

Resolution 2016-04
of the
Fox Canyon Groundwater Management Agency

CONCERNING
ADJUSTMENTS TO EXTRACTION ALLOCATION FOR THE CITY OF CAMARILLO
REGARDING SPECIAL USE OF MOUNDED, DEGRADED WATER IN THE NORTH EASTERN
PORTION OF THE PLEASANT VALLEY BASIN

WHEREAS, the Fox Canyon Groundwater Management Agency ("Agency") was established to preserve the integrity of the quality and quantity of groundwater resources within its boundaries and manage the groundwater resources for the common benefit of the public and all agricultural, municipal and industrial users; and

WHEREAS, the Agency exercises its regulatory authority through ordinances, resolutions, and implementation of its adopted groundwater management plan; and

WHEREAS, the Sustainability Groundwater Management Act (SGMA) requires groundwater basins within California be sustainably managed; and

WHEREAS, the Agency is a groundwater sustainability agency (GSA) under SGMA for the portion of all groundwater basins within the Agency's boundary; and

WHEREAS, the current groundwater management plan ("Management Plan") was updated and adopted in May 2007. The Management Plan provides an extensive evaluation of the varying conditions in aquifers within the Agency and an assessment of the water management strategies that various entities propose for implementation within the Agency; and

WHEREAS, the Management Plan finds that the South and East Las Posas Basins and northern Pleasant Valley Basin are subject to continuing groundwater quality degradation and rising groundwater levels as a result of the large volume of poor quality water originating outside Agency boundaries and flowing into and recharging these basins; and

WHEREAS, the Management Plan identifies the development of a brackish groundwater desalination project as a strategy for improving groundwater quality in the Pleasant Valley Basin; and

WHEREAS, the Management Plan also finds that the area south of Highway 101 in the Pleasant Valley Basin is subject to significant water level decline and degraded water quality because of continued over-pumping and saline intrusion from surrounding sediments; and

WHEREAS, the City of Camarillo ("City") proposes to construct a groundwater desalter in the north eastern portion of the Pleasant Valley Basin in an area of significant groundwater quality degradation ("Desalter Project") as a groundwater remediation project; and

WHEREAS, the Desalter Project will have a 25-year life expectancy, after which it is anticipated that groundwater levels in the Pleasant Valley groundwater basin will be at conditions prior to the brackish water entering the basin, and will be allowed to recover to sustainable conditions; and

WHEREAS, the City on June 10, 2015, adopted a Final Environmental Impact Report (FEIR) for the Desalter Project; and

WHEREAS, the City on June 20, 2016, adopted a Supplemental Environmental Impact Report (SEIR), for the Desalter Project, and

WHEREAS, pursuant to the Agency Ordinance Code, the Agency Board of Directors has the authority to approve adjustment to the City's groundwater pumping allocation to support the operation of the Desalter Project and may impose conditions on the approval as may be appropriate to ensure that there is no net detriment to the aquifer systems; and

WHEREAS, the Agency has considered the environmental effects of the Desalter Project as shown in the FEIR (June 2015) and SEIR (June 2016) and made the findings required by California Environmental Quality Act Guidelines section 15091.

NOW, THEREFORE, IT IS HEREBY PROCLAIMED AND RESOLVED AS FOLLOWS:

The Agency authorizes the Desalter Project as proposed by the City subject to the conditions described below.

1. The City is authorized to extract a maximum of 4,500 acre-feet per year (AFY) for operation of the Desalter Project, without incurring surcharges or penalties for exceeding its groundwater allocation.
2. The City will report all groundwater extractions to the Agency on semi-annual extraction reports, along with a summary of the volume of groundwater extracted by well and water classification (as project-related or other).
3. Groundwater extracted and treated by the Desalter Project shall not be exported outside of the Agency either directly or indirectly, and shall be provided exclusively to City water customers within its service area which is located within the Pleasant Valley Basin.
4. The City has provided a Monitoring and Contingency Plan (included as Attachment No. 1) for the proposed groundwater pumping allowed pursuant to this Resolution. The Monitoring and Contingency Plan shall be revised by the City in accordance with Sections 5 of this Resolution, and approved by the Agency no later than six (6) months from the date of adoption of this Resolution.
5. The Monitoring and Contingency Plan shall be revised (Revised Plan) to add the following:
 - a. The State Well Numbers for all wells that are included in the groundwater level and water quality monitoring programs along with depth of well, screened interval(s) and name of aquifer being monitored.
 - b. Surface water monitoring and measuring station(s) locations and station number (or identification name), for water leaving the East Las Posas Basin and entering the Pleasant Valley Basin.
 - c. The quantity of subsurface inflow entering the Pleasant Valley Basin.
 - d. A description of groundwater monitoring program consisting of water level and water quality monitoring that is designed to detect ongoing conditions and delineate the vertical and lateral extent of the brackish groundwater plume within the Pleasant Valley Basin. Water level and quality data shall be collected on an ongoing basis for use to assess basin conditions and provide for the ongoing use for any future regional groundwater model in evaluating basin conditions.

- e. Identification of the lateral monitoring well, to the east of the City's extraction well field in the vicinity of the Arroyo Las Posas, to be included in the monitoring program.
6. Prior to operation of the Desalter Project, the City will drill and complete all monitoring wells associated with this project, implement the Revised Plan, and submit baseline monitoring data to the Agency.
7. Operational Triggers
- a. Water Level: The City shall reduce Desalter Project extractions when static water levels reach the depth in feet below sea level at well State Well No. 02N20W19M06S, or 02N20W19E01S as indicated in the Table below.

Measured Static Groundwater Elevation (ft msl) at 19E01 or 19M06	Pumping Reduction (%)
-126	10
-140	20
-150	30
-153	40
-157	50
-160	75
-168	100

- b. Water Quality: As more fully discussed in the Monitoring and Contingency Plan, if groundwater quality monitoring discloses extended pumping of non-brackish groundwater then the City's operations of the Desalter would no longer be eligible for the pumping authorization granted by this Resolution.

For purposes of defining non-brackish groundwater manganese is considered the most reliable constituent to use as an index of fresh and brackish water, at a threshold of 50 ug/L. Using this threshold, pumped groundwater with manganese concentrations above 50 ug/L¹ would be considered brackish water and its removal beneficial to the aquifers. Concentrations below that level would be considered fresh water pumping and debited against the City's extraction allocation. Water quality triggers for the project as groundwater quality improves will be as follows:

¹ Combined monthly weighted average based on analytical results for groundwater samples collected from project extraction facilities during subject month and quantity of groundwater extracted from each well sampled during subject month.

Contingency	Project well pumping brackish water has Manganese drop below 50 ug/L ¹	Project well pumping fresh water has Manganese increase to above 50 ug/L ¹
Action	Begin one year verification period	Begin one year verification period
Considered Fresh Water	Monthly testing remains 50 ug/L for Manganese during verification period	Any monthly test is below 50 ug/L Manganese
Add'l Evaluation	Evaluate whether regional conditions contributed to drop	Evaluate whether regional conditions contributed to increase
Considered Brackish Water	Any monthly test exceeds 50 ug/L Manganese	Monthly tests remain above 50 ug/L Manganese for verification period
Termination of Action	One year of pumping below 50 ug/L Manganese (reverts to fresh water) or any monthly test greater than 50 ug/L Manganese (remains brackish water)	One year of pumping above 50 ug/L Manganese (reverts to brackish water) or any test less than 50 ug/L Manganese (remains fresh water)
FCGMA Allocation	Project specific allocation	Prorated use of City's allocation*
Sunset Provision	If well pumps fresh water for 24 consecutive months, well permanently reverts to fresh water status	

c. Subsidence: In order to minimize subsidence caused by the project, the City will monitor for impacts related to subsidence in the following manner.

- (1) The subsidence monitoring will occur in the project area by survey (traditional survey or LIDAR) every five (5) years to detect possible changes in elevation related to subsidence.
- (2) Subsidence will be measured at the project extraction well sites.
- (3) If the subsidence is five inches or more in elevation (as part of routine five year monitoring program) from that detected prior to project operation, then the City will implement the following actions:
 - (a) Annual survey monitoring; and
 - (b) Reduce pumping by 10%
- (4) The procedures during the annual survey monitoring will be as follows:
 - (a) For each year that the subsidence is greater than one inch the City will reduce pumping by 5%.
 - (b) If subsidence is less than one inch per year for two consecutive years, then the City may increase pumping up to the maximum pumping level as originally authorized by this Resolution.

d. Seawater Intrusion Gradient Reversal: The following contingency measure is designed to maintain the seaward groundwater gradient between the project and the pumping depression located along the southern and western edge of the basin. To calculate the gradient, two sets of nested monitoring wells were selected – one an existing USGS monitoring well (02N21W34G02S through 05S) and the other a new nested monitoring well to be constructed as part of this project (project Monitoring Well at location B, near City Hall, with one nested well screened in the Hueneme Aquifer and the other nested well screened in the Fox Canyon Aquifer). The aquifer zones being monitored at each nested monitoring

well site are to be in hydraulic communication. The gradient between the two nested monitoring well sites in fall 2013² was southwestward with a hydraulic head difference of 85 feet over a distance of approximately one (1) mile. When static (non-pumping) groundwater elevations decrease to 15 feet or less between the two wells (elevation in Monitoring Well B minus elevation in 34G equivalent nested monitoring well), automatic cutbacks in project pumping would be implemented and the FCGMA would be informed of the trigger exceedance. The mitigation would be that project pumping would be reduced by 10%. If this action does not mitigate the problem, then pumping would be reduced an additional percentage based on the following table. This step-wise reduction would continue as shown in the table below until either the difference in groundwater elevations stabilizes or project production has been eliminated.

Groundwater Elevation Difference Between Monitoring Wells B (ft) and 34G02 through 05 (ft) (Elev B minus Elev of correlative unit in monitoring wells 34G02 through 05)	Percent Pumping Reduction (%)
15	10%
10	20%
7	30%
4	40%
2	50%
0 or negative	100%

The opposite would occur if the difference in groundwater elevations between the two wells increases. For each step-wise increase in the difference, a corresponding increase in project pumping would occur. When the difference in groundwater elevations returns to above 15 feet, full project production would resume.

8. Annual Report: An Annual Report shall be prepared summarizing data collected each calendar year and submitted to FCGMA and interested parties by April 1. The Annual Report shall include the following information:
 - a. A summary of project monthly groundwater extraction by well, treatment, and disposal (brineline) volumes, as well as volume of treated water delivered to City of Camarillo customers.

² Per report prepared by Bachman in May 2016, titled "Northern Pleasant Valley Desalter Groundwater Analysis and Modeling".

- b. Groundwater elevation³ and water quality data⁴ obtained from extraction wells, monitoring wells, wells near project area, the regional monitoring well, as well as analyses and conclusions formed from the analyses. A discussion regarding the health of the basin and region, and regional water quality and water quality trends will be included, and recommendations for future operations and monitoring.
- c. Vertical and lateral delineation of the brackish water plume as well as a summary of observed changes in the location and elevation of the brackish water plume, using information obtained from the extraction wells and monitoring wells.
- d. Summary of basin recharge from the East Las Posas Basin including results and supporting documentation for surface water and baseflow monitoring programs, along with calculated surface flow and groundwater inflow from the East Las Posas Basin
- e. Subsidence monitoring including results of any regional land survey program.
- f. Regional maps of groundwater elevation contours to document any effects of the project on the wider Pleasant Valley Basin.
- g. Summary of any contingency measures implemented and observed effect on groundwater elevations.

In addition to the annual reporting, the FCGMA shall be notified within one month of any unexpected or critical results from project monitoring. Examples of such results include rapidly dropping water levels, approach of target groundwater elevations, and unexpected water quality analyses.

- 9. For the purpose of determining net impacts to the basin as a result of Desalter Project operation, the Agency and City shall meet during the first week of May annually to review the contents of the Annual Report and its conclusion.
- 10. The City shall implement conservation and best management practices consistent with those required of member agencies of the Metropolitan Water District of Southern California and the California Urban Water Conservation Council, and its Urban Water Management Plan.
- 11. All reports shall be signed by California Licensed Professional Geologist(s) or Engineer(s).
- 12. All water quality testing shall be performed by an analytical laboratory certified by the State of California to perform such tests.
- 13. [This paragraph is effective through at least September 28, 2018] The Agency Board may reconsider and modify this Resolution and/or the Revised Plan only under the following circumstances:
 - a. to make this Resolution consistent with provisions of a Groundwater Sustainability Plan or update thereof that has been approved by the Agency Board; or

³ Including monitoring point, date measured, depth to water level and elevation of reference point, and method used to measure water level.

⁴ Including State Well Number of well sampled, date of sample collection, date of sample analyses, Lab that conducted analyses, analytical test results presented in table format with laboratory test reports appended.

- b. upon a finding by the Agency Board after a public hearing that the implementation of this Resolution is having a detrimental impact on water resources in the Pleasant Valley Basin.

The Agency shall provide a minimum of six months advance notice before implementing any material modification to this Resolution or any change resulting in the permanent reduction in the permitted rate, or cessation, of brackish groundwater pumping in the operation of the Desalter Project. For purposes of this Section 13, a "material modification" is defined to mean a change in Section 1 of this Resolution to decrease the maximum allowed pumping for operation of the Desalter Project or a change in Section 14 to reduce the term of this Resolution below twenty-five (25) years.

[If a Groundwater Sustainability Plan ("GSP") has not been adopted by the Agency by September 28, 2018, then the provisions of this paragraph, as set forth above, shall become null and void and shall be replaced by the following:]

The Agency Board may reconsider and modify this Resolution and/or the Revised Plan only under one or more of the following circumstances:

- a. When a material modification is required due to a change in state and/or federal law. The Agency shall provide a minimum of 45 days advance written notice to the City, or such other notice period as may be required by law, whichever is less, before approving any material modification to this Resolution based upon a change in state and or federal law, or
- b. Upon a finding by the Agency Board after a public hearing ("Public Hearing") that (i) the implementation of this Resolution is having a detrimental impact on water resources in the Pleasant Valley Basin ("Detrimental Impact") absent a reasonable mitigation measure as provided in this Section 13, or (ii) that the Agency is unable to sustainably manage the Pleasant Valley Basin without modifying this Resolution.
 - (1) For purposes of this provision: (a) a Detrimental Impact means a significant degradation of groundwater resources substantially caused by the Desalter Project and is an unforeseen impact that is not addressed in the Revised Plan, and (b) "unable to sustainably manage" means that continued operation of the Desalter Project will prevent the Agency from achieving the sustainability goal within 20 years of the implementation of a groundwater sustainability plan.
 - (2) The Agency shall provide a minimum of six months advance written notice ("Notice") to the City before approving any material modification to this Resolution due to a Detrimental Impact. Any material modification based on groundwater sustainability shall comply with the notice and consultation process specified in California Water Code section 10728.4.
 - (3) If the City does not present to the Agency a reasonable mitigation measure to adequately address the Detrimental Impact identified in the Notice within 120 days of receipt by the City of the Notice, then the Agency may approve a material modification of this Resolution at the Public Hearing to mitigate the identified Detrimental Impact.
 - (4) At the Public Hearing, the City will have the reasonable opportunity to present evidence in support of the mitigation measure proposed by the City to address the Detrimental Impact.

For purposes of this Section 13, a "material modification" is defined to mean either a change in this Resolution to temporarily or permanently decrease the maximum allowed pumping for operation of the Desalter Project or a change to reduce the term of this Resolution below twenty-five (25) years or any change in the operational triggers set forth in the Revised Plan.

14. This Resolution and authorization will terminate twenty five (25) years from the 1st day of operation of the Desalter Project. Prior to the termination date, and upon written application by the City, the Agency may extend the term of this Resolution in five (5) year increments, provided that all conditions of this Resolution have been complied with and the operation of the Desalter Project remains consistent with the provisions of a Groundwater Sustainability Plan and any update thereof that has been approved by the Agency Board.

On motion by Director Bennett, seconded by Director West, the foregoing resolution was passed and adopted on the 28th day of September 2016.

By: 
Lynn Maulhardt, Chair, Board of Directors
Fox Canyon Groundwater Management Agency

ATTEST: I hereby certify that the above is a true and correct copy of Resolution No. 2016-04.

By: 
Tammy Butterworth, Deputy Clerk of the Board

Attachment No. 1 – Monitoring and Contingency Plan

Attachment No. 1

NORTH PLEASANT VALLEY GROUNDWATER DESALTER PROJECT MONITORING AND CONTINGENCY PLAN – REVISED

This revised Monitoring and Contingency Plan (MCP) is included as an attachment to Fox Canyon Groundwater Management Agency's (FCGMA's) Resolution No. 2016-04 (Resolution). In the final Resolution, adopted on September 28th, 2016, the City of Camarillo (City) was directed to update the MCP within six (6) months of the Resolution's adoption. This revised MCP is updated in response to Resolution 16-04 and is intended for a maximum extraction of 4,500 acre-feet per year (AFY) for operation of the Desalter Project.

The purposes of the MCP are to: delineate the brackish groundwater plume, monitor groundwater quality, groundwater levels, basin recharge, and regional effects for subsidence and seawater intrusion. The monitoring program will receive input from dedicated monitoring and groundwater supply wells, located throughout the Pleasant Valley basin. The monitoring wells are grouped by location and parameter sampled. Wells will be monitored in the following general groups (Figure 1): northern portion of the Pleasant Valley basin area, wells in the project area, project extraction wells, and regional wells for groundwater trend evaluation. The details on the monitoring and contingency program are described in the following sections.

MONITORING

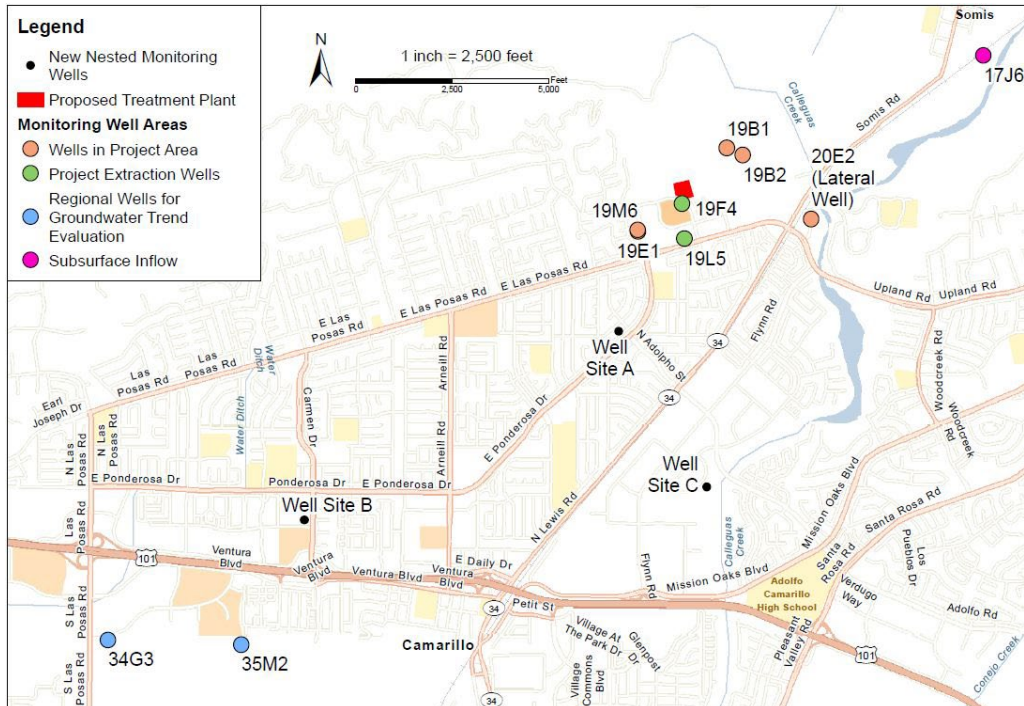


Figure 1: Monitoring Well Locations and Identification

Groundwater Monitoring: Northern Portion of the Pleasant Valley Basin Area. Four dedicated nested monitoring well sites will be used – three new nested monitoring wells and one existing USGS nested monitoring well site, 02N21W34G03. The purpose of the monitoring wells is two-fold: establishing baseline information and tracking the progress of the desalter project as it pulls salts from the basin. The recommended approximate locations of the dedicated monitoring wells are indicated in Figure 1 as well sites “A”, “B” and “C”. The precise locations of the new monitoring wells shall be identified by a qualified hydrogeologist. The monitoring wells shall be in operation prior to project-related groundwater pumping to allow baseline groundwater data to be collected.

Table 1: Northern Portion of the Pleasant Valley Basin Area Well Information.

MCP Well ID	State Well ID	Owner	Well Depth (ft. BGS)	Perf. (ft. BGS)	Aquifer
Well Site A ¹	Unassigned	City of Camarillo	1100	70-170 420-640 680-1040	Upper Aquifer System, Hueneme, Fox Canyon
Well Site B ¹	Unassigned	City of Camarillo	1150	70-110 620-740 830-1090	Upper Aquifer System Hueneme Fox Canyon
Well Site C ¹	Unassigned	City of Camarillo	1150	60-140 440-560 650-1080	Upper Aquifer System Hueneme Fox Canyon
34G3	02N21W34G03S	USGS/United Water	860	800-860	Fox Canyon

¹Wells have not been constructed yet and therefore do not have a State Well ID number. The screened perforations shall be determined after a geophysical log is run, however, anticipated screen depths have been provided.

The nested monitoring wells shall be completed at multiple depths (e.g., typical U.S. Geological Survey monitoring well), with each sampled zone sealed from the rest of the well. Recommended monitoring well depths and screen intervals are provided for each new nested monitoring well site in Table 1. The actual screened intervals shall be determined after a geophysical log is run, between the time the well is drilled and it is cased. Each screened interval shall be continuously gravel-packed from 10 to 20 feet below the screen to 10 to 20 feet above the screen. A bentonite seal shall be placed at the bottom of the hole and between each screened interval.

The monitoring wells shall be designed such that a transducer can be installed and a submersible pump temporarily lowered in each well for sampling. A transducer/data logger shall be installed in each screened casing, with data downloaded periodically. Table 2 lists data to be collected at each Northern Pleasant Valley basin monitoring well.

Table 2: Northern Pleasant Valley Basin Monitoring Well Data Collection

Parameter	Sample Type	Frequency
TDS (mg/l)	Grab	Quarterly
Chloride (mg/l)	Grab	Quarterly
Sulfate (mg/l)	Grab	Quarterly
Manganese (mg/l)	Grab	Quarterly
Groundwater level (each zone)	Grab	Quarterly
Groundwater level (each zone)	Continuous transducer (3 hour intervals)	Download data each quarter
Conductivity (each zone)	Grab	Quarterly
Conductivity (each zone)	Continuous transducer (3 hour intervals)	Download data each quarter

Groundwater Monitoring: Wells in Project Area. The groundwater elevation and water quality of existing groundwater production wells near the project wells shall also be monitored, including downgradient Pleasant Valley Mutual Water Company wells (02N20W19M06 or -19E01), a Bell Ranch well (02N20W19B01), an OUHSD well (02N20W19B02S) and lateral well to the east (02N20W20E02). Well information for the Wells in Project Area are provided in Table 3. Data to be collected at each Well in Project Area is provided in Table 4.

Table 3: Wells in Project Area Well information

MCP Well ID	State Well ID	Owner	Well Depth (ft. BGS)	Perf. (ft. BGS)	Aquifer
19E1	02N20W19E01S	Pleasant Valley Mutual	884	564-864	Fox Canyon
19M6	02N20W19M06S	Pleasant Valley Mutual	800	540-800	Fox Canyon
19B1	02N20W19B01S	Bell Ranch	660	400-650	Fox Canyon
19B2	02N20W19B02S	OUHSD	650	400-650	Fox Canyon
20E2 (Lateral Well)	02N20W20E02S	St. John Seminary ¹	875	479-875	Fox Canyon

¹Transducer to be installed if allowed by the well owner. If the City is unable to execute an Agreement with the well owner, then the City will drill a monitoring well that has a location, and design which is agreeable to the FCGMA.

Table 4: Wells in Project Area Data Collection

Parameter	Sample Type	Frequency
TDS (mg/l)	Grab	Semi-annually (April and October)
Chloride (mg/l)	Grab	Semi-annually (April and October)
Sulfate (mg/l)	Grab	Semi-annually (April and October)
Manganese (mg/l)	Grab	Semi-annually (April and October)
Groundwater level (each zone)	Grab	Semi-annually (April and October)
Groundwater level (each zone)	Continuous transducer* (3 hour intervals)	Download data quarterly
Conductivity (each zone)	Grab	Semi-annually (April and October)
Conductivity (each zone)	Continuous transducer* (3 hour intervals)	Download data quarterly

Groundwater Monitoring: Project Extraction Wells. The groundwater elevation and water quality of project extraction wells shall also be monitored. Well information for the Project Extraction Wells are provided in Table 5. Data to be collected at each Project Extraction Well is provided in Table 6.

Table 5: Project Extraction Wells Well Information

MCP Well ID	State Well ID	Owner	Well Depth (ft. BGS)	Perf. (ft. BGS)	Aquifer
19F4	02N20W19F04S	City of Camarillo	759	459-759	Fox Canyon
19L5	02N20W19L05S	City of Camarillo	830	467-830	Fox Canyon

Table 6: Project Extraction Well Data Collection

Parameter	Sample Type	Frequency
TDS (mg/l)	Grab	Monthly
Chloride (mg/l)	Grab	Monthly
Sulfate (mg/l)	Grab	Monthly
Manganese (mg/l)	Grab	Monthly
Groundwater level (static)	Grab	Monthly
Conductivity	Grab	Monthly
Monitoring consistent with DDW permit		

Groundwater Monitoring: Regional Wells for Groundwater Trend Evaluation.

Regional monitoring shall be conducted to detect regional trends (e.g., drought conditions, regional water quality changes) that may affect groundwater conditions at wells affected by the project. Wells 02N21W35M02 and 02N21W34G03 shall be used for regional monitoring. Data to be collected includes semi-annual (April and October) grab samples for groundwater level and conductivity. Well information for the Regional Wells for Groundwater Trend Evaluation are provided in Table 7.

Table 7: Regional Wells for Groundwater Trend Evaluation Well Information

MCP Well ID	State Well ID	Owner	Well Depth (ft. BGS)	Perf. (ft. BGS)	Aquifer
34G3	02N21W34G03S	USGS	860	800-860	Fox Canyon
35M2	02N21W35M02S	PV County	1100	700-1100	Fox Canyon

Surface Water Monitoring: Monthly review of the amount of base flow into the Pleasant Valley (PV) Basin along Arroyo Las Posas is important to the project’s operation. Because this baseflow is the source of the brackish water that infiltrates into the PV Basin, the amount of baseflow in the future will determine whether the PV Basin will continue to be degraded or, if upstream desalters capture much of this water, when the degradation may cease and the NPV desalter project can complete its extraction and remediation of the brackish mound.

Monitoring baseflow leaving the East Las Posas Basin is of interest, both to proponents of this project and future desalter projects in the East Las Posas Basin. Calleguas MWD has funded surface flow monitoring studies, conducted by Larry Walker Associates, of the Arroyo Las Posas in 2012, 2013, 2014 and 2015.

In 2014, following extensive stream flow monitoring in 2012 and 2013, Calleguas MWD began monitoring only the stream flow terminus. The City will partner with Calleguas MWD to continue

monitoring and mapping the stream flow terminus. Calleguas MWD monitors stream flow terminus during the dry months from May to December. The City will continue monthly monitoring of the terminus during the wet months, from January through April to create a continuous dataset of the Arroyo Las Posas terminus. Visual observations are recommended for monitoring in the area to determine whether surface flows from East Las Posas Basin are entering PV Basin. In the event Calleguas MWD discontinues monitoring, the City will continue with year-round monthly monitoring of the stream flow terminus.

Following extensive stream flow monitoring, the studies have found that installation of a permanent gauging station in this portion of the Arroyo Las Posas is not feasible. Problems include a wandering flowing channel, variable flow terminus, extensive vegetation management, sediment management and other difficulties prohibit gauge installation. The City will estimate base and storm flow into the PV Basin using the methodology established in the NPV Desalter Groundwater Analysis & Modeling (Bachman, 2016). The City will use two permanent gauge sites: one at Hitch Blvd (Gauges #841, 841a, located in East Las Posas Basin), and the other downstream near Highway 101 (Gauges #806, 806a, located in PV Basin). Flows subtracted from each station could provide rough estimates of surface/groundwater flows entering PV Basin. Monitoring at these gauge sites in conjunction with monitoring the stream flow terminus will help further basin recharge understanding.

Subsurface Inflow. Calleguas MWD recently installed a shallow monitoring well (02N20W17J06) at the edge of the East Las Posas/Pleasant Valley basin. This well is heavily influenced by flow of the Arroyo Las Posas, evidenced by the well going completely dry in 2016. The shallow well is approximately 200-ft deep with perforations between 62-ft and 142-ft. Well information for the shallow well is provided in Table 8. A permanent transducer in the wells logs groundwater level, temperature and conductivity every half-hour. The City will have access to the well data and will download data from the well quarterly. Well data will be used to estimate subsurface flow using Darcy’s Law equation, if a correlation can be developed.

Table 8: Subsurface Inflow Well Information

MCP Well ID	State Well ID	Owner	Well Depth (ft. BGS)	Perf. (ft. BGS)	Aquifer
17J6	02N20W17J06S	Calleguas MWD	142	62-142	Shallow/Upper Aquifer System

Monitoring for Subsidence. The proposed groundwater elevation contingency measures would avoid groundwater elevations from dropping below historic levels in both project areas, the northern portion of the Pleasant Valley Basin and the southwestern portion of the Basin, such that subsidence would be avoided. The City shall monitor surface elevations to detect subsidence and ensure contingency measures are effective.

The location and elevation of the project and City extraction wells, new and existing monitoring wells shall be surveyed (traditional survey or LIDAR) to serve as a baseline to detect subsidence. To ensure detection of any subsidence, both the wellhead and the nearby ground

surface shall be surveyed. The monitoring wells and adjacent ground surfaces shall be resurveyed every 5 years to detect any changes in elevation related to subsidence.

CONTINGENCIES

Groundwater Elevation Contingency Measures. These measures are based on numerical values/ groundwater elevations (triggers) as measured at specified wells (State Well Numbers (SWNs) 02N20W19E01S, or 02N20W19M06S at which action would be taken to avoid approaching and dropping below historic low groundwater elevations. For the wells in the northern portion of the PV Basin, when static (non-pumping) groundwater elevations reach 126 feet below mean sea level in the specified well, reductions in pumping from project extraction wells would be implemented. The amount of pumping reduction shall be based on water elevations observed at the extraction wells in the sequence indicated in Table 9. If water levels recover, pumping can then be increased using the same sequence.

Groundwater modeling indicates implementation of these contingency measures would avoid reducing groundwater elevations below historic lows under cumulative conditions (Bachman, 2016).

Table 9: Groundwater Pumping Reduction Contingency Triggers in North Pleasant Valley

Measured Static Groundwater Elevation (ft msl) at 19E01 or 19M06	Pumping Reduction (%)
-126	10
-140	20
-150	30
-153	40
-157	50
-160	75
-168	100

Contingency Plan for Water Quality. A purpose of the Desalter Project is to pump brackish water, treat it to remove salts, and discharge the salts from the watershed. With the adoption of Resolution No. 2016-04 the FCGMA has provided a project specific extraction allocation to pump and treat the brackish water and remediate the brackish water plume without the use of City’s groundwater extraction allocation or credits. The movement of salts can be more complex than modeled for this Project – particle tracking assumes plug flow (no dispersion or dilution) – and the aquifer is very likely to be more complex in its geometry and internal bedding than can be modeled. In reality, the water extracted for desalting may vary in salt content from day-to-day and month-to-month. Such variation is expected, cannot be avoided, and does not detract from the goals of the Project or the benefits of the Project to the aquifer.

As the Project matures and the travel paths of brackish water become more complex as the salts are recovered from aquifer areas further away from Project pumping, there are likely to be episodic periods when individual wells pump fresh water. Although this cannot be avoided when attempting to clean up the entire area of brackish groundwater, a contingency plan for FCGMA allocations and credits is prudent. The purpose of this section of the contingency plan is to differentiate between extended pumping of fresh groundwater (which would require the use of FCGMA allocations and/or credits) and pumping of primarily brackish groundwater (which would fit under the FCGMA policy related to pumping and treating brackish groundwater).

Analytical test results can be variable, and single water quality test results cannot characterize the duration, magnitude, or frequency of the measured quality. Therefore, it is recommended that a weighted average of single water quality test results collected from the extraction wells should be used as triggers to initiate a response, rather than only as a means to determine whether brackish water is being pumped.

As discussed previously, the salt content of brackish groundwater pumped by the Project is likely to vary episodically with time. Thus, the determination of primarily brackish groundwater must take this into account. For purposes of defining primarily brackish groundwater, four components were examined – manganese, chloride, sulfate, and Total Dissolved Solids (TDS). In all cases, concentrations were lower prior to the influence of the brackish water and considerably higher after the introduction of brackish water. Water Quality Objectives¹ and/or drinking water MCLs are currently being exceeded for all four constituents.

High sulfate concentrations are problematic for municipal drinking water, whereas high chloride concentrations are problematic for agricultural irrigation. As the most reliable constituent to use as an index of fresh and brackish water, Manganese is used here as the benchmark for project water quality. It is recommended that the criteria for brackish water be a threshold of 50 ug/L for Manganese to reflect historical concentrations and the secondary drinking water MCL. Using this threshold, pumped groundwater with Manganese concentrations above 50 ug/L would be considered brackish water and its removal beneficial to the aquifers.

At some time in the future, Project wells will likely start pumping a mixture of brackish and ambient groundwater as the brackish water is removed. It is unlikely that the transition from brackish to ambient groundwater will be a sharp break – it is most likely to be transitional, with periods of pumping brackish and fresher water. Given this scenario, there must be criteria for determining how this transition is considered. It is recommended that when Manganese concentrations drop below 50 ug/L in any project extraction well, a verification period would begin to ensure that brackish water has indeed been removed from the portion of the aquifer supplying water to the well. This verification period would be one year in duration, with water quality testing increased to monthly during the period. If, after one year, Manganese remained below 50 ug/L, then subsequent pumping would be debited against the City's extraction allocation.

¹ *Water Quality Control Plan Los Angeles Region*, 1995, Los Angeles Regional Water Quality Control Board, p. 3-19.

If future pumping of water from a Project well that has transitioned from brackish to fresh water returns to a brackish water condition, then the verification period would be reversed – it would require one year of verified pumping of groundwater above 50 ug/L for Manganese to return the well to a brackish water status. These criteria are summarized in the table below. The operational triggers for groundwater quality can be found in Table 10.

Table 10: Groundwater Quality Contingency Triggers

Contingency	Project well pumping brackish water has Manganese drop below 50 ug/L	Project well pumping fresh water has Manganese increase to above 50 ug/L
Action	Begin one year verification period	Begin one year verification period
Considered Fresh Water	Monthly testing remains 50 ug/L for Manganese during verification period	Any monthly test is below 50 ug/L Manganese
Add'l Evaluation	Evaluate whether regional conditions contributed to drop	Evaluate whether regional conditions contributed to increase
Considered Brackish Water	Any monthly test exceeds 50 ug/L Manganese	Monthly tests remain above 50 ug/L Manganese for verification period
Termination of Action	One year of pumping below 50 ug/L Manganese (reverts to fresh water) or any monthly test greater than 50 ug/L Manganese (remains brackish water)	One year of pumping above 50 ug/L Manganese (reverts to brackish water) or any test less than 50 ug/L Manganese (remains fresh water)
FCGMA Allocation	Project specific allocation	Prorated use of City's allocation*
Sunset Provision	If well pumps fresh water for 24 consecutive months, well permanently reverts to fresh water status	

Contingency Plan for Seawater Intrusion. Although significant impacts related to seawater intrusion are not anticipated, these contingency measures are provided to address unforeseen conditions that may cause extension of the pumping depression towards the project area. These contingency measures are based on maintaining a seaward groundwater gradient between the project and the pumping depression located along the southern and western edge of the PV basin. The depressions in the groundwater surface of the Upper and Lower Aquifer systems are associated with seawater intrusion. The critical area for this gradient is where there is currently a sharp groundwater gradient towards the pumping depression which minimizes the potential for the pumping depression to expand eastward and increase the size and depth of the depression.

To calculate this gradient, two wells were selected – one an existing USGS monitoring well (2N/21W-34G3) and the other a new nested monitoring well to be constructed as part of this project (project Monitoring Well B, located near City Hall). The locations of the two wells are shown in Figure 1 and Figure 2. The groundwater elevations will be compared using the

equivalent aquifer strata at each location. The current estimated gradient between the two monitoring wells is southwestward with a hydraulic head difference of 85 feet over a distance of approximately one (1) mile.

When the static (non-pumping) groundwater elevation differential between these two locations decreases to 15 feet or less between the two wells (elevation in Monitoring Well B minus elevation in 34G3 well), automatic cutbacks in project pumping would be implemented and the FCGMA would be informed of the trigger exceedance. The mitigation would be that project pumping would be reduced as indicated in Table 11. If this action does not mitigate the problem, then pumping would be reduced an additional percentage based on Table 11. This step-wise reduction would continue until either the difference in groundwater elevations stabilizes or project production has been eliminated.

Table 11: Seawater Gradient Contingency Triggers

Groundwater Elevation Difference Between Monitoring Wells B and 34G3 (ft) (Elev B minus Elev 34G3)	Percent Pumping Reduction (%)
15	10%
10	20%
7	30%
4	40%
2	50%
0 or negative	100%

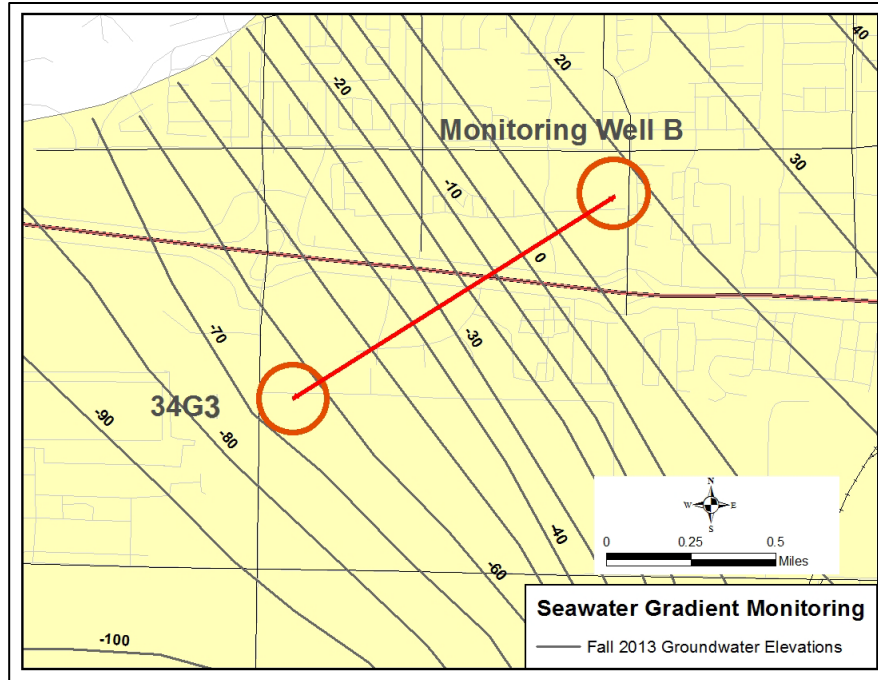


Figure 2: Seawater Intrusion Gradient Monitoring Wells

The opposite would occur if the difference in groundwater elevations between the two wells increases. For each step-wise increase in the difference, Table 11 would be used to increase the percentage of project pumping. When the difference increases to above 15 feet, full project production would resume.

This seawater contingency trigger method is similar to the water level contingency method to be used in the project area, where the reduction is progressive and based on the difference between heads in the two monitoring wells.

Contingency Plan for Subsidence. In order to minimize subsidence caused by the project, the City will monitor for impacts related to subsidence in the following manner.

- (1) The subsidence monitoring will occur in the project area by survey (traditional survey or LIDAR) every 5 years to detect possible changes in elevation related to subsidence.
- (2) Subsidence will be measured at the project extraction well sites.
- (3) If the subsidence is five inches or more in elevation (as part of routine five year monitoring program) from that detected prior to project operation, then the City will implement the following actions:
 - (a) Annual survey monitoring; and
 - (b) Reduce pumping by 10%
- (4) The procedures during the annual survey monitoring will be as follows;

- (a) For each year that the subsidence is greater than one inch the City will reduce pumping by 5%.
- (b) If subsidence is less than one inch per year for two consecutive years, then the City may increase pumping up to the maximum pumping level as originally authorized by this Resolution.

Annual Report. An Annual Report shall be prepared summarizing data collected each calendar year and submitted to FCGMA and interested parties by April 1. The Annual Report shall include the following information:

- A summary of project monthly groundwater extraction, treatment, and disposal (brine) volumes, as well as volume of treated water delivered to City of Camarillo customers.
- Groundwater elevation and water quality data obtained from extraction wells, monitoring wells, wells near project area, regional monitoring wells, as well as analyses and conclusions formed from the analyses. A discussion regarding the health of the basin and region, and regional water quantity and water quality trends will be included, as well as recommendations for future operations and monitoring.
- Vertical and lateral delineation of the brackish water plume as well as a summary of observed changes in the location and elevation of the salt plume, using information obtained from the extraction wells and monitoring wells.
- Summary of basin recharge from the East Las Posas Basin including results and supporting documentation for surface water and baseflow monitoring programs, along with calculated surface flow and groundwater inflow from the East Las Posas Basin
- Subsidence monitoring including results of any regional land survey program.
- Regional maps of groundwater elevation contours to document any effects of the project on the wider Pleasant Valley Basin.
- Summary of any contingency measures implemented and observed effect on groundwater elevations.

In addition to the annual reporting, the FCGMA shall be notified within one month of any unexpected or critical results from project monitoring. Examples of such results include rapidly dropping water levels, approach of target groundwater elevations, any contingency triggers reached or exceeded, any implemented pumping reductions or increases, and unexpected water quality analyses.