Appendix J

Water Supply Assessment

Water Supply Assessment for the City of Chico Valley's Edge Specific Plan

Chico-Hamilton City District
California Water Service

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Chico-Hamilton City District, California Water Service

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APPENDIX

1 INTRODUCTION

Included herein is a Senate Bill 610-compliant water supply assessment (WSA) in support of the proposed Valley's Edge Specific Plan Project (Project). As shown on Figure 1, the proposed Project comprises 1,448 acres within the unincorporated area of Butte County that is located in the foothills area at the eastern end of East 20th Street, east of Potter Road, and north of Honey Run Road and Skyway. Per the Project Description (Chico, 2019; Chico Land Investment LLC, 2019) and Figure 2, the proposed Project consists of a new mixed-use development that includes:

- 2,777 residential units, consisting of a mix of single-family residential (SFR) and multi-family residential (MFR) units[1], a portion of which are designated as age-restricted "senior community" housing;
- approximately 57 acres of commercial land;
- approximately 675 acres of special purpose land, including parks, open space, an elementary school site; and
- Approximately eight acres of water features, including an artificial lake and a series of ponds.

The proposed Project is located within the City of Chico's sphere of influence (SOI) and is immediately adjacent to the California Water Service (Cal Water) Chico-Hamilton City District (Chico District) service area. Cal Water will be the water service provider for the proposed Project (Figure 1; Chico, 2017). Providing services to the proposed Project will necessitate an expansion of the Chico District service area, which will be accomplished pending approval by the California Public Utilities Commission (CPUC) of a Certificate of Public Convenience and Necessity.

The information provided in this WSA is consistent with California Water Code (CWC or Water Code) §10910-10912 requirements and the California Department of Water Resources' (DWR's) *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001: To Assist Water Suppliers, Cities, and Counties in Integrating Water and Land Use Planning*, dated 8 October 2003. The text of specific sub-sections of the Water Code is included as indented and italicized font at the beginning of specific sections of this WSA. The information presented in those respective sections, and the associated tables and figures, respond directly to Water Code requirements.

The purpose of this WSA is to evaluate whether sufficient water supplies are available to meet all future demands within the Chico District service area, including demands associated with the proposed Project, during normal, single dry, and multiple dry hydrologic years for a 20-year time horizon. More specifically, this WSA includes:

- A summary of the WSA requirements articulated in Water Code §10910-10912 and a description of how they apply to the proposed Project;

[1] Housing includes approximately including 370 very low density units, 1,370 low density units, 880 medium density units, and 160 medium-high density units. Of these, 1,390 units are designated as age-restricted senior housing, including 40 very low density units, 830 low density units, and 520 medium density units.

- A description and analysis of the current and projected future water demands of the proposed Project through the year 2040;
- A description and analysis of the historical, current, and projected future water demands for the Chico District service area through the year 2040;
- A description and analysis of the current and projected future water supplies for the Chico District service area through the year 2040; and
- A comparison of the water supplies and demands for the Chico District service area, including the projected water demands associated with the proposed Project.

The information contained in this WSA is based primarily on the 2015 Urban Water Management Plan (UWMP) prepared for the Chico District, except where updated with relevant water demand and supply reliability and other information from sources including Cal Water, DWR, United States Geological Survey (USGS), Butte County Department of Water and Resource Conservation (BCDWRC), and others.

This WSA concludes that sufficient water supply is available to Cal Water to meet all future demands within the Chico District service area and those associated with the proposed Project.

2 GENERAL REQUIREMENTS FOR THE PREPARATION OF A WATER SUPPLY ASSESSMENT

The purpose of this section is to outline what types of projects require the preparation of a WSA, who is responsible for its preparation, and the necessary components of a WSA.

2.1 Applicability of Senate Bill 610 to the Project

Water Code Section 10910

(a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.

Water Code Section 10912

For the purposes of this part, the following terms have the following meanings:

(a) "Project" means any of the following:
(1) A proposed residential development of more than 500 dwelling units.
(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
(4) A proposed hotel or motel, or both, having more than 500 rooms.
(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
(6) A mixed-use project that includes one or more of the projects specified in this subdivision.
(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

The approximately 1,448-acre proposed Project site (Figure 1) is located in unincorporated Butte County and within the City of Chico's SOI. Based on information included in the Project Description provided by the City, and shown in Figure 2, the proposed Project consists of a new mixed-use development that includes 2,777 residential units, approximately 57 acres of commercial and, approximately 675 acres of special purpose land, including parks, open space, an elementary school site, and approximately eight acres of water features consisting of an artificial lake and series of ponds (Chico, 2019; Chico Land Investment LLC, 2019). The proposed Project satisfies the definition of "project" requiring a WSA pursuant to SB 610 (Water Code §10910(a) and 10912(a)(6)).

2.2 Responsibility for Preparation of the Water Supply Assessment

Water Code Section 10910

(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project

identified pursuant to this subdivision, a public water system, as defined in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

The proposed Project is located adjacent to the Chico District service area and, assuming successful annexation[2], the water for the proposed Project will be supplied by Cal Water. Therefore, in accordance with Water Code §10910(b), Cal Water is conservatively assumed to be the entity responsible for the WSA for the proposed Project.

2.3 Components of a Water Supply Assessment

Water Code Section 10910

(c) (4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

As listed above in Water Code §10910(c)(4), the primary purpose of a WSA is to evaluate whether sufficient water supply is available to meet all future demands within the water supplier's service area, including those associated with the proposed Project, during normal and dry hydrologic years for a 20-year time horizon. Therefore, the following information is included in this WSA:

- A description and analysis of the current and projected future water demands of the proposed Project through the year 2040;
- A description and analysis of the historical, current, and projected future water demands for the Chico District service area through the year 2040;
- A description and analysis of the current and projected future water supplies for the Chico District service area through the year 2040; and
- A comparison of the water supplies and demands for Chico District's service area, including the projected water demands and supplies associated with the proposed Project.

[2] Pending approval by the CPUC of a Certificate of Public Convenience and Necessity.

3 PROJECT DESCRIPTION

Based on the current Project Description provided by the City, and as shown on Figure 2, the approximately 1,448-acre proposed development will consist of the following: (1) 2,777 residential units, consisting of SFR and MFR units, including both "market-rate" and age-restricted senior housing; (2) approximately 57 acres of commercial land; and (3) approximately 675 acres of special purpose land, including parks, open space an elementary school site, and approximately eight acres of water features consisting of an artificial lake and series of ponds (Chico, 2019; Chico Land Investment LLC, 2019). If approved, construction of the proposed Project is anticipated to begin in 2025, with full buildout and occupancy expected by 2050 (Chico Land Investment LLC, 2019).[3] For the purpose of this WSA, it is conservatively assumed that buildout is accelerated such that full Project buildout is achieved by 2040.[4]

As shown on Figure 1, the proposed Project site is undeveloped land that is used for winter cattle grazing and there has been no historical municipal or other water use documented at the site (Chico Land Investment LLC, 2019; Chico, 2017). Further, the proposed Project site is not located within the current Chico District service area (Cal Water, 2016).

The Chico District service area is proposed to be expanded to include the proposed Project site so that potable water service can be provided by Cal Water[5]. The proposed Project will connect to the existing Chico District potable water distribution system along the proposed Project's western boundary at the present terminus of East 20th Street, and through a main-line extension from the primary entry west along Skyway to a point near Bruce Road (Figure 1; Chico, 2019). Development of the proposed Project will result in a net increase in potable water demand at the proposed Project site and on the Chico District system.

Two existing agricultural wells are located on the proposed Project site. It is anticipated that these wells will be utilized as a water source for irrigation for the community landscaping and the water features that are included as part of the proposed Project (Chico, 2019; Chico Land Investment LLC, 2019). Water use for landscape irrigation and the water features are conservatively included in the water demand analysis of this WSA, although they may not be supplied with potable water.

[3] Project buildout schedule provided by email from Bill Brouhard (Chico Land Investment LLC), 26 November 2019.
[4] WSAs are required to include a 20-year analysis of supply and demand. Per the Project proponent, minimal additional buildout is projected between 2040 and 2050. Buildout estimates were provided by the Project proponent, with the acknowledgement that the specific timing and phasing of buildout is uncertain at this point. Given this uncertainty, it was conservatively assumed that all buildout is achieved by 2040.
[5] Pending approval by the CPUC of a Certificate of Public Convenience and Necessity.

4 PROJECT WATER DEMAND

The City of Chico has adopted green building standards and water efficient landscaping ordinances consistent with previous versions of the CalGreen building standards and the California Model Water Efficient Landscape Ordinance (MWELO). As part of state requirements, all new developments must comply with these efficiency standards. As such, the proposed Project development is expected to include a number of water-efficient features, including, but not limited to:

- Use of low-flow lavatory faucets, kitchen faucets, toilets, and urinals in accordance with CalGreen Code; and
- Inclusion of low-water use landscaping and high-efficiency irrigation systems to minimize outdoor water use in accordance with MWELO.

As described below, the average annual water demand for the proposed Project was estimated based on: (1) the Cal Water WSA Water Factor Tool developed based on 2016-2018 water use data for the Chico District (CalWater, 2019a); and (2) information about the proposed Project provided by the Project proponent (Chico Land Investment LLC, 2019). Total water demands include water used by the proposed Project for residential units, commercial land, irrigation of community landscape, evaporative loss from water features, and water that is lost during distribution (i.e., "distribution system losses" or "unaccounted for water").

Table 1 includes a summary of the water demand projections associated with the proposed land uses through buildout of the proposed Project, including assumed distribution system losses. Project buildout is anticipated to occur through 2050 (Chico Land Investment LLC, 2019). However, as described in Section 3, for the purpose of this WSA, it is conservatively assumed that full Project buildout is achieved by 2040.

Tables 2a through 2c identify key land plan assumptions and water use factors for each of proposed Project land uses. Tables 3a through 3d present the estimated water use by land use type through 2040 buildout.

4.1 Residential Water Use

Water use factors for the proposed SFR and MFR units were developed by Cal Water based on customer-level metered water use records for 2016 through 2018 for the Chico District customers, referred to as the "WSA Water Factor Tool", (Cal Water, 2019a).[6] The WSA Water Factor Tool allows the user to select the most appropriate water use factors for a proposed development based on factors including the mean characteristics of the sample data (e.g., existing service area building stock) or to customize the water factors based on the expected characteristics of the proposed development.

[6] Cal Water WSA Water Factor Tool, Cal Water, developed by M.Cubed, received on 15 November 2019.

Using the WSA Water Factor Tool, water use factors were developed for SFR and MFR units based on the housing characteristics provided by the Project proponent. The specific housing types, number of units, key housing characteristics, and associated water use factors are presented in Table 2a.

The proposed Project includes a range of SFR housing types, including medium density residential areas with lot sizes of 1,855 to 3,000 square feet to very low-density residential areas, with lot sizes ranging from 0.25 to 1-acre. Additionally, the proposed Project includes a mix of Family Housing (also referred to as "market-rate" housing) and age-restricted Senior Housing. As shown in Table 2a, the resulting water use factors for SFR units range from 291 gallons per day per dwelling unit (gpd/du) to 704 gpd/du for SFR units.

The proposed Project also includes MFR units. Based on the WSA Water Factor Tool, the water use factor for MFR units is 108 gpd/du.

Based on these water use factors, it is estimated that the residential water use will be 1,294 acre-feet per year (AFY) at Project buildout. Table 3a presents the projected residential water use in five-year increments through Project buildout.

4.2 Commercial and Institutional Water Use

Based on current development plans, the proposed Project is expected to include an approximately 10-acre elementary school and approximately 57 acres of commercial land use, and 8.8 acres of public land designated as "Public Quasi Public", which is assumed to be consistent with commercial land uses.[7] Land use assumptions as provided by the Project proponent for the proposed elementary school and commercial land uses and the associated water use factors based on the WSA Water Factor Tool are presented in Table 2b.

As shown in Table 3b, water use for the elementary school is estimated to be 21 AFY at full buildout, based on a water use factor of 0.042 gallons per day per square foot (gpd/sf) of total lot size. The projected water use for the commercial land uses is projected to be 108 AFY based on a water use factor of 0.034 gpd/sf of total lot size.

Table 3b presents the projected school and commercial water use in five-year increments through Project buildout. The total commercial and institutional water use is estimated to be 129 AFY at Project buildout.

[7] The land plan includes 18.8 of "Public Quasi Public" land, which includes the 10-acre school site (Chico, 2019). The remaining non-school area is assumed to be consistent with commercial land uses.

4.3 Community Landscaping Water Use

The projected water demand for the community landscaping included as part of the proposed Project was estimated based on the Maximum Applied Water Allowance (MAWA; DWR, 2015). The MWELO requires that the annual estimated total water use for landscape irrigation not exceed the MAWA (DWR, 2015). As shown below, the MAWA is calculated based on the regional reference evapotranspiration rate, an evaporation adjustment factor, the total landscaped area, and the area of "special landscaped area".[8] We have conservatively assumed that water use for the Project landscaping irrigation will be equal to the MAWA, which is the upper limit of annual applied water for established landscaped areas.

The MAWA is calculated using the following equation:

$$MAWA = ETo \times [(ETAF \times LA) + (1-ETAF) \times SLA]$$

where:

ETo	=	The regional reference evapotranspiration rate[9]
ETAF	=	Evapotranspiration Adjustment Factor For parks (SLAs) = 1.0 For landscape corridors = 0.45
LA	=	Total landscape area (including SLA)
SLA	=	Special Landscape Area

Table 2c summarizes the anticipated land use assumptions for each community landscaping type, including percentage of area to be irrigated, based on the Project Description and information provided by the Project proponent (Chico, 2019; FRAYJI, 2019a). Based on the above methodology and information provided by the Project proponent, the total annual water use for the community landscaping is estimated to be 201 AFY at full buildout as shown in Table 3c (excluding the distribution system losses discussed in Section 4.5).

4.4 Water Feature Consumptive Water Use

Based on information provided by the Project proponent, the development plan includes two water features. Frontier Lake is expected to include two unlined lake features with a surface area of approximately six acres, and Pioneer Park is expected to have several small pond elements with a total surface area of approximately two acres (FRAYJI, 2019b). The water features may be maintained using stormwater and seasonal creek overflow during wet months and groundwater during the remaining months (FRAYJI, 2019b). However, given that the stormwater and creek overflow supplies are subject to approval of applicable permits, for purposes of this WSA it is conservatively assumed that the water features are supplied solely by groundwater. Given that

[8] Special Landscaped Area includes landscaping dedicated solely to edible plants, recreational areas, areas irrigated with recycled water, or water features using recycled water.

[9] Location-specific reference evapotranspiration ("ETo") data is required for calculating the MAWA. Reference evapotranspiration data were obtained from Appendix A of the MWELO (DWR, 2019) based on values for the City of Chico. The total annual reference evapotranspiration is 51.7 inches as shown in Table 3c.

the water features are unlined, it is assumed that the majority of the water used to fill the water features will recharge groundwater supply, and thus remain a part of the groundwater system. Thus, the only consumptive use by the water features is anticipated to be water lost to evaporation from the surface of the water features.

As shown in Table 3d, based on the annual reference evapotranspiration rate for the City of Chico area and a total water feature surface area of eight acres, the total annual consumptive water use of the water features projected to be 34 AFY.

4.5 Distribution System Losses

Although distribution system losses from newly-constructed infrastructure would be expected to be minimal, it is conservatively assumed that distribution system losses for the proposed Project are consistent with the average real loss per the validated water loss audits submitted to DWR in the preceding three years (i.e., 28.7 gallons per connection per day; DWR, 2020), as estimated based on the number of residential units included in the proposed Project. It should be noted that while real losses represent a demand on the system, water lost through the distribution system returns to the groundwater basin and thus is not a true demand on the groundwater supply. Table 1 shows the distribution system losses for the proposed Project, estimated at a total of 89 AFY in 2040.

4.6 Total Project Water Demand

Based on the above methodologies and assumptions, the total annual water demand for the proposed Project at full buildout and occupancy is estimated to be 1,748 AFY, as shown in Table 1. It is conservatively assumed that buildout is accelerated such that full Project buildout will occur by 2040.

5 CAL WATER CHICO DISTRICT WATER DEMAND

Water Code Section 10910

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(c) (3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

In preparation for the development of its 2020 UWMP, Cal Water updated its estimates of projected future water demand for the Chico District service area (Cal Water, 2019c). Consistent with the UWMP Act (Water Code §10610-10656), Cal Water's updated projected future water demand is estimated in five year increments, between the years 2020 and 2050, and is subdivided between the following seven customer sectors or use types: (1) residential single family, (2) residential multi-family, (3) commercial, (4) industrial, (5) institutional/ governmental, (6) other, and (7) system losses.

The updated water demand projections account for growth within the Chico District service area through 2050, and estimates of population growth based on County-level economic forecasts developed by CalTrans (CalTrans, 2017). While the updated water demand projections account for growth within the current Chico District service area, the proposed Project is located outside of the current service area and is therefore not explicitly included in these projections. Therefore, it is assumed that the water demand associated with the proposed Project is additive to the projected Chico District water demands. Additional discussion, including a comparison of the updated water demand projections to the 2015 UWMP water demand projections is provided in Section 5.2 below.

5.1 Current and Historical Water Demand Within the Chico District Service Area

The Hamilton City portion of the District water system is physically separated from the Chico portion of the District and located in a different groundwater basin (Figure 3). Thus, water supplies available to the Hamilton City portion of the District are not physically available to the City of Chico portion, and vice versa. Given this, the projected demands for the two portions of

the District are presented separately in attached tables, and the discussion below focuses on the demands associated with the Chico portion of the system, which will supply the proposed Project.

Historical water demand within the Chico District service area from 2000 through 2018 is summarized in Table 4. Based on 2018 water use, the majority of the water demand within the Chico portion of the District is from the SFR sector, which represented 54% of the demand in 2018. The remainder of the demand was split between commercial (21% of overall demand), MFR (14% of overall demand), institutional, industrial, and other (5% of the overall demand), with approximately 7% of the demand attributed to distribution system loss (Cal Water, 2019c).

Water use from 2000 to 2009 remained fairly consistent within the Chico portion of the District, at an average of approximately 29,019 AFY. A slight decrease in water use occurred from 2008 to 2011, which generally corresponds with the 2007-2009 drought and the economic downturn. Then, a significant drop in water demand occurred in 2014 and 2015, corresponding with the recent historic drought and mandatory state-wide water use restrictions and water conservation targets.

Total water demand within the Chico portion of the District averaged 18,930 AFY from 2015 through 2018 (Cal Water, 2019c).

5.2 Water Demand Projections

Water demands for the Chico District were estimated through 2050 in support of the upcoming 2020 UWMP (Cal Water, 2019c). The updated demand projections for the Chico District are presented in Table 5, by water use sector and by portion of the system (i.e., the Chico portion of which the proposed Project would be a part of, and the Hamilton City portion).

Table 6 presents a comparison of historical water demands, current water demand projections, and the demand projections included in the 2015 UWMP. Table 6 also shows the projected water demands for the Chico District inclusive of the estimated proposed Project water demands.

The updated demand projections are lower than those projected in the 2015 UWMP by approximately 6,400 AFY (in 2020) to 13,000 AFY (in 2040). It should be noted that the 2015 UWMP did not separate out demand projections by the two separate portions of the system, but that historically, the demand by the Hamilton City portion has been consistently approximately 2% of the total demand of the Chico District. As illustrated in the chart in Table 6, the 2015 UWMP projections are consistent with historical usage through 2013; however, water demands dropped significantly after 2013 due to the historic drought. While demands have rebounded somewhat, they have remained significantly lower than pre-drought demands.

The updated water demand projections incorporate increased water efficiency in the estimates. Even with the inclusion of the estimated water demands for the proposed Project, the updated water demand projections for the Chico District remain below the 2015 UWMP projections by over 11,000 AFY in 2040, assuming full Project buildout.

5.3 Planned Development Projects within the Chico District

The updated water demand projections also incorporate current and historical water usage within the Chico District, which reflect Cal Water's best efforts to include the development and growth that has occurred within the District to date (Cal Water, 2019c). Therefore, the updated Chico District demands presented in Tables 5 and 6 are inclusive of all identified development, as well as additional anticipated development within the current service area based on CalTrans (2017).

5.4 Total Projected Chico District Water Demand

For the purposes of this WSA, the total projected water demand for the Chico portion of the Chico District, as shown in Table 7, is the sum of water demands for the Chico portion of the existing District service area and the incremental water demand associated with the proposed Project. It is estimated that, inclusive of the proposed Project, the total annual water demand will be approximately 26,293 AFY in 2040 (i.e., 24,545 AFY within the existing service area and 1,748 AFY of additional water demands associated with the Project).

6 CAL WATER CHICO DISTRICT WATER SUPPLY

This section identifies the water supplies for the Chico District and discusses the vulnerability of the various supplies to drought and other factors affecting water supply reliability. The Hamilton City portion of the District water system is physically separated from the Chico portion of the District and is located in a separate groundwater basin (Figure 3). Thus, water supplies available to the Hamilton City portion of the District are not physically available to the City of Chico portion, and vice versa. The Chico portion of the District overlies the Vina Subbasin and the Hamilton City portion of the District overlies the Corning Subbasin. Given this, the attached tables and discussion below focus on the Chico portion of the District, which would be the sole supply source through Cal Water for the proposed Project.

6.1 Identification of Water Supply Rights

Water Code Section 10910

(d) (1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

Pursuant to Water Code §10910(d)(1), a WSA is required to include identification of all water supply entitlements, water rights, and water service contracts relevant to the identified water supply for the proposed Project. In accordance with these requirements, this WSA includes a summary of Cal Water's water supply sources in the Chico District service area.

6.1.1 Surface Water Supplies

The Chico District has not historically used, and does not currently use, surface water as a source of supply within its service area, according to its 2015 UWMP (Cal Water, 2016) and subsequent discussions with Cal Water staff. However, several recent and current efforts by BCDWRC and other water managers have been undertaken to evaluate the feasibility of bringing surface water supplies into the Chico District area to serve District demands. These efforts include: (1) a study of the potential use of excess State Water Project (SWP) water to which Butte County holds an entitlement in the Chico District area (Cal Water, 2016); and (2) feasibility evaluation of a potential intertie between the Paradise Irrigation District surface water system and the Chico District system which could potentially bring new surface water supplies into the District's service area (Vina Subbasin Board Meeting Agenda, 10 October 2019). However, as Cal Water currently has no specific and firm plans to develop surface water supplies, for the purposes of this WSA, surface water is not considered to be an available source of supply to the Chico District.

6.1.2 Potential Recycled Water Development

Recycled water is not currently used as a source of supply within the Chico District (Cal Water, 2016). Wastewater collection and treatment service within the Chico District area is provided by

the City of Chico in the Chico portion of the service area and by the Hamilton City Community Services District in the Hamilton City portion of the service area. Currently, treated wastewater from the Chico Wastewater Treatment Plant is discharged to the Sacramento River, and treated wastewater from the Hamilton City treatment facility is discharged to ponds where it either evaporates or infiltrates into the subsurface. The combined total volume of wastewater collected in these areas was approximately 10,018 acre-feet in 2015 (Cal Water, 2016).

Cal Water is actively seeking to identify and evaluate opportunities to use recycled water as a source of supply within the Chico District for certain purposes (e.g., landscape irrigation, cooling tower or other industrial and commercial reuse, and groundwater recharge) in its service area (Cal Water, 2016). However, because Cal Water currently has no specific and firm plans to develop recycled water supplies, for the purposes of this WSA, recycled water is not considered to be an available source of supply to the Chico District.

6.1.3 Groundwater Supply

Water Code Section 10910

(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) (A) A description of any groundwater basin or basins from which the proposed project will be supplied.

(B) For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree.

(C) For a basin that has not been adjudicated that is a basin designated as high- or medium-priority pursuant to Section 10722.4, information regarding the following:

(i) Whether the department has identified the basin as being subject to critical conditions of overdraft pursuant to Section 12924.

(ii) If a groundwater sustainability agency has adopted a groundwater sustainability plan or has an approved alternative, a copy of that alternative or plan.

(D) For a basin that has not been adjudicated that is a basin designated as low- or very low priority pursuant to Section 10722.4, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water supply assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

6.1.3.1 Basin Description

Pursuant to Water Code §10910f(2), the following is a description of the groundwater basin from which the proposed Project will be supplied, with a particular focus on the portion of the basin near the proposed Project site. The discussion is based on review of relevant information contained within the 2015 UWMP, pursuant to Water Code §10910f(1), as well as other sources.

The Vina Subbasin of the Sacramento Valley Groundwater Basin (California Department of Water Resources [DWR] Basin No. 5-021.57) underlies the proposed Project and the Chico portion of the Chico District service area, as shown on Figure 3.[10] The Vina Subbasin (Basin) covers an area of approximately 184,918 acres (289 square miles) and is bounded on the north by the Butte County/Tehama County line, on the east by the Chico Monocline, on the northwest by the Sacramento River and Big Chico Creek, and on the southwest and south (generally) by the northern boundary of the Western Canal Water District. The Basin's extent was revised in 2018 through the Sustainable Groundwater Management Act (SGMA) Basin Boundary Modification process. Prior to the modification, the Basin was defined with the northern boundary further north along Deer Creek and the southern boundary further north along Big Chico Creek. The modification brought portions of the former West Butte and East Butte Subbasins (DWR basins 5-021.58 and 5-021.59) into the Basin.

The water-bearing formations within the Basin are continental deposits ranging in age from Recent/Holocene to late Tertiary (Pliocene). From shallowest/youngest to deepest/oldest, these formations include Holocene Stream Channel Deposits and Basin Deposits, Pleistocene Modesto

[10] The Hamilton City portion of the Chico District overlies the Corning Subbasin. However, these two portions of the District are physically separate and water supplies available to the Hamilton City portion of the District are not physically available to the City of Chico portion, and vice versa. Thus, only the Vina Subbasin would be a supply the proposed Project.

Formation, and Riverbank Formation, and the Pliocene Tuscan Formation (DWR, 2004). These deposits constitute the upper section of Sacramento Valley fill materials that unconformably overlie older marine deposits of early Miocene and older age (Harwood and Helley, 1987). The geologic units dip gently to the west/southwest towards the axis of the Sacramento Valley.

The surficial geologic unit in the vicinity of the proposed Project site is the Tuscan Formation, which at this location is approximately 800 to 1,000 feet thick (Olmsted and Davis, 1961). The Tuscan Formation consists of volcanic and volcaniclastic rocks of andesitic or basaltic composition, including beds of breccia, tuff, sandstone, conglomerate, and tuffaceous silt and clay. The Tuscan Formation is considered to be moderately permeable and is a major water-bearing unit in the northeastern Sacramento Valley area (Olmsted and Davis, 1961). Further west, underlying the City of Chico, the surficial geologic units are Pleistocene and Recent alluvial fan deposits of highly variable permeability.

Project-specific hydrogeologic and geotechnical assessments have been conducted for the Project site, which note the presence of surficial and near-surface bedrock, springs, the potential for perched groundwater, and relatively low permeability of onsite soils (GEOPlus, 2010; 2019). The developer has indicated to Cal Water that the Project land use plan is intended to avoid areas with the potential for groundwater recharge and to focus the development on areas underlaid by lava cap, which are largely impermeable (Chico Land Investment LLC, 2020).

The proposed Project site overlies portions of six Public Land Survey System (PLSS) sections, which include, but extend beyond, the boundaries of the Project site. The proposed Project site comprises approximately 37% of the total area of these six sections. Information on groundwater wells drilled within these six sections was compiled from DWR's Well Completion Report Mapping Application, and indicates that a large number of domestic wells (144) and a total of 18 production wells, which includes four public supply wells, are or were present within these PLSS sections (but not necessarily within the proposed Project site). The domestic wells are generally shallower, with average depths by section ranging between 155 feet and 239 feet. The production wells are typically deeper with average depths by section ranging from 119 feet to 501 feet. The four public supply wells in these sections range from 560 to 704 feet in depth. It should be noted that the current status of these wells is unknown, and some may be inactive. Based on information provided by the City of Chico and Project proponent, only agricultural supply wells that have never been utilized are present on the Project site; therefore, it is likely that most of the wells identified within the six sections are located outside of the Project site.

6.1.3.2 Groundwater Management

Pursuant to Water Code §10910f(2)(C), the Basin is not adjudicated and, in its recent evaluation of California groundwater basins, DWR determined that the Basin was not in a condition of critical overdraft (DWR, 2019a).

The Basin is, however, designated as a high priority basin under DWR's 2019 Phase 2 Basin Prioritization (DWR, 2019). The main factors driving this designation include population growth (4 out of 5 possible ranking points), production well density (5 out of 5 possible points), irrigated

acreage per square mile (4 out of 5 possible points), and groundwater reliance (5 out of 5 possible points). Additional factors include population density (2 out of 5 possible points), public supply well density (3 out of 5 possible points), documented impacts including declining water levels and water quality impacts (2 out of 5 possible points), and habitat and streamflow impacts (2 out of 2 possible points).

6.1.3.2.1 Non-SGMA Groundwater Management Program

Prior to the passage of SGMA in 2014, the Basin was included in the Butte County AB 3030 Groundwater Management Plan (GMP) (CDM, 2004). Section 3 of the 2004 GMP describes the groundwater management goal and management objectives and also outlined the various components (i.e., implementation activities). The stated goal of the 2004 GMP is "to maintain efficient and effective groundwater management, quantity and quality, thereby providing a sustainable, high quality supply for agricultural, environmental, and urban use into the future that remains protective of residents' health, welfare, and safety."

The management objectives adopted in the 2004 GMP included the following: (1) minimize long-term drawdown of groundwater levels; (2) protect groundwater quality; (3) prevent inelastic land subsidence resulting from groundwater pumping; (4) minimum changes to surface water flows and quality that directly affect groundwater levels or quality; (5) minimize the effect of groundwater pumping on surface water flows and quality; (6) evaluate groundwater replenishment and cooperative management projects; and (7) provide effective and efficient management of groundwater recharge projects and areas.

These management objectives were then used to inform and develop Basin Management Objectives (BMOs) for 16 sub-inventory units (SIUs) within the County. The BMOs were formally adopted in 2006 as Chapter 33A of the Butte County Code of Ordinances (Butte County, 2011) and then amended in 2011 (BCDWRC, 2020). The BMOs include groundwater elevation thresholds (i.e., "Alert Stage 1" and "Alert State 2") established at key wells in each area and for spring and fall conditions that, if exceeded, trigger corresponding management responses including increased outreach to stakeholders, evaluation by a Technical Advisory Committee (TAC), and potential additional monitoring. The BMOs also included water quality thresholds (temperature, pH and salinity) and land subsidence thresholds, where applicable. The proposed Project site is located within the Durham Dayton SIU, just west of the Chico Urban Area SIU. There are no BMO key wells within one mile of the Project site (BCDWRC, 2019).[11]

6.1.3.2.2 SGMA Groundwater Management

In 2014, the California State Legislature enacted SGMA with subsequent amendments in 2015. The SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) and the development and implementation of Groundwater Sustainability Plans (GSPs) for groundwater basins that are designated by DWR as medium or high priority. As a high priority, non-critically overdrafted and non-adjudicated basin (see previous discussion), the Basin is subject to the

[11] Based on monitoring network maps presented in Appendix B of (BCDWRC, 2019).

requirements of SGMA, including the requirement to be covered by one or more GSAs and to prepare and submit to DWR one or more GSPs by 31 January 2022.

Pursuant to these SGMA requirements, two GSAs were formed in the Basin – the Vina GSA and the Rock Creek Reclamation District GSA. The Project site is located in the portion of the Basin covered by the Vina GSA, which was formed under a Joint Powers Agreement, dated 9 April 2019, by and between the County of Butte, the City of Chico, and Durham Irrigation District. The Vina GSA is governed by a five-member Board that includes one member for each of the three GSA member entities, one non-agricultural stakeholder, and one agricultural stakeholder. The Vina GSA Board is advised by a Stakeholder Advisory Committee that includes up to 10 members appointed by the Board. The Stakeholder Advisory Committee includes a representative from the Chico District, ensuring that the Chico District has an opportunity to provide formal input to the SGMA process.

The Vina GSA is in the process of developing a GSP for the Basin. The GSP development process is ongoing and is anticipated to be complete and submitted to DWR by the statutory deadline of 31 January 2022. As of 10 October 2019, GSP development activities listed as "current" included grant administration, facilitation services, integrated hydrologic modeling, data acquisition, monitoring protocols, data and reporting standards, Basin Setting (i.e., the Hydrogeologic Conceptual Model [HCM]; current and historical groundwater conditions assessment; water budget information for historical, current, and projected scenarios; and Management Areas), and monitoring networks (Vina GSA, 2019c). GSP development activities listed as "future" included GSA governance, monitoring networks, coordination with neighboring subbasins, data management tasks, sustainable management criteria, and projects and management actions.

Per the Draft Vina GSA Timeline and Milestones (rev. 4 September 2019), the Basin Setting Chapters are expected to be approved by the GSA Board in June 2020 (Vina GSA, 2019a). As such, the Basin Setting information is currently (as of February 2020) not complete and therefore cannot be relied upon for use in this WSA. Information available to date (LEG, 2019) indicates that the Chico District groundwater demands that are being used in the GSP water budget analysis are those contained within the Chico District 2015 UWMP which, as discussed in Section 5.2 above, are higher than the updated demand projections based on current water usage trends (Cal Water, 2019c).

6.1.3.3 Groundwater Use

Pursuant to Water Code §10910f(3), the amount of groundwater pumped by Cal Water within the Chico District for the past five years from the Basin from which the proposed Project will be supplied is provided in Table 8. The groundwater pumping data shown in Table 8 extends beyond the required period, and includes data from 2005 through 2018. The annual pumping volumes are based on information contained in the Chico District's 2015 UWMP (Appendix F, Worksheet 10) and additional data provided by Cal Water for the years 2016 through 2018.

As can be seen from the data shown on Table 8, the groundwater pumping volumes from the Basin in recent years (an average of 19,772 AFY from 2014 through 2018) are lower than they

were in previous years (an average of 28,049 from 2005 through 2013), reflecting Cal Water's successful implementation of water conservation measures in response to the drought and continued efficiency due to passive conservation and demand hardening.
The groundwater pumping by Cal Water in the amounts shown in Table 8 was pumped from the District's network of supply wells which are located in and around the City of Chico. Appendix A is a figure from the Butte County Groundwater Inventory Analysis (DWR, 2005) that shows the locations of the Cal Water municipal supply wells as of 2005. The District rotates its pumping throughout its network of 55 supply wells (Cal Water, 2019b).

6.1.3.4 Analysis of Sufficiency of Groundwater Supply

As described in Section 6.1.3, the sole source of supply for the Chico portion of the District (i.e., the portion of the Chico District that will supply the proposed Project) is groundwater pumped from the Basin. To assess the sufficiency of this supply to meet the projected demands, an analysis of the sustainable yield of the groundwater supply source is presented below.

First, from a regional or Basin-wide standpoint, it should be noted that the Chico District pumping is only a small fraction of the total groundwater pumping within the Basin, the majority of which is pumped for agricultural use. Average annual groundwater pumping from 2000 through 2014 in the Vina, West Butte, and East Butte "Inventory Units," as defined by the BCDWRC, portions of which make up the current Basin, was approximately 31,400 AFY for municipal and industrial (M&I) use, 323,600 AFY for irrigated agriculture and wetlands, and 4,000 AFY for rural residential use (BCDWRC, 2016). These data show that M&I pumping accounts for less than 9% of total pumping in these three areas, and the proposed Project would only represent an increase in total demand of approximately 0.5%. It is therefore likely that management of agricultural groundwater use, rather than M&I use, will be a much larger determining factor in achieving and maintaining groundwater sustainability in the Basin in the future.

On a more local scale, groundwater supply sufficiency can be considered in the context of potential effects of groundwater pumping on groundwater conditions. As defined under SGMA (Water Code §10721(w)), sustainable yield means "the maximum quantity of water, calculated over a base period representative of long-term conditions in a basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing Undesirable Results." This definition, therefore, inherently depends on how a GSA defines Undesirable Results. Because the GSP development process in the Basin is ongoing and not yet complete, it is uncertain exactly how Undesirable Results and sustainable yield will be defined in the Vina GSP. It is possible, however, to examine historical groundwater pumping alongside historical groundwater conditions, and to assess whether such pumping has been sustainable from a standpoint of avoiding significant and unreasonable effects for the relevant sustainability indicators[12]. This is the approach taken in this supply sufficiency analysis.

[12] The term "sustainability indicator" is defined in the GSP Emergency Regulations (Title 23, Division 2, Chapter 1.5, Subchapter 2 of the California Code of Regulations §351(ah)), with reference to undesirable results defined in CWC §10721(x).

One potential way that Undesirable Results and sustainable yield may be defined under SGMA is the avoidance of significant and unreasonable groundwater level decline over the long term. Assuming this is the case, the analysis described below estimates the amount of groundwater pumping by the Chico District that could occur in the future without creating Undesirable Results.

For the purposes of this analysis, an acceptable rate of change in groundwater levels is conservatively considered to be between 0.0 and -1.0 feet per year (ft/yr) under average climate conditions. This range is considered acceptable for several reasons. First, an average rate of change of -1.0 ft/yr is similar to what has been observed historically in District's wells (i.e., approximately 30 feet decline over 28 years from 1986 through 2015 to average depths of approximately 95 feet below ground surface; Cal Water, 2016), changes which have been manageable to-date; well depth data from DWR[13] indicate that the minimum public supply well depth in most PLSS sections in and around the City of Chico is greater than 300 feet, suggesting that these public supply wells are not at risk of dewatering. Second, as discussed above, the District's pumping constitutes only a small fraction of the total pumping in the Basin (the majority stemming from agricultural irrigation use), and it is anticipated that under SGMA more robust water budget monitoring and management in the agricultural sector may result in decreased agricultural demand and a more balanced water budget. This would reduce or eliminate declining trends in those areas which would in turn reduce downwards pressure on groundwater levels in the Chico District area. Third, rates of change of up to -1.0 ft/yr are relatively slow and therefore unlikely to result in sudden or unexpected undesirable effects on groundwater beneficial uses and users, given the comprehensive monitoring that Cal Water conducts and that will increase under SGMA. Last, Cal Water is an active participant in the Stakeholder Advisory Committee directly involved in GSP development and implementation and will be able to support appropriate management actions to address any undesirable results should they arise in the future.

Groundwater pumping within the Chico portion of the Chico District over the period from 2005 through 2018 is summarized in Table 8. As noted previously, due to successful conservation efforts the groundwater pumping amounts were significantly lower from 2014 through 2018 (i.e., averaging 19,772 AFY) than they had been in the previous nine years (i.e., averaging 28,049 AFY).

During the 2005 through 2013 time period, groundwater levels in ten nearby wells with available data[14] indicate an average rate of change of –0.90 ft/yr (see Table 9). It should be noted that this nine-year period was significantly drier than normal, with average precipitation of 19.96 inches

[13] DWR Well Completion Report Map Application; https://www.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37.

[14] Groundwater level data for wells in the vicinity of the Chico portion of the Chico District, with long-term groundwater level records, were obtained from the California Statewide Groundwater Elevation Monitoring (CASGEM) website: https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM

per year (or 86.7% of the long-term average of 23.02 inches[15]). During the 2014 through 2018 time period, those same ten wells had an average rate of groundwater level change of +0.04 ft/yr at a time when average precipitation was still similarly low (i.e., 19.89 inches per year or 86.4 percent of the long-term average[16]). The composite hydrograph shown on Table 9, which is based on groundwater level data from these ten wells, illustrates the overall behavior of groundwater levels in this area, including seasonal fluctuations on the order of 10 to 15 feet and the average trends during the 2005 to 2013 and 2014 to 2018 periods.

The amount of Chico District pumping that would be expected to result in similar groundwater level changes in the future under normal climate conditions (i.e., average rainfall) is estimated by scaling up the observed District pumping rates by the amount of the precipitation shortfall. In other words, the pumping rates that resulted in groundwater level changes of -0.90 and +0.04 ft/yr under the observed dry conditions were multiplied by the ratio 100/86.5 to determine the pumping rates that would be expected to result in changes of -0.90 and +0.04 ft/yr under normal conditions (see Table 10).[17]

Assuming that there is a unique relationship[18] between District pumping and local groundwater level changes under normal conditions, the pumping rates that would result in local groundwater level changes of -1.0 ft/yr and 0.0 ft/yr were estimated to define a range of potentially sustainable pumping rates. As shown on Table 10, the estimated sustainable pumping range for the Chico District is from 23,287 AFY (with 0.0 ft/yr of groundwater level change) to 33,462 AFY (with -1.0 ft/yr of groundwater level change).

This analysis indicates that the estimated pumping rates by the Chico District (inclusive of the proposed Project) are not anticipated to create significant water level declines in the Basin especially given that M&I pumping remains such a small fraction of total Basin pumping. Therefore, the Basin groundwater supply is estimated to be sufficient to support the Chico District's projected demand over the next 20 years including that of the proposed Project (i.e., 26,321 AFY; see Table 7) without causing significant and unreasonable effects on groundwater levels and storage.

[15] Long-term average precipitation is from the Durham CIMIS Station (Station #12) with a period of record from 1983 to 2019. An additional indicator of the dryness of this period is the Sacramento River Hydrologic Index. According to the SRHI, the nine-year period from 2005-2013 included two wet years, one above normal year, two below normal years, three dry years, and one critical year.

[16] The SHRI during the five-year period from 2014-2018 included one wet year, two below normal years, and two critical years.

[17] The scaling factor of 100/86.5 is based on the assumption that pumping rates could increase proportionally to the increase in precipitation (i.e., from 86.5% of average under the dry conditions to 100% of average under normal conditions).

[18] It should be noted that the overall groundwater level response in the Basin is actually driven by other significant factors (e.g., climate and agricultural pumping) and that pumping by the Chico District has a nominal impact, given the relative volumes under consideration.

6.2 Total Projected Potable Supply in Normal, Single Dry, and Multiple Dry Years

As discussed above, groundwater constitutes the sole source of supply for the Chico District. The District operates a network of 55 wells for which it has been able to pump up to 30,324 AFY (in 2008) from the Basin and has been able to consistently provide sufficient supply to meet its demands (Cal Water, 2019b; 2019c). Historical (five years from 2014 through 2018) and projected (every five years from 2020 through 2050) groundwater pumping rates are presented in Table 11.

Because of the demonstrated ability of the Chico District to meet historical demands from the Basin that are even greater than the projected demands, for purposes of this WSA, the available supplies are considered to be equal to the Chico portion of the Chico District demands under all conditions (i.e., current and projected, and for normal, single dry, and multiple dry years including a 5-year drought period). The total projected potable supplies for normal, single dry, and multiple dry years are presented in Tables 12, 13, and 14, respectively.

7 COMPARISON OF SUPPLY AND DEMAND

Water Code Section 10910

(c) (3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses.

Pursuant to CWC §10910c(3), and because the proposed Project is not explicitly included in the Chico District's most recent (2015) UWMP, this WSA must include an estimate of the projected water supplies available to the Chico District under normal, single dry, and multiple dry years, and a discussion of whether those supplies will meet the projected demand associated with the proposed Project, in addition to the water system's existing and planned future uses. This assessment is parallel to the multiple-dry year supply reliability analysis required for UWMPs under CWC §10635. In 2018, CWC §10635 was revised to require UWMPs to extend this analysis to consider "a drought lasting five consecutive water years." Although CWC §10910c(3) has not yet been updated to require this for WSAs, a five-year drought scenario is also evaluated herein.

Table 15 provides a comparison of the demands and supplies both with and without the proposed Project in normal year, single-dry year, and multiple-dry year hydrologic scenarios, for the Chico portion of the Chico District. As discussed above, because projected groundwater pumping is not projected to create Undesirable Results, the total projected supplies are assumed to be equal to the projected demands under all conditions (i.e., current and projected, and for normal, single dry, and multiple dry years) and therefore sufficient to meet those demands.

While supply shortfalls are not projected, any shortfalls that could occur in the future would be managed through the implementation of the Chico District's Water Shortage Contingency Plan (WSCP). As described in the 2015 UWMP, Rule 14.1 filed with the CPUC, serves as Cal Water's WSCP. Cal Water's current Schedule 14.1 was filed on 1 April 2016, and systematically identifies ways in which Cal Water can reduce water demands during dry years (Cal Water, 2016). The overall reduction goals in the WSCP are established in four stages to meet supply reductions: (1) up to 10%, (2) up to 20%, (3) up to 25%, and (4) greater than 35% (Cal Water, 2016). With implementation of its WSCP during the historic five-year 2013-2017 drought, the Chico portion of the Chico District achieved a demand reduction of 34% (2015 water demand compared to 2013 water demand; Cal Water, 2019c). As a customer within the Chico District, the proposed Project would be obligated to comply with the demand reduction efforts imposed by Cal Water through implementation of the WSCP in any future water shortage conditions. Therefore, the proposed Project would contribute a proportionate share of the reduction in water demands during dry years.

In 2016, Governor Brown signed Executive Order B-37-16 *Making Water Conservation a California Way of Life* (EO) and subsequently Senate Bill (SB) 606 and Assembly Bill (AB) 1668

were passed. SB 606/AB 1688 set new requirements for urban water agencies to continue to increase water efficiency beyond the 2020 water use targets developed under the Water Conservation Act of 2009 (Senate Bill X7-7). Beginning in 2023, agencies will be required to report on and comply with "annual water use objectives". The specific standards that will be used to determine an agency's annual water use objectives are currently under development, but are expected to result in continued increases in efficiency for all urban water suppliers in the state. In addition, SB 606/AB 1668 add new requirements related to drought planning and WSCPs, including requirements for agencies to (1) conduct a drought risk assessments part of their future UWMPs to assess water supply reliability (or vulnerability) for a period of drought lasting five consecutive water years (CWC §10635(b)) and (2) conduct annual water supply and demand assessments to determine its water supply reliability for the current year and one dry year (CWC §10632(a)).

Therefore, based on (1) historic groundwater use in the Basin, and that Undesirable Results do not appear to be occurring, (2) the demonstrated effectiveness of the Chico District's WSCP in the case of supply shortages, and (3) the increasing efficiency and drought planning requirements from the State, sufficient water supply is estimated to be available to Cal Water to meet all future demands within the Chico District service area and those associated with the proposed Project.

In addition, pursuant to California Government Code §66473.7, the proposed Project will be subject to the Water Supply Verification prior to approval of the Project. This Water Supply Verification step will require Cal Water to review the current water supply conditions, and provide written verification as to whether the Chico District is able to provide a sufficient water supply that will meet the projected demand associated with the proposed Project. At that point in time, Cal Water will be able to review changes to groundwater supply availability, if any, resulting from the SGMA compliance and Vina GSP development process as it further evolves.

8 CONCLUSIONS

As listed in CWC §10910(c)(4), the primary purpose of this WSA is to evaluate whether sufficient water supply is available to meet all future water demands within the water supplier's service area, including those associated with the proposed Project, during normal and multiple dry hydrologic years for a 20-year time horizon.

As described in Section 4, the water demand of the proposed Project (i.e., 1,748 AFY at buildout) has been conservatively estimated. As discussed in Sections 5.2 and 6.1.3.4, these demands and the demands associated with other development in the Chico District are well within the projected water demand growth envisioned in the 2015 UWMP, and within the demonstrated capacity of the Basin to meet demands. In addition, Cal Water, through local and regional efforts, is striving to increase its water supply portfolio for the Chico District (Sections 6.1.1 and 6.1.2), and due to new requirements by the State, will be required to continue to increase water efficiency in its service area into the future (Section 7). **Therefore, this WSA concludes that sufficient water supply is available to Cal Water to meet all future demands within the Chico District service area and those associated with the proposed Project.**

9 REFERENCES

Butte County, 2011. Butte County Code of Ordinances, Chapter 33A - Basin Management Objectives, amendment adopted 13 September 2011: http://www.buttecounty.net/Portals/26/Chapter33A091311.pdf, accessed 8 January 2020.

Butte County Department of Water and Resource Conservation (BCDWRC), 2016. *Butte County Water Inventory and Analysis, Final Report*, dated June 2016.

BCDWRC, 2019. *Groundwater Status Report, 2018 Water Year*, revised with TAC January 2019 comments.

BCDWRC, 2020. Butte County Basin Management Objectives website: https://www.buttecounty.net/waterresourceconservation/basinmanagementobjectives accessed 7 February 2020.

CalTrans, 2017. Long-Term Socio-Economic Forecasts by County, prepared by California Economic Forecast, Inc. for California Department of Transportation, dated 2017 (https://dot.ca.gov/programs/transportation-planning/economics-data-management/transportation-economics/long-term-socio-economic-forecasts-by-county).

Cal Water, 2016. 2015 Urban Water Management Plan, Chico-Hamilton City District, prepared by California Water Service, dated June 2016.

Cal Water, 2019a. Cal Water WSA Water Factor Tool, developed by M.Cubed, dated 22 October 2019.

Cal Water, 2019b. Email response to questions, provided by Cal Water on 25 October 2019.

Cal Water, 2019c. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.

CDM, 2004, Butte County Groundwater Management Plan, prepared by CDM, dated September 2004 (https://www.buttecounty.net/waterresourceconservation/groundwatermanagementplan).

Chico, 2017. Chico 2030 General Plan, City of Chico, adopted April 2011, amended March 2017.

Chico, 2019. Valley's Edge Specific Plan Project EIR Project Description, draft dated 23 October 2019, provided by City of Chico 10 October 2019.

Chico Land Investment LLC, 2019. Information provided by the Project Proponent, personal communication and emails, October-November 2019.

Chico Land Investment LLC, 2020. Email form Bill Brouhard (Chico Land Investment LLC) to Cal Water, dated 15 April 2020.

DWR, 2004. *California's Groundwater Bulletin 118, Vina Subbasin Description*, last updated 2/27/2004.

DWR, 2005, *Butte County Groundwater Inventory Analysis*, dated February 2005. (https://www.buttecounty.net/Portals/26/Reports/Inventory%20Analysis/DWR%20Butte%20Co%20Groundwater%20Inventory%20Analysis.pdf)

DWR, 2006. *California's Groundwater Bulletin 118, Westside Groundwater Basin*, dated January 2006.

DWR, 2015. California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance, effective 1 December 2015.

DWR, 2017. California Department of Water Resources, State Water Resources Control Board, California Public Utilities Commission, California Department of Food and Agriculture, and California Energy Commission, Making Water Conservation a California Way of Life: Implementing Executive Order B-37-16 Final Report, dated April 2017.

DWR, 2019. *Sustainable Groundwater Management Act 2018 Basin Prioritization, State of California*, dated January 2019.

DWR, 2020. WUEdata - Water Audit Report Data website, accessed 13 February 2020, (https://wuedata.water.ca.gov/awwa_plans).

FRAYJI, 2019a. Draft Valley's Edge Simplified Water Study, City of Chico, prepared by FRAYJI, draft dated 12 November 2019.

FRAYJI, 2019b. Email from Jason Reed (FRAYJI), 18 November 2019.

GEOPlus, 2010. Preliminary Hydrogeologic Assessment, Honey Run – Doe Mill Project, prepared by GEOPlus, dated 21 May 2010.

GEOPlus, 2019. Preliminary Geotechnical Investigation Report, Valley's Edge Multi-Use Development, prepared by GEOPlus, dated 27 February 2019.

Harwood, D.S., and Helley, E.J., 1987. *Late Cenozoic Tectonism of the Sacramento Valley, California*, U.S. Geological Survey Professional Paper 1359, 46 pp.

LEG, 2019. Local Experts Group Meeting, 18 December 2019. Presentation slides entitled "Basin Settings Development for Groundwater Sustainability Plans, Butte, Vina, and Wyandotte Creek Subbasins, Updates on Water Budgets, Modeling, and Groundwater Conditions", provided by Cal Water on 18 December 2019.

Olmsted, F.H., and Davis, G.H., 1961. *Geologic features and ground-water storage capacity of the Sacramento Valley, California*, U.S. Geological Survey Water Supply Paper 1497, 241p.

Vina GSA, 2019a. Vina Groundwater Sustainability Agency Board Meeting Agenda and Packet, 12 September 2019, https://www.vinagsa.org/files/da42dbdd4/Vina+GSA+Agenda+Sept+12+2019+Packet.pdf, accessed 30 October 2019.

Vina GSA, 2019b. Vina Groundwater Sustainability Agency Board Meeting Agenda and Packet, 10 October 2019, https://www.vinagsa.org/files/96934dd81/Vina+GSA+Agenda+Oct+10+2019+Packet.pdf accessed 30 October 2019.

Vina GSA, 2019c. Vina Subbasin, Groundwater Sustainability Plan Status presentation, 10 October 2019 http://www.buttecounty.net/wrcdocs/planning/SGWMA/Subbasins/Vina/VinaGSABoard/191010_Vina_GSP%20Status_Oct.pdf, accessed 30 October 2019.

City of Chico

32

018-390-005

018-390-007

E 20th St

Bruce Rd

Potter Rd

017-210-005

017-210-006

Proposed Project

Skyway Rd

017-240-023

017-260-119

Honey Run Rd

99

99

Legend

- Proposed Valley's Edge Specific Plan Project
- Parcel Boundaries
- Cal Water Chico-Hamilton City District Service Area

Abbreviation

Cal Water = California Water Service

Notes

1. All locations are approximate.

Sources

1. Basemap Imagery, ESRI, 6/27/2018

N

0 2,000 4,000

Feet

Proposed Project Location

eki environment & water

Butte County, CA
April 2020
EKI B90143.00
Figure 1

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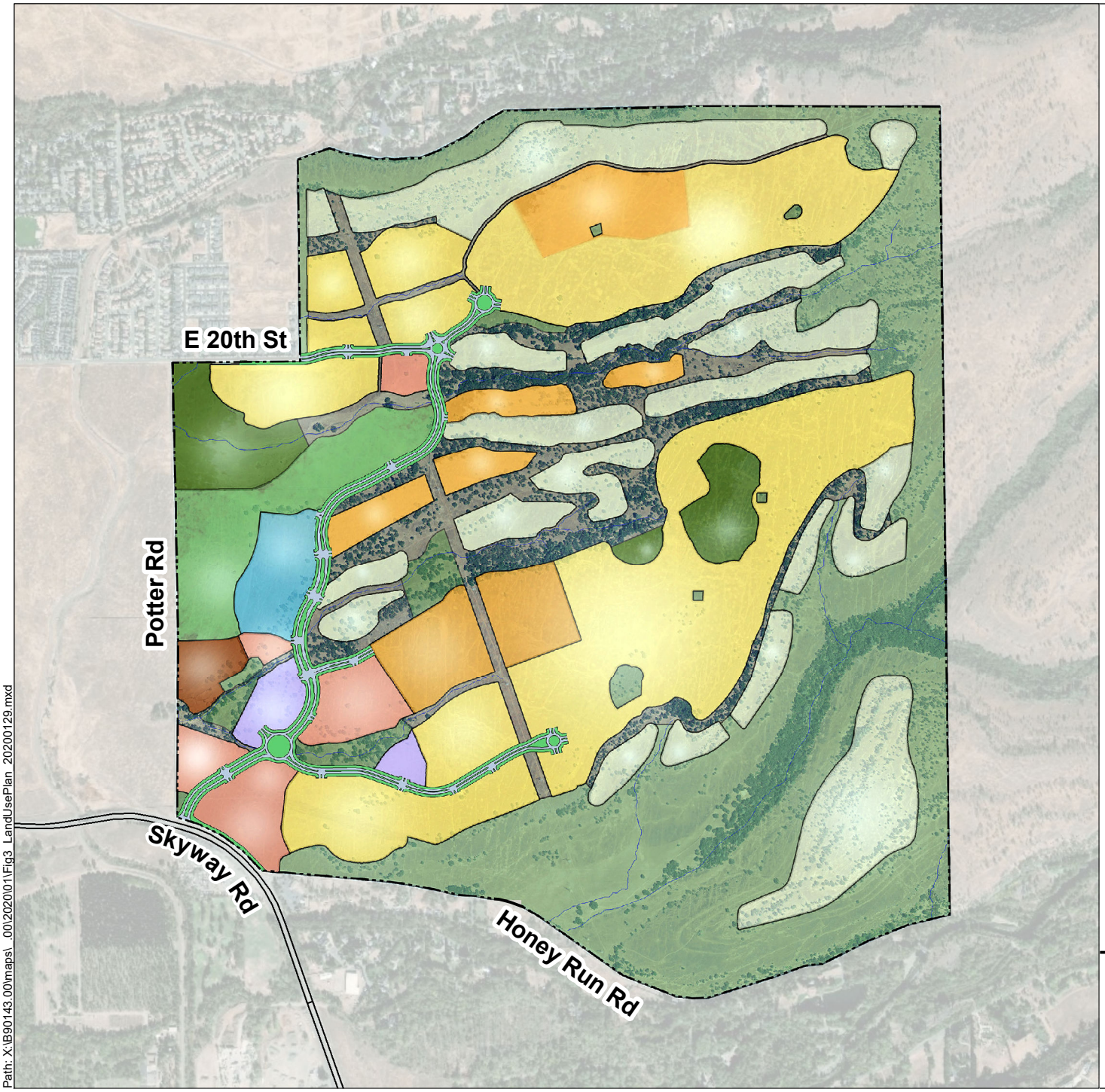

Legend

- VLDR
- LDR
- MDR
- MHDR
- VILLAGE CORE
- VILLAGE COMMERCIAL
- PUBLIC QUASI-PUBLIC
- PRIMARY OPEN SPACE
- VALLEY OPEN SPACE
- REGIONAL OPEN SPACE
- PRIMARY ROADWAYS
- SEASONAL CREEKS

Notes

1. All locations are approximate.
2. Figure 4.3: Land Use Plan reproduced from Frayji (2019).

Sources

1. Basemap Imagery, ESRI, obtained 29 January 2020.
2. Frayji, 2019. *Valley's Edge – Clarification of Cal Water Memo Dated November 29, 2018,* dated 29 August 2019.

N

0 1,500 3,000

Feet

Proposed Land Use Plan

eki environment & water

Butte County, CA
April 2020
EKI B90143.00
Figure 2

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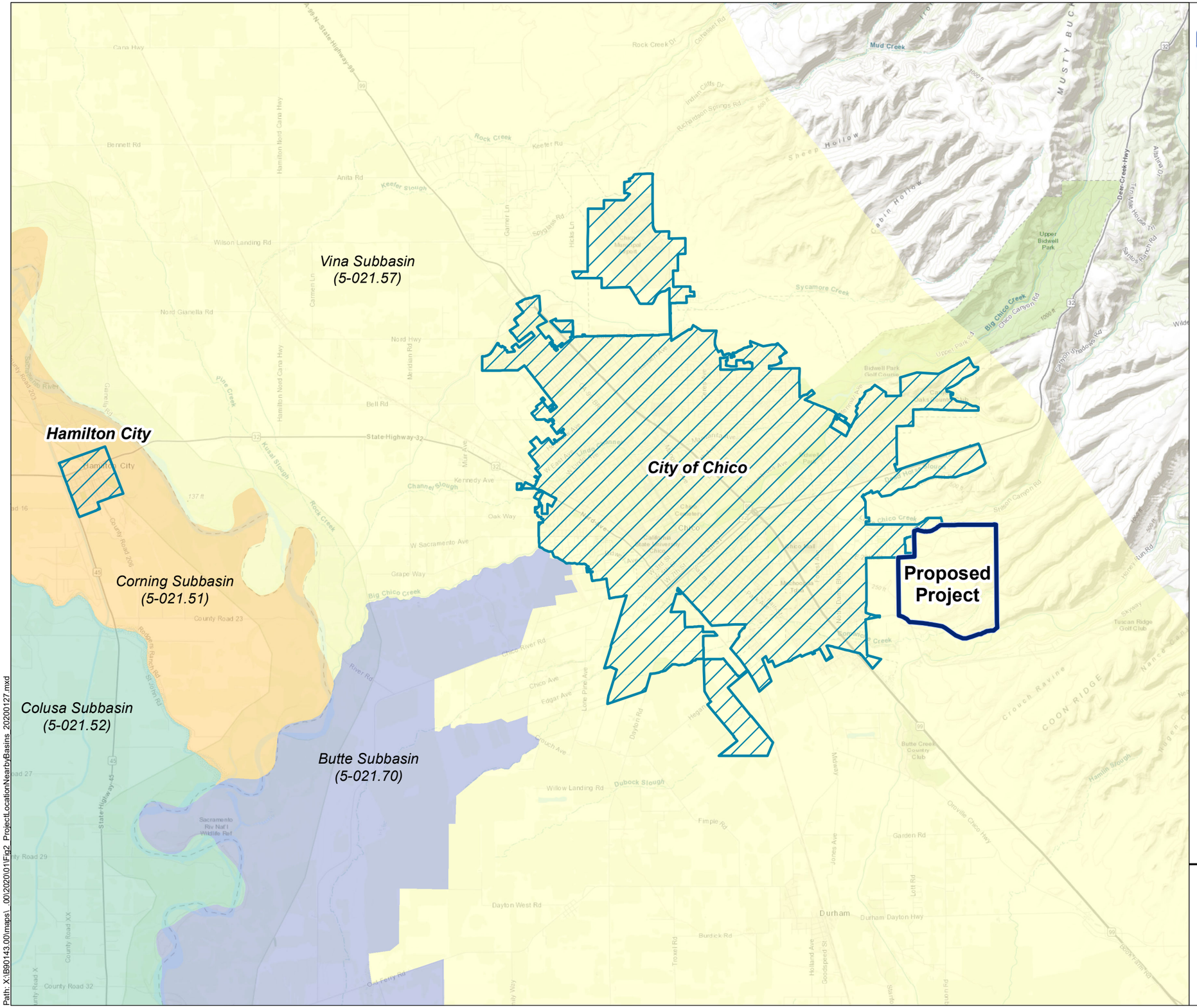

Legend

- Proposed Valley's Edge Specific Plan Project
- Cal Water Chico-Hamilton Service Area

Groundwater Subbasin

- Butte (5-021.70)
- Colusa (5-021.52)
- Corning (5-021.51)
- Vina 5-021.57)

Abbreviations

Cal Water = California Water Service

Notes

1. All locations are approximate.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 7 February, 2020.
2. DWR groundwater basins are based on the boundaries defined in California's Groundwater, Bulletin 118 - 2018 Update.

N

0 1.5 3

Miles

Regional Setting and Groundwater Subbasins

Butte County, CA
April 2020
EKI B90143.00
Figure 3

eki environment & water

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Table 1

Summary of Estimated Annual Project Water Demand

Valley's Edge Specific Plan, City of Chico, California

Land Use Category	Total Water Demand (AFY) (g)			
	2025	2030	2035	2040
Residential (a)				
Single Family Housing	280	760	1,099	1,275
Multi-Family Housing	0	12	20	20
Commercial and Institutional (b)	13	62	104	129
Community Landscaping (c)	33	145	201	201
Water Features (d)	34	34	34	34
Distribution System Losses (e)	19	55	79	89
Total Annual Water Demand (f)	***381***	***1,068***	***1,537***	***1,748***

Abbreviations:

"AFY" = acre-feet per year

Notes:

(a) See Table 3a for estimated indoor and outdoor water use for residential land uses.

(b) See Table 3b for estimated water use for commercial and institutional land uses.

(c) See Table 3c for estimated water use for community landscaping.

(d) See Table 3d for estimated water use for water features.

(e) Although distribution system losses from newly-constructed infrastructure would be expected to be minimal, it is conservatively assumed that distribution system losses for the proposed Project are consistent with the average real loss per the validated water loss audits submitted to DWR in the preceding three years (i.e., 28.7 gallons per connection per day; Reference 1), as estimated based on the number of residential units included in the proposed Project.

(f) The total water demands are the sum of the estimated water uses for each land use, plus the assumed distribution system losses. Totals may not add exactly due to rounding.

(g) Project buildout is anticipated to occur through approximately 2050, per Reference 2. For the purpose of this WSA, it is conservatively assumed that buildout is accelerated such that full project buildout is achieved by 2040.

References:

1. DWR WUEdata - Water Audit Report Data website, accessed 13 February 2020, (https://wuedata.water.ca.gov/awwa_plans).
2. Five Year Incremental Project Buildout provided by Bill Brouhard, Chico Land Investment LLC, via email on 26 November 2019.

Table 2a

Residential Land Plan and Water Use Factors

Valley's Edge Specific Plan, City of Chico, California

Land Use	Description (a)	Housing Type	Number of Dwelling Units (a)	Average Density (a) (du/ac)	Land Use Area (a) (ac)	Average House Size (d) (sq ft)	Average Lawn Area (d) (sq ft)	Percentage of Homes with Pools (d)	Water Use Factor (b)(c)(d) (gpd/du)
Single-Family Housing									
VLDR	Custom single-family detached homes; residential lots range from 1/4 acre to 1 acre	Family Housing	328	1.6	235	3,500	1,100	60%	704
		Senior Housing	40			3,000	1,100	20%	597
LDR	Detached, single-family, one-story and two-story homes with a minimum lot size of 4,050 square feet	Family Housing	546	4.1	334	2,500	615	30%	504
		Senior Housing	825			2,000	530	10%	406
MDR	Traditional lotting, courtyard homes, town homes, single-family detached and attached homes; minimum lot size would be 1,855 sf, 2640 sf, or 3,000 square feet	Family Housing	356	9.6	91	1,800	65	3%	342
		Senior Housing	520			1,500	65	1%	291
Multi-Family Housing									
MHDR	Apartments and condominiums with minimum lot size of 4,000 square feet	Family Housing	162	18	9.0	NA	NA	NA	108

Abbreviations:

"ac" = acre
"du" = dwelling units
"du/ac" = dwelling units per acre
"gpd/du" = gallon per day per dwelling unit
"LDR" = low density residential
"MDR" = medium density residential
"MHDR" = medium high density residential
"NA" = not applicable
"sq ft" = square foot
"VLDR" = very low density residential
"WSA" = water supply assessment

Notes:

(a) Land Use description, number of dwelling units by land use, housing type, and land use area are from Reference 1. Average density values are from Reference 2.
(b) Water Use Factors are estimated for single-family housing and multi-family housing using the Cal Water WSA Water Factor Tool, per Reference 3.
(c) Single-family housing includes market family housing and age-restricted senior housing. Water use factors for family housing are estimated based on 2016-2018 water use in the Chico-Hamilton City District by the WSA Water Factor Tool. Water use factors for senior housing are assumed to be the lower end of the 95% confidence interval estimated by the tool.
(d) Average house size, average lawn area, and percentage of homes with pools are provided in Reference 4.
(e) Demand factor for multi-family housing is based on mean water use for multi-family housing, based on the WSA Water Factor Tool.

Reference:

1. Project Description, Valley's Edge Specific Plan Project, draft dated 23 October 2019.
2. Draft Valley's Edge Simplified Water Study, City of Chico, prepared by FRAYJI, draft dated 12 November 2019.
3. Cal Water WSA Water Factor Tool, Cal Water, developed by M.Cubed, received on 15 November 2019.
4. Information provided by Paul Kronser, FRAYJI, through email on 18 November 2019.

Table 2b

Project Commercial and Institutional Land Plan and Water Use Factors

Valley's Edge Specific Plan, City of Chico, California

Land Use (a)	Land Use Area (a) (ac)	Water Use Factor (b) (gpd/sf of parcel)	Description
Elementary School (c)	10.0	0.042	An approximately 10-acre elementary school is planned within the area designated as "Public Quasi Public."
Public Quasi Public	8.8	0.034	The remaining, non-school portion of the "Public Quasi Public" area is assumed to be consistent with commercial land uses.
Village Core	12.6		Land uses anticipated within the Village Core include professional and medical services, neighborhood retail shops and services, food and beverage, a community clubhouse with swimming pool and other recreational facilities, a community garden, water features, and public gathering places, such as a bandstand and amphitheater.
Village Commercial	43.7		Land uses within this designation include medical and professional offices, multifamily housing (e.g., apartments) day care, hospitality, and retail uses.

Abbreviations:

"ac" = acre
"gpd/sf" = gallons per day per square foot
"WSA" = Water Supply Assessment

Notes:

(a) Land use information is from Reference 1.
(b) Water use factors are based on average 2016-2018 water use data for the Chico-Hamilton City District, as provided in the Cal Water WSA Water Factor Tool, per Reference 2. Given the limited landscaping to be associated with commercial uses, the commercial water factor is assumed to be the lower end of the 95% confidence interval estimated by the tool.
(c) Water use factor for elementary school is based on the average water use by six existing Chico elementary schools in the WSA Water Factor Tool.

Reference:

1. Project Description, Valley's Edge Specific Plan Project, draft dated 23 October 2019.
2. Cal Water WSA Water Factor Tool, Cal Water, developed by M.Cubed, received on 15 November 2019.

Table 2c

Common Area Landscaping and Water Feature Land Plan

Valley's Edge Specific Plan, City of Chico, California

Parks, Roads, and Common Area Landscaping

Land Use	Land Use Area (a)(b) (ac)	Percentage of Irrigated Area (b)	Landscaped Area (ac)	Description (c)
Regional Open Space	371	0%	0	It is assumed that no additional water would be required for the Regional Park since it would remain in the existing natural condition.
Primary Open Space	46	0%	0	It is assumed that no additional water would be required for the Primary Open Space, which is designed for environmentally sensitive habitat and species.
Neighborhood Parks	40	40%	16	Family residential area includes Homestead Park, Child's Meadows, Pioneer Park, Village Core Park, and Senior and Active Adult Parks.
Community Gardens	2	50%	1	The mini-parks and tot lots would include small turf areas with shade trees, fitness and play structures.
Community Park	30	70%	21	Proposed recreational amenities include bicycle/pedestrian trails, sports fields community center, playground, dog park, court play area, picnic areas, concessions, and restrooms.
Big Meadows Park	18	20%	4	The park would include Class I trails, fishing stations, play area, picnic area, shaded rest area, and interpretive signage.
Landscape Corridors	24	50%	12	Landscaped road medians.

Water Features

Water Feature	Water Surface Area (d) (ac)	Description (d)
Frontier Lake	6.0	Two un-lined lake/pond features. Pending appropriate permitting, storm water and seasonal creek overflow may be used as water sources in wet months, and groundwater pumped from an on-site well may be used in summer months. It is conservatively assumed for purposes of this WSA that all water is supplied by Cal Water.
Pioneer Park Ponds	2.0	Small pond elements with recirculating water course. Pending appropriate permitting, storm water and seasonal creek overflow may be used as water sources in wet months, and groundwater pumped from an on-site well may be used in summer months. It is conservatively assumed for purposes of this WSA that all water is supplied by Cal Water.

Table 2c

Common Area Landscaping and Water Feature Land Plan

Valley's Edge Specific Plan, City of Chico, California

Abbreviations:
"ac" =acre

Notes:

(a) Land use area of parks is from Reference 1.

(b) Percentage of irrigated area and area of landscape corridors are based on Reference 2.

(c) Description of land uses is from References 3 and 4.

(d) Surface area and description of water features is from Reference 4.

Reference:

1. Five Year Incremental Project Buildout provided by Bill Brouhard, Chico Land Investment LLC, via email on 26 November 2019.
2. Draft Valley's Edge Simplified Water Study, City of Chico, prepared by FRAYJI, draft dated 12 November 2019.
3. Project Description, Valley's Edge Specific Plan Project, draft dated 23 October 2019.
4. Information received from Paul Kronser, FRAYJI, via email on 18 November 2019.

Table 3a

Estimated Project Residential Water Use

Valley's Edge Specific Plan, City of Chico, California

Land Use	Housing Type	Water Use Factor (a) (gpd/du)	Estimated Water Use (AFY) (b)			
			2025	2030	2035	2040
Single-Family Housing						
VLDR	Family Housing	704	28	86	159	259
	Senior Housing	597	0	7.4	21	27
LDR	Family Housing	504	85	226	298	308
	Senior Housing	406	109	282	365	376
MDR	Family Housing	342	19	55	103	136
	Senior Housing	291	39	104	154	170
Multi-Family Housing						
MHDR	Family Housing	108	0	12	20	20
Total	-	-	**280**	**772**	**1,118**	**1,294**

Abbreviations:

"AFY" = acre feet per year
"gpd/du" = gallon per day per dwelling unit
"LDR" = low density residential
"MDR" = medium density residential
"MHDR" = medium high density residential
"VLDR" = very low density residential

Notes:

(a) Land use plan assumptions and water use factors for residential water use are shown in Table 2a. One AFY is equal to 893 gpd.

(b) Project buildout is anticipated to occur through approximately 2050, per Reference 2. For the purpose of this WSA, it is conservatively assumed that buildout is accelerated such that full project buildout is achieved by 2040.

Reference:

1. Cal Water WSA Water Factor Tool, Cal Water, developed by M.Cubed, received on 15 November 2019.
2. Five Year Incremental Project Buildout provided by Bill Brouhard, Chico Land Investment LLC, via email on 26 November 2019.

Table 3b

Estimated Project Commercial and Institutional Water Use

Valley's Edge Specific Plan, City of Chico, California

Land Use	Land Use Area (a) (ac)	Water Use Factor (b) (gpd/sf of parcel)	Estimated Water Use (AFY) (c)			
			2025	2030	2035	2040
Elementary School	10.0	0.042	0	21	21	21
Public Quasi Public	8.8	0.034	0	1.7	15	15
Village Core (c)	12.6		3.0	8.9	15	21
Village Commercial (c)	43.7		10	31	53	72
Total	-	-	**13**	**62**	**104**	**129**

Abbreviations:

"ac" = acre

"AFY" = acre feet per year

"gpd/sf" = gallons per day per square foot

Notes:

(a) Land use acreage information is from Reference 1.

(b) Land use plan assumptions and water use factors for commercial and institutional water use are shown in Table 2b. One AFY is equal to 893 gpd.

(c) Project buildout is anticipated to occur through approximately 2050, per Reference 3. For the purpose of this WSA, it is conservatively assumed that buildout is accelerated such that full project buildout is achieved by 2040.

Reference:

1. Project Description, Valley's Edge Specific Plan Project, draft dated 23 October 2019.
2. Cal Water WSA Water Factor Tool, Cal Water, developed by M.Cubed, received on 15 November 2019.
3. Five Year Incremental Project Buildout provided by Bill Brouhard, Chico Land Investment LLC, via email on 26 November 2019.

Table 3c

Estimated Project Community Landscaping Water Use

Valley's Edge Specific Plan, City of Chico, California

Landscaping Land Use (a)	[A] Area of Land Use (ac) (a)	[B] Percentage of Landscaped Area (%) (a)	[C] Landscaped Area (ac) C = A x B	[D] Annual Reference Evapotranspiration Rate (in) (b)	[E] Evapotranspiration Adjustment Factor (ETAF) (c)	[F] Maximum Applied Water Allowance (MAWA) (AFY) F = C * D * E (f)	Estimated Water Use (g) (AFY) 2025	2030	2035	2040
Neighborhood Parks	40	40%	16	51.7	1.0	69	12	50	69	69
Mini-Parks and Tot Lots	2.0	50%	1.0	51.7	1.0	4	0	2.1	4.3	4.3
Community Park	30	70%	21	51.7	1.0	90	0	54	90	90
Big Meadows Park	18	20%	3.6	51.7	1.0	15	9.4	15	15	15
Landscape Corridors	24	50%	12	51.7	0.45	23	12	23	23	23
Estimated Total Outdoor Water Use for Community Landscaping						**201**	**33**	**145**	**201**	**201**

Abbreviations:

"ac" = acre
"AFY" = acre-feet per year
"AFY/ac" = acre-feet per year per acre
"ETAF" = Evapotranspiration Adjustment Factor
"in" = inches
"MAWA" = Maximum Applied Water Allowance

Notes:

(a) Landscaping land uses and acres for parks are based project construction buildout in 5 year increments in Reference 1. Percentage of Irrigated Area and area of landscape corridors are based on Reference 2.
(b) The annual reference evapotranspiration rate for the City of Chico area is from Reference 3.
(c) Evapotranspiration Adjustment Factor (ETAF) was set to be 1.0 for parks assuming 100% special landscape areas for recreational areas. An ETAF of 0.45 was used for landscape corridors based on Reference 3.
(f) The Maximum Applied Water Allowance (MAWA) calculations are described in Reference 3.
(g) Project buildout is anticipated to occur through approximately 2050, per Reference 1. For the purpose of this WSA, it is conservatively assumed that buildout is accelerated such that full project buildout is achieved by 2040. Landscape corridors are assumed to achieve 50% construction by 2025 and 100% by 2030.

Reference:

1 Five Year Incremental Project Buildout provided by Bill Brouhard, Chico Land Investment LLC, via email on 26 November 2019.
2 Draft Valley's Edge Simplified Water Study, City of Chico, prepared by FRAYJI, draft dated 12 November 2019.
3 California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance, 29 November 2019.

Table 3d

Estimated Project Water Feature Consumptive Water Use

Valley's Edge Specific Plan, City of Chico, California

Water Feature	Water Surface Area (a) (ac)	Annual Reference Evapotranspiration (b) (in)	Estimated Water Loss to Evaporation (c) (AFY)			
			2025	2030	2035	2040
Frontier Lake	6.0	51.7	26	26	26	26
Pioneer Park Ponds	2.0	51.7	8.6	8.6	8.6	8.6
Total	**8.0**	**-**	**34**	**34**	**34**	**34**

Abbreviations:

"ac" = acre

"AFY" = acre-feet per year

"in" = inches

Notes:

(a) Surface area for water features are from Reference 1.

(b) The annual reference evapotranspiration rate for the City of Chico area is from Reference 2.

(c) Water features are assumed to be constructed by 2025.

Reference:

1. Information received from Paul Kronser, FRAYJI, via email on 18 November 2019.

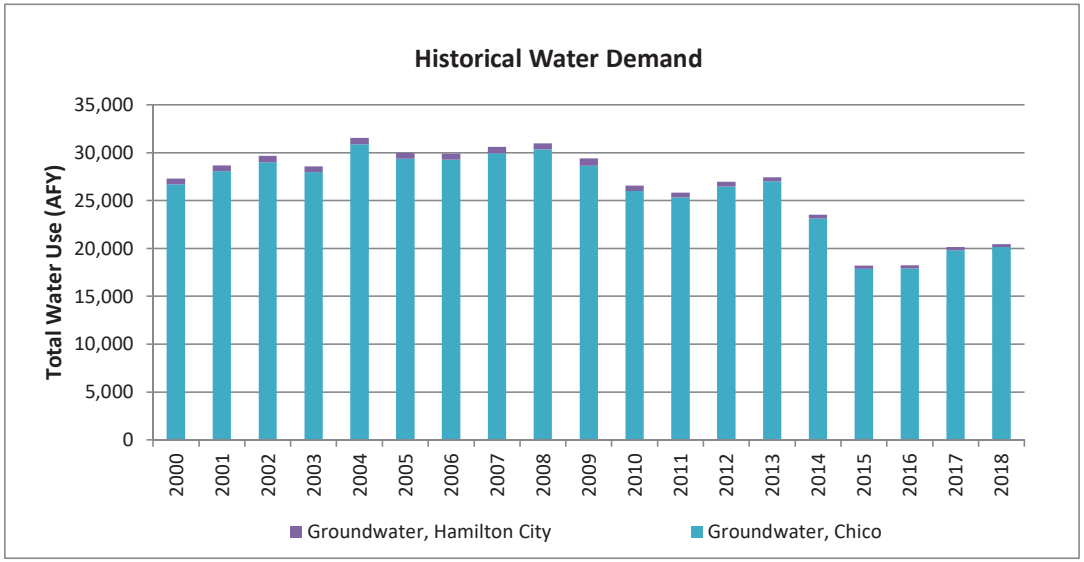
2. California Code of Regulations, Title 23, Division 2, Chapter 2.7, Model Water Efficient Landscape Ordinance, 29 November 2019.

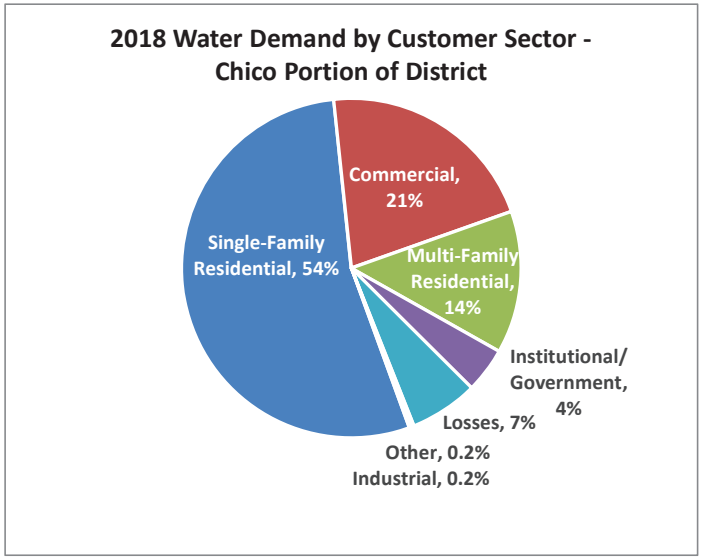
Table 4

Historical Water Demand for Cal Water

Valley's Edge Specific Plan, City of Chico, California

Category	Cal Water Historical Annual Water Demand (a) (AFY)																		
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Groundwater, Chico	26,706	28,055	28,991	27,972	30,873	29,372	29,284	29,971	30,324	28,643	26,008	25,345	26,486	27,006	23,139	17,864	17,888	19,820	20,148
Groundwater, Hamilton City	596	634	670	602	656	620	613	655	645	784	564	484	472	440	405	363	356	323	330
Total Water Demand	**27,301**	**28,689**	**29,661**	**28,573**	**31,529**	**29,992**	**29,897**	**30,626**	**30,970**	**29,427**	**26,572**	**25,828**	**26,958**	**27,446**	**23,544**	**18,227**	**18,244**	**20,143**	**20,478**





Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Historical water demands are per Reference 1 and Worksheet 10, Appendix F in Reference 2. The 2018 water use by customer sector was provided in Reference 1.

References:

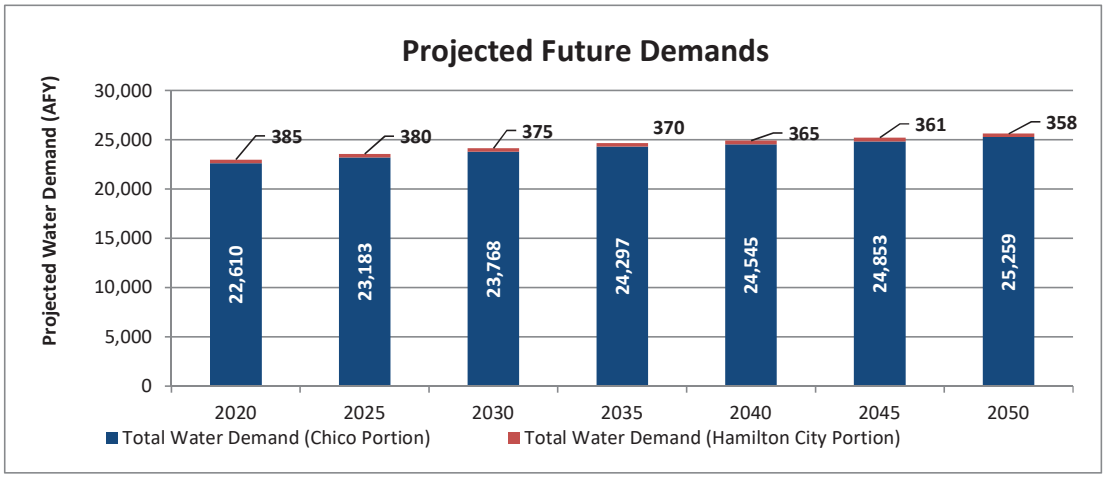
1. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.
2. 2015 Urban Water Management Plan, Chico-Hamilton City District, prepared by California Water Service, dated June 2016.

Table 5

Projected Future Water Demand for the Chico District

Valley's Edge Specific Plan, City of Chico, California

Customer Category	Projected Annual Water Demand (a)(c) (AFY)						
	2020	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Chico Portion of System (b)							
Single Family Residential	11,986	12,373	12,779	13,041	13,109	13,259	13,509
Multi-family Residential	2,871	3,010	3,151	3,328	3,445	3,527	3,595
Commercial	4,788	4,788	4,777	4,805	4,830	4,862	4,898
Industrial	1,079	1,079	1,082	1,100	1,117	1,136	1,154
Institutional/Governmental	34	35	36	36	37	38	39
Other	39	39	39	39	39	39	39
Losses (Non-Revenue Water)	1,813	1,859	1,906	1,948	1,968	1,993	2,026
Total Water Demand (Chico Portion)	**22,610**	**23,183**	**23,768**	**24,297**	**24,545**	**24,853**	**25,259**
Hamiton City Portion of System (b)							
Single Family Residential	235	233	231	229	226	225	224
Multi-family Residential	5	5	5	5	4	4	4
Commercial	39	37	36	35	34	34	33
Industrial	0	0	0	0	0	0	0
Institutional/Governmental	37	36	35	34	34	33	33
Other	0	0	0	0	0	0	0
Losses (Non-Revenue Water)	70	69	68	67	66	65	65
Total Water Demand (Hamilton City Portion)	**385**	**380**	**375**	**370**	**365**	**361**	**358**



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

"UWMP" = Urban Water Management Plan

Notes:

(a) Cal Water updated its water demand projections for the Chico District in 2019, per Reference 1.

(b) The total water demand is the sum of total water use and distribution system losses.

(c) The Hamilton City portion of the District water system is physically separated from the Chico portion of the District. Thus, water supplies available to the Hamilton City portion of the District are not physically available to the City of Chico portion, and vice versa. The proposed Project would be a part of the Chico portion of the District.

References:

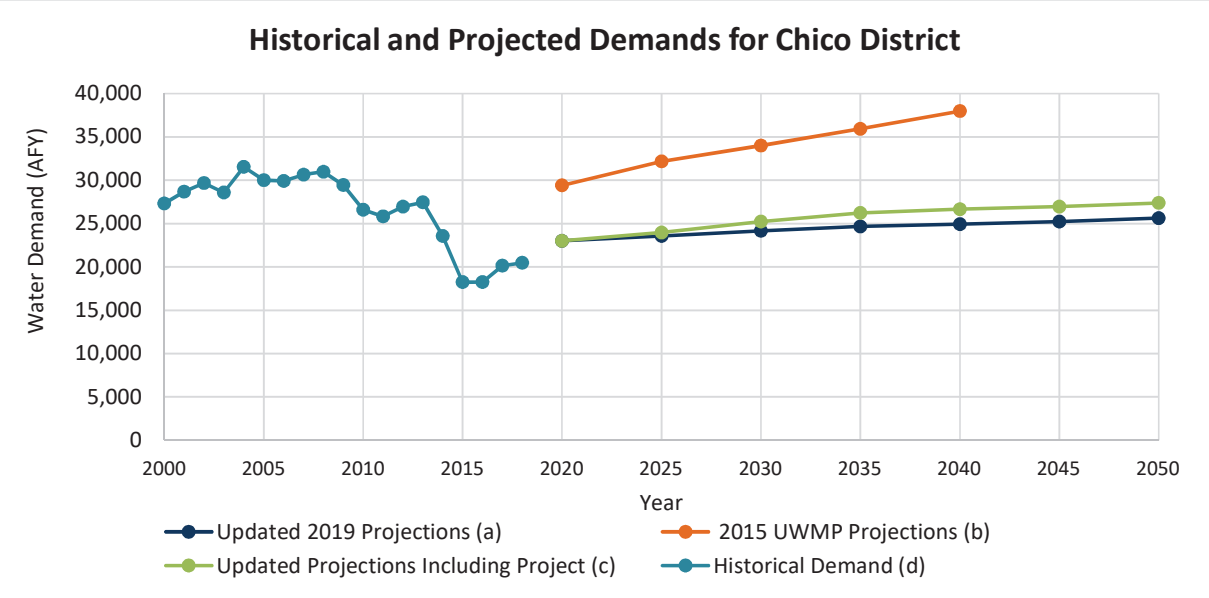
1. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.

Table 6

Comparison of 2015 UWMP to Updated Water Demand Projections for the Chico District

Valley's Edge Specific Plan, City of Chico, California

Projected Water Demand	Projected Water Demand (AFY)						
	2020	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Updated 2019 Projections (a)							
Chico Portion of System	22,610	23,183	23,768	24,297	24,545	24,853	25,259
Hamilton City Portion of System	385	380	375	370	365	361	358
2015 UWMP Projections (b)							
Chico Portion of System	29,397	32,162	33,981	35,916	37,974	--	--
Hamilton City Portion of System							
Difference Between 2015 UWMP and Current Projections	*6,402*	*8,599*	*9,838*	*11,249*	*13,064*	--	--
Estimated Project Water Demand (c)	0	381	1,069	1,540	1,751	1,751	1,751



Abbreviations:

"AFY" = acre feet per year

"UWMP" = Urban Water Management Plan

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Water demand projections for the Chico District were upadted in 2019, and are presented per Reference 1.

(b) 2015 UWMP projections are shown per Reference 2. The 2015 UWMP did not differentiate demand projections for the Hamilton City and Chico portions of the District. Historically, the demand by the Hamilton City portion has been consistently approximately 2% of the total demand of the Chico District.

(c) Estimated demands for the proposed project are shown in Table 1.

(d) Historical water demands are shown in Table 4.

References:

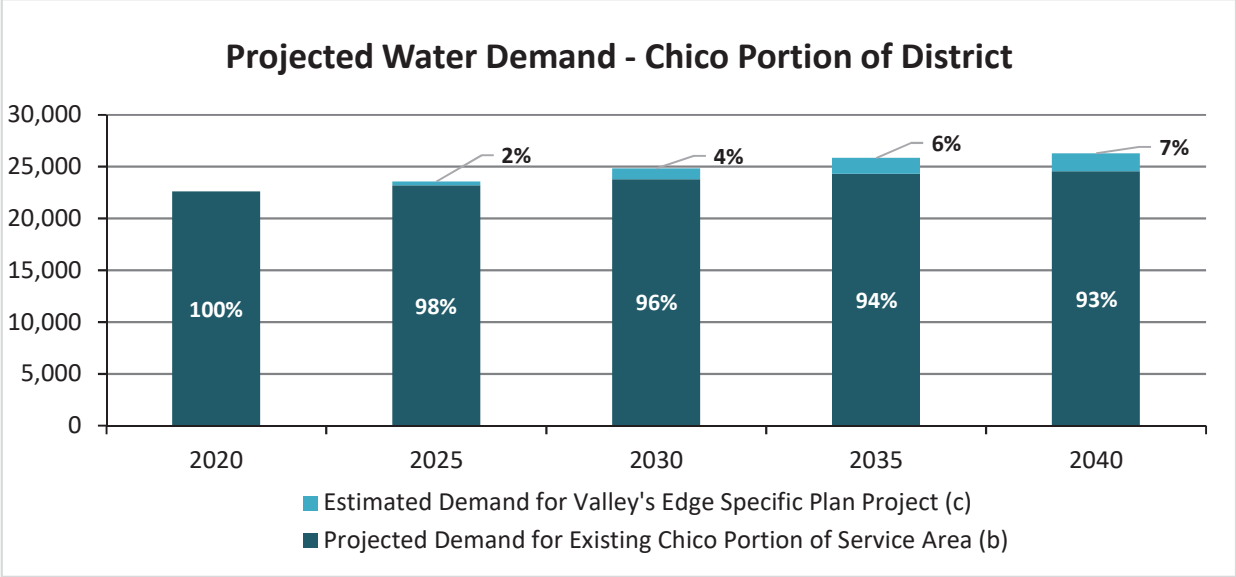
1. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.
2. 2015 Urban Water Management Plan, Chico-Hamilton City District, prepared by California Water Service, dated June 2016.

Table 7

Total Projected Future Water Demand for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

Water Demand	Future Water Demand (AFY) (a)				
	2020	2025	2030	2035	2040
Projected Demand for Existing Chico Portion of Service Area (b)	22,610	23,183	23,768	24,297	24,545
Estimated Demand for Valley's Edge Specific Plan Project (c)	0	381	1,068	1,537	1,748
Projected Water Demand Inclusive of Project	***22,610***	***23,564***	***24,836***	***25,834***	***26,293***



Abbreviations:

"AFY" = acre-feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

"WSA" = Water Supply Assessment

Notes:

(a) The Hamilton City portion of the District water system is physically separated from the Chico portion of the District. Thus, water supplies available to the Hamilton City portion of the District are not physically available to the City of Chico portion, and vice versa. Therefore, water demands for the Chico portion of the District only are presented in this table.

(b) Water demand projections for the Chico District were upadted in 2019, and are presented per Reference 1.

(c) Estimated demands for the proposed Project are shown in Table 1.

References:

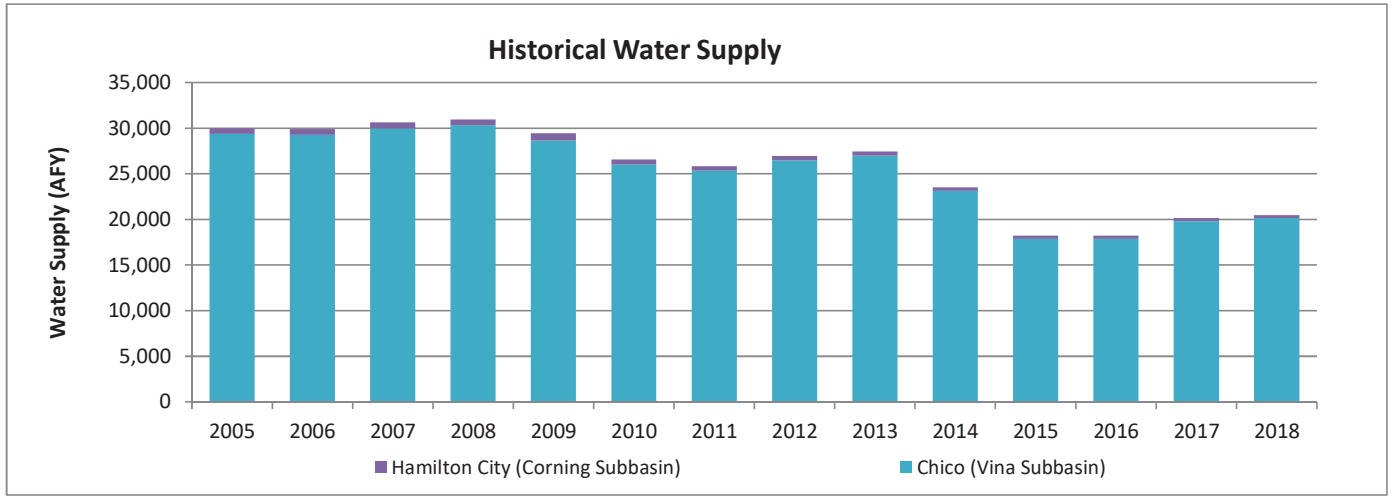
1. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.

Table 8

Historical Water Supply for Cal Water

Valley's Edge Specific Plan, City of Chico, California

Water Supply Source	Historical Water Supply (a) (AFY)													
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Chico (Vina Subbasin)	29,372	29,284	29,971	30,324	28,643	26,008	25,345	26,486	27,006	23,139	17,864	17,888	19,820	20,148
Hamilton City (Corning Subbasin)	620	613	655	645	784	564	484	472	440	405	363	356	323	330
Total Water Supply	29,992	29,897	30,626	30,969	29,427	26,572	25,829	26,958	27,446	23,544	18,227	18,244	20,143	20,478



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Historical water supply values are per Reference 1 and Worksheet 10, Appendix F in Reference 2.

(b) Groundwater subbasin boundaries were modified by the Department of Water Resources (DWR) in 2018. Indicated subbasins are per Reference 3.

References:

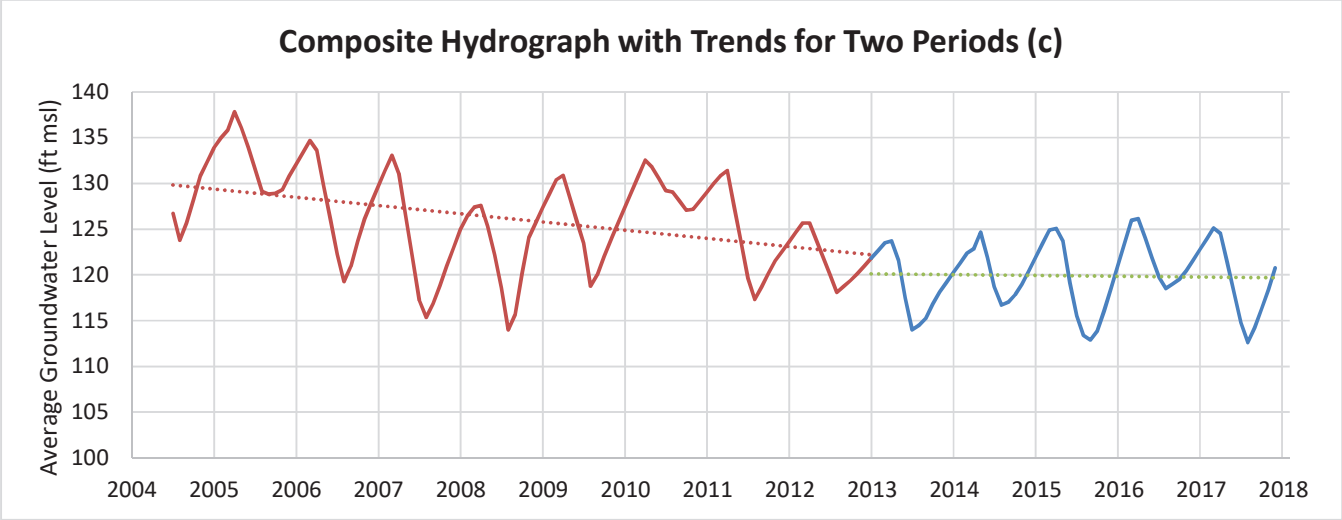
1. Historical and Projected Water Demands for the Chico-Hamilton City District, provided by Cal Water on 8 November 2019.
2. 2015 Urban Water Management Plan, Chico-Hamilton City District, prepared by California Water Service, dated June 2016.
3. SGMA Basin Boundary Modification Reuest System. https://sgma.water.ca.gov/basinmod/modrequest/preview/227

Table 9

Groundwater Level Trends for Wells with Available Data in Vicinity of Chico District

Valley's Edge Specific Plan, City of Chico, California

Well	Available Groundwater Level Data (a)			Groundwater Level Trend (ft/yr) (b)	
	Start Date	End Date	Number of Data	2005 - 2013	2014 - 2018
22N02E30C002M	12/19/2001	7/1/2019	89	-1.52	0.87
22N01E35E001M	6/15/2005	10/14/2019	61	-1.37	1.62
22N02E18J001M	4/6/2001	10/15/2019	45	-0.89	-3.08
21N02E07C001M	2/28/1967	7/9/2018	165	0.43	0.93
21N01E12K001M	8/12/1959	10/18/2019	168	0.09	1.39
21N01E12D001M	7/15/1995	10/18/2019	63	0.16	-2.89
21N01E10B003M	7/15/1995	10/17/2019	101	-1.75	1.58
22N01E09B001M	5/9/2001	10/18/2019	88	-1.43	1.06
22N01E20K001M	5/10/1961	10/18/2019	373	-1.14	1.07
23N01E33A001M	10/14/2001	10/18/2019	83	-1.56	-2.15
			AVERAGE:	**-0.90**	**0.04**



Abbreviations:

"CASGEM" = California Statewide Groundwater Elevation Monitoring
"ft msl" = feet mean sea level
"ft/yr" = feet per year

Notes:

(a) Groundwater level data obtained from CASGEM (Reference 1).
(b) Groundwater level trends based on linear regression of available data interpolated to regular monthly intervals to ensure equal temporal weighting.
(c) Composite hydrograph is based on the average water level in the ten wells and illustrates the different trend for the two periods.

References:

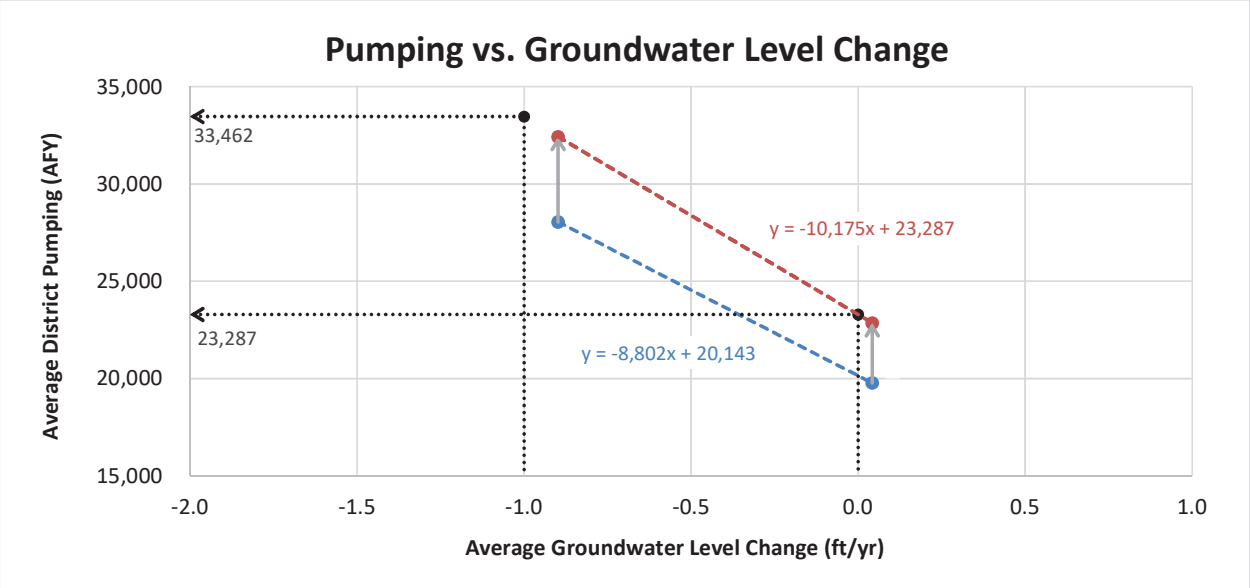
1. https://www.casgem.water.ca.gov/

Table 10

Estimated Sustainable Pumping Based on Groundwater Level Change

Valley's Edge Specific Plan, City of Chico, California

Period	Average Groundwater Level Change (ft/yr) (a)	Average District Pumping, Chico Service Area (AFY)
Observed (Dry Climate Period) (b)		
2005 - 2013	-0.90	28,049
2014 - 2018	0.04	19,772
Estimated (Average Climate Period) (c)		
Average Climate Period	-0.90	32,426
	0.04	22,858
Interpolated (Average Climate Period) (d)		
Estimated Sustainable Pumping Range	0.0	23,287
	-1.0	33,462



Abbreviations:

"AFY" = acre-feet per year

"ft/yr" = feet per year

Notes:

(a) Average groundwater level changes based on data from eight CASGEM wells in vicinity of Chico District.

(b) Both periods, 2005-2013 and 2014-2018, are considered dry periods, with precipitation of 86.7% and 86.4% of the long-term average, respectively.

(c) Estimated District pumping under normal or average climate conditions based on scaling of dry period values upwards proportionally to precipitation (i.e., from 86.5% to 100%), as shown by grey arrows.

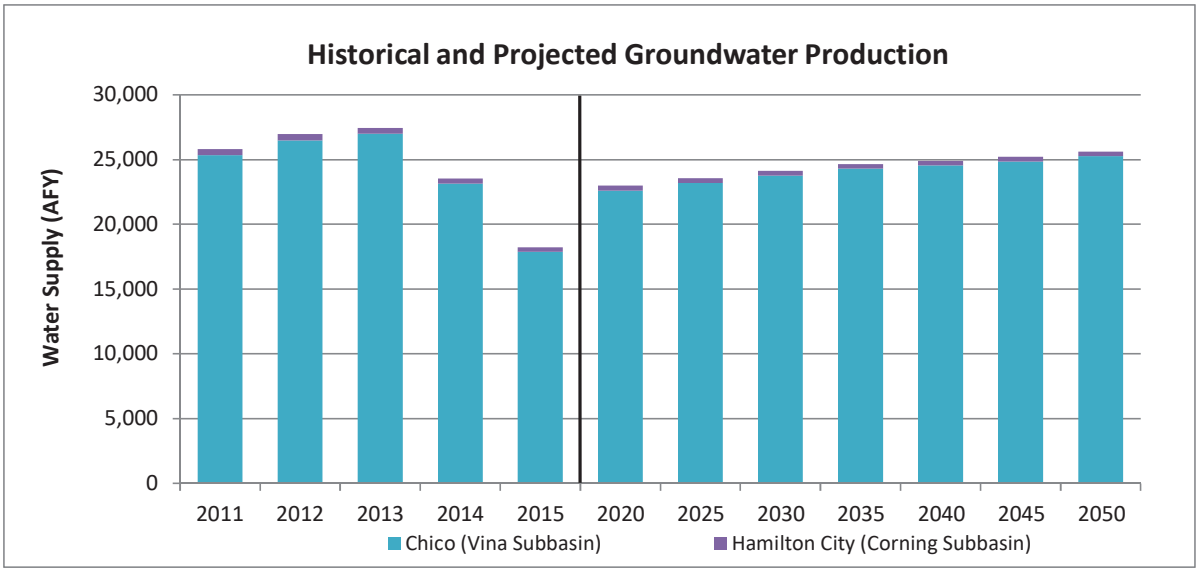
(d) Estimated sustainable pumping range under normal or average conditions based on interpolation of best-fit line (red dashed line), using a range of allowable groundwater level change of 0.0 to -1.0 ft/yr.

Table 11

Historical and Projected Groundwater Pumping

Valley's Edge Specific Plan, City of Chico, California

Water Supply Source (b)	Historical Groundwater Production (a) (AFY)					Projected Groundwater Production (a) (AFY)						
	2011	2012	2013	2014	2015	2020	2025	2030	2035	2040	2045	2050
Chico (Vina Subbasin)	25,345	26,486	27,006	23,139	17,864	22,610	23,183	23,768	24,297	24,545	24,853	25,259
Hamilton City (Corning Subbasin)	484	472	440	405	363	385	380	375	370	365	361	358
Total Groundwater Supply	25,828	26,958	27,446	23,544	18,227	22,995	23,563	24,143	24,667	24,910	25,214	25,617



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Historical groundwater pumping by Cal Water, as reported in Table 6-1 per Reference 1. Projected groundwater pumping per Reference 2.

(b) Groundwater subbasin boundaries were modified by the Department of Water Resources (DWR) in 2018. Indicated subbasins are per Reference 3.

References:

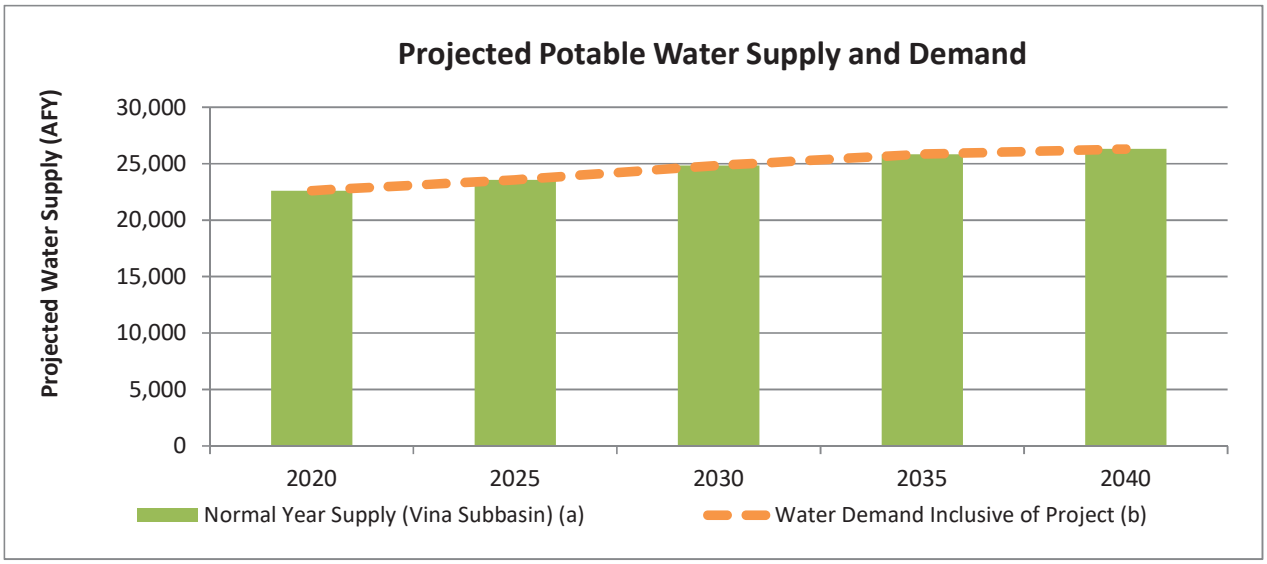
1. 2015 Urban Water Management Plan, Chico-Hamilton City District, prepared by California Water Service, dated June 2016.
2. Historical and Projected Water Demands for the Chico-Hamilton City District provided by Cal Water on 8 November 2019.
3. SGMA Basin Boundary Modification Reuest System. https://sgma.water.ca.gov/basinmod/modrequest/preview/227

Table 12

Projected Normal Year Water Supply and Demand for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

Water Demand and Supply Source	Projected Normal Year Supply and Demand (AFY)				
	2020	2025	2030	2035	2040
Normal Year Supply (Vina Subbasin) (a)	22,610	23,564	24,836	25,834	26,293
Water Demand Inclusive of Project (b)	22,610	23,564	24,836	25,834	26,293
Supply Shortfall (% demand)	***0%***	***0%***	***0%***	***0%***	***0%***



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Based on the demonstrated ability of the Chico District to meet historical demands that are even greater than the projected system demands, the available supplies are considered equal to the demands under all conditions. See Section 6.1.3.4 of the text for additional information.

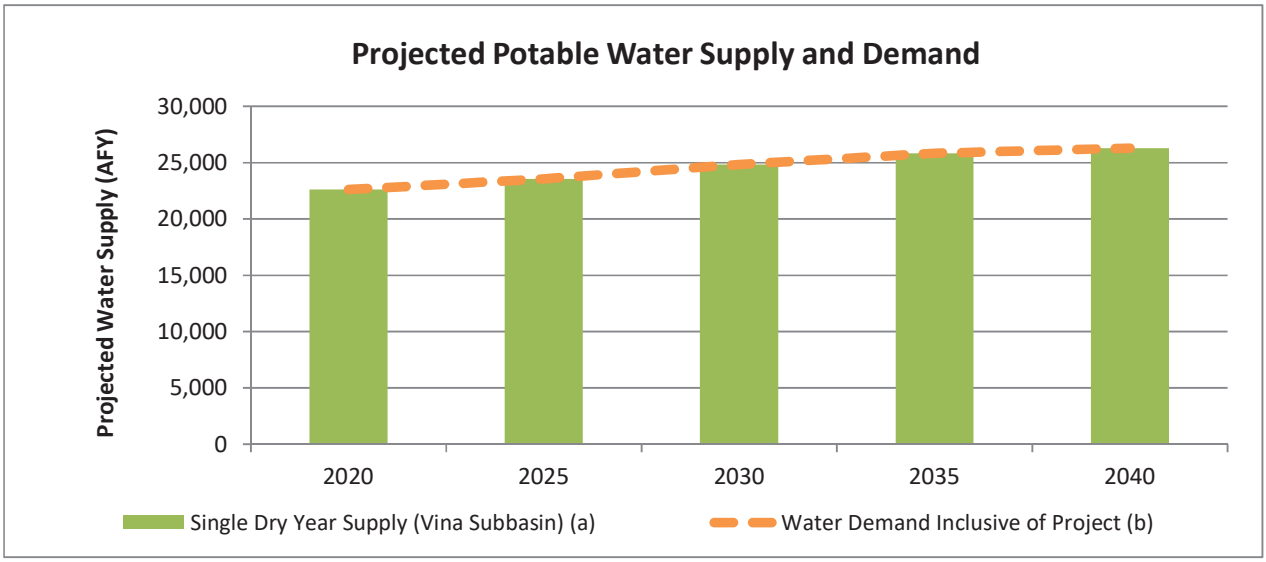
(b) Water demand shown is limited to the Chico portion of the Chico District, which is supplied by groundwater from the Vina Subbasin (Table 7).

Table 13

Comparison of Single Dry Year Water Supply and Demand for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

Water Supply Source	Projected Water Supply and Demand (AFY)				
	2020	2025	2030	2035	2040
Single Dry Year Supply (Vina Subbasin) (a)	22,610	23,564	24,836	25,834	26,293
Water Demand Inclusive of Project (b)	22,610	23,564	24,836	25,834	26,293
Supply Shortfall (% demand)	***0%***	***0%***	***0%***	***0%***	***0%***



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Based on the demonstrated ability of the Chico District to meet historical demands that are even greater than the projected system demands, the available supplies are considered equal to the demands under all conditions. See Section 6.1.3.4 of the text for

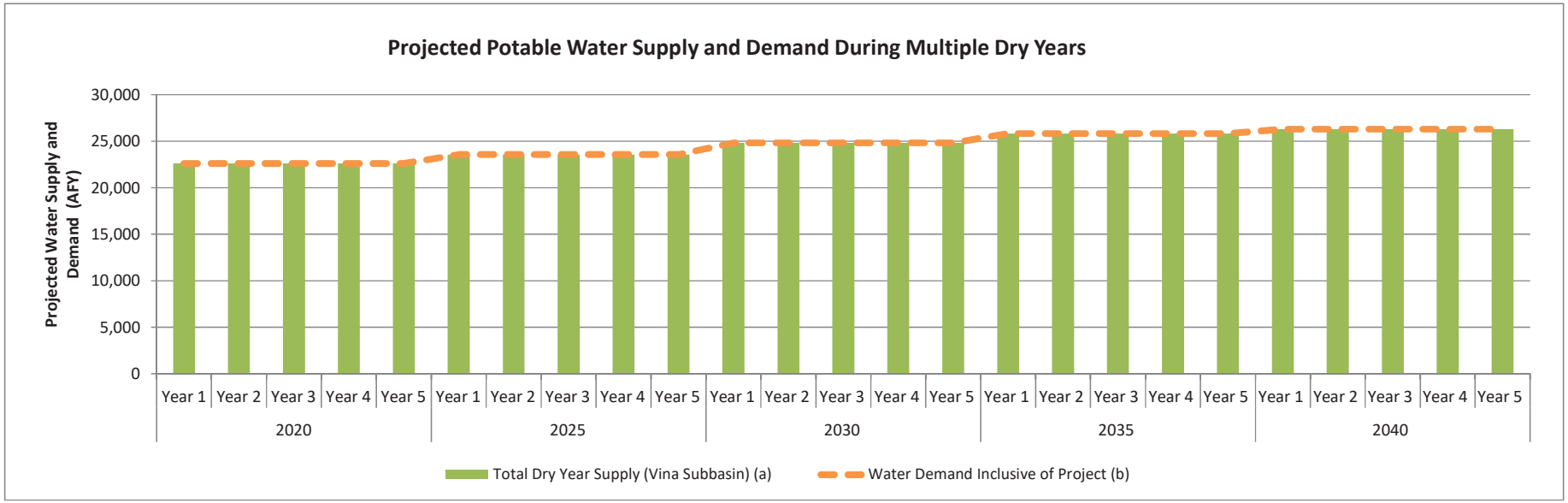
(b) Water demand shown is limited to the Chico portion of the Chico District, which is supplied by groundwater from the Vina Subbasin

Table 14

Comparison of Multiple Dry Year Water Supply and Demand for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

	Projected Water Supply and Demand During Multiple Dry Years (AFY)																								
	2020					2025					2030					2035					2040				
Supply Source	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Total Dry Year Supply (Vina Subbasin) (a)	22,610	22,610	22,610	22,610	22,610	23,564	23,564	23,564	23,564	23,564	24,836	24,836	24,836	24,836	24,836	25,834	25,834	25,834	25,834	25,834	26,293	26,293	26,293	26,293	26,293
Water Demand Inclusive of Project (b)	22,610	22,610	22,610	22,610	22,610	23,564	23,564	23,564	23,564	23,564	24,836	24,836	24,836	24,836	24,836	25,834	25,834	25,834	25,834	25,834	26,293	26,293	26,293	26,293	26,293
Supply Shortfall (%	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***	***0%***



Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

Notes:

(a) Based on the demonstrated ability of the Chico District to meet historical demands that are even greater than the projected system demands, the available supplies are considered equal to the demands under all conditions. See Section 6.1.3.4 of the text for additional information.

(b) Water demand shown is limited to the Chico portion of the Chico District, which is supplied by groundwater from the Vina Subbasin (Table 7).

Table 15

Incremental Impact of the Project on Water Supply and Demand in Normal and Dry Years for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

Year			[A] Total Supply (AFY) (a)	Without Project		With Project		
				[B] Demand (AFY)	[C] C = (A - B) / B Supply Shortfall (% of Demand)	[D] Demand (AFY)	[E] E = (A - D) / D Supply Shortfall (% of Demand)	[F] F = E - C Incremental Shortage
2020	Normal		22,610	22,610	No Shortfall	22,610	No Shortfall	0%
	SDY		22,610	22,610	No Shortfall	22,610	No Shortfall	0%
	MDY	Year 1	22,610	22,610	No Shortfall	22,610	No Shortfall	0%
		Year 2	22,610	22,610	No Shortfall	22,610	No Shortfall	0%
		Year 3	22,610	22,610	No Shortfall	22,610	No Shortfall	0%
		Year 4	22,610	22,610	No Shortfall	22,610	No Shortfall	0%
		Year 5	22,610	22,610	No Shortfall	22,610	No Shortfall	0%
2025	Normal		23,564	23,183	No Shortfall	23,564	No Shortfall	0%
	SDY		23,564	23,183	No Shortfall	23,564	No Shortfall	0%
	MDY	Year 1	23,564	23,183	No Shortfall	23,564	No Shortfall	0%
		Year 2	23,564	23,183	No Shortfall	23,564	No Shortfall	0%
		Year 3	23,564	23,183	No Shortfall	23,564	No Shortfall	0%
		Year 4	23,564	23,183	No Shortfall	23,564	No Shortfall	0%
		Year 5	23,564	23,183	No Shortfall	23,564	No Shortfall	0%
2030	Normal		24,836	23,768	No Shortfall	24,836	No Shortfall	0%
	SDY		24,836	23,768	No Shortfall	24,836	No Shortfall	0%
	MDY	Year 1	24,836	23,768	No Shortfall	24,836	No Shortfall	0%
		Year 2	24,836	23,768	No Shortfall	24,836	No Shortfall	0%
		Year 3	24,836	23,768	No Shortfall	24,836	No Shortfall	0%
		Year 4	24,836	23,768	No Shortfall	24,836	No Shortfall	0%
		Year 5	24,836	23,768	No Shortfall	24,836	No Shortfall	0%

Table 15

Incremental Impact of the Project on Water Supply and Demand in Normal and Dry Years for the Chico Portion of the Chico District

Valley's Edge Specific Plan, City of Chico, California

Year			[A] Total Supply (AFY) (a)	Without Project		With Project		
				[B] Demand (AFY)	[C] C = (A - B) / B Supply Shortfall (% of Demand)	[D] Demand (AFY)	[E] E = (A - D) / D Supply Shortfall (% of Demand)	[F] F = E - C Incremental Shortage
2035	Normal		25,834	24,297	No Shortfall	25,834	No Shortfall	0%
	SDY		25,834	24,297	No Shortfall	25,834	No Shortfall	0%
	MDY	Year 1	25,834	24,297	No Shortfall	25,834	No Shortfall	0%
		Year 2	25,834	24,297	No Shortfall	25,834	No Shortfall	0%
		Year 3	25,834	24,297	No Shortfall	25,834	No Shortfall	0%
		Year 4	25,834	24,297	No Shortfall	25,834	No Shortfall	0%
		Year 5	25,834	24,297	No Shortfall	25,834	No Shortfall	0%
2040	Normal		26,293	24,545	No Shortfall	26,293	No Shortfall	0%
	SDY		26,293	24,545	No Shortfall	26,293	No Shortfall	0%
	MDY	Year 1	26,293	24,545	No Shortfall	26,293	No Shortfall	0%
		Year 2	26,293	24,545	No Shortfall	26,293	No Shortfall	0%
		Year 3	26,293	24,545	No Shortfall	26,293	No Shortfall	0%
		Year 4	26,293	24,545	No Shortfall	26,293	No Shortfall	0%
		Year 5	26,293	24,545	No Shortfall	26,293	No Shortfall	0%

Abbreviations:

"AFY" = acre feet per year

"Cal Water" = California Water Service, Chico-Hamilton City District

"MDY" = Multiple Dry Year

"SDY" = Single Dry Year

Notes:

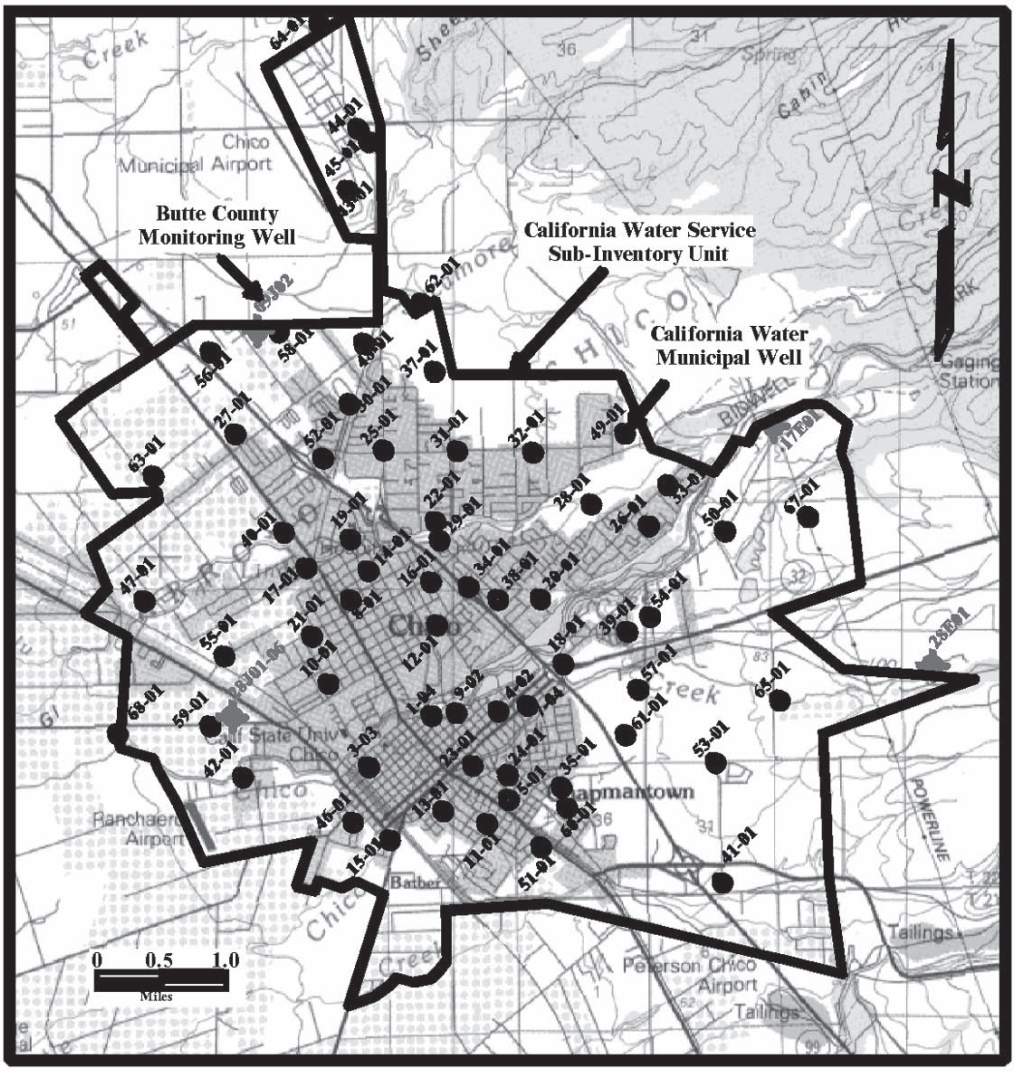
(a) Based on the demonstrated ability of the Chico District to meet historical demands that are even greater than the projected system demands, the available supplies are considered equal to the demands under all conditions. See Section 6.1.3.4 of the text for additional information.

(b) Water demand shown is limited to the Chico portion of the Chico District, which is supplied by groundwater from the Vina Subbasin (Table 7).

Appendix A

Figure 24 from the Butte County Groundwater Inventory Analysis (DWR, 2005) entitled "Municipal and Monitoring Well Locations, California Water Service Sub-Inventory Unit"

Figure 24.
Municipal and Monitoring Well Locations,
California Water Service Sub-inventory Unit



There are about 1,600 wells in the California Water Service Sub-inventory Unit. Table 1, Appendix B, lists the number of wells according to five well types: domestic, irrigation, municipal, monitoring, and other. Table 1 shows that 907 wells are listed as domestic, 149 are listed as irrigation, 66 are listed as municipal, 252 are listed as monitoring, and 228 are listed as other. Figure 25 illustrates the breakdown of wells by use for the California Water Service Sub-inventory Unit.

Groundwater Level

DWR and BCDWRC currently monitor groundwater levels in 7 wells within the California Water Service Sub-inventory Unit. The monitoring wells consist of domestic and observation wells. Table 5 lists the current monitoring wells along with the annual fluctuations in groundwater levels during normal and drought years. Table 5 also lists the well use, the aquifer system that is being monitored, and the monitoring period of record.

Data from the Butte County monitoring grid in Table 5 shows that the annual fluctuations in groundwater levels in the unconfined portion of the aquifer system are