Appendix 4.8
Water Supply Assessment

DRAFT WATER SUPPLY ASSESSMENT (SB 610)

DOWNTOWN DAVIS SPECIFIC PLAN

PRODUCED FOR THE CITY OF DAVIS

SEPTEMBER 2020

DRAFT

Lotus Water engineering

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1 INTRODUCTION

1.1 Purpose

This report provides information necessary to complete a Water Supply Assessment (WSA) for the Downtown Davis Specific Plan Development (the Project). The WSA has been prepared pursuant to the requirements of Senate Bill 610 (Costa; Chapter 643, Stats. 2001) ("SB 610"), which requires public water agencies, parties or purveyors that may supply water to certain proposed development projects to prepare a WSA for use by the city or county in environmental documentation for such projects, pursuant to the California Environmental Quality Act ("CEQA").

The WSA is meant to document available water supply to the City of Davis, and how the proposed Project will impact water demand for the City relative to available supply over the life of the project, in this case through the year 2040. The WSA evaluates supply and demand in "normal" or average conditions distributed temporally over the life of the project, as well as supply and demand in a multiple dry-year scenario in the context of a full buildout condition.

1.2 Background

Historically, and until recently, the City relied on groundwater for 100% water supply using twenty groundwater wells. To replace the capacity lost with the removal of wells that did not comply with current potable water quality regulations, the City shifted its water portfolio in 2016 to rely primarily on surface water allocations from the Sacramento River.

Today, water is supplied through the Woodland Davis Clean Water Agency, which draws surface water from the Sacramento River. The regional surface water supply largely replaces groundwater supplies with safe, more reliable treated surface water from the Sacramento River. Select wells will remain in service as supplemental water supply in addition to the surface water supply.

1.3 Service Area Description

Downtown Davis, also called the Core Area, is a 32-block area of approximately 132 acres of mixed land uses, forming the commercial heart of the City of Davis since its incorporation in 1917. The Downtown Davis Specific Plan describes a design approach that reflects the community vision and serve as the heart of the City while maintaining a diverse mix of land uses.

1.4 Wholesale Water Supply

In 2016, the City of Davis began to integrate surface water from the Sacramento River. Surface Water from the Sacramento River is pumped to the Woodland-Davis Clean Water Agency regional surface water supply project in Woodland, where water is treated and delivered to the City's transmission line.

The *2015 City of Davis Urban Water Management Plan (2015 UWMP)* documents water supplies and historical and projected water demands for the City. Per the 2015 UWMP, the projected available water supply to Davis from the surface water project is 10.2 million gallons per day (MGD) year-round.

1.5 Groundwater Supply and Management Summary

The City draws groundwater from the Sacramento Valley groundwater basin, Yolo Subbasin. Historically, the City has relied on groundwater for 100 percent water supply through the use of twenty groundwater wells, until the City shifted its water supply to the Sacramento River in 2016. The groundwater pumping, though no longer a primary source of water for the City will continue to provide a reliable and high-quality secondary water source to the City. Per the 2015 UWMP, the projected available deep well groundwater water supply has a capacity of 13.2 MGD year-round. If the water supply from the wholesale surface water supply and the deep wells does not meet demand, or the wholesale water supply is not available, the City will rely on intermediate depth wells for backup water supply.

The Yolo subbasin is not adjudicated and there are no legal restrictions to groundwater pumping and the California Department of Water Resources (DWR) Bulletin 118 does not consider the basin to be in overdraft. The City of Davis is a member of the Yolo Subbasin Groundwater Agency (YSGA) which is charged with providing a dynamic, cost-effective, flexible collegial organization to ensure compliance with SGMA within the Yolo Subbasin. Each of the Member and Affiliated Parties has the responsibility for groundwater management within their respective jurisdictional boundaries and the YSGA will serve a coordinating and administrative role for developing the subbasin's Groundwater Sustainability Plan. The Yolo Subbasin Groundwater Sustainability Plan will be completed by January 1, 2022 to meet the State's deadline.

1.6 Water Demand

The water demand for the City has been documented in 2015 UWMP, detailing water demand across different uses, historical water demand for the City, and project water uses through 2035. See Section 2.2 for historical and project water demands for the City.

The existing and proposed water demand associated with the Development Plan Area are detailed in the *Downtown Davis Specific Plan*. See Section 3.2 for historical and projected water demands for the Project.

2 CITY WATER SUPPLY ASSESSMENT

2.1 Water Supply

The Woodland-Davis Clean Water Agency regional surface water supply project can supply up to 30 MGD of potable water per day, with an option for future expansion to 34 MGD. Of the 30 MGD, Woodland's share of treated surface water is 18 MGD, Davis' share is 10.2 million gallons per day, and UC Davis' share is 1.8 MGD.

As noted in Section 1, the City water supply is currently comprised of the wholesale water supply from the treatment facility, up to 10.2 MGD. If the City demand exceeds available water supply from the treatment facility, the supplemental water will be supplied by the existing deep groundwater wells, which have a year-round capacity of 13.2 MGD. This does not include the capacity of the intermediate-depth wells which make up the emergency backup well water supply.

See Table 2-1 for a summary of the water supply to the City on a normal year.

Table 2-1. City Water Supply Summary

	Water Supply (MGD)	Water Supply (AF/YR)
Treatment Facility to City of Davis [B]	10.2	11,246
Groundwater Wells [B]	13.2	14,834
Total to City [A]	23.4	26,080

NOTE:
A: Treatment Facility Supply Agreement to the City of Davis excludes water supply to University of California Davis (UC Davis)
B: 2015 UWMP Table 6-9 – Projected Water Supplies

2.1.1 Dry-Year Supply

The *2015 Urban Water Management Plan (UWMP)* documents water supply in single and multiple dry years. Based on historical data, as noted in the UWMP, the City's groundwater supply has not been impacted by dry years, average years or wet years. In dry years, the groundwater levels may decline, but this has not reduced the pumping capacity of the City's wells.

The available groundwater supply remains constant through the multiple dry years. The water supply from the regional surface water supply project will be reduced from normal year supply due to mandated curtailments on the Sacramento River per the *Sacramento River Joint Intake and Diversion Agreement*, as shown in Table 2-2. If the water demand exceeds both the surface water and deep groundwater well supplies, the intermediate-depth groundwater wells will be used to meet the demand in conjunction with demand management measures, as well as potetntially invoking the City of Davis Water Shortage Contingency Plan.

Table 2-2. Multiple Dry Years City Water Supply

	First Dry Year		Second Dry Year		Third Dry Year	
	AFY	*MGD*	*AFY*	*MGD*	*AFY*	*MGD*
Treatment Facility	*8,495*	*7.58*	*7,462*	*6.66*	*7,556*	*6.75*
Groundwater	*14,834*	*13.24*	*14,834*	*13.24*	*14,834*	*13.24*
Total to City	23,329	20.83	22,296	19.90	22,390	19.99

NOTE:
Multiple Dry Year Supply and Demand Comparison (2015 UWMP Table 7-4)

3 CITY WATER DEMAND ASSESSMENT

The 2020-2040 projected City water demand values are based on the projected populations from the City of Davis 2017 State of the City Report, plus additional demands from future developments analyzed in the 2015 Water Supply Assessment.

3.1.1 2015 WSA Developments

The 2017 State of the City Report populations do not account for the future developments analyzed in the 2015 Water Supply Assessment (2015 WSA Developments). These developments have not yet been constructed and are in various stages of planning, permitting, and implementation.

The 2015 WSA Developments, with 2019 updates from the City, include:

- Aggie Research Project
    - Documented as the Mace Ranch Innovation Center (IC) in the 2015 WSA
    - The City confirmed that the Project will include a residential component, therefore this WSA will conservatively assume the Mixed-Use Alternative
- Bretton Woods Project - West Davis Active Adult Community
    - Water Demand summarized in the 2017 West Davis Active Adult Water Supply Assessment
    - Replaces the Davis IC Project in the 2015 WSA, per correspondence with the City Planning Department
    - Total water demand significantly lower than the Davis IC Project in the 2015 WSA
- Nishi Property
- Triangle

The increase in peak daily water demand and the average annual water demand from the 2015 WSA Developments is summarized in Table 3-1.

Table 3-1. 2015 WSA Developments Projected Water Demand

	Aggie Research	Bretton Woods Adult Community	Nishi	Triangle	Total
Average Annual Water Demand (AFY)	404 [A]	234 [B]	167 [C]	13 [D]	818
Peak Daily Demand (MGD) [E]	0.65	0.38	0.27	0.02	1.31

NOTE:
A: Mace Ranch Innovation Center Mixed-Use Alternative Buildout Demand Maximum Daily Demand (Table 3-16, 2015 WSA)
B: West Davis Active Adult Community Land Use Changes Water Supply Assessment, Prepared by Tully & Young, Inc (Table 2-2)
C: Nishi Property Buildout Demand Maximum Daily Demand (Table 3-18, 2015 WSA)

D: Triangle Development Buildout Demand Maximum Daily Demand (Table 3-19, 2015 WSA)
E: Peak Daily Demand is calculated by the Average Annual Demand (AFY) with a peaking factor of 1.8

3.1.2 Projected City Demand without Downtown Davis Specific Plan Development

The projected city demand values are estimated based on the projected City populations and projected per capita water use. The projected average daily gallons per capita (GPCD) demand is estimated to be 143 GPCD, per discussions with the City. Per a conference call between Lotus Water and the City Public Works Department (PWD) on August 29, 2019, the City reported a historical average water demand of 130 GPCD in 2018, and applied a 10% conservative increase in future years, resulting in a projected average daily use of 143 GPCD. The historical city demand in 2015 is documented to be 9,212 AFY per 2015 City Data.

See Table 3-2 for a summary of the projected water demands for the City. The projected water demands (2020-2040) in this section include the additional water demand from 2015 WSA Developments (Table 3-1). The buildout dates for the individual 2015 WSA Developments are not yet known, therefore the analysis conservatively assumes that the full buildout of the 2015 WSA Developments occur in 2020. The projected water demand in Table 3-2 do not include the increased demand from the Downtown Davis Development.

Table 3-2. City Water Demand without Project Impact

	2015 [F]	2020	2025	2030	2035	2040
Population [B]	-	73,351	75,192	77,032	79,240	80,712
Annual Daily per Capita Water Use (GPCD) [C]	-	143	143	143	143	143
Peak Daily Demand (MGD)						
Average Daily Demand (MGD)	8.22	10.50	10.80	11.00	11.30	11.50
Peak Daily Demand (MGD) [D]	14.80	18.88	19.35	19.83	20.40	20.78
2015 WSA Developments – Max Daily Demand (MGD) [E]	-	1.31	1.31	1.31	1.31	1.31
Total Peak Daily Demand (MGD)	14.80	20.20	20.67	21.14	21.71	22.09
Average Annual Demand (AFY)						
Average Annual Demand (AFY)	9,212	11,749	12,044	12,339	12,693	12,928
2015 WSA Developments – Average Annual Demand (AFY) [E]	-	818	818	818	818	818
Total Average Annual Demand (AFY)	9,212	12,567	12,862	13,157	13,511	13,746

NOTE:

A: The projected demands do not account for the proposed Downtown Davis Development Area increased water demand

B: The projected populations values from the City of Davis 2017 State of the City Report

C: The projected average daily demand from the City, based on a 10% increase from the 2018 average daily demand of 130 GPD

D: The Peak Daily Demand applies a 1.8 Peaking Factor to the average daily demand

E: The increase from the four proposed developments from the 2015 WSA are summarized in Table 3-1

F: Historical City Demand for 2015 is from the 2015 UWMP -Table 2-1, references 2015 City records.

3.2 Development Demand

3.2.1 Historical Development Plan Area Demand

For the development parcels included in the Specific Plan Project Plan Area, average existing daily water demand is approximately 54,000 gallons per day (gpd), or 0.054 MGD, based on 2016 and 2017 City data.

3.2.2 Projected Development Plan Area Demand

The water demand analysis for the Project Plan Area is documented in Chapter 7 of the *Downtown Davis Specific Plan Public Review Draft, October 2019*. Three water reuse scenarios were considered for the Plan Area, each with different plant palettes, potential sources of recycled water, water reuse applications, and with increasing degrees of onsite water reuse and conservation. The three scenarios are:

- Business as Usual: Maintain status quo with assumed turfgrass in landscape areas and open spaces; no water recycling; no water reuse.
    - Buildout Demand: 162 AFY
- Sustainable Reuse**:** Moderate water conservation and decentralized reuse with mix of traditional turf-native plant palette; recycled water generated from laundry applied to exterior irrigation use (i.e. laundry-to-landscape) throughout the Plan Area.
    - Buildout Demand: 160 AFY
- Resilient Reuse: Expanded water reuse and conservation with full native plant palette; recycled water generated from [a] laundry applied to exterior irrigation use (i.e. laundry-to-landscape) throughout the Plan Area, and [b] rainwater harvesting applied to interior non-potable use within a centralized water reuse district in the Heart of Downtown.
    - Buildout Demand: 158 AFY

For the purpose of this Water Supply Assessment, the proposed water demand will be based on the Business as Usual scenario, the most conservative approach (highest projected water demand), which results in a buildout demand of 162 AFY.

See Table 3-3 for a summary of the historical and projected water demands for Downtown Davis Development.

Table 3-3. Project Area Historical and Projected Water Demand

	2016	2020	2025	2030	2035	2036	2040
Population [E]	915	1365	1835 [A]	2034	2774 [A]	2867	3243
Annual Demand (AFY)							
Average Annual Demand (AFY)[B]	62 [D]	104 [B]	119 [B]	133 [B]	148 [B]	150 [B]	162 [B]
Increase in Average Annual Demand (AFY)	-	42	57	71	86	88	100
Peak Daily Demand (MGD)							
Average Annual Demand (MGD)	0.05	0.09	0.11	0.12	0.13	0.13	0.15
Peak Daily Demand (MGD)[C]	0.10	0.17	0.19	0.21	0.24	0.24	0.26
Increase in Peak Daily Demand (MGD)	-	0.07	0.09	0.11	0.14	0.14	0.16

NOTE:
A: The population for 2025 and 2035 is based on an interpolated project population value
B: The average annual demand for 2020-2040 is calculated based on the incremental population growth from 2020 to buildout (2040)
C: Peak Daily Demand (MGD) is based on the average annual demand with a 1.8 Peaking Factor, as documented in the 2015 UWMP
D: The 2016 Historical Annual Average Demand is based on the average demand of 0.054 MGD reported by the City
E: Project Population Source: 2017 Downtown Davis Specific Plan Existing Conditions Report

3.3 *Impact of the Project on City Demand*

The final buildout of the Project is projected to increase the Project Plan Area peak daily demand by 0.16 MGD, and the average annual demand by 100 AFY.

See Table 3-4 for a summary of the impact of the Development on total City demand at each 5-year development milestone.

Table 3-4. Projected City Demand with Development Impact

	2020	2025	2030	2035	2040
City Demand - Without Development					
Average Annual Demand (AFY) [A]	12,567	12,862	13,157	13,511	13,746
Peak Daily Demand (MGD)[B]	20.20	20.67	21.14	21.71	22.09
City Demand - With Development					
Average Annual Demand (AFY) [C]	12,609	12,919	13,228	13,596	13,846
Peak Daily Demand (MGD) [D]	20.26	20.76	21.26	21.85	22.25
% Increase in Peak Daily Demand	0.3%	0.4%	0.5%	0.6%	0.7%

NOTE:
A: Table 3-2: City of Davis Historical and Projected Average Annual Water Demand (AFY)
B: Table 3-2: City of Davis Historical and Projected Peak Day Demand (MGD)
C: Table 3-3: Development Area Historical and Projected Water Demand, Increase in Average Annual Demand
D: Table 3-3: Development Area Historical and Projected Water Demand, Increase in Peak Daily Demand

The Development slightly increases the peak daily City demand (by less than 1%) after buildout. The projected City demand after the Development buildout (approximately 22.3 MGD) does not exceed the total supply of 23.4 MGD to the City in a normal year.

3.4 City Dry Year Demand

The projected dry-year demand analysis is based on historical average per capita water use during restricted drought years. Years 2015-2017 were dry years, and as reported by the California State Water Resources Control Board (CSWRCB) years 2016-2017 were restricted due to reduced water supply in drought years.

During historical dry years, the average daily water demand was lower than normal years due to the Governor's Executive Order for conservation measures and due to conservation measures the City was conducting.

See Table 3-5 for a summary of historical per capita water demands for 2015-2017. These historical demands were provided by the City Public Works Department (PWD) during a conference call on August 29, 2019 between Lotus Water and the City PWD. The City agreed that the historical demands for 2015-2017 represent a multiple dry year scenario.

Table 3-5. City Historical Dry Year Demand

	2015	2016	2017
City Demand (GPCD)	120	125	126

NOTE: Historical GPCD based on City of Davis Department of Public Works Data

See Table 3-6 for a projected buildout water demand for the City in multiple dry years, assuming the average daily water use during the historical drought years. This analysis is based on the projected 2040 population plus the estimated increase in water demand from the Development during a dry year.

The projected 2040 City population includes the increase from the 2015 WSA Developments with a conservative increase in population of 3,915 based on the Mace Ranch Mixed-Use Alternative presented in the 2015 WSA.

Table 3-6. Projected City Dry Year Demand with Development

	First Dry Year	Second Dry Year	Third Dry Year
Demand (GPCD) [A]	120	125	126
Buildout Population [B]	84,627	84,627	84,627
Peak Daily Demand (MGD)			
Average Annual Demand (MGD)	10.16	10.58	10.66
Daily Peak Demand (MGD) without Development	18.28	19.04	19.19
Daily Peak Demand with Development Increase (MGD) [C]	18.44	19.20	19.35
Annual Demand (AFY)			
Average Annual Demand (AFY) without Development	11,375	11,849	11,944
Daily Peak Demand with Development Increase (MGD) [D]	11,475	11,949	12,044

NOTE:
A: The estimated daily demand is based on historical 2015-2017 daily water use data provided by the City
B: The buildout population is based on the 2040 projected population from the City of Davis 2017 State of the City Report, plus an estimated buildout population of 3915 from the 2015 WSA Developments (Table 2-6: Water Service Area Population)
C: Table 3-3: Development Area Historical and Projected Water Demand, Increase in Peak Daily Demand (Increase of 0.16 MGD at buildout)
D: Table 3-3: Development Area Historical and Projected Water Demand, Increase in Average Annual Demand (Increase of 100 AFY at buildout)

4 CITY SUPPLY AND DEMAND COMPARISON

The projected City demand for a normal year includes the demands associated with the 2015 WSA Developments and the Downtown Davis Specific Plan Public Review Draft — October 2019 Business As-Usual buildout scenario. See Table 4-1 for a comparison of City supply and peak daily demand for a normal year

Table 4-1. City Supply and Demand Comparison – Normal Year at Buildout

	Normal Year	
	Average Annual Demand (AFY)	*Peak Daily Demand (MGD)*[A]
Projected City Supply [A]	26,080	23.40
Projected City Demand [B]	13,846	22.25
Supply minus Demand	12,234	1.15

NOTE:
A: Projected City Demand at Buildout (2040) (Table 2-1)
B: Projected City Demand at Buildout (2040) (Table 3-4)

The projected City water demand for a normal year is not expected to exceed the City water supply after buildout.

See Table 4-2 for a comparison of City supply and demand for a multiple dry year scenario.

Table 4-2. City Supply and Demand Comparison – Multiple Dry Years at Buildout

	First Dry Year		Second Dry Year		Third Dry Year	
	Average Annual Demand (AFY)	Peak Daily Demand (MGD)	Average Annual Demand (AFY)	Peak Daily Demand (MGD)	Average Annual Demand (AFY)	Peak Daily Demand (MGD)
Projected City Supply [A]	23,329	20.83	23,296	19.90	22,390	19.99
Projected City Demand [B]	11,475	18.44	11,949	19.20	12,044	19.35
Supply minus Demand	11,854	2.39	10,347	0.70	10,346	0.63

NOTE:
A: Projected City Supply in Multiple Dry Years (Table 2-2)
B: Projected City Dry Year Demand with Development (Table 3-6)

The projected water supply for the City in dry years is sufficient for the projected water demand in a multiple year-drought, considering conservation measures and historical dry year demands.

5 CONCLUSIONS

The City water supply is currently comprised of the wholesale water supply from the Woodland Davis Clean Water Agency treatment facility and deep groundwater wells for a total supply capacity of 23.4 MGD in a normal year. If the City demand were to exceed this available water supply from these sources, the supplemental water can be supplied by the intermediate-depth groundwater wells as an emergency backup water resource.

The total water demand for the City, accounting for the Downtown Davis Specific Plan Project and the four planned developments analyzed in the 2015 Water Supply Assessment, is projected to be 22.25 MGD. It is estimated that the capacity of the City's available water supply without using the intermediate-depth groundwater wells is sufficient for the City demand at full buildout in a normal year. It is also estimated that the capacity of the City's non-emergency water supply in a multiple dry year-scenario is sufficient for the City's dry year demands. This estimation considers prescribed curtailments from the Sacramento River during dry years, as well as the impact of observed demand reductions from water conservation measures. The Project's demands are within the City of Davis' supply capacity.

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