Section 6

Sustainable Management Criteria

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6. SUSTAINABLE MANAGEMENT CRITERIA

This chapter describes sustainable management criteria defining undesirable results in the Northern and Central Regions of the Delta-Mendota Subbasin and establishing the objectives by which Subbasin Groundwater Sustainability Agencies (GSAs) will obtain sustainable use of groundwater in Subbasin. Sustainability criteria defined herein include minimum thresholds and measurable objectives for each applicable sustainability indicator, pursuant to the Groundwater Sustainability Plan (GSP) Emergency Regulations Article 5 *Plan Contents*, Subarticle 3 *Sustainable Management Criteria* (§ 354.22 through 354.30).

The following criteria for each sustainability indicator applicable to the Plan area are described herein:

- Sustainability Goal
- Undesirable Results
- Minimum Thresholds
- Measurable Objectives
- Interim Milestones

The Sustainable Groundwater Management Act (SGMA) defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (California Water Code Section 10721). Sustainable Groundwater Management Criteria, or SMC, were developed using information presented in Chapter 5 *Basin Setting*. Input from Subbasin stakeholders was accepted and incorporated into the established SMC through discussion and presentation at public workshops and meetings of the following groups throughout the GSP development process: Northern and Central Delta-Mendota Technical Working Group, Northern and Central Delta-Mendota Region Management Committees, Delta-Mendota Subbasin Technical Working Group, and the Delta-Mendota Subbasin Coordination Committee.

The SMC developed for the Northern and Central Delta-Mendota Regions will be used to assess progress toward achieving the sustainability goal for the Delta-Mendota Subbasin. The Northern & Central Delta-Mendota Region GSP Group will continue to coordinate with the other GSP Groups in the Subbasin as each GSP is implemented to ensure actions of neighboring GSP Groups do not cause undesirable results for another GSP Group and that, collectively, progress is made towards achieving the Subbasin sustainability goal by 2040. Similarly, the Northern and Central Delta-Mendota Regions will continue to coordinate with adjacent subbasins (Tracy, Modesto, Turlock, Westside, and Kings) regarding SMC and ensuring activities within the Plan area do not cause undesirable results for adjacent subbasins.

6.1 USEFUL TERMS

A list and description of technical terms used throughout this section to discuss Sustainable Management Criteria are listed below. Figure 6-1 shows a graphic demonstrating the relationship between the Sustainable Management Criteria terms using groundwater elevation as an example. The terms and their descriptions are identified here to guide readers through this section and are not a definitive definition of each term.

- Undesirable Result – Significant and unreasonable negative impacts associated with each sustainability indicator, avoidance of which is used to guide development of GSP components.
- Minimum Threshold – Quantitative threshold for each sustainability indicator used to define the point at which undesirable results may begin to occur.
- Measurable Objective – Quantitative target that establishes a point above the minimum threshold that allows for a range of active management in order to prevent undesirable results.

- Interim Milestones – Targets set in increments of five years over the implementation period of the GSP to put the basin on a path to sustainability.
- Margin of Operational Flexibility – The range of active management between the measurable objective and the minimum threshold.

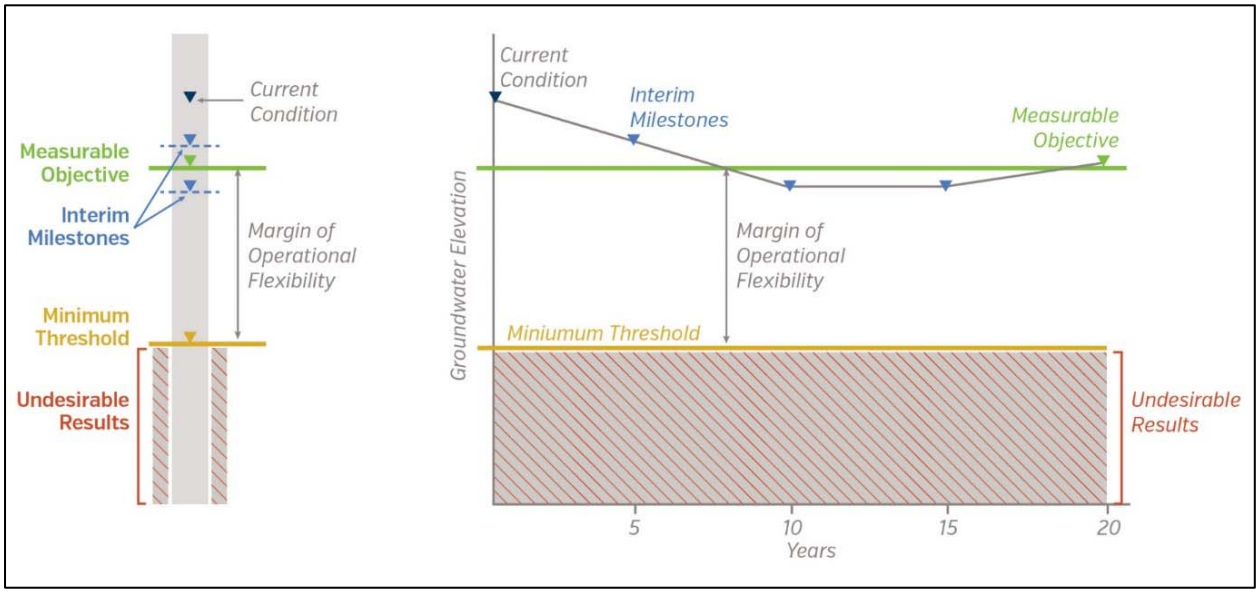

Figure 6-1. Sustainable Management Criteria Definitions Graphic (Groundwater Elevation Example)

6.2 SUSTAINABILITY GOAL

The sustainability goal for the Delta-Mendota Subbasin was established to succinctly state the objectives and desired conditions of the Subbasin that culminates in the absence of undesirable results by 2040. The sustainability goal for the Delta-Mendota Subbasin is as follows and was approved by the Delta-Mendota Coordination Committee:

> The Delta-Mendota Subbasin will manage groundwater resources for the benefit of all users of groundwater in a manner that allows for operational flexibility, ensures resource availability under drought conditions, and does not negatively impact surface water diversion and conveyance and delivery capabilities. This goal will be achieved through the implementation of the proposed projects and management actions to reach identified measurable objectives and milestones through the implementation of the GSP(s), and through continued coordination with neighboring subbasins to ensure the absence of undesirable results by 2040.

The sustainability goal described above was developed based on information presented in Chapter 5 *Basin Setting*. Conjunctive use of groundwater and surface water is prevalent throughout the Delta-Mendota Subbasin, where many water purveyors and private landowners pump groundwater and receive surface water deliveries from the San Joaquin River, the Kings River, the Central Valley Project (CVP) via the Delta-Mendota Canal, and the State Water Project (SWP) via the California Aqueduct. Operational flexibility is critical for many agencies within the Delta-Mendota Subbasin to allow for increased use of groundwater when surface water supplies are reduced or unavailable during prolonged dry periods. Additionally, operational flexibility allows for the storage of surface water supplies or groundwater recharge during wet periods for recovery and use during dry periods, as well as to manage other undesirable results such as inelastic land subsidence as a result of Lower Aquifer pumping.

In order to make progress in meeting the sustainability goal, locally-defined minimum thresholds and measurable objectives have been established for the Northern & Central Delta-Mendota Region GSP Group to define the 'operating range' of the groundwater subbasin. These criteria were developed in a coordinated fashion with the other

GSP Groups in the Subbasin, where definitions of undesirable results were developed and approved by all GSP Groups within the Subbasin for each sustainability indicator.

Each GSP Group is responsible for managing to locally-derived applicable sustainability indicators so conditions are improved as a whole and the Subbasin is sustainably managed by 2040. Projects and management actions, as detailed in Section 7.1 *Projects & Management Actions*, were selected to address adverse conditions and mitigate undesirable results within the Plan area. For more information about sustainable yield and the projects and management actions to be implemented during the 20-year implementation period, refer to Section 5.4.11 *Sustainable Yield* of the *Basin Setting* and Section 7.1.

Over the GSP planning and implementation horizon, Subbasin conditions are expected to fluctuate relative to minimum thresholds, measurable objectives, and interim milestones as projects and management actions are implemented and basin operations are modified to make progress toward sustainability. It is anticipated that, despite seasonal and short-term fluctuations, the Plan area and Subbasin will be managed to prevent undesirable results. Demonstration of the absence of undesirable results will support a determination that the Subbasin is operating within its sustainable yield and result in the conclusion that the sustainability goal has been achieved by 2040 and sustainability will be maintained beyond 2040.

6.3 SUSTAINABILITY THRESHOLDS

The following subsections present undesirable results, minimum thresholds, measurable objectives, and interim milestones for the following sustainability indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Degraded water quality
- Seawater intrusion (not applicable to the Delta-Mendota Subbasin)
- Land subsidence
- Depletions of interconnected surface water

6.3.1 Chronic Lowering of Groundwater Levels

Undesirable results, minimum thresholds, measurable objectives, and interim milestones for the chronic lowering of groundwater levels sustainability indicator are described in the subsequent subsections.

6.3.1.1 Undesirable Results

A description of undesirable results as defined under SGMA and by the Delta-Mendota Subbasin GSAs, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results relative to the chronic lowering of groundwater levels sustainability indicator are detailed below.

6.3.1.1.1 Description of Undesirable Results

The undesirable result related to groundwater levels is defined under SGMA as:

> *Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods* (California Water Code [CWC] Section 10721(x)(1)).

An undesirable result for chronic lowering of groundwater levels in the Delta-Mendota Subbasin is experienced through *significant and unreasonable chronic change in water levels, as defined by each GSP Group, that has an impact on the beneficial users of groundwater in the Subbasin through intra- and/or inter-basin actions*. This Subbasin-wide definition of an undesirable result was agreed upon by all GSP Groups through the Delta-Mendota Subbasin Coordination Committee. Public feedback was considered in defining an undesirable result for the chronic lowering of groundwater levels based on stakeholder participation at public workshops held in May 2019.

6.3.1.1.2 Identification of Undesirable Results

An undesirable result for chronic lowering of groundwater levels is triggered, or conditions are deemed "significant and unreasonable," when groundwater elevations drop below the site-specific minimum threshold at 25 percent of representative monitoring wells in a principal aquifer in the Northern and Central Delta-Mendota Regions concurrently over a given year (5 out of 17 wells in the Upper Aquifer and/or 5 out of 18 wells in the Lower Aquifer). If these conditions were to occur, it is anticipated that shallow domestic wells in the same subregion as the representative monitoring points in exceedance of the minimum threshold would go dry and/or these conditions would result in higher pumping costs and/or the need to modify wells to obtain groundwater (for more information about monitoring network subregions, refer to Section 7.2 *Monitoring* of the *Sustainability Implementation* chapter).

6.3.1.1.3 Potential Causes of Undesirable Results

The Delta-Mendota Subbasin is currently designated as a critically overdrafted basin by the California Department of Water Resources (DWR). Potential causes of undesirable results resulting from the chronic lowering of groundwater levels could include insufficient pumping offsets or reductions that result in localized or Plan area-wide lowering of groundwater elevations. Delays in implementation of projects or management actions due to increased demands or regulatory, permitting or funding obstacles may also cause undesirable results. Additionally, regulatory requirements placed on CVP and SWP operations, as well as instream flow requirements on the San Joaquin River and its tributaries, have and will continue to have negative impacts on surface water supplies available to the Subbasin, resulting in increased reliance on groundwater resources within the Delta-Mendota Subbasin and potentially resulting in the chronic lowering of groundwater levels.

6.3.1.1.4 Potential Effects of Undesirable Results

If groundwater levels in either of the two principal aquifers (Upper Aquifer and Lower Aquifer) were to reach levels causing undesirable results, dewatering of wells could occur, beginning with shallow domestic wells where many residents and communities rely on groundwater as their sole potable water supply. Groundwater levels (piezometric head) in the Lower Aquifer could be reduced to the point where significant and unreasonable inelastic land subsidence is observed, thus impacting land use and water conveyance capacity. There are also parts of the Plan area where no groundwater pumping occurs, and thus GSAs have no control over groundwater levels. As such, there is the potential for undesirable results to occur in these areas of no groundwater pumping.

Reduced groundwater levels could result in surface water depletions that may impact beneficial uses of interconnected surface water within the Plan area. Similarly, significantly declining groundwater elevations could also impact productive agriculture. Municipal users of groundwater may be impacted where groundwater is the primary or sole supply source, such as for the City of Patterson and the communities of Grayson and Westley. Potable water supply costs for municipalities are likely to increase in the event of undesirable results due to a need to deepen wells, increased power-related costs to lift the water, a need for new wells, and/or if municipalities are forced to seek supplemental or alternative potable water supplies, such as surface water.

6.3.1.2 Minimum Thresholds

The minimum thresholds for the chronic lowering of groundwater levels sustainability indicator are set as the hydrologic low for wells perforated in the Upper Aquifer (above the Corcoran Clay) and 95 percent of the hydrologic

low for wells perforated in the Lower Aquifer (below the Corcoran Clay) over the available hydrographs on record. It should be noted that for Upper Aquifer wells, minimum thresholds are based on the hydrologic lows comparable to the last drought period and at these levels, significant impacts are not anticipated to occur for drinking water users, including domestic well users. Figure 6-2 and Figure 6-3 show the locations of groundwater level representative monitoring wells in the Upper Aquifer and Lower Aquifer, respectively. Table 6-1 and Table 6-2 show the minimum thresholds at each representative monitoring site in the Upper Aquifer and Lower Aquifer, respectively, for the chronic lowering of groundwater levels sustainability indicator in feet above mean sea level (msl) relative to the North American Vertical Datum of 1988 (NAVD88). Hydrographs for all representative wells demonstrating the minimum threshold can be found in Appendix E.

To develop these minimum thresholds, the Northern and Central Delta-Mendota Technical Advisory Committee (TAC) examined available hydrographs throughout the Plan area. In 2015, groundwater levels in both the Upper Aquifer and Lower Aquifer were at or near historic lows. Groundwater levels in both primary aquifers were at or near historic highs in 2017, where in only two years groundwater levels increased from near historic lows at the height of the drought to near historic highs. Based on observations, technical understanding and local knowledge, it was concluded that groundwater levels in both the Upper Aquifer and Lower Aquifer have the potential to rebound after dry years, even if levels where undesirable results are observed are reached (e.g. post-2015). Therefore, the hydrologic low (Water Year [WY] 2015 in most cases) was deemed appropriate for setting the minimum threshold for the Upper Aquifer.

In the Lower Aquifer, undesirable results related to land subsidence were observed when comparing subsidence rates to 2015 groundwater levels, which were at or near historic lows. Subsidence rates were seen to decrease as Lower Aquifer groundwater elevations rose from the historic low groundwater elevations during the subsequent recovery period. As inelastic land subsidence is not recoverable, based on professional judgement and local knowledge, minimum thresholds of 95 percent of the hydrologic low was deemed appropriate as a starting point for the Lower Aquifer based on current information available. The Lower Aquifer minimum threshold will be reevaluated during the first GSP update and revised, as necessary, to determine if 95 percent of the hydrologic low provides an appropriate buffer to avoid an undesirable result for the chronic lowering of groundwater levels and land subsidence sustainability indicators.

The location of the Corcoran Clay layer, which subdivides the Upper Aquifer and Lower Aquifer, and inelastic land subsidence observed in correlation with Lower Aquifer pumping largely dictates the differences in characteristics and response of the two principal aquifers. This warrants different methodologies for setting minimum thresholds for representative monitoring points in the Upper Aquifer versus Lower Aquifer. As previously stated, by examining available hydrographs in both aquifers, similar trends were observed in aquifer response as conditions were at or near hydrologic lows in 2015 and rebounded to at or near hydrologic highs in 2017. Thus, it was deemed appropriate that the methodology for setting minimum thresholds is the same at each representative site for the Upper Aquifer and Lower Aquifer, respectively, but different based on principal aquifer. Minimum thresholds for groundwater levels have been set for the Lower Aquifer, where groundwater pumping from the Lower Aquifer is the primary cause of inelastic land subsidence, to avoid undesirable results by including a 5 percent buffer, resulting in thresholds set at 95 percent of the hydrologic low.

The subbasins adjacent to the Northern & Central Delta-Mendota Region GSP Group include the Tracy, Modesto, Turlock, Merced, Westside, and Kings subbasins. The GSPs for the Tracy, Modesto, and Turlock Subbasins are not due to DWR until January 2022, therefore evaluation of how minimum thresholds for chronic lowering of groundwater levels in the Northern and Central Delta-Mendota Regions affect the ability of these adjacent basins to achieve their sustainability goals will be evaluated in subsequent annual reports, during the GSP updates, and through on-going coordination efforts with these adjoining subbasins. Interbasin coordination has occurred to some extent with the Merced, Westside and Kings subbasins; however, time limitations have resulted in limited detailed discussions. As with the other three adjoining subbasins, ongoing coordination will occur during GSP implementation and will be reflected in the GSP updates.

Beneficial uses and users of groundwater, including domestic, municipal, agricultural and environmental use and their associated land uses and property interests, were considered in establishing minimum thresholds for the chronic lowering of groundwater levels sustainability indicator. Stakeholders, including the public, were invited to provide feedback on minimum thresholds during Working Group meetings and during public workshops centered around SMC held throughout the Delta-Mendota Subbasin in May 2019. Northern and Central Delta-Mendota regional representatives from the municipal and agricultural sectors are Working Group members and provided input in setting the minimum thresholds for the chronic lowering of groundwater levels sustainability indicator throughout the development process. Municipal and agricultural representatives stated that setting the minimum thresholds as the hydrologic low for the Upper Aquifer and 95 percent of the hydrologic low for the Lower Aquifer were not likely to cause an undesirable result, based on observed conditions and impacts to operations during the most recent drought. Domestic wells are generally shallower than agricultural and municipal wells and thus more sensitive to undesirable results. Additionally, the loss of a domestic well usually results in a loss of water for consumption, cooking, and sanitary purposes, which can often have substantial impacts on the users of the water and can be financially difficult for the well owner to replace. Based on local knowledge and experience during the last drought, setting the minimum threshold for the Upper Aquifer as the hydrologic low (analogous to WY2015 groundwater elevations in most places) is protective of an undesirable result for chronic lowering of groundwater levels.

Currently, there are no other State, federal, or local standards within the Plan area that relate to the chronic lowering of groundwater levels sustainability indicator in the Northern and Central Delta-Mendota Regions. SGMA is the prevailing legislation dictating requirements and standards for the chronic lowering of groundwater levels sustainability indicator. Any future State, federal, or local standards that relate to the chronic lowering of groundwater levels sustainability indicator will be evaluated and considered in potential modifications to minimum thresholds during subsequent updates to this GSP.

For information regarding how minimum thresholds for the chronic lowering of groundwater levels will be quantitatively measured, including monitoring protocols as well as frequency and timing of measurement, refer to Section 7.2.5.1 *Groundwater Level Monitoring Network* of the *Sustainability Implementation* chapter.

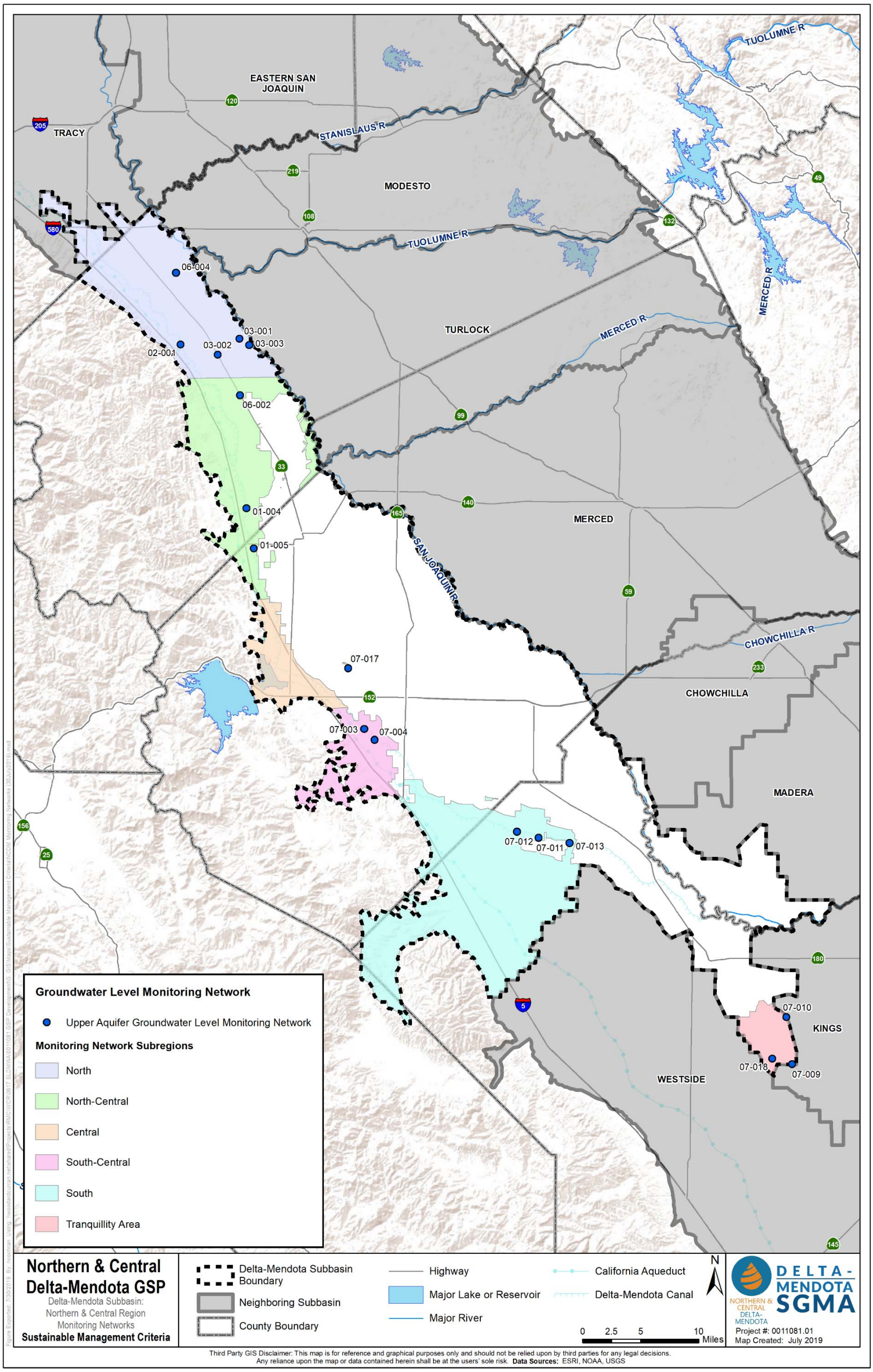

Figure 6-2. Location of Representative Monitoring Wells for Groundwater Levels, Upper Aquifer

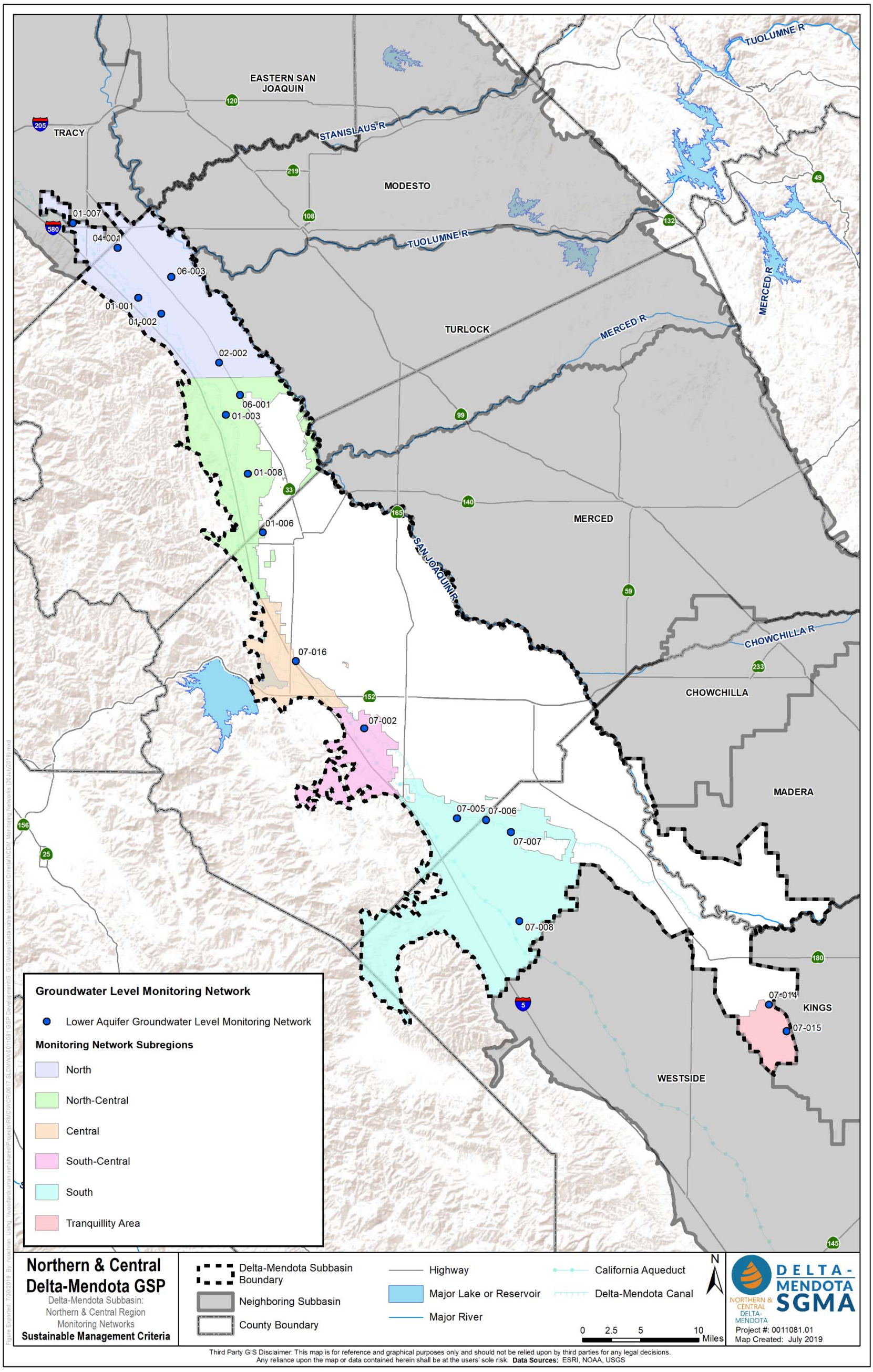

Figure 6-3. Location of Representative Monitoring Wells for Groundwater Levels, Lower Aquifer

Table 6-1. Minimum Thresholds for Chronic Lowering of Groundwater Levels, Upper Aquifer

Narrative Description				
The minimum threshold is the hydrologic low over the available hydrograph record.				
Numeric Minimum Thresholds – Chronic Lower of Groundwater Levels in Upper Aquifer				
Data Management System (DMS) ID	State Well Number	CASGEM ID (if applicable)	Local ID	Minimum Threshold (feet above msl NAVD88)
02-001	05S07E15N002M	374934N1211934W001	MP037.32L	-49.1
06-004			MP031.31L1-L2Well1	14.8
03-001		375015N1211011W001	MW-2	25.40
03-002			MW-3	4.39
03-003	05S/08E-16R		WSJ003	30.7
06-002	06S08E09E003M	374316N1210994W003	P259-3	28.6
01-004	07S08E28R002M	372907N1210875W002	MC10-2	158.8
01-005	08S08E15G001M	372424N1210754W001	MP058.28L	83.9
07-017			Well 1	9.4
07-003	10S10E32L002M	370173N1208999W002	MC15-2	62.4
07-004	11S10E04L001M		MP081.08R	58.2
07-011		368835N1206270W001	MP099.24L	-52.63
07-012	12S/12E-16B		GDA003	-41.1
07-013			MP102.04R	-15.9
07-010		366500N1202500W001	KRCDTID02	72.7
07-009		366000N1202300W001	KRCDTID03	60.3
07-018	15S/16E-20		WSJ001	60.3

Table 6-2. Minimum Threshold for Chronic Lowering of Groundwater Levels, Lower Aquifer

Narrative Description				
The minimum threshold is 95 percent of the hydrologic low for the available hydrograph record.				
Numeric Minimum Thresholds – Chronic Lower of Groundwater Levels in Lower Aquifer				
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Minimum Threshold (feet above msl NAVD88)
01-007			MP021.12L	-12.0
01-001	04S06E36C001M	375509N1212609W001	MP030.43R	-16.3
01-002	05S07E05F001M	375313N1212242W001	MP033.71L	-34.3
06-003		375774N1212096W001	WSID 3	-8.6
02-002			WELL 02 - NORTH 5TH STREET	-17.4
06-001	06S08E09E001M	374316N1210994W001	P259-1	-6.6
01-003	06S08E20D002M	374061N1211212W001	MP045.78R	-20.7
04-001		376129N1212942W001	121	-6.1
01-008			MP051.66L	-42.6
01-006		372604N1210611W001	91	72.3
07-016			Well 01	-10.5
07-002	10S10E32L001M	370173N1208999W001	MC15-1	84.5
07-005	12S11E03Q001M	369097N1207554W001	MP091.68R	-80.4
07-006	12S12E07E001M	369044N1207092W001	MP094.26L	-77.8
07-007	12S12E16E003M	368896N1206702W001	MC18-1	-50.8
07-008	13S12E22F001M	367885N1206510W001	PWD 48	-87.4
07-014			TW-4	-126.8
07-015			TW-5	-146.8

6.3.1.3 Measurable Objectives and Interim Milestones

Measurable objectives are quantitative goals that reflect the desired Plan area conditions and allow the Subbasin to achieve the sustainability goal. The measurable objective is set to allow a reasonable margin of operational flexibility (Margin) between the measurable objective and minimum threshold for the active management of the groundwater basin. The Margin is intended to accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities. The purpose of establishing measurable objectives is to define specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions, thereby defining the range of operational flexibility for basin management.

For the chronic lowering of groundwater levels sustainability indicator, the measurable objective is set as the lowest value of three possible parameters – the average of historic seasonal highs over the available hydrograph, Spring 2012 seasonal high, or Spring 2017 seasonal high (where seasonal high and Spring are synonymous and defined as measurements taken between February and April). Table 6-3 and Table 6-4 list the measurable objectives for each representative monitoring well in the Upper Aquifer and Lower Aquifer, respectively, in feet above msl NAVD88. Hydrographs for each representative monitoring site, when available, that show the minimum threshold and measurable objective for that location are located in Appendix E.

To assist the Plan area in reaching the measurable objectives for groundwater levels by 2040, interim milestones are established for 2025, 2030, and 2035 as a means of assessing progress towards the Regions' sustainability goal. In cases where the measurable objective has been achieved (as was the case in 2017, the most recent dataset reviewed for the Northern and Central Delta-Mendota Regions), the interim goals reflect overall objective of

maintaining those water levels. The interim milestones for chronic lowering of groundwater levels are therefore set as follows:

- Year 5 (2025): Maintain groundwater elevations comparable to 2012/2017 hydrologic highs and lows
- Year 10 (2030): Maintain groundwater elevations comparable to 2012/2017 hydrologic highs and lows
- Year 15 (2035): Maintain groundwater elevations comparable to 2012/2017 hydrologic highs and lows

The established measurable objectives and interim milestones will aid in achieving the sustainability goal within 20 years of Plan implementation.

Table 6-3. Measurable Objective for Chronic Lowering of Groundwater Levels, Upper Aquifer

Narrative Description				
The measurable objective is set at the lowest value of three parameters: the average historic seasonal high over the available hydrograph, Spring 2012 seasonal high, or Spring 2017 seasonal high.				
Numeric Measurable Objectives – Chronic Lower of Groundwater Levels in Upper Aquifer				
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Measurable Objective (feet above msl, NAVD88)
02-001	05S07E15N002M	374934N1211934W001	MP037.32L	22.0
06-004			MP031.31L1-L2Well1	38.9
03-001		375015N1211011W001	MW-2	-29.90
03-002			MW-3	23.89
03-003	05S/08E-16R		WSJ003	29.90
06-002	06S08E09E003M	374316N1210994W003	P259-3	40.3
01-004	07S08E28R002M	372907N1210875W002	MC10-2	160.8
01-005	08S08E15G001M	372424N1210754W001	MP058.28L	108.5
07-017			Well 1	79.7
07-003	10S10E32L002M	370173N1208999W002	MC15-2	71.6
07-004	11S10E04L001M		MP081.08R	90.1
07-011		368835N1206270W001	MP099.24L	12.1
07-012	12S/12E-16B		GDA003	24.7
07-013			MP102.04R	34.9
07-010		366500N1202500W001	KRCDTID02	96.3
07-009		366000N1202300W001	KRCDTID03	70.5
07-018	15S/16E-20		WSJ001	70.5

Table 6-4. Measurable Objective for Chronic Lowering of Groundwater Levels, Lower Aquifer

Narrative Description				
The measurable objective is set at the lowest value of three parameters: the average historic seasonal high over the available hydrograph, Spring 2012 seasonal high, or Spring 2017 seasonal high.				
Numeric Measurable Objectives – Chronic Lower of Groundwater Levels in Lower Aquifer				
Primary Well ID	State Well Number	CASGEM ID (if applicable)	Local ID	Measurable Objective (feet above msl, NAVD88)
01-007			MP021.12L	15.5
01-001	04S06E36C001M	375509N1212609W001	MP030.43R	16.5
01-002	05S07E05F001M	375313N1212242W001	MP033.71L	6.6
06-003		375774N1212096W001	WSID 3	31.3
02-002			WELL 02 - NORTH 5TH STREET	24.7
06-001	06S08E09E001M	374316N1210994W001	P259-1	45.7
01-003	06S08E20D002M	374061N1211212W001	MP045.78R	63.8
04-001		376129N1212942W001	121	7.8
01-008			MP051.66L	8.5
01-006		372604N1210611W001	91	84.4
07-016			Well 01	71.7
07-002	10S10E32L001M	370173N1208999W001	MC15-1	126.7
07-005	12S11E03Q001M	369097N1207554W001	MP091.68R	-34.3
07-006	12S12E07E001M	369044N1207092W001	MP094.26L	-28.8
07-007	12S12E16E003M	368896N1206702W001	MC18-1	-2.0
07-008	13S12E22F001M	367885N1206510W001	PWD 48	-49.0
07-014			TW-4	-28.2
07-015			TW-5	-27.2

6.3.2 Reduction of Groundwater Storage

Undesirable results, minimum thresholds, measurable objectives, and interim milestones for the reduction in groundwater storage sustainability indicator are described in the subsequent subsections.

6.3.2.1 Undesirable Results

A description of undesirable results as defined under SGMA and by the Delta-Mendota Subbasin GSAs, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results relative to the reduction in groundwater storage sustainability indicator are detailed below.

6.3.2.1.1 Description of Undesirable Results

The undesirable result related to groundwater storage is defined under SGMA as:

> *Significant and unreasonable reduction of groundwater storage* (CWC Section 10721(x)(2)).

An undesirable result for reduction of groundwater storage in the Delta-Mendota Subbasin is experienced through *significant and unreasonable chronic decrease in groundwater storage, as defined by each GSP Group, that has an impact on the beneficial users of groundwater in the Subbasin through either intra- and/or inter-basin actions*. This definition of an undesirable result was agreed upon by all GSP Groups through the Delta-Mendota Subbasin

Coordination Committee. Public feedback was considered in defining an undesirable result for reduction in groundwater storage based on stakeholder participation at public workshops held in May 2019.

Depletion of groundwater storage appears to have occurred over the historic and current period established in the water budgets for the Northern and Central Delta-Mendota Regions; however, based on existing data, this trend appears to have been reversed as a result of recent wet years, and are not anticipated to occur in the future with the implementation of projects and management actions to promote long-term subbasin sustainability. Groundwater pumping from the Upper Aquifer is largely limited by poorer quality water compared to the Lower Aquifer, particularly in the Stanislaus County portion of the Plan area, and areas with shallow groundwater within the southwestern portion of the Subbasin indicate that Upper Aquifer water supplies are abundant, where shallow groundwater is drained from the root zone to allow for agricultural production. The Lower Aquifer extends from the bottom of the Corcoran Clay layer to the top of the base of freshwater, which is located around -2,000 feet above mean sea level, as defined by Page (1973) (see Section 5.2 *Hydrogeologic Conceptual Model* of the *Basin Setting* chapter for more information about the base of freshwater). Based on the definition of the base of freshwater for the Delta-Mendota Subbasin, a large volume of groundwater is available in storage within the Lower Aquifer. Extractions from the Lower Aquifer are dictated by other sustainability indicators, such as inelastic land subsidence, rather than by available storage.

6.3.2.1.2 Identification of Undesirable Results

The same trigger for an undesirable result for the chronic lowering of groundwater levels is applicable to the long-term reduction of groundwater storage (see Section 6.3.1.1.2 for more detail). Long-term reductions in storage are not anticipated for either principal aquifer so long as groundwater levels are managed above minimum thresholds. Through coordination with the other GSP Groups in the Delta-Mendota Subbasin, additional projects and/or management actions will be implemented to prevent long-term decline in groundwater storage.

6.3.2.1.3 Potential Causes of Undesirable Results

Although the Subbasin has enough fresh groundwater in both principal aquifers to sustain groundwater pumping with the addition of projects and management actions, dramatic increases in reliance on groundwater, severe drought, or other major changes in groundwater management over time would cause the volume of fresh groundwater in storage to decline to a significant and unreasonable level. Additionally, regulatory requirements placed on CVP and SWP operations, as well as instream flow requirements on the San Joaquin River and its tributaries, have and will continue to have negative impacts on surface water supplies available to the Subbasin, resulting in increased reliance on groundwater resources within the Delta-Mendota Subbasin and potentially resulting in the long-term reduction in groundwater storage.

This undesirable result is driven by the chronic lowering of groundwater levels sustainability indicator, and minimum thresholds set for the chronic lowering of groundwater levels sustainability indicator, combined with identified projects and management actions, will also be protective of possible undesirable results for the long-term reduction in groundwater storage.

6.3.2.1.4 Potential Effects of Undesirable Results

If groundwater levels were to reach the point where undesirable results are observed, undesirable effects could include encroachment on the groundwater reserved as a drought buffer, increased cost of pumping as deeper wells are required to access groundwater, and reduction in beneficial uses. Groundwater pumping from the Lower Aquifer is known to cause inelastic land subsidence. Therefore, increased pumping from the Lower Aquifer could result in undesirable results for the land subsidence sustainability indicator.

6.3.2.2 Minimum Thresholds

This GSP uses groundwater levels minimum thresholds as a proxy for the reduction of groundwater storage sustainability indicator. As such, the minimum thresholds for the reduction of groundwater storage sustainability indicator are consistent with the minimum thresholds for the chronic lowering of groundwater levels sustainability indicator.

GSP regulations allow GSAs to use groundwater levels as a proxy metric for any sustainability indicator, provided the GSP demonstrates that there is a significant correlation between groundwater levels and the other metrics. In order to rely on groundwater levels as a proxy, one approach suggested by DWR is to:

> *Demonstrate that the minimum thresholds and measurable objectives for chronic declines of groundwater levels are sufficiently protective to ensure significant and unreasonable occurrences of other sustainability indicators will be prevented. In other words, demonstrate that setting a groundwater level minimum threshold satisfies the minimum threshold requirements for not only chronic lowering of groundwater levels but other sustainability indicators at a given site* (DWR, 2017).

Minimum thresholds for groundwater levels will effectively avoid undesirable results for reduction of groundwater storage by ensuring that groundwater elevations (and therefore the volume of groundwater in storage) does not chronically decline in the future and has a demonstrated ability to rebound in subsequent normal and wet years following a drought. Minimum thresholds and measurable objectives for groundwater levels can therefore be used as a proxy for reduction in groundwater storage because groundwater levels are sufficiently protective against occurrences of significant and unreasonable reductions in groundwater storage.

6.3.2.3 Measurable Objectives and Interim Milestones

Since the chronic lowering of groundwater levels is used as a proxy for reduction in groundwater storage, the measurable objectives and interim milestones for the reduction in groundwater storage sustainability indicator are consistent with the measurable objectives and interim milestones for the chronic lowering of groundwater levels sustainability indicator as set forth in Section 6.3.1.3 and will utilize the same monitoring networks and data sets for the evaluating performance and sustainability metrics.

6.3.3 Degraded Water Quality

Undesirable results, minimum thresholds, measurable objectives, and interim milestones for the degraded water quality sustainability indicator are described in the subsequent subsections.

6.3.3.1 Undesirable Results

A description of undesirable results as defined under SGMA and by the Delta-Mendota Subbasin GSAs, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results relative to the degraded water quality sustainability indicator are detailed below.

6.3.3.1.1 Description of Undesirable Results

The undesirable result related to degraded water quality is defined under SGMA as:

> *Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies* (CWC Section 10721(x)(4).

An undesirable result for degraded water quality in the Delta-Mendota Subbasin is experienced through *significant and unreasonable degradation of groundwater quality, defined by each GSP Group, that has an impact on the beneficial users of groundwater in the Subbasin through intra- and/or inter-basin actions and/or activities*. This

definition of an undesirable result was agreed upon by all GSP Groups through the Delta-Mendota Subbasin Coordination Committee. Public feedback was considered in defining an undesirable result for degraded water quality based on stakeholder participation at public workshops held in May 2019.

As described in Section 5.3 *Groundwater Conditions* of the *Basin Setting* chapter, groundwater quality concerns within the Plan area are largely related to non-point sources and/or naturally-occurring constituents. Total dissolved solids (TDS), nitrate (discussed herein as nitrogen or N), and boron have been identified as constituents of concern related to groundwater levels or other SGMA-related groundwater quality management activities and were selected based on available data, the potential to impact existing or future groundwater use, the ability to address groundwater quality impacts through projects and/or management actions, and the source of the constituent. Based on publicly available datasets, there are no known groundwater contamination sites or plumes within the Northern and Central Delta-Mendota Regions. While other constituents of concern are known to exist in the Delta-Mendota Subbasin (such as arsenic, selenium, and hexavalent chromium), concentrations of these constituents do not appear to be linked to groundwater elevations or other groundwater-related management activities. The groundwater quality monitoring network developed for this GSP will continue to collect data relative to ongoing groundwater concentrations for these constituents for future assessment in coordination with other existing and anticipated future regulatory programs.

6.3.3.1.2 Identification of Undesirable Results

An undesirable result for degraded water quality is triggered, or considered "significant and unreasonable," when:

- Groundwater quality exceeds Maximum Contaminant Levels (MCLs) or water quality objectives (WQOs) for TDS, nitrate, or boron over three (3) consecutive sampling events in non-drought years, or additional degradation of current groundwater quality where current groundwater quality exceeds the MCLs or WQOs.
- Water quality degradation due to recharge projects that exceeds 20 percent of the aquifer's assimilative capacity for one or more constituents without justification of a greater public benefit achieved.

6.3.3.1.3 Potential Causes of Undesirable Results

As previously stated, TDS, nitrate as N, and boron have been identified as constituents of concern and are largely the result of non-point sources. Elevated TDS and boron concentrations are primarily a result of a combination of land use practices, the geochemistry of the Coast Range rocks, recharge derived from the Coast Range streams, dissolvable materials within the alluvial fan complexes, and the naturally poor-draining conditions which tends to result in accumulation of these constituents. Elevated nitrate as N is largely the result of agricultural applications of fertilizer along with leaching from naturally-occurring alluvium in the southwestern portion of the Subbasin. Similarly, elevated boron concentrations are also the result of applied pesticides and accumulation in areas of poor drainage. For more information about groundwater water quality in the Plan area, refer to Section 5.2.8 *Water Quality* and Section 5.3.5 *Groundwater Quality* of the *Basin Setting* chapter.

6.3.3.1.4 Potential Effects of Undesirable Results

If an undesirable result for the degraded water quality sustainability indicator were to occur, the overarching impact would be a reduction in usable groundwater supply for all beneficial users of groundwater within the Plan area and/or an increased need for groundwater treatment prior to use. Wellhead or distribution system treatment would be necessary before domestic, municipal, or agricultural use or alternative supplies might be sought out, with small domestic users most impacted financially by these potential imposed costs. For agricultural groundwater users, degraded water quality may cause potential changes in irrigation practices, crops grown, agricultural efficiencies, adverse effects on property values, and other economic impacts, with the potential to adversely impact the larger economy throughout the Subbasin.

6.3.3.2 Minimum Thresholds

The minimum thresholds for the degraded water quality sustainability indicator are set as the upper Secondary MCL for TDS (1,000 mg/L) (State of California, 2006), the Primary MCL for nitrate (10 mg/L as N) (SWRCB, March 2018), and the agricultural WQO for irrigation for boron (0.7 mg/L) (Ayers and Westcot, 1985) or current groundwater quality as of December 2018 for both the Upper Aquifer and Lower Aquifer if the listed MCL or WQO is already exceeded. For more information regarding current water quality as of December 2018 within the Plan area in the Upper Aquifer and Lower Aquifer, refer to Figure 5-86 and Figure 5-87, respectively, in Section 5.3 *Groundwater Conditions* of the *Basin Setting* chapter. Figure 6-4 and Figure 6-5 show the locations of groundwater quality representative monitoring wells in the Upper Aquifer and Lower Aquifer, respectively. Table 6-5 and Table 6-6 show the minimum thresholds at each representative monitoring site in the Upper Aquifer and Lower Aquifer, respectively, for the degraded water quality sustainability indicator.

In developing the minimum thresholds for groundwater quality, State, federal, and local standards were evaluated to ensure consistency with existing water quality standards within the Plan area. Under the Central Valley Regional Water Quality Control Board's (CV-RWQCB) *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (or Basin Plan) (SWRCB, May 2018), the Delta-Mendota Subbasin is given a municipal (MUN) beneficial use designation, which dictates the WQOs for ambient water quality consistent with drinking water standards. The Statewide Recycled Water Policy regulations were also incorporated into the minimum thresholds for degraded water quality as recycled water-related projects are currently planned to aid in GSP implementation (see Section 7.1 *Projects & Management Actions* for more information about recycled water projects in the Plan area). Resolution 68-16 (SWRCB, 1968), also known as the California Anti-Degradation Policy, was also used to inform the minimum thresholds for the degraded water quality sustainability indicator where existing groundwater will be maintained to ensure the highest water quality to the maximum benefit to the people of the State. The Basin Plan, Statewide Recycled Water Policy, and Resolution 68-18, combined with the requirement to establish existing baseline conditions under SGMA, were relied upon to establish and justify the minimum thresholds for the degraded water quality sustainability indicator.

Water quality in the Delta-Mendota Subbasin varies both by principal aquifer and by location within the Subbasin. The Upper Aquifer is considered a semi-confined aquifer and elevated concentrations detected in groundwater are mostly associated with anthropogenic activities, such as through irrigation water and fertilizer application. The Lower Aquifer, as a confined aquifer, generally has good water quality (as the Corcoran Clay acts as a barrier to the downward migration of constituents), but is impacted to some extent along the western margin of the Subbasin (where the Corcoran Clay does not exist) or where composite wells are screened across the Corcoran Clay and have the potential to act as a conduit for constituent migration within and between primary aquifers.

TDS, nitrate, and boron are also naturally-occurring in both the Upper Aquifer and Lower Aquifer. Water quality conditions were evaluated based on aquifer designation and the range of conditions present within each monitoring network subregion. Therefore, differences in vertical and horizontal spatial patterns of elevated constituent concentrations warrants the differences in minimum threshold values at representative monitoring sites by monitoring network subregion and principal aquifer for the degraded water quality sustainability indicator. Across sustainability indicators, the constituents of concern that will be monitored under this GSP in coordination with groundwater levels to support groundwater management operations, providing future insight into potential links between groundwater levels and water quality. Management of the chronic lowering of groundwater levels relative to minimum thresholds for groundwater levels is anticipated to avoid an undesirable result for degraded water quality based on professional judgement and local knowledge of concentrations of constituents of concern observed at hydrologic low conditions (as supported by historical changes in groundwater quality during periods of low groundwater elevations). It should be noted that minimum thresholds for the degraded water quality sustainability indicator are established for ambient groundwater quality, where treatment may be required prior to the intended beneficial use of groundwater.

Similar to the establishment of sustainability indicators for groundwater elevations, limited interbasin coordination has been conducted relative to establishing the minimum thresholds and measurable objectives for groundwater quality. As previously noted, three of the adjoining subbasins (Tracy, Modesto, Turlock Subbasins) are not required to submit their GSPs to DWR until January 2022, and due to time constraints in preparing the GSPs, limited coordination was conducted with the Merced, Westside and Kings Subbasins. As such, ongoing interbasin coordination between the subbasins will be conducted during GSP implementation, and the annual reports and GSP updates will contain evaluations of how minimum thresholds for degraded water quality in the Northern and Central Delta-Mendota Regions may affect the ability of these adjacent basins to meet achieve their sustainability goals.

The beneficial uses and users of groundwater, as well as land uses and property interests, were considered when establishing minimum thresholds for the degraded water quality sustainability indicator. Stakeholders, including the public, were invited to provide feedback on minimum thresholds during Working Group meetings (publicly noticed per Brown Act requirements) and during public workshops centered around SMC held throughout the Delta-Mendota Subbasin in May 2019. Representatives from the municipal sector (primarily the City of Patterson and Santa Nella County Water District) and agricultural sector are Working Group members and provided input in setting the minimum thresholds for the degraded water quality sustainability indicator throughout the development process. Agricultural sector representatives indicated that ambient groundwater quality consistent with the Secondary MCL for TDS, the Primary MCL for nitrate, and the WQO for irrigation for boron were sufficiently protective of the agricultural beneficial use of groundwater as they are consistent with State regulations and the agricultural WQOs described in the *Delta-Mendota Canal Non-Project Water Pump-in Program Monitoring Plan* (USBR, 2018). Input was also provided by agricultural representatives where current water quality as of December 2018 was in excess of the described objectives to determine that an undesirable result for degraded water quality was not already occurring.

For information regarding how minimum thresholds for the degraded water quality sustainability indicator will be quantitatively measured, including monitoring protocols as well as frequency and timing of measurement, refer to Section 7.2.5.4 *Degraded Water Quality Monitoring Network* of the *Sustainability Implementation* chapter.

Table 6-5. Minimum Thresholds for Degraded Water Quality, Upper Aquifer

Narrative Description						
The minimum threshold is set as the upper Secondary MCL for TDS, Primary MCL for nitrate as N, and WQO for irrigation for boron or the current groundwater quality where it exceeds the afore-mentioned criteria as of December 2018.						
Numeric Minimum Thresholds – Degraded Water Quality in Upper Aquifer						
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Minimum Threshold (mg/L)		
				TDS	Nitrate as N	Boron
02-001	05S07E15N002M	374934N1211934W001	MP037.32L	4,000	80	3.0
06-004			MP031.31L1-L2Well1	4,000	80	3.0
03-001		375015N1211011W001	MW-2	4,000	80	3.0
03-002			MW-3	4,000	80	3.0
03-003	05S/08E-16R		WSJ003	4,000	80	3.0
06-002	06S08E09E003M	374316N1210994W003	P259-3	2,500	60	1.7
01-004	07S08E28R002M	372907N1210875W002	MC10-2	2,500	60	1.7
01-005	08S08E15G001M	372424N1210754W001	MP058.28L	2,500	60	1.7
07-017			Well 1	1,000	60	0.9
07-003	10S10E32L002M	370173N1208999W002	MC15-2	2,700	90	1.0
07-004	11S10E04L001M		MP081.08R	2,700	90	1.0
07-011		368835N1206270W001	MP099.24L	3,500	13	6.0
07-012	12S/12E-16B		GDA003	3,500	13	6.0
07-013			MP102.04R	3,500	13	6.0
07-010		366500N1202500W001	KRCDTID02	1,000	10	2.2
07-009		366000N1202300W001	KRCDTID03	1,000	10	2.2
07-018	15S/16E-20		WSJ001	1,000	10	2.2

Table 6-6. Minimum Thresholds for Degraded Water Quality, Lower Aquifer

Narrative Description						
The minimum threshold is set as the upper Secondary MCL for TDS, Primary MCL for nitrate as N, and WQO for irrigation for boron or the current groundwater quality where it exceeds the afore-mentioned criteria as of December 2018.						
Numeric Minimum Thresholds – Degraded Water Quality in Lower Aquifer						
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Minimum Threshold (mg/L)		
				TDS	Nitrate as N	Boron
01-007			MP021.12L	2,000	50	3.0
01-001	04S06E36C001M	375509N1212609W001	MP030.43R	2,000	50	3.0
01-002	05S07E05F001M	375313N1212242W001	MP033.71L	2,000	50	3.0
06-003		375774N1212096W001	WSID 3	2,000	50	3.0
02-002			WELL 02 - NORTH 5TH STREET	2,000	50	3.0
06-001	06S08E09E001M	374316N1210994W001	P259-1	4,000	70	0.7
01-003	06S08E20D002M	374061N1211212W001	MP045.78R	4,000	70	0.7
04-001		376129N1212942W001	121	4,000	70	0.7
01-008			MP051.66L	4,000	70	0.7
01-006		372604N1210611W001	91	4,000	70	0.7
07-016			Well 01	1,000	17	0.7
07-002	10S10E32L001M	370173N1208999W001	MC15-1	1,200	18	0.8
07-005	12S11E03Q001M	369097N1207554W001	MP091.68R	2,600	10	6.0
07-006	12S12E07E001M	369044N1207092W001	MP094.26L	2,600	10	6.0
07-007	12S12E16E003M	368896N1206702W001	MC18-1	2,600	10	6.0
07-008	13S12E22F001M	367885N1206510W001	PWD 48	2,600	10	6.0
07-014			TW-4	1,000	10	1.1
07-015			TW-5	1,000	10	1.1

6.3.3.3 Measurable Objectives and Interim Milestones

The measurable objective for degraded water quality is set as current water quality conditions for TDS, nitrate, and boron as established for each monitoring network subregion (see Section 7.2 *Monitoring* of the *Sustainability Implementation* chapter for more information on the monitoring network subregions). The upper limit of the concentration range presented for the Upper Aquifer and Lower Aquifer in Figure 5-86 and Figure 5-87, respectively, in Section 5.3 *Groundwater Conditions* in the *Basin Setting* chapter were used to set the measurable objective at each monitoring site. Table 6-7 and Table 6-8 reflect the measurable objectives for degraded water quality for the Upper Aquifer and Lower Aquifer, respectively. Measurable objective values were set based on water quality data from existing water quality monitoring programs and evaluating concentrations for TDS, nitrate as N, and boron between 2000 and 2018. Local input and professional judgement were also applied in setting the measurable objectives. The selected minimum thresholds reflect input from local drinking water purveyors, as well as the local agricultural community, and is expected to maintain beneficial uses of groundwater for both drinking water and agricultural users. It should be noted that concentrations presented for measurable objectives reflect ambient groundwater quality, where additional treatment may be necessary to meet State and federal MCLs for drinking water.

To assist the Plan area in reaching the measurable objective for degraded water quality, interim milestones are established for 2025, 2030, and 2035 as a means of assessing progress towards the Regions' sustainability goal. In cases where the measurable objective has been achieved, the interim goals reflect overall objective of maintaining existing groundwater quality. Therefore, the interim milestones for degraded water quality are set as follows:

- Year 5 (2025): Maintain current groundwater quality
- Year 10 (2030): Maintain current groundwater quality
- Year 15 (2035): Maintain current groundwater quality

Table 6-7. Measurable Objective for Degraded Water Quality, Upper Aquifer

Narrative Description						
The measurable objective is set as the current groundwater quality conditions by GSP subregion.						
Numeric Measurable Objectives – Degraded Water Quality in Upper Aquifer						
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Measurable Objective (mg/L)		
				TDS	Nitrate as N	Boron
02-001	05S07E15N002M	374934N1211934W001	MP037.32L	4,000	80	3.0
06-004			MP031.31L1-L2Well1	4,000	80	3.0
03-001		375015N1211011W001	MW-2	4,000	80	3.0
03-002			MW-3	4,000	80	3.0
03-003	05S/08E-16R		WSJ003	4,000	80	3.0
06-002	06S08E09E003M	374316N1210994W003	P259-3	2,500	60	1.7
01-004	07S08E28R002M	372907N1210875W002	MC10-2	2,500	60	1.7
01-005	08S08E15G001M	372424N1210754W001	MP058.28L	2,500	60	1.7
07-017			Well 1	1,000	60	0.9
07-003	10S10E32L002M	370173N1208999W002	MC15-2	2,700	90	1.0
07-004	11S10E04L001M		MP081.08R	2,700	90	1.0
07-011		368835N1206270W001	MP099.24L	3,500	13	6.0
07-012	12S/12E-16B		GDA003	3,500	13	6.0
07-013			MP102.04R	3,500	13	6.0
07-010		366500N1202500W001	KRCDTID02	800	1	2.2
07-009		366000N1202300W001	KRCDTID03	800	1	2.2
07-018	15S/16E-20		WSJ001	800	1	2.2

Table 6-8. Measurable Objective for Degraded Water Quality, Lower Aquifer

Narrative Description						
The measurable objective is set as the current groundwater quality conditions by GSP subregion.						
Numeric Measurable Objectives – Degraded Water Quality in Lower Aquifer						
DMS ID	State Well Number	CASGEM ID (if applicable)	Local ID	Measurable Objective (mg/L)		
				TDS	Nitrate as N	Boron
01-007			MP021.12L	2,000	50	3.0
01-001	04S06E36C001M	375509N1212609W001	MP030.43R	2,000	50	3.0
01-002	05S07E05F001M	375313N1212242W001	MP033.71L	2,000	50	3.0
06-003		375774N1212096W001	WSID 3	2,000	50	3.0
02-002			WELL 02 - NORTH 5TH STREET	2,000	50	3.0
06-001	06S08E09E001M	374316N1210994W001	P259-1	4,000	70	0.6
01-003	06S08E20D002M	374061N1211212W001	MP045.78R	4,000	70	0.6
04-001		376129N1212942W001	121	4,000	70	0.6
01-008			MP051.66L	4,000	70	0.6
01-006		372604N1210611W001	91	4,000	70	0.6
07-016			Well 01	1,000	17	0.2
07-002	10S10E32L001M	370173N1208999W001	MC15-1	1,200	18	0.8
07-005	12S11E03Q001M	369097N1207554W001	MP091.68R	2,600	10	6.0
07-006	12S12E07E001M	369044N1207092W001	MP094.26L	2,600	10	6.0
07-007	12S12E16E003M	368896N1206702W001	MC18-1	2,600	10	6.0
07-008	13S12E22F001M	367885N1206510W001	PWD 48	2,600	10	6.0
07-014			TW-4	775	1	1.1
07-015			TW-5	775	1	1.1

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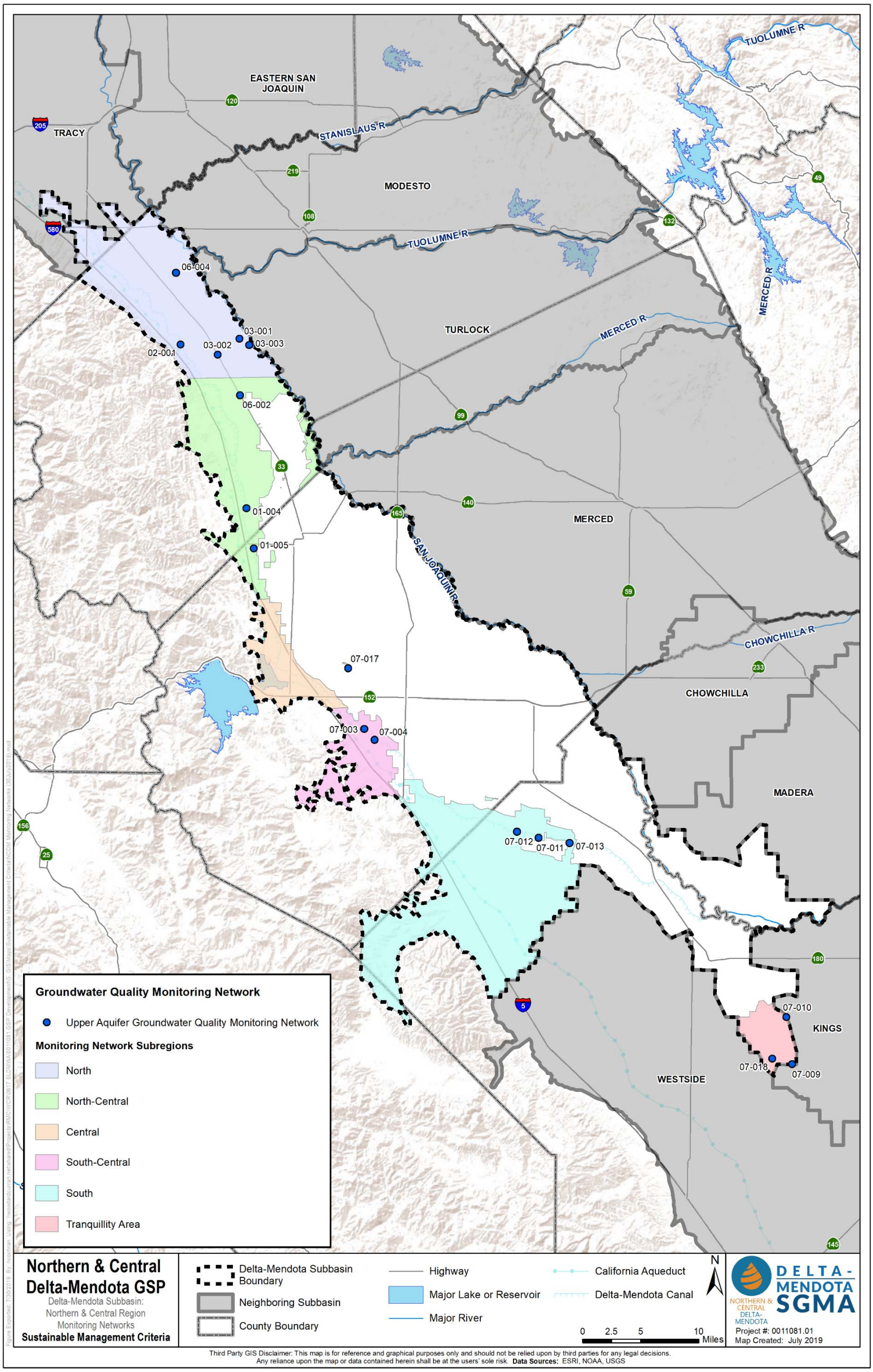

Figure 6-4. Locations of Representative Monitoring Wells for Degraded Water Quality, Upper Aquifer

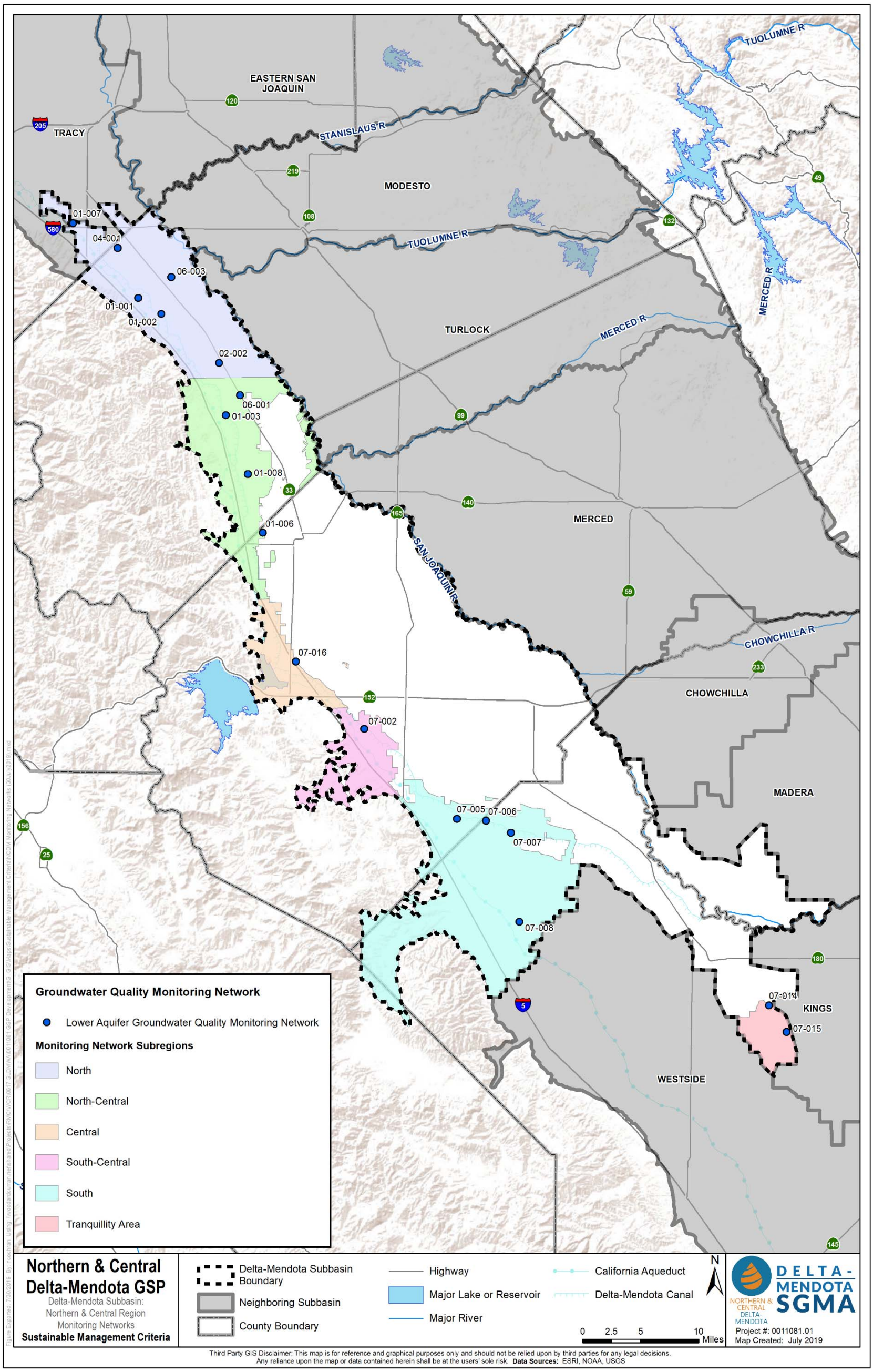

Figure 6-5. Locations of Representative Monitoring Wells for Degraded Water Quality, Lower Aquifer

6.3.4 Seawater Intrusion

Seawater intrusion is not an applicable sustainability indicator for the Delta-Mendota Subbasin as the Subbasin is located inland from the Pacific Ocean. Therefore, sustainable management criteria for seawater intrusion will not be set for the Plan area.

6.3.5 Land Subsidence

Undesirable results, minimum thresholds, measurable objectives, and interim milestones for the land subsidence sustainability indicator are described in the subsequent subsections.

6.3.5.1 Undesirable Results

A description of undesirable results as defined under SGMA and by the Delta-Mendota Subbasin, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results relative to the land subsidence sustainability indicator are detailed below.

6.3.5.1.1 Description of Undesirable Results

The undesirable result related to land subsidence is defined under SGMA as:

> *Significant and unreasonable land subsidence that substantially interferes with surface land uses* (CWC Section 10721(x)(5).

An undesirable result for land subsidence in the Delta-Mendota Subbasin is experienced through *changes in ground surface elevation that cause damage to critical infrastructure that would cause significant and unreasonable reductions of conveyance capacity, damage to personal property, impacts to natural resources, or create conditions that threaten public health and safety*. This definition of an undesirable result was agreed upon by all GSP Groups through the Delta-Mendota Subbasin Coordination Committee. Public feedback was considered in defining an undesirable result for land subsidence based on stakeholder participation at public workshops held in May 2019.

6.3.5.1.2 Identification of Undesirable Results

As previously described in Section 5.5 *Management Areas* of the *Basin Setting* chapter, two management areas (MAs) have been established for the land subsidence sustainability indicator within the Plan area: West Stanislaus Irrigation District-Patterson Irrigation District (WSID-PID) MA and Tranquillity Irrigation District (TRID) MA. Definitions triggering an undesirable result have been established for each land subsidence MA, as well as for the Plan area as a whole. An undesirable result for land subsidence is triggered, or considered "significant and unreasonable," for each management area and remaining Plan area when:

- WSID-PID MA: Significant impacts occur to laterals from differential settlement that reduces the ability to deliver surface water supplies.
- TRID MA: Inadequate freeboard exists on the levee system to retain flood flows in wet years as a result of significant additional land subsidence.
- Remaining Plan area: Significant increases in 2014-2016 subsidence rates due to groundwater pumping in two or more subregions that result in 50 percent loss of standup capacity (where standups are defined as vertical stand concrete pipes at Delta-Mendota Canal [DMC] turnouts) and/or 75 percent overtopping of lining in the Delta-Mendota Canal as a result of inelastic land subsidence.

Minimum thresholds established for this sustainability indicator have been established to reflect these undesirable results.

6.3.5.1.3 Potential Causes of Undesirable Results

Land subsidence in the Delta-Mendota Subbasin typically is the result of over-extraction of groundwater. Inelastic land subsidence throughout the Subbasin is largely occurs from Lower Aquifer groundwater pumping resulting in the compaction of clays below the Corcoran Clay layer as a result of the loss of piezometric head. Generally poor water quality within the Upper Aquifer and transitions from pasture or fallowed land to irrigated land uses has resulted in increased groundwater demand from the Lower Aquifer. Conjunctive use of surface water and groundwater is prevalent throughout the Plan area as supplies from the San Joaquin River, Kings River, CVP, and SWP are utilized and supplemented with groundwater when surface water deliveries are reduced or non-existent. As a result, groundwater extractions increase during periods of drought or as the result of regulatory constraints, when surface water supplies are inadequate to meet agricultural demand, resulting in higher rates of inelastic land subsidence.

6.3.5.1.4 Potential Effects of Undesirable Results

Undesirable results related to land subsidence could potentially cause unrecoverable loss of groundwater storage and differential changes in land surface elevation, resulting in damage to water conveyance infrastructure, flood control facilities and other infrastructure, and causing decreased capacity to convey water or control flood waters. This could impact the ability to deliver surface water within the Subbasin as well as throughout California, as the DMC and California Aqueduct run the nearly the entire length of the Northern and Central Delta-Mendota Regions. The cost to convey surface water or control flood waters would likely increase as gradients of gravity-driven conveyance structures would require repair and modification or increased energy to pump and move surface or flood water. These potential effects could result in significant economic costs and adversely impact property value as well as public safety.

6.3.5.2 Minimum Thresholds

The minimum thresholds for the land subsidence sustainability indicator are set as follows for the two established management areas and the remaining Plan area:

- WSID-PID MA: Acceptable loss in distribution capacity (as based on a future capacity study) due to inelastic land subsidence resulting from groundwater pumping. Numerical values for this criterion to be determined based on data collection between 2020 and 2025.
- TRID MA: Four (4) feet additional subsidence compared to 2019 benchmark elevations.
- Remaining Plan area: Target rate/goal by monitoring network subregion, based on the average 2014-2016 elevation change from recent DMC surveys.

Figure 6-6 shows the locations of land subsidence representative monitoring sites. Table 6-9 includes the minimum thresholds at each representative monitoring site for the land subsidence sustainability indicator.

To develop minimum thresholds for the land subsidence sustainability indicator, different information and data were evaluated for the two MAs (WSID-PID and TRID) and the remaining Plan area. Minimal land subsidence has previously been observed in the WSID-PID MA. Both WSID and PID receive sufficient surface water supplies via the San Joaquin River and the CVP to meet demands within the districts, meaning Lower Aquifer groundwater pumping (which results in inelastic land subsidence) within this MA is minimal. Therefore, the established minimum threshold for the WSID-PID MA described above is protective of beneficial uses of surface water in WSID and PID should land subsidence be observed as a results of a future capacity study.

Within the TRID MA, the locally-owned levee operated by TRID was raised in 2017 to approximately two (2) feet above the maximum flow condition to provide sufficient freeboard as a flood control measure due to wet conditions observed in 2017. Local representatives from TRID indicated that the additional cost and loss of productive agricultural land to raise the levee an additional four (4) feet compared to the 2019 levee elevation have already been

planned for and would not cause an undesirable result for this MA. For the remaining Plan area, the average 2014-2016 elevation from recent DMC surveys and analyses performed by the United States Bureau of Reclamation were used to establish minimum thresholds outside the designated management areas. The subsidence rates from the 2014 and 2016 surveys were used because they encompass the largest portion of the recent drought period where significant subsidence was observed. These thresholds were established using the best available data and will be reevaluated following a capacity analysis and bathymetric survey of the DMC.

The minimum thresholds within the two MAs and the remaining Plan area were established to be protective of water conveyance infrastructure and surface water delivery capabilities specific to these areas to avoid an undesirable result. Within the WSID-PID MA, impacts related to subsidence would be considered "significant and unreasonable" if impacts to laterals from differential settlement reduced the ability to deliver surface water supplies from the San Joaquin River and Central Valley Project. These conditions would likely result in increased groundwater extractions to replace undelivered surface water, thereby potentially exacerbating the subsidence conditions.

Within the TRID MA, impacts would be considered "significant and unreasonable" if inadequate freeboard on TRID's levee system during flood releases of the Kings River are observed as a result of significant additional land subsidence resulting from groundwater extractions. Throughout the remaining Plan area, the DMC is the primary infrastructure of concern as it is the primary means of conveying surface water to irrigated lands in the Subbasin. Land subsidence rates for each pool along the DMC, presented in Table 5-8 (Section 5.3 *Groundwater Conditions* of the *Basin Setting* chapter), were assigned to each monitoring network subregion and an average of the pool 2014-2016 average elevation changes within a given subregion was established as the minimum threshold for all monitoring sites within a subregion. In setting minimum thresholds based on these land subsidence rates, professional judgement deems that an undesirable result for land subsidence will be avoided as a "significant and unreasonable" loss in standup capacity or overtopping of lining is unlikely to occur due to land subsidence.

The minimum thresholds for land subsidence within the two MAs and the remaining Plan area do not directly impact any of the other applicable sustainability indicators. As previously stated, the land subsidence and chronic lowering of groundwater levels sustainability indicators are linked as groundwater pumping from the Lower Aquifer results in deeper groundwater levels and causes inelastic subsidence.

Similar to the establishment of sustainability indicators for groundwater elevations, limited interbasin coordination has been conducted relative to establishing the minimum thresholds and measurable objectives for inelastic land subsidence. As previously noted, three of the adjoining subbasins (Tracy, Modesto, Turlock Subbasins) are not required to submit their GSPs to DWR until January 2022, and due to time constraints in preparing the GSPs, limited coordination was conducted with the Merced, Westside and Kings Subbasins. As such, ongoing interbasin coordination between the subbasins will be conducted during GSP implementation, and the annual reports and GSP updates will contain evaluations of how minimum thresholds for land subsidence in the Northern and Central Delta-Mendota Regions may affect the ability of these adjacent basins to meet achieve their sustainability goals

The beneficial uses and users of groundwater, as well as land uses and property interests, were considered when establishing minimum thresholds for the land subsidence sustainability indicator. Stakeholders, including the public, were invited to provide feedback on minimum thresholds during Working Group meetings (publicly noticed per Brown Act requirements) and during public workshops centered around SMC held throughout the Delta-Mendota Subbasin in May 2019. Representatives from the municipal sector (primarily the City of Patterson and Santa Nella County Water District) and agricultural sector are Working Group members and provided input in setting the minimum thresholds for the land subsidence sustainability indicator throughout the development process. Many agricultural water users within the Plan area conjunctively use groundwater and surface water and therefore provided feedback in setting minimum thresholds for the land subsidence sustainability indicator related to both surface water and groundwater. An undesirable result for land subsidence throughout the Plan area relates to damage of critical infrastructure for conveying surface water through reductions in conveyance capacity, damage to personal property, impacts to natural resources, or creating conditions that threaten public health and safety as a result of Lower Aquifer

groundwater pumping. Based on the above described communication with beneficial users of groundwater, it was deemed that the minimum thresholds set for the land subsidence and chronic lowering of groundwater levels sustainability indicators would avoid undesirable results for both sustainability indicators.

Currently, there are no other State, federal, or local standards within the Plan area that relate to the land subsidence sustainability indicator. SGMA is the prevailing legislation dictating requirements and standards for the land subsidence sustainability indicator. Since the California Aqueduct runs nearly the entire length of the Plan area and is managed by DWR, the Northern and Central Delta-Mendota Regions met with representatives from DWR and coordinated with DWR in regards to land subsidence throughout the development of this GSP. As this GSP was being developed, DWR was conducting an on-going evaluation of land subsidence relative to the California Aqueduct, which is expected to be complete and released in late 2019. Discussions and coordination with DWR involved DWR's tolerance for additional land subsidence along the California Aqueduct within the Delta-Mendota Subbasin to ensure minimum thresholds set in this GSP are compatible with DWR's projected operations of the California Aqueduct. DWR did not, however, opt to participate in GSP development prior to the release of the Public Draft GSP.

For information regarding how minimum thresholds for the land subsidence sustainability indicator will be quantitatively measured, including monitoring protocols as well as frequency and timing of measurement, refer to Section 7.2.5.5 *Land Subsidence Monitoring Network* of the *Sustainability Implementation* chapter.

6.3.5.3 Measurable Objectives and Interim Milestones

The measurable objectives for land subsidence are set as followed for the WSID-PID and TRID MAs, as well as the remaining Plan area:

- WSID-PID MA: No loss in distribution capacity as a result of subsidence resulting from groundwater pumping. Numerical value for this criterion to be determined based on data collection between 2020 and 2025.
- TRID MA: Two (2) feet additional subsidence compared to 2019 benchmark elevation.
- Remaining Plan area: Target rate/goal by monitoring network subregion, based on the average 2016-2018 elevation change from recent DMC surveys.

Table 6-10 reflects the measurable objectives for land subsidence at each representative monitoring site. As previously noted, undesirable results for land subsidence relate to conveyance capacity of water conveyance or flood control infrastructure as significant and unreasonable rates of land subsidence occur. By managing the Lower Aquifer according to the chronic lowering of groundwater levels measurable objectives, as well as the measurable objectives set forth for the land subsidence sustainability indicator, it is anticipated that an undesirable result for land subsidence will be avoided and therefore the sustainability goal will be met by 2040.

To assist the Plan area in reaching the measurable objective for land subsidence, interim milestones are established for 2025, 2030, and 2035 as a means of assessing progress towards the Regions' sustainability goal. For this sustainability indicator, interim milestones are based on achieving the sustainability goal within the 20-year time period provided under SGMA. The interim milestones for land subsidence are shown in Table 6-11.

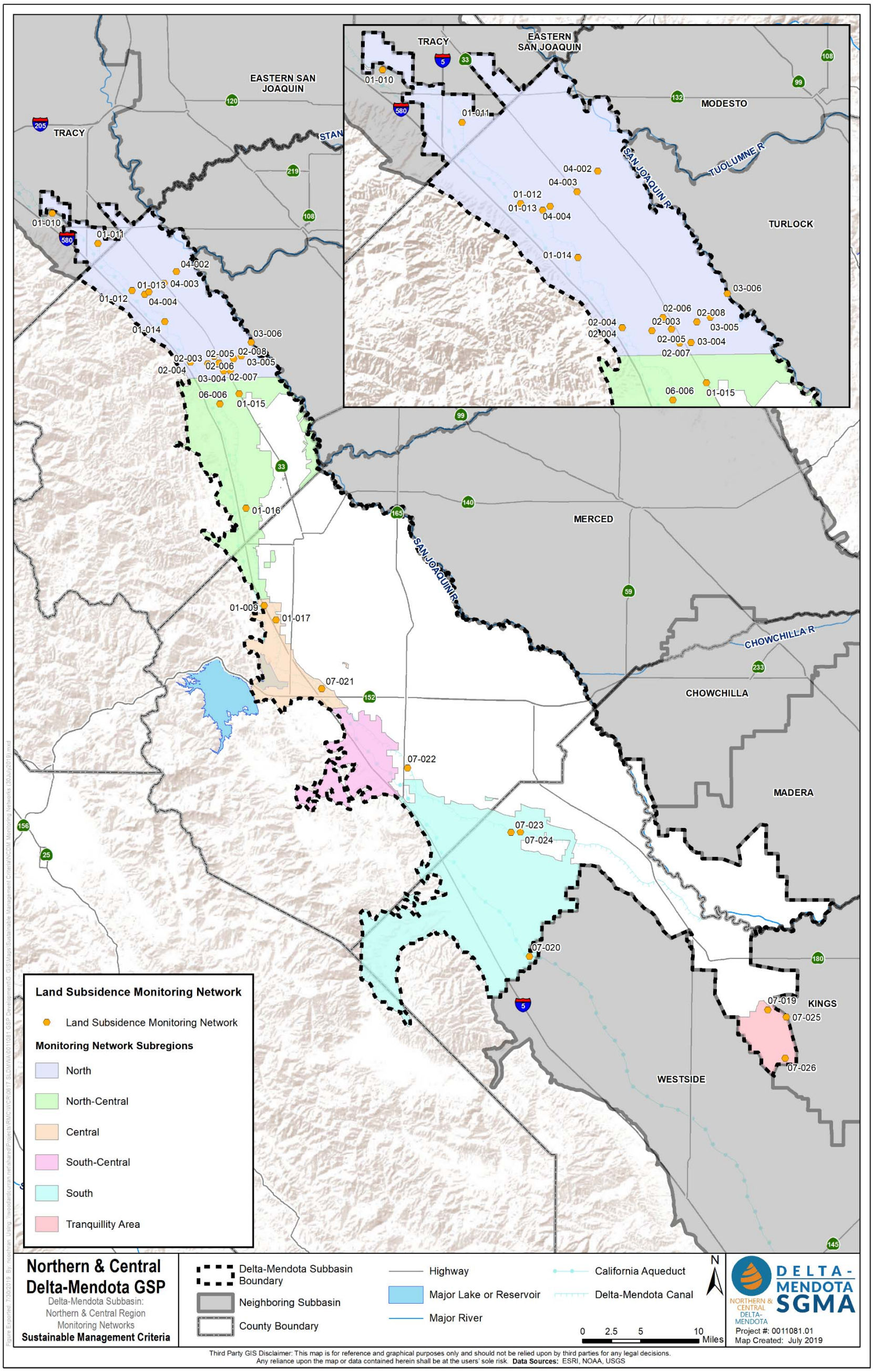

Figure 6-6. Location of Representative Monitoring Sites for Land Subsidence

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Table 6-9. Minimum Thresholds for Land Subsidence

Narrative Description

WSID-PID Management Area: The minimum threshold is set as the acceptable loss in distribution capacity as a result of subsidence resulting from groundwater pumping as based on future capacity study.

TRID Management Area: The minimum threshold is set as four (4) feet additional subsidence compared to 2019 benchmark elevation.

Remaining Plan Area: The minimum threshold is set as target rate/goal by monitoring subregion, based on the average 2014-2016 elevation change from recent DMC surveys.

Numeric Minimum Thresholds – Inelastic Land Subsidence

DMS ID	Local ID	Management Area	Minimum Threshold[1,2]	Units[1,2]
02-003	Floragold Well	N/A	-0.13	ft/year
02-008	Well 11	N/A	-0.13	ft/year
02-005	Well 2	N/A	-0.13	ft/year
02-006	Well 4	N/A	-0.13	ft/year
02-007	Well 6	N/A	-0.13	ft/year
03-004	Locust Avenue Well	WSID-PID	TBD	TBD
03-005	Pumping Plant No. 2	WSID-PID	TBD	TBD
03-006	River Station	WSID-PID	TBD	TBD
01-010	Subsidence Monitoring Point #1	N/A	-0.13	ft/year
01-011	Subsidence Monitoring Point #2	N/A	-0.13	ft/year
01-012	Subsidence Monitoring Point #3	N/A	-0.13	ft/year
01-013	Subsidence Monitoring Point #4	N/A	-0.13	ft/year
01-014	Subsidence Monitoring Point #5	N/A	-0.13	ft/year
02-004	Subsidence Monitoring Point #6	N/A	-0.13	ft/year
04-002	WSID 1	WSID-PID	TBD	TBD
04-003	WSID 11	WSID-PID	TBD	TBD
04-004	WSID 21	WSID-PID	TBD	TBD
01-015	Subsidence Monitoring Point #7	N/A	-0.26	ft/year
06-006	Subsidence Monitoring Point #8	N/A	-0.26	ft/year
01-016	Subsidence Monitoring Point #9	N/A	-0.26	ft/year
01-017	Subsidence Monitoring Point #10	N/A	-0.21	ft/year
07-021	Subsidence Monitoring Point #11	N/A	-0.21	ft/year
01-009	P252	N/A	-0.21	ft/year
07-022	Subsidence Monitoring Point #12	N/A	-0.15	ft/year
07-023	Subsidence Monitoring Point #13	N/A	-0.15	ft/year
07-020	104.20-R	N/A	-0.18	ft/year
07-024	Subsidence Monitoring Point #14	N/A	-0.18	ft/year
07-025	Subsidence Monitoring Point #15	N/A	-0.18	ft/year
07-019	AG-24	TRID	153.77	ft GSE
07-026	TID A	TRID	156.54	ft GSE
07-027	TID B	TRID	165.22	ft GSE

[1] TBD = To be determined
[2] ft GSE = feet ground surface elevation (NAVD88)

Table 6-10. Measurable Objective for Land Subsidence

Narrative Description

WSID-PID Management Area: The measurable objective is set as no loss in distribution capacity as a result of subsidence resulting from groundwater pumping. Numerical values for this criterion to be determined based on data collection between 2020 and 2025.

TRID Management Area: The measurable objective is set as two (2) feet additional subsidence compared to 2019 benchmark elevation.

Remaining Plan Area: The measurable objective is set as target rate/goal by monitoring subregion, based on the average 2016-2018 elevation change from recent Delta-Mendota Canal survey.

Numeric Measurable Objectives – Inelastic Land Subsidence

DMS ID	Local ID	Management Area	Measurable Objective[1,2]	Units[1,2]
02-003	Floragold Well	N/A	-0.11	ft/year
02-008	Well 11	N/A	-0.11	ft/year
02-005	Well 2	N/A	-0.11	ft/year
02-006	Well 4	N/A	-0.11	ft/year
02-007	Well 6	N/A	-0.11	ft/year
03-004	Locust Avenue Well	WSID-PID	TBD	TBD
03-005	Pumping Plant No. 2	WSID-PID	TBD	TBD
03-006	River Station	WSID-PID	TBD	TBD
01-010	Subsidence Monitoring Point #1	N/A	-0.11	ft/year
01-011	Subsidence Monitoring Point #2	N/A	-0.11	ft/year
01-012	Subsidence Monitoring Point #3	N/A	-0.11	ft/year
01-013	Subsidence Monitoring Point #4	N/A	-0.11	ft/year
01-014	Subsidence Monitoring Point #5	N/A	-0.11	ft/year
02-004	Subsidence Monitoring Point #6	N/A	-0.11	ft/year
04-002	WSID 1	WSID-PID	TBD	TBD
04-003	WSID 11	WSID-PID	TBD	TBD
04-004	WSID 21	WSID-PID	TBD	TBD
01-015	Subsidence Monitoring Point #7	N/A	0.01	ft/year
06-006	Subsidence Monitoring Point #8	N/A	0.01	ft/year
01-016	Subsidence Monitoring Point #9	N/A	0.01	ft/year
01-017	Subsidence Monitoring Point #10	N/A	-0.03	ft/year
07-021	Subsidence Monitoring Point #11	N/A	-0.03	ft/year
01-009	P252	N/A	-0.03	ft/year
07-022	Subsidence Monitoring Point #12	N/A	-0.01	ft/year
07-023	Subsidence Monitoring Point #13	N/A	-0.01	ft/year
07-020	104.20-R	N/A	-0.08	ft/year
07-024	Subsidence Monitoring Point #14	N/A	-0.08	ft/year
07-025	Subsidence Monitoring Point #15	N/A	-0.08	ft/year
07-019	AG-24	TRID	155.77	ft GSE
07-026	TID A	TRID	158.54	ft GSE
07-027	TID B	TRID	167.22	ft GSE

[1] TBD = To be determined
[2] ft GSE = feet ground surface elevation (NAVD88)

Table 6-11. Interim Milestones for Land Subsidence

Narrative Description

WSID-PID Management Area
- Year 5 (2025): Establish minimum threshold and measurable objective for land subsidence sustainability indicator
- Year 10 (2030): To be determined in 5-Year GSP update in 2025 based on additional data analysis
- Year 15 (2035): To be determined in 5-Year GSP update in 2025 based on additional data analysis

TRID Management Area
- Year 5 (2025): Minimal additional subsidence
- Year 10 (2030): Minimal additional subsidence
- Year 15 (2035): Minimal additional subsidence

Remaining Plan Area
- Year 5 (2025): Minimal additional subsidence
- Year 10 (2030): Minimal additional subsidence
- Year 15 (2035): Minimal additional subsidence

Numeric Interim Milestones – Inelastic Land Subsidence

DMS ID	Local ID	Management Area	Year 5 (2025) [1,2]	Year 10 (2030) [1,2]	Year 15 (2035) [1,2]	Units[1,2]
02-003	Floragold Well	N/A	-0.12	-0.12	-0.11	ft/year
02-008	Well 11	N/A	-0.12	-0.12	-0.11	ft/year
02-005	Well 2	N/A	-0.12	-0.12	-0.11	ft/year
02-006	Well 4	N/A	-0.12	-0.12	-0.11	ft/year
02-007	Well 6	N/A	-0.12	-0.12	-0.11	ft/year
03-004	Locust Avenue Well	WSID-PID	TBD	TBD	TBD	TBD
03-005	Pumping Plant No. 2	WSID-PID	TBD	TBD	TBD	TBD
03-006	River Station	WSID-PID	TBD	TBD	TBD	TBD
01-010	Subsidence Monitoring Point #1	N/A	-0.12	-0.12	-0.11	ft/year
01-011	Subsidence Monitoring Point #2	N/A	-0.12	-0.12	-0.11	ft/year
01-012	Subsidence Monitoring Point #3	N/A	-0.12	-0.12	-0.11	ft/year
01-013	Subsidence Monitoring Point #4	N/A	-0.12	-0.12	-0.11	ft/year
01-014	Subsidence Monitoring Point #5	N/A	-0.12	-0.12	-0.11	ft/year
02-004	Subsidence Monitoring Point #6	N/A	-0.12	-0.12	-0.11	ft/year
04-002	WSID 1	WSID-PID	TBD	TBD	TBD	TBD
04-003	WSID 11	WSID-PID	TBD	TBD	TBD	TBD
04-004	WSID 21	WSID-PID	TBD	TBD	TBD	TBD
01-015	Subsidence Monitoring Point #7	N/A	-0.18	-0.09	-0.01	ft/year
06-006	Subsidence Monitoring Point #8	N/A	-0.18	-0.09	-0.01	ft/year
01-016	Subsidence Monitoring Point #9	N/A	-0.18	-0.09	-0.01	ft/year
01-017	Subsidence Monitoring Point #10	N/A	-0.15	-0.09	-0.03	ft/year
07-021	Subsidence Monitoring Point #11	N/A	-0.15	-0.09	-0.03	ft/year
01-009	P252	N/A	-0.15	-0.09	-0.03	ft/year
07-022	Subsidence Monitoring Point #12	N/A	-0.1	-0.06	-0.01	ft/year
07-023	Subsidence Monitoring Point #13	N/A	-0.1	-0.06	-0.01	ft/year
07-020	104.20-R	N/A	-0.15	-0.11	-0.08	ft/year
07-024	Subsidence Monitoring Point #14	N/A	-0.15	-0.11	-0.08	ft/year
07-025	Subsidence Monitoring Point #15	N/A	-0.15	-0.11	-0.08	ft/year
07-019	AG-24	TRID	< -0.5	< -0.5	< -0.5	ft GSE
07-026	TID A	TRID	< -0.5	< -0.5	< -0.5	ft GSE
07-027	TID B	TRID	< -0.5	< -0.5	< -0.5	ft GSE

[1] TBD = To be determined
[2] ft GSE = feet ground surface elevation (NAVD88)

6.3.6 Depletions of Interconnected Surface Water

Undesirable results, minimum thresholds, measurable objectives, and interim milestones for the depletions of interconnected surface water sustainability indicator are described in the subsequent subsections.

6.3.6.1 Undesirable Results

A description of undesirable results as defined under SGMA and by the Delta-Mendota Subbasin, identification of undesirable results, potential causes of undesirable results, and potential effects of undesirable results relative to the depletions of interconnected surface water sustainability indicator are detailed below.

6.3.6.1.1 Description of Undesirable Results

The undesirable result related to depletions of interconnected surface water is defined under SGMA as:

> *Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water* (CWC Section 10721(x)(6)).

An undesirable result for depletions of interconnected surface water in the Delta-Mendota Subbasin is experienced through *depletions of interconnected surface water, as defined by each GSP Group, that have significant and unreasonable adverse impacts on the beneficial uses of surface water*. This definition of an undesirable result was agreed upon by all GSP Groups through the Delta-Mendota Subbasin Coordination Committee. Public feedback was considered in defining an undesirable result for depletions of interconnected surface water based on stakeholder participation at public workshops held in May 2019.

6.3.6.1.2 Identification of Undesirable Results

An undesirable result for depletions of interconnected surface water is triggered, or considered "significant and unreasonable," when where interconnected stretches of surface water are identified and a significant increase in the depletions of surface water is occurring as a result of groundwater pumping. The percent increase in depletions considered significant, identified herein as 'X,' is to be determined from monitoring data to be collected between 2020 and 2025 and associated analysis of these data.

6.3.6.1.3 Potential Causes of Undesirable Results

The potential causes of undesirable results for the depletions of interconnected surface water includes increased groundwater demand along interconnected corridors. The portion of the San Joaquin River bordering the Northern Delta-Mendota Region has been identified as the only interconnected surface water body in the Plan area, based on information available during development of this GSP as described in Section 5.3.7 *Interconnected Surface Water Systems* of the *Basin Setting* chapter.

6.3.6.1.4 Potential Effects of Undesirable Results

If depletions of interconnected surface water were to reach levels causing undesirable results, adverse effects could include reduced flow and stage within the San Joaquin River to the extent that insufficient surface water flows would be available to support diversions for agricultural uses or to support regulatory environmental requirements. This could result in increased groundwater production, changes in irrigation practices and crops grown, and could cause adverse effects to property values and the subbasin-wide economy. Such impacts could also be tied to the inability to meet minimum flow requirements, which are defined for the San Joaquin River and are managed by upstream dams and reservoir releases.

6.3.6.2 Minimum Thresholds

At the time of GSP development, there are insufficient data available to set numeric values for minimum thresholds for the depletions of interconnected surface water sustainability indicator in a manner that is not subjective. A qualitative statement of minimum thresholds has been developed in the interim for this sustainability indicator as follows:

> *An X percent increase in surface water depletions along interconnected stretches of surface water as a result of groundwater pumping, where 'X' is the present increase in depletions to be determined from monitoring data collected between 2020 and 2025 and associated analyses of these data.*

Data collected from wells within the depletions of interconnected surface water monitoring network and stream gauges located along the San Joaquin River between 2020 and 2025 will be analyzed to determine the location, timing, and quantity of depletions over reaches of interconnected surface water within and/or adjoining the Northern and Central Delta-Mendota Regions. Data and assessments gathered during this time period will be used to establish numeric minimum thresholds for inclusion in the first 5-Year GSP Update. Figure 6-7 shows the representative monitoring locations for the depletions of interconnected surface water sustainability indicator.

6.3.6.3 Measurable Objectives and Interim Milestones

At the time of GSP development, there are insufficient data available to set numeric values for measurable objectives and interim milestones for the depletions of interconnected surface water sustainability indicator. Data collected from wells within the depletions of interconnected surface water monitoring network and stream gauges located along the San Joaquin River between 2020 and 2025 will be analyzed to determine the location, timing, and quantity of depletions. Data and assessments gathered between this time period will be used to establish numeric measurable objectives and interim milestones for inclusion in the first the 5-Year GSP Update.

In the interim, a qualitative statement has been developed for the measurable objective for depletions of interconnected surface water as follows:

> *No increased depletions of surface water as a result of groundwater pumping.*

Since the 2025 interim goal is to establish measurable objectives for this sustainability indicator (in addition to subsequent interim goals), numeric measurable objectives and 2030 and 2035 interim goals will be included in the first 5-Year GSP Update based on additional data collected and analyses performed.

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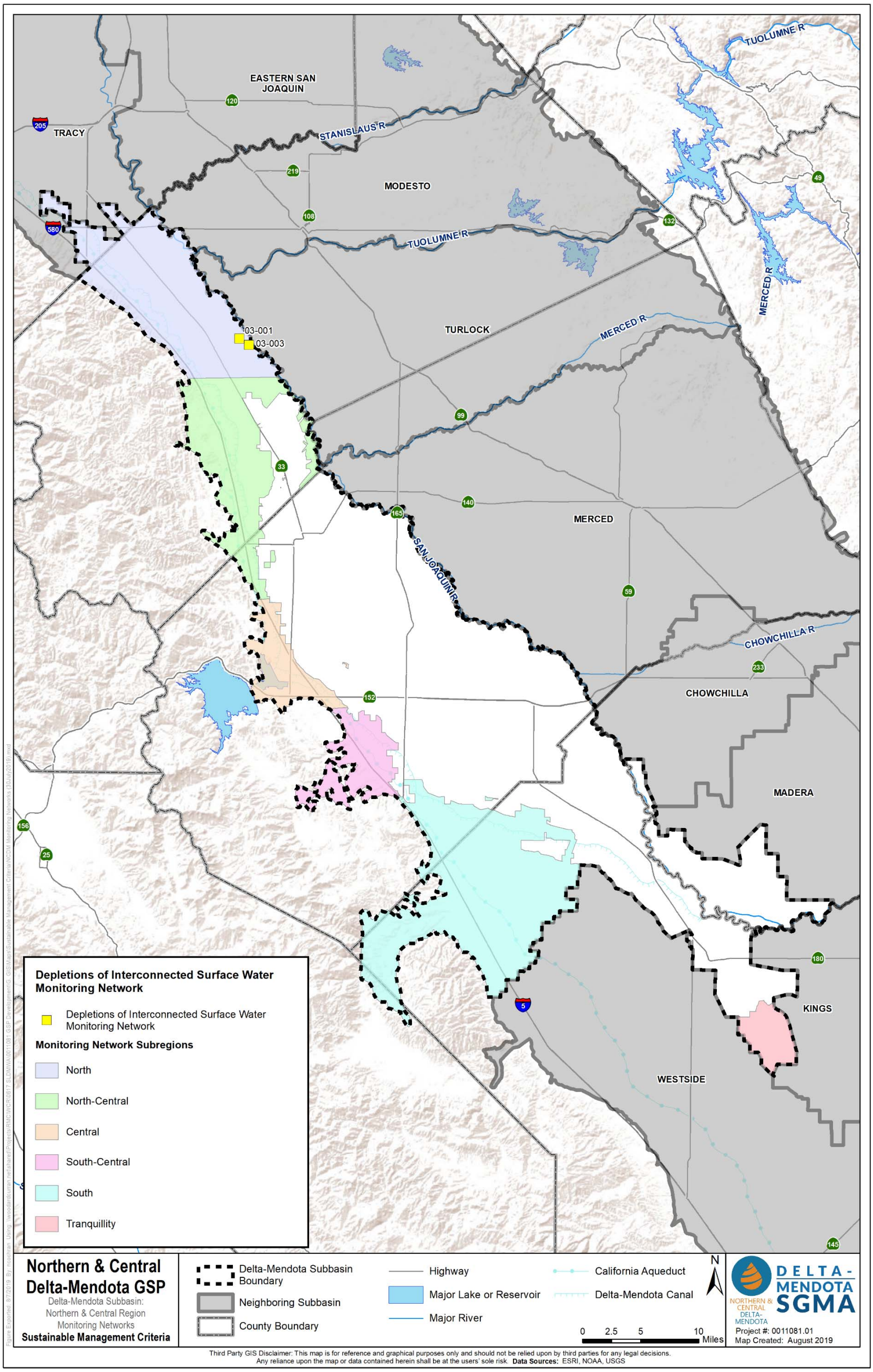

Figure 6-7. Locations of Representative Monitoring Wells for Depletions of Interconnected Surface Water

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6.4 REFERENCES

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