Monterey**	**City of Sand City**	**City of Seaside**	**Monterey County**	**U.S. Department of the Army**
Impact / Mitigation	**City of Del Rey Oaks General Plan Update EIR**	**City of Monterey General Plan Update EIR**	**Sand City General Plan Update MND**	**City of Seaside General Plan EIR**	**Monterey County General Plan EIR [To 2030 / To 2092][a]**	**Presidio of Monterey Real Property Master Plan EIS[b]**
Agricultural Resources						
Impacts						
Conversion of important farmland to non-agricultural use.					U / U	
Involve other changes that would result in conversion of farmland to non-agricultural use.					U / U	
Cumulative impact on agricultural resources.					CC	
Mitigation Measures						
No feasible mitigation beyond General Plan goals and policies is available.					X	
Air Quality						
Impacts						
Construction-related air quality impacts.				U	S / S	S
Transportation-related air quality impacts.		S				
Net change ozone precursor (ROG and NOx) and particulate matter emissions.					U / U	
Exposure of sensitive receptors to increased diesel exhaust.					S / S	
Emission of objectionable odors.					S / S	
Cumulative air quality impacts					CC	
Cumulative construction-related air quality impacts.				U		
Mitigation Measures						
Implement General Plan Circulation Element policies to maximize the efficiency of the transportation network such that level of service standards are met.		X				
Require review of development proposals for air quality impacts and cooperate with the regional APCD to reduce construction impacts.				X		

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Air Quality (cont.)						
Mitigation Measures (cont.)						
Require that future development implement applicable MBUAPCD control measures, including MBUAPCD PM_{10} control measures to ensure PM10 thresholds are not exceeded, and that applicants for discretionary permits work with the MBUAPCD to incorporate feasible measures that assure that standards for diesel particulate emissions are met. Implement MPUAPCD measures to address off-road mobile source and heavy duty equipment emissions as conditions of approval to ensure that construction-related NOX emissions do not exceed the MBUAPCD's daily threshold for NOX.					X	
Implement MBUAPCD mitigation measures for commercial, industrial, and institutional land uses. Require that future development be designed to maximize energy efficiency to the extent feasible and accommodate energy infrastructure, including the potential for distributed renewable generation.					X	
Implement MBUAPCD Mitigation Measures for Residential Land Uses,					X	
Implement MBUAPCD Mitigation Measures for Alternative Fuels; quantify current and projected 2020 greenhouse gas emissions, and adopt a Greenhouse Gas Reduction Plan for County operations.					X	
Require that construction contracts be given to those contractors who show evidence of the use of soot traps, ultra-low sulfur fuels, and other diesel engine emissions upgrades that reduce PM10 emissions to less than 50% of the statewide PM10 emissions average for comparable equipment.					X	
Revise General Plan open space policy to require that development of new sensitive land uses be located at least 500 feet from a freeway carrying more than 100,000 vehicles per day.					X	
Revise General Plan agricultural policy to require that wineries provide for proper storage and disposal of pomace resulting from winery operations.					X	
Implement identified best management practices to reduce of fugitive dust from construction vehicles and equipment and soil disturbance.						X

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Biological Resources						
Impacts						
Effects on special status species.	S	S	S		S / U	S
Effects on riparian habitat and other sensitive natural communities.	S	S	S	S	S / U	
Effects on federally protected wetlands.		S		S		
Potential conflicts with local policies or ordinances protecting biological resources.		S				
Effects on a variety of biological resources.	S			S		
Interference with migratory patterns or wildlife corridors.		S	S		S / S	
Potential loss or disturbance of nesting migratory birds and raptors.					S / S	
Effects on migratory birds and raptors.						S
Introduction of exotic species.						S
Cumulative impacts on biological resources					CC	
Mitigation Measures						
Implement General Plan polices contained in the Conservation/Open Space, Conservation, Open Space, and/or Urban Design elements.	X	X		X		
Adopt and implement a policy to assure that development of or adjacent to wetlands provides mitigation consistent with applicable state and federal law.	X					
Require that development at the corner of Highways 68 and 218 maintain the riparian habitat values of Arroyo Del Rey Creek.	X					
Prohibit the direct discharge of stormwater or other drainage from new impervious surfaces in the natural area expansion parcel.	X					
Construct golf course greens and tees to collect and disperse percolating water to vegetated buffer areas for additional filtering and absorption of nitrate or pesticide residue; prepare and implement a Golf Course Environmental Management Plan.	X					

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Biological Resources (cont.)						
Mitigation Measures (cont.)						
Implement General Plan policies created to preserve, protect and enhance special status species habitat and wetlands.				X		
Work with USACOE, USFWS, CDFG during project permitting and review.				X		
Connect open spaces to preserve habitat and create wildlife corridors.				X		
Prepare a Habitat Conservation Plan.			X			
Require new development to be responsible for site investigations, determinations of species presence, and mitigation.			X			
The County shall in concert with others develop a conservation strategy for the Salinas Valley to provide for the preservation of adequate habitat to sustain the San Joaquin kit fox population.					X	
By 2030, prepare an update to the General Plan to identify expansion of existing focused growth areas and/or to identify new focused growth areas to reduce loss of natural habitat in Monterey County.					X	
By 2030, prepare a Comprehensive Conservation Strategy.					X	
In order to preserve riparian habitat, conserve the value of streams and rivers as wildlife corridors and reduce sediment and other water quality impacts of new development, the County shall develop and adopt a Stream Setback Ordinance.					X	
The County shall prepare, adopt and implement a program that allows projects to mitigate the loss of oak woodlands.					X	
Add considerations regarding riparian habitat and stream flows to criteria for long-term water supply and well assessment.					X	
The County shall require discretionary projects to retain movement corridors of adequate size and habitat quality to allow for continued wildlife use based on the needs of the species occupying the habitat.					X	
Remove vegetation during the nonbreeding season and avoid disturbance of nesting migratory birds, including raptors, as appropriate (generally September 16 to January 31).					X	

TABLE J2-1 (Continued) SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

	City of Del Rey Oaks	**City of Monterey**	**City of Sand City**	**City of Seaside**	**Monterey County**	**U.S. Department of the Army**
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Biological Resources (cont.)						
Mitigation Measures (cont.)						
Conduct focused biological surveys to identify the presence and location of individual special status plants; in consultation with CDFG and USFWS determine and implement appropriate course of action for any special species encountered.						X
Complete consultation with USFWS regarding effects on Yadon's piperia and implement Biological Opinion recommendations, as required.						X
Require contractor to adhere to tree protection procedures						X
Flag native trees that are scheduled for removal and replace native trees at a 2:1 ratio in accordance with the Integrated Natural Resources Management Plan.						X
Take measures to avoid the introduction of exotic or invasive plant species.						X
To prevent effects on California tiger salamander install suitable, temporary, exclusion fencing around project boundaries.						X
Limit work within habitat occupied by special status plant and wildlife species to existing access roads and the smallest area practical.						X
Make all efforts to salvage, transport, and relocate special status plant and wildlife species encountered prior to or during construction when feasible.						X
Train construction personnel prior to construction regarding biological resources present at the site.						X
Time project construction to occur outside the breeding bird season to avoid violations of migratory bird protections and prevent effects on migratory bird species. If construction must occur during nesting season, conduct biological surveys; halt construction within any active nests, notify USFWS and CDFG, and implement appropriate procedures.						X
Implement the Tree Mitigation Plan, including replanting native trees at a ratio of 2:1; focus restoration planting on site-specific native plants, and adhere to specified landscape design standards.						X

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Cultural Resources						
Impacts						
Potential effects on, disruption of, or damage to archaeological, paleontological, or historic resources.		S		S	S / S	U
Mitigation Measures						
Require archaeological studies by a professional archaeologist for projects proposed in areas with a high probability of containing archaeological resources.		X		X		
Implement General Plan Conservation/Open Space Element policies.				X		
Review development proposals and require mitigation for impacts to sensitive historic or archaeological resources.		X		X		
Revise Central Salinas Valley Area Plan policy to designate Paraiso Hot Springs properties as a Special Treatment Area and permit uses in accordance with a general development plan prepared for the area.					X	
If cultural resources are inadvertently discovered, work shall be halted and the find evaluated by a qualified professional archaeologist and the U.S. Army Garrison- Presidio of Monterey Cultural Resource Manager; required consultation procedures and planning requirements shall be implemented. if human remains are inadvertently discovered, work shall cease and the Cultural Resource Manager immediately notified; if remains appear to be recent the Army's Criminal Investigation Command will assume control of the crime scene. If remains appear to be of Native American descent the Monterey County coroner's office and Ohlone Costanoan Esselen Nation will be contacted.						X
Geology, Soils and Seismicity						
Impacts						
Exposure of new development to potential seismic or geologic hazards, such as seismic ground shaking, ground failure, liquefaction, or landslides.	S	S		S		
Creation of or exposure of new development to hazards related to soil erosion and /or expansive soils.		S				

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Geology, Soils and Seismicity (cont.)						
Impacts (cont.)						
Creation of soil erosion hazards.					S / S	
Increased soil erosion during construction or due to new development.				S		S
Exposure of new development to potential hazards, such as tsunamis and seiches.		S		S		
Mitigation Measures						
Adopt and implement a program in the General Plan Land Use Element that states that the City shall update the General Plan Seismic Safety Element to incorporate the most recent geological information provided by the State Department of Conservation Division of Mines and Geology.	X					
Implement the General Plan Safety Element policies that address geologic and seismic hazards, including the policy that requires engineering and geologic investigations for most new construction.		X				
Implement the General Plan Safety Goal Flood policy that addresses tsunami and storm wave run up hazard.		X				
Require new structures to conform to the most recent Uniform Building Code.			X	X		
Require geologic investigations by a licensed Engineering Geologist for new development to evaluate soil erosion and expansiveness hazards.			X	X		
Implement the General Plan Implementation Plan.			X			
Enforce State and seismic structural design standards for all new development.				X		
Annually review the Emergency Preparedness Plan				X		
Regulate locations of critical facilities.				X		
Develop and adopt a Stream Setback Ordinance.					X	
For each construction project, prepare and submit to the SWRCB Permit Registration Document; implement best management practices in the required Stormwater Pollution Prevention Plan.						X

TABLE J2-1 (Continued) SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Geology, Soils and Seismicity (cont.)						
Mitigation Measures (cont.)						
To the extent practical apply low impact development techniques, using small-scale stormwater management design measures that mimic natural processes that slow, filter, infiltrate and detain runoff.						X
Hazards						
Impacts						
Potential exposure of people and development, including schools, to hazardous materials releases.		S				
Increase in storage of hazardous materials and the potential for leakage.		S		S		
Safety hazards from development near an airport.		S				
Increased risk of hazardous materials release resulting from spill or accident due to increases in transportation of hazardous materials.		S		S		
Release of asbestos-containing material or lead-based paint to the environment.						S
Effects of using hazardous substances in construction.						S
Flooding hazards caused by increased runoff and effects from flooding.		S		S		
Exposure of structures to increased risk of wildland fires				S		
Cumulative wildfire hazard exposure.					CC	
Mitigation Measures						
Require facilities dealing with hazardous waste to incorporate actions to minimize hazards to public health and safety.		X	X			
Review proposals for new development near airports.		X	X			
Implement the General Plan Safety Element.				X		
Identify transportation routes for transport of hazardous material			X	X		

TABLE J2-1 (Continued) SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Hazards (cont.)						
Mitigation Measures (cont.)						
Implement policies established in the Monterey County Hazardous Waste Management Plan.				X		
Implement a Mulithazrad Emergency Plan.				X		
Cooperate with the Monterey County Environmental Health Division.		X	X	X		
Require mitigation in discretionary development projects.		X	X	X		
Use an update Emergency Preparedness Plan.		X		X		
Inspect all publicly maintained flood control facilities.				X		
Require new development to provide adequate drainage system				X		
Participate in National Flood Insurance Program.		X		X		
Maintain emergency procedures for evacuation and control of population within floodplain areas.				X		
Implement Storm Drainage Plan.			X	X		
Maintain landscaping, buffer zones in areas of high wildland fire risk.				X		
Collaborate with Monterey County Airport District to review projects and mitigate impacts during development review process.		X				
Implement most recent Uniform Fire Code				X		
Manage asbestos-containing materials and lead-based paint removed during building rehabilitation according to local, state, and federal and MPUAPCD requirements; implement the Presidio of Monterey Asbestos Management Plan; manage and dispose asbestos-containing materials in accordance with MBUAPCD rules and policies.						X
Modify closure and post-closure maintenance plans for construction projects that may affect the cap of the closed landfill, POM-05. Submit proposed land use changes and development plans that include design and mitigation to the local regulatory and land use agencies, the Central Coast RWQCB, and the CIWMB for approval.						X

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Hazards (cont.)						
Mitigation Measures (cont.)						
Comply with the California Stormwater Construction General Permit; develop and implement a Stormwater Pollution Prevention Plan that outlines best management practices for handling and disposal of hazardous, toxic, and radioactive substances in accordance with the Resource Conservation and Recovery Act.						X
Hydrology and Water Quality						
Impacts						
Impacts on hydrology and water quality, including groundwater quality.	S					
Impacts to hydrology and surface water resources.				S		
Increased stormwater pollution during construction and/or following project completion.						S
Impacts of polluted runoff from cumulative development on surface and groundwater quality.				U		
Agricultural and resource development would increase sediment and nutrients in downstream waterways and violate water quality standards.					S / S	
Increased demand for water supplies and water storage, treatment, and conveyance facilities that could have significant secondary impacts on the environment.					U / U	
Substantial depletion of groundwater supplies.		S			S / U	
Exceed capacity of existing water supplies and necessitate acquisition of new supplies to meet expected demands.					U / U	
Increased demand on groundwater supplies in areas experiencing or susceptible to saltwater intrusion.				U	S / U	
Increase flood hazard from changes in drainage patterns or insufficient storm drainage infrastructure.		S		S		
Alterations of existing drainage patterns would increase erosion in overland flow paths and in drainage swales and creeks.					S / S	

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Hydrology and Water Quality (cont.)						
Impacts (cont.)						
Placement of housing or other development within a 100-year floodplain.		S			LS / U	
The placement of land uses and structures within Special Flood Hazard Areas would impede or redirect flood flows, resulting in secondary downstream damage, including bank failure.					LS / U	
Potential failure of levees or dams would expose people and structures to inundation and result in the loss of property, increased risk, injury, or death.					LS / U	
Cumulative impacts on groundwater quality.					CC	
Cumulative indirect Impacts of water supply projects.					CC	
Mitigation Measures						
Adopt and implement a policy that prohibits drainage from new impervious surfaces into the natural area expansion parcel and requires appropriate management of stormwater runoff.	X					
Construct golf course and tees with subdrains to collect and dispers percolating water to vegetated buffer areas.	X					
Prepare and implement a Golf Course Environmental Management Plan that includes an Integrated Pest Management strategy to reduce the use of and exposure to pesticides.	X					
Implement the policies and programs of the General Plan Urban Design, Conservation, Public Facilities, and Safety Elements.		X				
Review all development proposals planned for areas within a 100-year flood hazard zone and require mitigation as needed for conformance with National Flood Insurance Program standards.		X				
Implement General Plan policies that require the City to monitor the capacity of the local WWTP and identify need for expanded treatment capacity.				X		
Implement General Plan policies that require the City to verify adequacy of sewer collection and treatment facilities during processing of development proposals.				X		

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Hydrology and Water Quality (cont.)						
Mitigation Measures (cont.)						
Implement General Plan policies calling for the City to update and implement the City's Sewer and Drainage Plan as necessary.				X		
Implement General Plan policies calling for the City to consult and coordinate with water districts regarding the potential impacts of new development and implement measures to address impacts.				X		
Implement General Plan policies that require new development to implement BMPs pursuant to NPDES permits.				X		
Implement General Plan policies that require improvement of drainage and stormwater detention capabilities.				X		
Implement General Plan policies that require the City to cooperate with regional water suppliers, local water districts, and school districts encourage conservation and public education.				X		
Implement General Plan policies that call for the City to work with MCWRA, ACOE, SWRCB, MPWMD to address seawater intrusion.				X		
Implement General Plan policies that require the City to continue to require new public and private development and redevelopment projects to install and utilize water conservation measures.				X		
Implement General Plan policies that requires the City to coordinate with MPWMD and MCWD to extend recycled water infrastructure.				X		
Develop and adopt a Stream Setback Ordinance.					X	
Support a regional solution for the Monterey Peninsula in addition to the Coastal Water Project. Participate in regional coalitions for the purpose of identifying and supporting a variety of new water supply projects, water management programs, and multiple agency agreements that will provide additional domestic water supplies for the Monterey Peninsula and Seaside basin, while continuing to protect the Salinas and Pajaro River groundwater basins from saltwater intrusion. Complete the cooperative planning of these water supply alternatives within five years of adoption of the General Plan and implement the selected alternatives within five years after that time.					X	

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Hydrology and Water Quality (cont.)						
Mitigation Measures (cont.)						
Initiate planning for additional water supplies in the Salinas Valley.					X	
Add considerations regarding riparian habitat and stream flows to criteria for long-term water supply and well assessment to Public Services policies that establish criteria for domestic and high-capacity wells.						
General Plan and Area Plan goals and policies will apply. Future projects will be subject to CEQA and have specific mitigation measures. Experience shows that impacts of large-scale water supply projects cannot always be mitigated to a less than significant level.					X	
Implement in all new facilities the water conservation measures that were identified in the 2004 Presidio of Monterey Water Management Plan and have since been refined.						X
Install rainwater collection systems in all new buildings.						X
Install purple piping for recycled water in all new buildings.						X
Regarding long term water supply, explore the feasibility of transferring a portion of the Ord Military Community's water rights to the Presidio of Monterey to reduce the Presidio's projected water shortfall and the possibility of a trading a portion of OMC water rights to the City of Seaside for a portion of the City's CalAm water supply allocation to the Presidio; consider contracting for additional water from the regional water supply projects that are being developed. Consider installing water meters, implementing water conserving measures at the La Mesa Military Housing Complex to claim water use credits, and employing water conservation measures for the proposed development at the Presidio of Monterey.						X
Construct proposed improvements such that downstream flooding conditions are not exacerbated and to maximize stormwater infiltration and minimize stormwater runoff and erosion.						X
As part of site design, include non-structural stormwater controls that filter and settle out pollutants and provide infiltration and /or storage.						X
During project design select specific post-construction best management practices that comply with post-construction runoff requirements.						X

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Land Use						
Impacts						
Inconsistency with Zoning Code.				S		
Impacts to open space areas.	S					
Conflicts between incompatible land uses.	S					
Mitigation Measures						
Implement the General Plan Housing Element Policies				X		
Adopted and implement General Plan policies that encourage consideration and preservation of irreplaceable natural resources and open space and that require review of development projects with regard to the need for open space buffers and require open space buffers and requires as a conditions of project approval incorporation into the development plan of other mitigation to avoid development of incompatible land uses.	X					
Implement General Plan policies that require review of development for compatibility with adjacent open space land uses	X					
Implement a General Plan policy requiring avigation easements for future development in the Airport Land Use Planning area,	X					
Incorporate and implement General Plan development standards for development in the clear zone for the airport.	X					
Noise						
Impact						
Exposure of existing and new sensitive land uses to increased noise.		S				
Exposure of new development to noise levels that exceed standards.		S				
Increases in construction-related noise.		S		S		S
Increases in traffic noise / increases in cumulative traffic noise.				S / U		
Increases in stationary noise / airport noise.		S		S		

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Noise (cont.)						
Mitigation Measures						
Require noise studies for new development.				X		
Implement the General Plan Noise Element.		X		X		
Enforce noise limits (e.g. noise levels and hours of operation) and construction/ operation noise regulations.		X		X	X	
Implement appropriate sound attenuation measures to meet local ordinances whenever possible.						X
Require construction contractors to ensure that construction vehicles and equipment use the manufacturer's recommended noise abatement devices and are properly maintained.						X
Provide public notice of the project to local area neighborhoods and post signage that provides a phone number to call to register complaints about construction-related noise problems.						X
Parks and Recreation						
Impact						
Potential conflict between new development and existing and expanded recreational/education uses.	S					
Environmental effects of construction of new park facilities and potential degradation of existing or future parks or recreational facilities.		S				
Increased demand resulting in the need for new or expanded parks and recreational facilities.					S / S	
Mitigation Measures						
Implement the applicable General Plan Public Services and Public Facilities Element policies and programs.	X	X				
The County shall adopt an ordinance that requires residential subdivision projects to provide and maintain park and recreation land and facilities or pay in-lieu fees in proportion to the need created by the development.					X	
Conduct project-level CEQA review of new or expanded park and recreational facilities to identify and mitigate adverse environmental effects.		X				

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Population and Housing						
Impacts						
Induced population growth.					U / U	
Mitigation Measures						
(None available that would avoid growth.)					X	
Public Services						
Impacts						
Increased demand for law enforcement and/or fire protection services requiring new or expanded public facility.		S		S		
Environmental effects from construction of schools to accommodate new development.		S				
Effects on adjacent land uses of operation of schools constructed or expanded to accommodate new development.					LS / U	
Mitigation Measures						
Implement General Plan Public Facilities policies and undertake project-level CEQA review to identify and mitigate adverse effects of construction of a new public safety facility or fire station when needed in the future.		X				
Implement general plan policies and mitigation measures identified in other sections of the EIR.				X		
(Specific mitigation of school operational impacts is not feasible because specific future school characteristics are unknown.)					X	
Traffic and Transportation						
Impact						
Congestion impacts on local and regional roadways and intersections	S	S	S	S		
Unacceptable LOS on roadways.		S	S	U	U / U	
Decreased parking capacity.		S				

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

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Traffic and Transportation (cont.)						
Impact (cont.)						
Increased demand for transportation alternatives.		S				
Inadequate emergency access.					U / U	
Impacts of development on County roads within the Agricultural and Winery Corridor.					S / S	
Impacts of traffic from cumulative development on LOS standards.					CC	
Inadequate emergency access resulting from cumulative development.					CC	
Increased traffic volumes and deterioration of existing deficient performance conditions on Monterey County roadways from cumulative development.					CC	
Increased traffic volumes and intersection delays on internal Presidio of Monterey and Ord Military Community roadways and intersections. Increased vehicle queuing at access control point locations.						S
Mitigation Measures						
Implement policies contained in the General Plan Circulation Element.	X	X	X	X		
Revise the General Plan Circulation Element to address specified roadway segments and intersections.	X					
Adopt and implement policies to coordinate with and assist regional agencies in providing funding for an efficient regional transportation network and policies to participate in regional and state transportation planning efforts.	X					
Revise Circulation Element language to require integration of land use and circulation plans.	X					
Implement identified improvements, including installation of traffic signals, provision of dedicated left-turn lanes, and construction of street extensions, as specified.			X			
Identify improvements for Highways 1, 68 and other locations important to the functioning of the regional transportation network so that level of service standards are met.		X	X	X		
Update Capital Improvements Plan and establish funding for roadway improvements.		X	X	X		

TABLE J2-1 (Continued)
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Traffic and Transportation (cont.)						
Mitigation Measures (cont.)						
Require Traffic Studies for new development proposals.			X	X		
Expand and improve pedestrian and bicycle circulation; require rights-of-way on new roads for pedestrian and bicycle access.		X	X	X		
Require new development to pay fair share for improvements and parking.			X	X		
Participate in a regional traffic fee program.				X		
Revise the Safety Element policy on increasing roadway connectivity to require that emergency response routes and street connectivity plans be required for Community Areas and Rural Centers, and for any development producing traffic at an equivalent or greater level to five or more lots/units.					X	
Revise policies in the Carmel Valley Master Plan to address specified roadway improvements.					X	
Include within the County Traffic Impact Fee Program and CIFP roadway segments within the Agricultural and Winery Corridor Plan that exceed LOS standards.					X	
Encourage the use of alternative transportation.						X
Reconfigure parking and roadways to improve bicycle and pedestrian accessibility						X
Provide sidewalk and bicycle trail connectivity throughout the Presidio.						X
Implement as appropriate the short-, medium-, and long-term recommendations provided in the 2010 Comprehensive Transportation Study.						X
Comply with CEQA and NEPA requirements; prepare traffic engineering study; and acquire appropriate rights of way for development of the new access control point.						X
Develop staging plan for each new project that evaluates the possible use of nearby vacant land for staging and temporary parking.						X

TABLE J2-1 (Continued)
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Utilities and Service Systems						
Impacts						
Implementation of the General Plan would require water resources that exceed available water supply.	S	S	S	U		
Require construction of new water supply and treatment facilities.			S			
Require construction of new or expanded stormwater drainage.		S			S / S	
Impacts related to new or expanded solid waste facilities.					LS / U	
Cumulative impact on water supply.				U		
Mitigation Measures						
Adopt and implement a water conservation ordinance, which may include requirements for plumbing retrofits to reduce water demand and effluent generation.	X					
Adopt and implement a policy that requires, as a condition of approval of development plans, verification of available water service that does not aggravate or accelerate existing salt water intrusion in the Salinas Valley groundwater basin.	X					
Adopt and implement policies that consider water conservation, reclamation, and stormwater detention to increase water supply for former Fort Ord land and explore potential sewage treatment options to enhance the non-potable water supply for use on golf courses.	X					
Implement General Plan policies that manage growth consistent with available water supply and promote development of additional water supplies and/or the conservation of water to mitigate impacts from insufficient supply.		X				
Implement General Plan policies that encourage infill development and require implementation of design features and measures to reduce the need for additional stormwater infrastructure projects.		X				
Implement General Plan policies to pursue development of a water desalination plant or other systems capable of enhancing the City's water supply.			X			

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

	City of Del Rey Oaks	City of Monterey	City of Sand City	City of Seaside	Monterey County	U.S. Department of the Army
Impact / Mitigation	**City of Del Rey Oaks General Plan Update EIR**	**City of Monterey General Plan Update EIR**	**Sand City General Plan Update MND**	**City of Seaside General Plan EIR**	**Monterey County General Plan EIR [To 2030 / To 2092]**[a]	**Presidio of Monterey Real Property Master Plan EIS**[b]
Utilities and Service Systems						
Mitigation Measures (cont.)						
Analyze and mitigate the extension and/or replacement of infrastructure facilities as part of the environmental review for private development projects. Hold public infrastructure and facility projects to the same standard as private projects in terms of CEQA compliance and mitigation of impacts.			X			
Make development approval dependent upon the demonstrated availability of water through existing allocations, proven water rights, or the successful acquisition or production of new supplies.			X	X		
Implement the General Plan Land Use Element.				X		
Work with local water districts and water agencies to extend water supply and conveyance infrastructure.				X		
Support local water district efforts to develop new sources of water supply (including wells, desalination, water recycling, and importation).				X		
Encourage conservation and public education.				X		
Require all future developments to include in their stormwater management plans as many Low Impact Development (LID) techniques as feasible.					X	
Review County's Solid Waste Management Plan on a 5-year basis and institute policies and programs as necessary to exceed the waste reduction requirements of the California Integrated Waste Management Act; require wineries to undertake individual or joint composting programs to reduce the volume of their waste stream.					X	
Climate Change						
Impacts						
Development of the general plan would have a considerable contribution to cumulative greenhouse gas emissions and global climate change.					CC	
Potential exposure of property and persons to otherwise avoidable physical harm in light of inevitable climate change.					LCC	

TABLE J2-1 (Continued)
SIGNIFICANT MITIGABLE (S) AND SIGNIFICANT UNAVOIDABLE (U) IMPACTS OF GROWTH IDENTIFIED BY GENERAL PLAN ENVIRONMENTAL IMPACT REPORTS AND MITIGATED NEGATIVE DECLARATIONS IN THE PROJECT AREA

	City of Del Rey Oaks	**City of Monterey**	**City of Sand City**	**City of Seaside**	**Monterey County**	**U.S. Department of the Army**
Impact / Mitigation	**City of Del Rey Oaks General Plan Update EIR**	**City of Monterey General Plan Update EIR**	**Sand City General Plan Update MND**	**City of Seaside General Plan EIR**	**Monterey County General Plan EIR [To 2030 / To 2092]**[a]	**Presidio of Monterey Real Property Master Plan EIS**[b]
Climate Change (cont.)						
Mitigation Measures						
Modify General Plan policy regarding development and adoption of a Greenhouse Gas Reduction Plan, its goals, and required content. During preparation of the plan evaluate options for changes to County land use and circulation policies to further achieve the 2020 and 2030 reduction goals.					X	
Add a General Plan policy requiring adoption of a Green Building Ordinance.					X	
Add a General Plan policy to promote alternative energy development					X	
Add a General Plan policy to promote recycling and waste reduction.					X	
At five-year intervals examine the degree to which thresholds predicted in the General Plan EIR for the timeframe 2006-2030 for increased population, residential and commercial growth have been attained. If the examination shows that actual growth is within 10 percent of thresholds the County shall initiate a General Plan amendment to consider expansion of focused growth areas.					X	
To address Greenhouse Gas Reduction Plan requirements beyond 2030, in parallel with adoption of the 2030 General Plan the County will develop and adopt a Greenhouse Gas Reduction Plan with a target to reduce 2050 GHG emissions by 80 percent relative to 1990 emissions.					X	
Develop and integrate climate change preparedness planning for Monterey County.					X	

[a] The Monterey County General Plan EIR evaluated impacts anticipated to occur by the General Plan's 2030 planning horizon, as well as impacts anticipated to occur under full General Plan buildout, which is assumed to occur in 2092. The column shows both significance conclusions (impacts to 2030 are shown on the left and Impacts to 2092 on the right).

[b] Impacts and significance levels shown are for the Preferred Alternative evaluated in the EIS; this was the alternative that the Army intended to implement according to the EIS Record of Decision.

S = Less than Significant with Mitigation
U = Significant and Unavoidable
LS = Less than significant without mitigation (shown only for impacts in Monterey County where the planning horizon impact (to 2030) would be LS but the buildout impact (to 2092) was identified as either S or U).
CC = Cumulatively considerable impact, as identified in the general plan EIRs (i.e., the terminology used in respective general plan EIR is followed here).
LCC = Cumulative impact would be less than cumulatively considerable with mitigation, as identified in the general plan EIRs.

Appendix J2 – References

City of Del Rey Oaks, *Final Environmental Impact Report for the Del Rey Oaks General Plan Update Project*, May 16, 1997.

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Monterey County, 2010b. *Revised Supplemental Materials to the Final EIR (October 15, 2010)*, Exhibit I of the Board Package for the October 26, 2010 Board of Supervisors meeting; available online: http://www.co.monterey.ca.us/planning/gpu/GPU_2007/102610_Board_Package/102610_Board_Package.htm.

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APPENDIX K

Existing Water Conservation and Water Recycling

Water Conservation and Demand Management

It is assumed that because there would not be enough water supply to meet baseline demand, CalAm and MPWMD would continue their implementation of conservation programs and measures with the same intensity as under existing conditions. Because these programs and measures, such as limiting losses from aging pipes, are existing and ongoing efforts, they are not considered a component of the No Action Alternative, but do provide context for optional further reductions in demand compared to baseline. Estimates of the effect of these ongoing programs on baseline demand are provided to the extent that they can be quantified.

CalAm and MPWMD implement numerous water conservation and demand management programs within CalAm's Monterey District service area that have been critical to meeting the reduction mandates included in SWRCB's 1995 Order 95-10 and 2009 CDO, and the 2006 Seaside Groundwater Basin adjudication. Additionally, in 1998, MPWMD adopted its Regulation XV, Expanded Water Conservation and Standby Rationing Plan, which included seven successive stages of conservation and rationing to respond to supply constraints. In 2016, MPWMD revised Regulation XV and adopted an updated, four-stage conservation and rationing plan. As with the previous plan, Stage 1, Prohibition of Water Waste, remains in effect at all times and applies to all water users. The existing and past programs and their effectiveness by year are described below. As the table below shows, the programs that can be quantified were estimated to reduce total demand each year between 2010 and 2015 by 220 to 370 af. Reductions in demand achieved by these programs are reflected in the baseline, as well as in CalAm's consideration of 10-year average demand (2006-2015) and in 2010, the year CalAm used as the basis to assess the adequacy of the MPWSP, in combination with other supplies, to meet peak and regulatory supply capacity requirements (see Section 2.3 in Chapter 2, Water Demand, Supplies, and Water Rights).

A recent study (Alliance for Water Efficiency, 2015) suggests that MPWMD regulations and CalAm's and MPWMD's past and ongoing conservations programs will limit the magnitude of any post-drought rebound in demand in CalAm's Monterey District. Because conservation programs have been underway for many years and have reached a high degree of saturation in the CalAm service area, some (minor) rebound in demand can be expected when the drought period ends. Given past and existing programs that have resulted in long-term changes in water consumption, and the fact that a sharply tiered rate structure was adopted in 2010, the feasibility of achieving substantial additional water savings through conservation is uncertain. Therefore, for purposes of determining the effectiveness of continuing to implement conservation programs to further reduce demand in the No Project/No Action Scenario, it is assumed that additional quantifiable conservation savings in the current year and future years will not surpass that achieved in recent years shown in the table below. Assuming 2015 effectiveness in reducing demand, continuation of the programs described in this appendix would result in estimated additional conservation savings of approximately 220 af of new conservation each year, with each year's savings carrying forward to the following years. More likely, however, the annual savings will decrease as more businesses and residents undertake such retrofits and replacements, leaving fewer inefficient water uses in the service area from which potential additional conservation savings could be derived. Assuming a new conservation savings of 220 af in 2016 (the same as 2015) and that the effectiveness of the conservation programs decreases by 5 af each year thereafter, the total reduction in demand by 2021 would be approximately 1,260 afy. In reality, the effectiveness may be diminished by more than 5 af per year in future years, considering existing conservation program saturation levels, which would result in less total reduction in demand than assumed here.

Local Programs

CalAm and MPWMD implement numerous water conservation and demand management programs within CalAm's Monterey District service area. Promotion of water conservation, as well as water reuse and reclamation, has been part of MPWMD's core purpose since it was established in 1978. SWRCB's 1995 Order 95-10 and 2009 CDO, and the 2006 Seaside Groundwater Basin adjudication, have spurred additional efforts. Conservation programs have been critical to meeting the reduction mandates included in these orders and decisions.

Order 95-10 required CalAm, while it sought a replacement water supply, to institute additional conservation measures to reduce demand by 15 percent by 1996 and by 20 percent thereafter, relative to CalAm's historical usage cited in Order 95-10 (14,106 afy). The 2009 CDO necessitated additional conservation and demand management efforts: it required CalAm to immediately reduce diversions from the Carmel River by another 5 percent, or 549 afy, starting in October 2009, and achieve further annual reductions starting in October 2011 and continuing until all CalAm diversions from the river in excess of CalAm's established rights are terminated.[1] The CDO and 2016 Revised CDO prohibit CalAm from diverting water from the Carmel River for new service connections or intensified water use at existing connections. The Seaside Groundwater Basin adjudication requires reductions in the amount of water pumped every three years until the amount pumped equals the adjudicated amount.

In 1998, MPWMD adopted its Regulation XV, Expanded Water Conservation and Standby Rationing Plan, which included seven successive stages of conservation and rationing to respond to supply constraints. In 2016, MPWMD revised Regulation XV and adopted an updated, four-stage conservation and rationing plan. As with the previous plan, Stage 1, Prohibition of Water Waste, remains in effect at all times and applies to all water users.

MPWMD's water conservation regulations require that low-water-use fixtures and appliances be used in new construction, that faucets and toilets in commercial and industrial land uses be retrofitted with low-water use fixtures, and that all residential, commercial, and industrial properties that have not already been retrofitted be retrofitted upon change of ownership, remodel, or change of use. Conservation programs being implemented by CalAm and/or MPWMD include incentive-based billing rates, a restricted irrigation schedule, free water audits, free water-saving devices, rebates on high-efficiency plumbing fixtures and appliances, rebates for turf removal and its replacement by drought-tolerant landscaping, and educational programs

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[1] The 2009 CDO specified that this endpoint be achieved by water year 2016-2017. The Revised CDO extended the date to December 31, 2021, among other provisions (see EIR/EIS Chapter 5, Section 5.4.2.3).

that encourage water conservation. **Table K-1** summarizes key CalAm and MPWMD conservation programs and estimated water savings for those that are quantifiable, for years 2010 through 2015. Reductions in demand achieved by these programs are reflected in CalAm's consideration of 10-year average demand (2006-2015) and in 2010, the year CalAm used as the basis to assess the adequacy of the MPWSP to meet (with other supplies) peak and regulatory supply capacity requirements (see Section 2.3 in Chapter 2, Water Demand, Supplies, and Water Rights). As the table shows, the programs that can be quantified were estimated to save from 200 to 370 afy.

These programs have contributed (with other factors such as the mild climate) to the Monterey Peninsula having among the lowest residential per capita water use rates in the state. SWRCB staff calculated that annual average residential per capita usage in CalAm's Monterey District service area from June 2014 through May 2016 was 55 to 57 gallons per capita per day, based on reporting required under emergency conservation regulations. This level is in the lowest 12 percent of urban users in the state (SWRCB, 2016). Statewide water use levels reported during the drought emergency reflect water agency actions and requirements to curtail use and comply with the state's emergency drought regulation. MPWMD already enforced all the elements of the state's regulation, but increased its efforts in coordination with CalAm (CalAm and MPWMD, 2015). Past experience suggests that when a drought period ends, water use rebounds over time. Therefore, per capita usage under non-drought conditions can be expected to be somewhat higher than these reported levels. Some water customers in CalAm's service area undertook extraordinary measures during the drought, implementing behavioral changes to reduce water use that may not be sustained after the drought; however, given the Monterey Peninsula's history of water shortages and drought, MPWMD's regulations prohibiting water waste and incentives to conserve, and the many years of implementing conservation programs outlined above, it is reasonable to assume that per capita water use rates on the Monterey Peninsula will stay low and continue to be among the lowest in the state.

The Alliance for Water Efficiency study (2015) indicates that post-drought rebound in demand has been less pronounced since the 1990s than during the 1970s and 1980s, when behavioral changes adopted during a drought were relaxed and previous water use practices resumed after a drought ended. The study found that adoption of plumbing codes, active retrofit programs, and conservation billing rates has helped lessen post-drought rebound in demand and that drought periods have in fact presented opportunities to encourage (through incentive programs, for example) plumbing retrofits and the replacement of appliances with more water efficient models that are now available. Such changes have helped stabilize the water savings achieved during a drought, after the drought has ended. The study found that water suppliers' policies and regulations can also influence the magnitude of a post-drought rebound in demand (Alliance for Water Efficiency, 2015). This study suggests, as noted above, that MPWMD regulations and CalAm's and MPWMD's past and ongoing conservations programs will limit the magnitude of any post-drought rebound in demand in CalAm's Monterey District.

TABLE K-1
SUMMARY OF EXISTING SERVICE AREA CONSERVATION PROGRAMS

Program	Description	Promotion/Implementation	Estimated Savings (AF)					
			2010	2011	2012	2013	2014	2015
Residential Audits	CalAm offers free residential audits, called Water Wise House Calls, for single- or multi-family homes; the audits identify ways to save water indoors and outside.	Bill inserts, newspaper and radio ads, and rebate brochures offer the audit service to customers; also targets customers who receive high water bills due to CalAm's tiered rate structure. 350 audits and 790 high bill investigations completed in 2015.	5.15	4.20	6.77 (estimated) Actual Savings: 9.6	8.20 (estimated) Actual Savings: 10.90	8.2 Actual = 17.98	Savings not quantified.
Residential Plumbing Retrofit	CalAm provides residential customers with various free water savings devices for bathrooms and kitchens and for outdoor watering.	Devices are distributed to CalAm customers at community events, at the CalAm office, at onsite audits, upon customer request.	5.16	19.24	19.24	28.57	28.57	40.40
Large Landscape Audits and Water Budgets	CalAm and MPWMD complete landscape water audits and budgets required by MPWMD's Rule 172.	Certified landscape irrigation auditors carried out 230 audits in 2010. The program was on hold for three years due to budget constraints and in 2013 a software problem. From 2010 through 2012 410 audits were completed. 14 large landscape and 4 large dedicated irrigation audits were completed in 2014.	123.00	2.93	2.93	0	Not quantified	Not quantified
Rebates	Provides customers incentives to upgrade to high efficiency/water saving fixtures and appliances.	Rebate applicants learn about the rebate program primarily through newspaper advertising, direct-mail rebate brochures sent to CalAm customers, and staff contacts at local outreach events.	62.21	25.01	2.59	57.38	75.88	32.07
Public Outreach and Education	CalAm and MPWMD implement a joint campaign to promote awareness about water-saving programs and the need for water conservation.	Outreach includes school presentations, a conservation website, print and television ads, radio announcements, mailed brochures and bill inserts, booths at community events, televised reports, and conservation classes.	Not quantifiable					
Commercial, Institutional & Industrial (CII) Audits	Water use surveys, including audit of water fixtures and water use patterns and behavior. Customers receive an audit report that includes findings, recommendations, and expected payback periods for recommended upgrades.	CalAm selects potential candidates with the greatest need for water savings. Audits are conducted by a contractor with follow-up by CalAm conservation staff.	47.17	43.00	60.00	9.00	8.93 Actual: 12 af	1.0
Rain Sensor Installation Program	Provides direct installation of rain sensors for residential, commercial and public authority customers.	CalAm began the program in October 2011.	-	2.37[a]	6[a]	100 Rain Sensors installed; Not quantified	39 Rain Sensors installed Not quantified.	39 Rain Sensors installed Savings not quantifiable

TABLE K-1 (Continued)
SUMMARY OF EXISTING SERVICE AREA CONSERVATION PROGRAMS

Program	Description	Promotion/Implementation	Estimated Savings (AF)					
			2010	2011	2012	2013	2014	2015
Free Water Usage	CalAm has 14 customers who receive “free water” in exchange for rights-of-way and/or transfer of riparian water rights to the Carmel River. The program is part of CalAm’s effort to limit customers’ usage and to determine whether CalAm can negotiate a termination of free service.	Cal Am contacted free water customers in 2010. Four residential landscape audits and one non-residential audit were performed. In 2012 CalAm started sending monthly statements to enable the free water customers to monitor usage.	3.00	6.00	6.00	-	-	-
Landscape Grant Program	Provides grants for the replacement of turf on city property with low-water-use landscaping or synthetic grass and/or for the installation of water saving irrigation technology. Provides funding for demonstration projects with high visibility, water savings, exemplary landscaping, and/or use of water saving-irrigation technology. CalAm began implementing the program in 2010.	CalAm sent letters about the program to the service area cities and the Presidio of Monterey in 2010 and 2013. In 2011, CalAm awarded grants for projects in the cities of Monterey and Seaside that were completed by the end of 2012 (4 af). In 2013, CalAm awarded grants for projects in the cities of Monterey and Pacific Grove (2.2 af). Grants provided to Monterey Peninsula Unified School District for 9 schools expected to save 1 million gallons per year.	-	-	4.0	2.2	Not quantified	3
Conservation Intern(s)	Internship position to assist with a variety of tasks relating to the conservation programs including planning, creating, and implementing conservation programs.	In December 2009 CalAm hired a conservation intern to assist with conservation program implementation.	Not quantifiable	Not quantifiable	Not quantifiable	Not quantifiable	Not quantifiable	-
Water Conservation Representative	Staff position to perform water waste enforcement and follow-up, participate in public outreach events, and perform property inspections and audits.	Maintain one staff position	Not quantifiable					
Water Conservation Seminars	Provide education hands-on learning with focus on reducing outdoor and CII water use.	MPWMD’s training agenda focuses on providing gardeners, landscapers, builders, homeowners, plumbers and others the tools necessary to maximize water efficiencies and includes workshops on rainwater harvesting and graywater use.						
Water Wise Gardening for Monterey County	Monterey area-specific gardening software designed to assist with water-efficient plant choices.	MPWMD licenses the product for web use, since 2009. Before that MPWMD had reprinted CDs for distribution.						
Linen/Towel Reuse Program	Provides cards notifying hotel customers of the option to either reuse or obtain new linens and towels, provides conservation message mirror clings, and provides “drinking water served only on request” tent cards for restaurants.	Reprints cards for placement in hotels and restaurants. The program is mandatory within the MPWMD.	up to 101 afy at 60% occupancy	up to 101 afy at 60% occupancy	up to 101 afy at 60% occupancy	up to 101 afy at 60% occupancy	up to 101 afy at 60% occupancy	up to 101 afy at 60% occupancy

TABLE K-1 (Continued)
SUMMARY OF EXISTING SERVICE AREA CONSERVATION PROGRAMS

Program	Description	Promotion/Implementation	Estimated Savings (AF)					
			2010	2011	2012	2013	2014	2015
California Irrigation Management Information System (CIMIS) Station Maintenance	CIMIS data are used by weather-based irrigation controllers. MPWMD sponsors three CIMIS stations on the Peninsula.	MPWMD staff maintains the stations by cleaning the devices periodically.	Not quantifiable					
Conservation Devices	MPWMD provides CalAm customers with various free water-savings devices including showerheads, bathroom and kitchen faucet aerators, leak detection tablets/kits, and outdoor water saving tools.	MPWMD distributes devices at community events, at the MPWMD front desk (to walk-in customers), at onsite inspections, upon customer request, during presentations, and during water waste enforcement visits.	18.94	24.31	25.26	14.48	32	22.38
Conservation Printed Material	The printed material program updates and distributes water conservation materials.	MPWMD prepares and distributes print material promoting water conservation, including brochures about the rebate program (drafted with CalAm), and rainwater harvesting and use of graywater.	Not quantifiable					
Water Waste Prohibitions	The program seeks to eliminate water running to waste and other forms of water waste.	Notification to property occupant and follow up to ensure corrections as needed.						
Water Rate Structure	CalAm employs a tiered water rate structure for residential and non-residential customers specifically designed tromote conservation.	A water rate increase affecting all accounts and dramatically increasing the fourth and fifth tiers of the residential rate structure took effect in February 2010 and some of the savings reported for the landscape audits in 2010 was attributable to the rate increase. A large increase in residential tiered rates in 2012 prompted an upsurge in demand for residential water audits.	see note b					
Mandatory Water Retrofit Requirements	New structures and sites that have change of ownership or use, or expansion of use, required to meet water efficiency standards.	Water savings verified by site inspections conducted to ensure compliance.		13.67	9.01	18.95	9.53	22.3
Total of Quantifiable Estimated Savings			366	242	239	238	264	222

NOTES:

[a] Actual savings reported in the following year's annual conservation report.

[b] The annual conservation reports generally do not quantify savings from the tiered rate structures but indicate that the rate structures are assumed to encourage participation in, and contribute to water savings reported for, other conservation programs that are quantified (such as the large landscape audit program and rain sensor installation program). The 2013 conservation report states that fifth tier residential water usage dropped from 598 acre-feet in 2007 to 212 acre-feet in 2013. In 2014 and 2015 fifth tier usage dropped to 194 acre-feet and 163 acre-feet, respectively. Rainfall during winter and summer months also affects outdoor usage; review of records over time indicates that fourth and fifth tier usage normally decreases during year of high rainfall and increased during years of low rainfall.

SOURCES: CalAm and MPWMD, 2011; CalAm and MPWMD, 2012; CalAm and MPWMD, 2013; CalAm and MPWMD, 2014; CalAm and MPWMD, 2015, CalAm and MPWMD, 2016.

Plumbing Code-Related Reductions

Water savings from plumbing code requirements accrue over time as water fixtures are replaced due to failure, aging, or remodeling, and must be replaced by more efficient models, pursuant to the state plumbing code (part of the state building code). CalAm and MPWMD have been implementing rebate and retrofit programs that encourage or require replacement or retrofitting of fixtures with more efficient models. This analysis assumes that a substantial portion of the savings that would be gained by plumbing code requirements has already been realized within the CalAm Monterey District service area and is reflected in existing service area demand.

Non-Revenue Water Reduction

Another element of demand management is reduction in non-revenue water. Non-revenue water (also referred to as unaccounted-for water) represents the difference between total water produced in a system (e.g., from CalAm's wells and distribution facilities) and total water billed to customers (i.e., water consumed). Reduction of system losses through maintenance and repair can make available for other uses water that was formerly lost in the system. As described in Chapter 2, Section 2.5.3.3, CalAm has undertaken efforts to reduce non-revenue water in its Monterey District, and CalAm's quarterly reports to the SWRCB (CalAm, 2011, 2012, 2013, 2014, 2015) indicate that CalAm has reduced system losses by an average of 506 afy over the past five years (water years 2010-2011 through 2014-2015). It is assumed that CalAm's program to address system losses would continue under the No Project/No Action Alternative pursuant to requirements of CPUC general rate case decisions requiring reduction in system losses. However, while additional reductions in demand associated with non-revenue water can be expected, data are not available to quantify potential additional future savings from such efforts. Over time, the size of additional reductions in system losses will inevitably decrease as the oldest and most leak-prone lines and mains are replaced and other efforts to reduce losses are implemented.

Water Recycling

Existing Recycled Water Projects

Water recycling involves treating wastewater to a quality suitable for irrigation and other nonpotable uses. In the Monterey area, wastewater is currently recycled by the MRWPCA, and through the Carmel Area Water District/Pebble Beach Community Services District (CAWD/PBCSD) Project, which is operated by CAWD. MRWPCA's Regional Treatment Plant is capable of producing an average of 29.6 million gallons per day (mgd) of recycled water (roughly 33,000 afy) for use as irrigation water in the northern Salinas Valley (MRWPCA, 2013). MRWPCA currently recycles 60 percent of the incoming wastewater (MRWPCA, 2015). While the Regional Treatment Plant has a dry weather design capacity of 29.6 mgd, it currently receives and treats approximately 18.5 mgd of wastewater and therefore has capacity to treat additional flows (MRWPCA, 2016).

The Pebble Beach Project recycles roughly 1,000 afy of wastewater (Stoldt, 2011),[2] which is used to meet 100 percent of the irrigation needs of all of the golf courses in the Del Monte Forest,[3] thereby offsetting the equivalent amount of potable water demand. Reductions in potable water demand resulting from the Pebble Beach Project, including its second phase which was completed in 2009, would largely be reflected in CalAm demand figures used for the MPWSP.

Pacific Grove Local Water Project

The City of Pacific Grove is developing the Pacific Grove Local Water Project. The primary goal of the Local Water Project is to provide high-quality recycled water to replace the use of potable water for non-potable water demands such as landscaping. The project consists of three components or phases that are considered in terms of the “Demand Groups” that would be served by each phase:

- Demand Group I would involve construction of a new Satellite Recycled Water Treatment Plant (SRWTP) that would provide up to 125 afy of non-potable recycled water to serve irrigation needs at the Pacific Grove Golf Links and the El Carmelo Cemetery, as well as water for toilet and urinal flushing at the golf links restrooms. In recognition of the water saved by this project, MPWMD established water entitlements totaling 75 afy of metered use, which would offset system demand of about 81 afy. Demand Group I of the Local Water Project is scheduled to be fully online before December 31, 2016 (Ordinance 168).

- Demand Group II would expand the SRWTP and the recycled water distribution system to serve numerous small irrigation sites (such as schoolyards, parks and playfields) throughout Pacific Grove, and would provide 99 afy. Construction of Demand Group II elements could begin following completion of project-level CEQA analysis and regulatory approval. This analysis assumes that such review and approval would be achieved, and the project implemented.

- Demand Group III would expand the SRWTP and serve larger-demand sites east and west of Pacific Grove. Demand Group III would connect to the CAWD/PBCSD recycled water system to the east and the Presidio of Monterey to the west, and would have the potential to meet 376 afy of recycled water demand. This component is not included in the total demand offset this analysis assumes the Pacific Grove Local Water Project will achieve, however, because it is less certain. It would require institutional agreements between Pacific Grove and CAWD/PBCSD and the Presidio of Monterey, as well as the identification of suitable sites and customers able to use recycled water to replace potable supply.

This alternatives analysis assumes that a total of 180 afy from implementation of Demand Groups I (81 afy) and II (99 afy) would be provided to offset potable demand.

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[2] CAWD/PBCSD sold 977 af of recycled water in 2012 and 965 af in 2013 (CAWD/PBCSD, 2013); SWRCB Order WR 2016-0016 refers to a demand offset from this project of about 970 afy.

[3] The golf courses are Pebble Beach Golf Links, Spyglass Hill, The Links at Spanish Bay, Peter Hay, Cypress Point, Monterey Peninsula Country Club, and Poppy Hills (CAWD, 2013).

Monterey-Pacific Grove Area of Special Biological Significance Stormwater Management Project

The Monterey-Pacific Grove ASBS Stormwater Management Project involves construction of a stormwater treatment plant at Point Pinos (near the proposed SRWTP described above) and multiple conveyance and storage structures, including restoration of the David Avenue Reservoir, construction of a new underground storage facility under a local school playfield that could potentially be used for irrigation during the dry season, and diversion structures that would direct runoff to MRWPCA's Regional Treatment Plant. The goal of this project is primarily to reduce the amount of polluted runoff entering the Pacific Grove Area of Special Biological Significance (ASBS) and secondarily to provide non-potable supply for irrigation or for the Groundwater Replenishment Project (GWR). While the project would prevent substantial quantities of untreated stormwater runoff from entering the ASBS, the certified FEIR identifies only a limited quantity – 12.3 afy – that is expected to specifically offset existing potable demand (City of Pacific Grove, 2014b). Water would be used for irrigation at the Robert Down Elementary School (5 afy), at Caledonia Park (1 afy), and at Point Pinos for the golf links or cemetery (6.3 afy). This alternatives analysis therefore assumes that implementation of the Monterey-Pacific Grove ASBS Stormwater Management Project would offset 12.3 afy of potable demand.

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APPENDIX L

Alternative Supply – Demand Scenarios

Sections 8.2.13.2 and 8.2.13.3 of Master Response 13, Demand (Project Need) and Growth, summarize the EIR/EIS demand and supply assumptions, respectively, and document why they are reasonable. However, questions have been raised as to whether the project is necessary or could be smaller if one considered different supply and demand numbers that some commenters believe are more reasonable than those used in the Draft EIR/EIS. This appendix was prepared to test that possibility by considering the results of using different supply and demand numbers. The primary consideration is whether facts exist to support a smaller desalination plant (e.g., having one less reverse osmosis [RO] unit) such that either a smaller plant or a phased plant could be approved for the 9.6 mgd project or the 6.4 mgd Alternative 5a. The results of this sensitivity analysis could inform and affect the ultimate project decision.

The alternative supply and demand scenarios include two demand scenarios, each coupled with six alternative supply scenarios. Alternative demand Scenario 1 assumes that annual demand consists of demand in 2013, rather than 2010, and alternative demand Scenario 2 assumes that annual demand consists of demand in 2015, rather than 2010. The recent drought was underway in 2013 but 2013 is the most recent demand year before the drought emergency regulations were issued in January 2014 and thus avoids potentially temporary decreases in demand that occurred in response to the declared drought emergency. Of the last two years for which demand data are available, as of September 2017, demand in 2015 was slightly higher than in 2016. Use of 2015 to represent annual demand assumes that much of the conservation programs and behaviors adopted during the drought, including during the declared drought emergency, will continue in the future, but allows for a slight “relaxation” in conservation compared to 2016, the last year of the five-year drought. Both the 2013 and 2015 demand scenarios also assume the following:

- the remaining Pebble Beach entitlement assumed for the MPWSP (325 afy) would need to be served, given that this volume represents an entitlement
- development of lots of record would require half as much supply as was assumed for the MPWSP and shown in EIR/EIS Table 2-3 (590 afy rather than 1,180 afy)
- economic recovery of the tourism industry would require half as much supply as was proposed for this demand component for the MPWSP and shown in EIR/EIS Table 2-3 (250 afy rather than 500 afy)

Table L-1 summarizes the two alternative demand scenarios and the demand assumed in the EIR/EIS.

TABLE L-1
MPWSP DEMAND AND ALTERNATIVE DEMAND SCENARIOS (AFY)

	MPWSP: 2010	Scenario 1: 2013	Scenario 2: 2015
Annual Demand	12,270	11,356	9,545
Pebble Beach Entitlements	325	325	325
Anticipated Demands[a]	1,680	840	840
Total	**14,270**	**12,521**	**10,710**

NOTES:

[a] Anticipated demands consist of demand associated with development of currently vacant lots of record and economic recovery of the hospitality industry.

The two demand scenarios were combined with variations on the amount of water assumed to be provided by two of CalAm's other supply sources, the Sand City desalination plant and the Seaside Basin Aquifer Storage and Recovery (ASR) system. Specifically, the alternative supply scenarios assumed that the Sand City desalination plant would provide either 94 afy, CalAm's long-term[1] share of plant production pursuant to agreements between CalAm and the city of Sand City as assumed for the MPWSP, or 230 afy, the amount assumed to be available to CalAm until Sand City needs the 136 afy difference for its own use, as described in Note f in EIR/EIS Table 2-4, and in EIR/EIS Section 5.4.2 under the discussion of No Project Alternative. The timing and amount of availability of water for CalAm in excess of 94 afy is solely a function of growth in Sand City. The latter assumption would require that by the time Sand City needs any of the 136 afy above CalAm's long term supply, CalAm will have identified a replacement supply for it or that service area demand will have been reduced by this amount. The supply scenarios include three possible ASR system supplies: 1,300 afy, as assumed for the MPWSP; 1,600 afy, as MPWMP currently estimates assuming construction of the new Monterey Pipeline and accounting for different water year types; or no water from the ASR system, to approximate ASR supply in drought conditions when any ASR reserves have been depleted and stream flows are too low to divert water from the Carmel River for ASR injection. All supply scenarios assume that 3,376 afy is available from the Carmel River, consistent with SWRCB Order 95-10's determination of CalAm's lawful right, and that CalAm is providing in lieu replenishment to the Seaside Groundwater Basin (SGB) such that 774 afy of CalAm's 1,474 afy adjudicated right is available to CalAm. **Table L-2** summarizes the alternative supply scenarios. The two demand and three supply scenarios were combined to create six supply and demand scenarios assuming 2013 annual demand (Scenarios 1a through 1f) and six assuming 2015 annual demand (Scenarios 2a through 2f). Scenarios 1a and 2a assume the same supply volumes assumed for the MPWSP during the Seaside Groundwater Basin replenishment period, but combined with the alternative demand scenarios described above. **Tables L-3 and L-4** show the assumptions for the combined supply and demand scenarios. Each scenario assumed a 6 percent Salinas Valley Groundwater Basin (SVGB) return water obligation for a 9.6 mgd plant 1,620 afy.

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[1] MPWMD Ordinance 132 indicates that the 94 afy is permanently added to the broader CalAm system.

TABLE L-2
ALTERNATIVE SUPPLY SCENARIOS (AFY)

	Supply Scenario a	Supply Scenario b	Supply Scenario c	Supply Scenario d	Supply Scenario e	Supply Scenario f
Sand City Desalination Supply	94[a]	230[b]	94[a]	230[b]	94[a]	230[b]
ASR Supply	1,300[c]	1,300[c]	1,600[d]	1,600[d]	0[e]	0[e]
Carmel River Supply	3,376	3,376	3,376	3,376	3,376	3,376
Seaside Groundwater Basin Supply	774	774	774	774	774	774
Total Other Supplies	**5,544**	**5,680**	**5,844**	**5,980**	**4,244**	**4,380**

NOTES:

[a] CalAm's long-term supply from the Sand City desalination plant.

[b] Estimated near-term supply available to CalAm from the Sand City desalination plant.

[c] Average annual ASR supply assumed for the MPWSP.

[d] Average annual ASR supply estimated by MPWMD to be available with the Monterey Pipeline and accounting for different water year types.

[e] ASR supply in an extended drought that has depleted previously injected supplies.

TABLE L-3
SCENARIO 1A-1F (AFY)

	Scenario 1a	Scenario 1b	Scenario 1c	Scenario 1d	Scenario 1e	Scenario 1f
Annual Demand	11,356	11,356	11,356	11,356	11,356	11,356
Pebble Beach Entitlements	325	325	325	325	325	325
Anticipated Demands[a]	840	840	840	840	840	840
Total Demand	**12,521**	**12,521**	**12,521**	**12,521**	**12,521**	**12,521**
Sand City Desalination Supply	94[b]	230[c]	94[b]	230[c]	94[b]	230[c]
ASR Supply	1,300[d]	1,300[d]	1,600[e]	1,600[e]	0[f]	0[f]
Carmel River Supply	3,376	3,376	3,376	3,376	3,376	3,376
Seaside Groundwater Basin Supply	774	774	774	774	774	774
Total Other Supplies	**5,544**	**5,680**	**5,844**	**5,980**	**4,244**	**4,380**

NOTES:

[a] Anticipated demands consist of demand associated with development of currently vacant lots of record (590 afy) and economic recovery of the hospitality industry (250 afy).

[b] CalAm's long-term supply from the Sand City desalination plant.

[c] Estimated near-term supply available to CalAm from the Sand City desalination plant.

[d] Average annual ASR supply assumed for the MPWSP.

[e] Average annual ASR supply estimated by MPWMD to be available with the Monterey Pipeline and accounting for different water year types.

[f] ASR supply in an extended drought that has depleted previously injected supplies.

TABLE L-4
SCENARIO 2A-2F (AFY)

	Scenario 2a	Scenario 2b	Scenario 2c	Scenario 2d	Scenario 2e	Scenario 2f
Annual Demand	9,545	9,545	9,545	9,545	9,545	9,545
Pebble Beach Entitlements	325	325	325	325	325	325
Anticipated Demands[a]	840	840	840	840	840	840
Total Demand	**10,710**	**10,710**	**10,710**	**10,710**	**10,710**	**10,710**
Sand City Desalination Supply	94[b]	230[c]	94[b]	230[c]	94[b]	230[c]
ASR Supply	1,300[d]	1,300[d]	1,600[e]	1,600[e]	0[f]	0[f]
Carmel River Supply	3,376	3,376	3,376	3,376	3,376	3,376
Seaside Groundwater Basin Supply	774	774	774	774	774	774
Total Other Supplies	**5,544**	**5,680**	**5,844**	**5,980**	**4,244**	**4,380**

NOTES:

[a] Anticipated demands consist of demand associated with development of currently vacant lots of record (590 afy) and economic recovery of the hospitality industry (250 afy).

[b] CalAm's long-term supply from the Sand City desalination plant.

[c] Estimated near-term supply available to CalAm from the Sand City desalination plant.

[d] Average annual ASR supply assumed for the MPWSP.

[e] Average annual ASR supply estimated by MPWMD to be available with the Monterey Pipeline and accounting for different water year types.

[f] ASR supply in an extended drought that has depleted previously injected supplies.

The proposed MPWSP 9.6 mgd desalination plant would consist of six 1.6 mgd reverse osmosis (RO) units and the 6.4 mgd plant considered under Alternative 5a would consist of four 1.6 mgd RO units. The desalination plant must provide adequate supply, with CalAm's other sources, to meet peak hour, day, and month demands. For either a smaller plant or a phased plant to be feasible based on any of these the alternative supply and demand scenarios, this analysis assumes that average daily supply each month must exceed average daily demand by 1.6 mgd or more, such that it would be feasible, at least theoretically, to eliminate an RO unit. With these considerations in mind, monthly operations tables were prepared based on the 12 supply and demand scenarios described above. Total system demand plus SVGB return water requirements were subtracted from total system supplies. The 1.6 mgd was then subtracted from that difference each month. For most scenarios the result of subtracting 1.6 mgd were positive in some months (indicating there was enough excess supply that month to remove 1.6 mgd) and negative in other months (there was not enough excess supply that month to remove 1.6 mgd without incurring a supply shortfall).

This analysis assumes that excess supply available in those months showing excess supply (a positive difference) could be shifted to months showing a deficit in supply (a negative difference). For example, if after subtracting 1.6 mgd there was a shortfall of supply to meet demand one month, the amount of supply delivered to ASR storage could be reduced that month and the amount of supply delivered directly to the distribution system increased by a corresponding quantity. In a month showing excess supply, the amount of supply delivered to ASR storage could be increased, to compensate for the decrease made in another month, and the amount of supply delivered to the distribution system decreased. To test whether supply deficits shown for any months could be averted by shifts in supply going to ASR storage versus going to the distribution system, the results for each month of subtracting 1.6 mgd from the difference of total supply minus total production demand were added together for the year. If that sum was positive, it was assumed that supplies could be shifted such that supplies would be adequate to meet demands in all months if an RO unit were eliminated. If that sum was negative, it was assumed that excess supplies were insufficient to eliminate supply deficits in one or more months if an RO unit were eliminated. This is only a preliminary test of the potential to reduce plant size based on the alternative supply and demand assumptions. **Tables L-5 through L-16** showing monthly operations for each scenario are presented at the end of this appendix.

Results

Scenario 1: Assuming that the ASR system provided at least as much supply as the 1,300 afy assumed in the Draft EIR/EIS – i.e., Scenarios 1a, 1b, 1c, and 1d in Table L-4 – the plant size could be reduced by one 1.6 mgd RO unit. This would reduce the plant size from 9.6 to 8.0 mgd for the proposed project or from 6.4 to 4.8 mgd for Alternative 5a. However, in a drought when little or no supply was available from the ASR system – Scenarios 1e and 1f in Table L-4 – there would be insufficient supply to meet demand if the plants were one RO unit smaller. For all Scenario 1 options, the amount of supply provided when all proposed RO units were operational would not exceed the amount of water needed for growth under adopted general plans discussed in the Draft EIR/EIS. Therefore, the supply and demand assumptions in these scenarios would not change the Draft EIR/EIS conclusions about the project's growth inducing impact. A key issue, in considering Scenarios 1a through 1f, is that the recent severe, five year drought demonstrated that it is not reasonable to assume that there would never be drought conditions that could deplete ASR reserves. Consequently, any reductions in plant size based on scenarios that assume adequate ASR supplies would be available in all years would need to be considered carefully.

Scenario 2: Based on Scenario 2 demand assumptions, the plant size could be reduced by one RO unit even in drought conditions with no ASR supply. Assuming the availability of ASR system supplies, i.e., non-drought conditions – Scenarios 2a, 2b, 2c, and 2d in Table L-5 – plant size could be reduced by two RO units. This would reduce the plant size from 9.6 to 6.4 mgd for the proposed project or from 6.4 to 3.2 mgd for Alternative 5a. However, in a drought when little or no supply was available from the ASR system – Scenarios 2e and 2f in Table L-5 – there would be insufficient supply to meet assumed demands if the plants were two RO units smaller. Under Scenarios 2a through 2d, which would allow for elimination of two RO units, if at least one unit was *not* eliminated, the amount of supply that could be provided in excess of demand **would exceed the amount of water needed for growth under adopted general plans described in the Draft EIR/EIS. This would change the Draft EIR/EIS conclusion regarding the consistency of the project with planned growth and thus the project's growth inducing impact.** However, as discussed above regarding Scenario 1, the recent drought has shown that it is not reasonable to assume there will never be drought conditions that could deplete ASR reserves and eliminate this as a supply source in some years. Given that development under general plan buildout would require adequate supply in all water year types, including droughts, Scenarios 2e and 2f – are more reasonable scenarios to plan for to ensure the adequacy of supplies in all years. Supplies under these scenarios are therefore the more appropriate volumes with which to compare with the amount of water needed for general plan buildout. The amount of water that would be provided in excess of demand under Scenarios 2e and 2f is within the amount of water needed for growth under adopted general plans discussed in the Draft EIR/EIS; therefore, the supply and demand assumptions in these scenarios would not change the Draft EIR/EIS conclusions about the project's growth inducing impact.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario a: 1300 afy from ASR; 94 afy from Sand City desalination plant	**Table X-5: Scenario 1a**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	10.9	14.1	16.1	16.7	16.4	16.1	13.0	11.1	9.1	14,300	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.6**	**16.4**	**18.6**	**19.1**	**18.8**	**18.6**	**14.6**	**11.7**	**9.6**	**15,920**	
Difference -Total Supply minus Total Production Demand	1.0	0.8	0.6	-0.3	1.3	3.1	3.3	3.0	3.4	1.6	1.0	-0.1	1,765	
Minus 1.6 mgd	-0.6	-0.8	-1.0	-1.9	-0.3	1.5	1.7	1.4	1.8	0.0	-0.6	-1.7	Sum Less 1 RO = ~0 -->	-0.3
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.6	4.4	7.3	7.8	7.4	7.4	3.3	1.0	0.0	**3,675**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario b: 1300 afy from ASR; 230 afy from Sand City desalination plant	**Table X-6: Scenario 1b**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)^{a}**	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	11.1	14.2	16.2	16.8	16.5	16.2	13.1	11.2	9.2	14,436	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.8**	**16.5**	**18.7**	**19.2**	**18.9**	**18.7**	**14.7**	**11.8**	**9.7**	**16,056**	
Difference -Total Supply minus Total Production Demand	1.2	1.0	0.8	-0.1	1.4	3.2	3.4	3.1	3.5	1.7	1.1	0.0	1,902	
Minus 1.6 mgd	-0.4	-0.6	-0.8	-1.7	-0.2	1.6	1.8	1.5	1.9	0.1	-0.5	-1.6	Sum Less 1 RO = Positive -->	1.1
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.6	4.4	7.3	7.8	7.4	7.4	3.3	1.0	0.0	**3,675**	
a Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.														

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario c: 1600 afy from ASR; 94 afy from Sand City desalination plant	**Table X-7: Scenario 1c**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	11.0	14.5	16.6	17.2	16.9	16.6	13.2	11.3	9.1	14,568	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.8**	**16.8**	**19.0**	**19.6**	**19.3**	**19.0**	**14.9**	**11.9**	**9.6**	**16,188**	
Difference -Total Supply minus Total Production Demand	1.0	0.8	0.6	-0.1	1.6	3.6	3.8	3.5	3.9	1.9	1.2	-0.1	2,033	
Minus 1.6 mgd	-0.6	-0.8	-1.0	-1.7	0.0	2.0	2.2	1.9	2.3	0.3	-0.4	-1.7	Sum Less 1 RO = Positive -->	2.5
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.7	4.7	7.8	8.3	7.9	7.9	3.5	1.2	0.0	**3,943**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario d: 1600 afy from ASR; 230 afy from Sand City desalination plant	Table X-8: Scenario 1d													
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total (afy)[a]	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	11.2	14.6	16.7	17.3	17.0	16.7	13.3	11.4	9.2	14,704	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.9**	**16.9**	**19.1**	**19.7**	**19.4**	**19.1**	**15.0**	**12.1**	**9.7**	**16,324**	
Difference -Total Supply minus Total Production Demand	1.2	1.0	0.8	0.0	1.7	3.7	3.9	3.6	4.0	2.0	1.3	0.0	2,170	
Minus 1.6 mgd	-0.4	-0.6	-0.8	-1.6	0.1	2.1	2.3	2.0	2.4	0.4	-0.3	-1.6	Sum Less 1 RO = Positive -->	5.6
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.7	4.7	7.8	8.3	7.9	7.9	3.5	1.2	0.0	**3,943**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario e: 0 afy from ASR; 94 afy from Sand City desalination plant	**Table X-9: Scenario 1e**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	10.3	12.5	13.8	14.2	13.9	13.8	11.6	10.1	9.1	12,968	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.0**	**14.8**	**16.3**	**16.6**	**16.3**	**16.3**	**13.2**	**10.7**	**9.6**	**14,588**	
Difference -Total Supply minus Total Production Demand	1.0	0.8	0.6	-0.9	-0.3	0.8	0.8	0.5	1.1	0.2	0.0	-0.1	433	
Minus 1.6 mgd	-0.6	-0.8	-1.0	-2.5	-1.9	-0.8	-0.8	-1.1	-0.5	-1.4	-1.6	-1.7	Sum Less 1 RO = Negative -->	-14.5
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	**2,343**	

a Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 1: Annual demand =2013 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario f: 0 afy from ASR; 230 afy from Sand City desalination plant	**Table X-10: Scenario 1f**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.5	8.9	9.7	11.2	12.8	13.0	13.4	13.4	12.7	11.3	10.1	9.2	12,534	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	9.0	9.4	10.3	11.9	15.1	15.5	15.8	15.8	15.1	13.0	10.8	9.7	14,154	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	10.5	12.6	13.9	14.3	14.0	13.9	11.7	10.2	9.2	13,104	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.2**	**14.9**	**16.4**	**16.7**	**16.4**	**16.4**	**13.3**	**10.8**	**9.7**	**14,724**	
Difference -Total Supply minus Total Production Demand	1.2	1.0	0.8	-0.7	-0.2	0.9	0.9	0.6	1.2	0.3	0.1	0.0	570	
Minus 1.6 mgd	-0.4	-0.6	-0.8	-2.3	-1.8	-0.7	-0.7	-1.0	-0.4	-1.3	-1.5	-1.6	Sum Less 1 RO = Negative -->	-13.1
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	**2,343**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario a: 1300 afy from ASR; 94 afy from Sand City desalination plant	**Table X-11: Scenario 2a**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)[a]**	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	10.9	14.1	16.1	16.7	16.4	16.1	13.0	11.1	9.1	14,300	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.6**	**16.4**	**18.6**	**19.1**	**18.8**	**18.6**	**14.6**	**11.7**	**9.6**	**15,920**	
Difference -Total Supply minus Total Production Demand	1.2	1.3	1.5	1.3	4.1	5.3	5.3	4.8	4.9	3.3	3.4	1.9	3,576	
Minus 1.6 mgd	-0.4	-0.3	-0.1	-0.3	2.5	3.7	3.7	3.2	3.3	1.7	1.8	0.3	Sum Less 1 RO = Positive -->	19.0
Minus 3.2 mgd	-2.0	-1.9	-1.7	-1.9	0.9	2.1	2.1	1.6	1.7	0.1	0.2	-1.3	Sum Less 2 RO = ~0 -->	-0.2
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.6	4.4	7.3	7.8	7.4	7.4	3.3	1.0	0.0	**3,675**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

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	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario b: 1300 afy from ASR; 230 afy from Sand City desalination plant	**Table X-12: Scenario 2b**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)[a]**	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	11.1	14.2	16.2	16.8	16.5	16.2	13.1	11.2	9.2	**14,436**	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.8**	**16.5**	**18.7**	**19.2**	**18.9**	**18.7**	**14.7**	**11.8**	**9.7**	**16,056**	
Difference -Total Supply minus Total Production Demand	1.3	1.4	1.6	1.5	4.2	5.4	5.4	4.9	5.0	3.4	3.5	2.0	3,712	
Minus 1.6 mgd	-0.3	-0.2	0.0	-0.1	2.6	3.8	3.8	3.3	3.4	1.8	1.9	0.4	Sum Less 1 RO = Positive -->	20.5
Minus 3.2 mgd	-1.9	-1.8	-1.6	-1.7	1.0	2.2	2.2	1.7	1.8	0.2	0.3	-1.2	Sum Less 2 ROs = Positive -->	1.3
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.6	1.6	2.3	2.5	2.5	2.3	1.4	1.0	0.0	1,332	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.6	4.4	7.3	7.8	7.4	7.4	3.3	1.0	0.0	**3,675**	

a Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario c: 1600 afy from ASR; 94 afy from Sand City desalination plant	**Table X-13: Scenario 2c**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	11.0	14.5	16.6	17.2	16.9	16.6	13.2	11.3	9.1	14,568	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.8**	**16.8**	**19.0**	**19.6**	**19.3**	**19.0**	**14.9**	**11.9**	**9.6**	**16,188**	
Difference -Total Supply minus Total Production Demand	1.2	1.3	1.5	1.4	4.4	5.8	5.8	5.3	5.3	3.6	3.6	1.9	3,844	
Minus 1.6 mgd	-0.4	-0.3	-0.1	-0.2	2.8	4.2	4.2	3.7	3.7	2.0	2.0	0.3	Sum Less 1 RO = Positive -->	21.8
Minus 3.2 mgd	-2.0	-1.9	-1.7	-1.8	1.2	2.6	2.6	2.1	2.1	0.4	0.4	-1.3	Sum Less 2 ROs = Positive -->	2.6
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.7	4.7	7.8	8.3	7.9	7.9	3.5	1.2	0.0	**3,943**	
a Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.														

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario d: 1600 afy from ASR; 230 afy from Sand City desalination plant	**Table X-14: Scenario 2d**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	11.2	14.6	16.7	17.3	17.0	16.7	13.3	11.4	9.2	14,704	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.9**	**16.9**	**19.1**	**19.7**	**19.4**	**19.1**	**15.0**	**12.1**	**9.7**	**16,324**	
Difference -Total Supply minus Total Production Demand	1.3	1.4	1.6	1.6	4.5	5.9	5.9	5.4	5.4	3.7	3.7	2.0	3,981	
Minus 1.6 mgd	-0.3	-0.2	0.0	0.0	2.9	4.3	4.3	3.8	3.8	2.1	2.1	0.4	Sum Less 1 RO = Positive -->	23.3
Minus 3.2 mgd	-1.9	-1.8	-1.6	-1.6	1.3	2.7	2.7	2.2	2.2	0.5	0.5	-1.2	Sum Less 2 ROs = Positive -->	4.1
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.7	1.9	2.8	3.0	3.0	2.8	1.7	1.2	0.0	1,600	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.7	4.7	7.8	8.3	7.9	7.9	3.5	1.2	0.0	**3,943**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario e: 0 afy from ASR; 94 afy from Sand City desalination plant	**Table X-15: Scenario 2e**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)**[a]	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	94	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.5	9.8	10.3	10.3	12.5	13.8	14.2	13.9	13.8	11.6	10.1	9.1	12,968	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.0**	**10.2**	**10.9**	**11.0**	**14.8**	**16.3**	**16.6**	**16.3**	**16.3**	**13.2**	**10.7**	**9.6**	**14,588**	
Difference -Total Supply minus Total Production Demand	1.2	1.3	1.5	0.7	2.5	3.0	2.8	2.3	2.6	1.9	2.4	1.9	2,244	
Minus 1.6 mgd	-0.4	-0.3	-0.1	-0.9	0.9	1.4	1.2	0.7	1.0	0.3	0.8	0.3	Sum Less 1 RO = Positive -->	4.8
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	**2,343**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.

	31	28	31	30	31	30	31	31	30	31	30	31		
Demand Scenario 2: Annual demand =2015 demand, Pebble Beach=325, Lots of Record =590, Economic Recovery=250. Supply Scenario f: 0 afy from ASR; 230 afy from Sand City desalination plant	**Table X-16: Scenario 2f**													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total (afy)[a]**	
Average Demand	8.4	8.5	8.8	9.6	10.0	10.8	11.4	11.6	11.2	9.6	7.7	7.2	10,724	
Water Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Water Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total System Production Demand	8.8	9.0	9.4	10.3	12.3	13.3	13.8	14.0	13.7	11.3	8.4	7.7	12,344	
System Supplies														
Carmel River to Distribution System	5.7	5.7	5.7	5.2	2.2	1.0	1.0	1.0	1.0	1.0	1.0	5.7	3,366	
Seaside Supply to Distribution System	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.3	1.1	1.1	1.1	0.0	771	
Sand City Desalinated Supply to Distribution System	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	230	
ASR - GWR Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Carmel River Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
ASR - Desalination Supplies Extracted from SGWB	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
MPWSP Desalinated Supplies to Conveyance System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Total Supplies to Distribution System	9.7	9.9	10.5	10.5	12.6	13.9	14.3	14.0	13.9	11.7	10.2	9.2	13,104	
Supplies to Distribution System + Salinas Valley Return [from below]	**10.1**	**10.4**	**11.0**	**11.2**	**14.9**	**16.4**	**16.7**	**16.4**	**16.4**	**13.3**	**10.8**	**9.7**	**14,724**	
Difference -Total Supply minus Total Production Demand	1.3	1.4	1.6	0.9	2.6	3.1	2.9	2.4	2.7	2.0	2.5	2.0	2,380	
Minus 1.6 mgd	-0.3	-0.2	0.0	-0.7	1.0	1.5	1.3	0.8	1.1	0.4	0.9	0.4	Sum Less 1 RO = Positive -->	6.3
MPWSP Desalinated Plant Operations														
Desalinated Supplies for Distribution System	3.8	4.0	4.6	5.1	6.3	6.5	6.5	6.6	6.5	7.5	7.9	3.3	6,394	
Desalinated Supplies for ASR Injection	5.4	5.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.8	2,347	
Desalinated Supplies for Salinas Valley Return - Castroville	0.5	0.5	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.7	0.5	800	
Desalinated Supplies for Salinas Valley Return - CSIP	0.0	0.0	0.0	0.0	1.5	1.6	1.6	1.6	1.6	0.9	0.0	0.0	820	
Total Desalinated Supplies	**9.6**	**9.5**	**9.6**	**9.3**	**8.6**	**9.0**	**8.9**	**9.0**	**9.0**	**9.2**	**9.6**	**9.6**	**10,361**	
Supplies Extracted from Seaside Groundwater Basin (via ASR)														
GWR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Carmel River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Desalinated Supplies	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	2,343	
Total Extraction	0.0	0.0	0.0	0.0	2.8	5.0	5.3	4.9	5.1	1.9	0.0	0.0	**2,343**	

[a] Annual totals were calculated from the estimated monthly operations shown here and may differ from annual information presented in text due to rounding.