Davis Woodland Water Supply
Design Build and Operate (DBO) Project

The Cities of Woodland and Davis California joined together to construct a new surface water treatment plant using a 15 year Design Build and Operate (DBO) agreement and public financing from State Revolving Fund (SRF) loans to reduce the lifecycle cost of the project.

Woodland and Davis, two neighboring California cities, have historically relied on groundwater as their primary drinking water source. Problems with the quality and the long-term quantity of regional groundwater sources required the cities to build a new surface water treatment facility. Faced with an ambitious regulatory deadline and a complicated multicomponent project design, the communities chose to join together to form a new regional utility, the Woodland-Davis Clean Water Agency (the Agency). The Agency's charge was to construct new raw water intake facilities, a large surface water treatment facility, and transmission lines connecting the facility to existing utility networks in the Cities of Woodland and Davis. After careful evaluation of different procurement options, the Agency entered into a Design Build Operate (DBO) agreement with CH2M HILL Companies, Ltd. (CH2M). One of the unique aspects of this DBO project was that state law allowed it to take advantage of low cost public financing in the form of State Revolving Fund (SRF) loans.

Table 1. Key Project Details

Project Title:	Davis Woodland Water Supply Project
Primary Facility/Service:	Surface water treatment plant (30 million gallons per day), raw water pipeline, treated water transmission lines to City of Woodland and City of Davis distribution systems
Local Government Entity:	Woodland-Davis Clean Water Agency (A Joint Powers Authority created by Cities of Davis and Woodland, University of California Davis, and Yolo County)
Primary Partner:	CH2M Hill
Primary Advisor:	West Yost Associates
Delivery Model:	Design Build and Operate agreement (DBO)
Contract Period:	15 years with 5 year renewal option
Population Served:	Approximately 2/3rds of Yolo County, CA (roughly 140,000 people)
Major Initial Outlays:	$141,152,772 for Design Build portion of the DBO agreement
Flow of Revenues:	Davis and Woodland remain the primary retail water service providers and control rate setting for their respective communities. The cities use revenue from water sales to make payments to the Agency, which in turn is responsible for paying facility debt service and DBO agreement fees.

Background

In the past, the Cities of Woodland and Davis have relied completely on groundwater for drinking water; however, over time, groundwater quality has declined. For 40 years, from the 1950s through the 1980s, the region tapped into the intermediate portion of the groundwater basin to meet water needs. Since then, new water quality requirements at both the state and federal level, as well as the deterioration of existing wells, made it necessary for Davis and the University of California – Davis to construct deeper wells, some up to 2,000 feet below ground.[1]

By tapping into the surface waters of the Sacramento River, the Cities of Woodland and Davis hoped to replace depleted groundwater resources with a safer and more reliable water supply.[2] In addition, the cities faced regulatory pressure to improve the quality of their wastewater discharges. In March of 2010, under the cities' National Pollutant Discharge Elimination System (NPDES) permits, the Central Valley Regional Water Quality Control Board issued a ruling requiring the cities to improve their wastewater discharge and gain compliance by late 2015 (Davis) and 2016 (Woodland).[3] The source water switch avoided trace contaminants (Selenium) and high levels of salinity found in their groundwater source, thus resulting in improved wastewater discharge.

In order to access Sacramento River surface waters, the Agency had to acquire water rights, engage partners in planning (including a reclamation district interested in improving fish habitat), finance a shared raw water intake, and install raw water transmission lines and treated water lines. Ultimately, providing water customers in the region with access to treated surface water required a number of integrated projects. This project profile focuses on the part of the overall water supply development that was delivered through a Design Build and Operate agreement.

Project Development and Procurement

[1] *Davis-Woodland Water Supply Project Community Profile: Sustainable Economical Drinking Water Solutions*. Woodland-Davis Clean Water Agency. December 2007. http://www.wdcwa.com/images/uploadsdoc/Atch5DWWSPCommunityReportDec07.pdf

[2] *Woodland-Davis Clean Water Agency Website*. http://www.wdcwa.com/

[3] *Briefing Notes CWSRF Financing for the Davis-Woodland Water Supply/Water Quality Improvement Project.* California State Water Resources Control Board. March 18, 2014.

Due to its complexity and scope, the project required significant staff support, as well as outside legal and engineering consultant services. The Agency engaged West Yost Associates, an engineering firm that had worked extensively with Woodland and Davis in the past, to lead project management and procurement oversight efforts. The firm analyzed potential project delivery mechanisms, carried out preliminary design activities, and prepared a project financial analysis. The Agency also engaged Municipal Finance Services, Inc. to analyze financing options for the project. The consultants worked closely through all phases of procurement with a specially created advisory team (the "Facilities Procurement Committee") that included staff from the cities and several representatives of the Agency's consultants.[4] A technical memo sent to the Agency in October of 2010 summarized the results of a detailed analysis of procurement options, including looking at traditional methods (Design Bid Build) and using a Design Build (DB) contract and separate operations contract. The memo concluded by recommending that the Agency proceed with an integrated Design Build and Operate (DBO) procurement model.[5]

The process to select a private partner took approximately 3 years. The Facilities Procurement Committee oversaw every step of the process; the committee was responsible for making recommendations to the Agency General Manager, who would in turn make recommendations to the Agency Board.

The Agency issued a Request for Qualifications in January of 2011 and eventually invited three firms to submit proposals. The Agency then issued a draft Request for Proposals (RFP) for comment to potential bidders in October of 2011. After receiving comments, the Agency issued a revised RFP in December of 2012 that laid out the technical requirements as well as the financial structure of the envisioned DBO agreement. The final procurement involved two steps: initial submissions were due in February of 2013 and final detailed proposals were due in June of 2013.[6]

Two of the three invited firms submitted proposals (the third firm cited timing and workload issues as its reason for not participating). One of the two submitting teams withdrew after being notified that its Initial Concept Submittal (ICS) was not in compliance with the RFP.[7] Late in the procurement process (during the pricing phase), the Agency became concerned that the lack of multiple proposals might reduce competitive pricing pressure. To address this concern, the Agency lowered their not-to-exceed contract price cap an additional 10% from a cap that had already been set 10% lower than West Yost's project estimate under a traditional procurement model. According to the Agency's General Manager, this, along with the Agency's requirement that bidders maintain "open books" that included the entire bid pricing details which could be reviewed during the negotiation process, led to a very cost effective final price.[8]

Since the Agency was a new entity with few existing staff, the RFP did not include staff retention requirements that are common for projects involving expansion or upgrades. In the RFP, the Agency established requirements that respondents solicit local contractor interest in addition to submitting a local procurement and employment plan. The Agency also required that respondents provide these elements while still adhering to competitive pricing for the design, construction, and operation of the project.[9]

The choice of DBO as the project delivery method was not the focus of public concerns. However, there was significant public debate (particularly in Davis) over the more fundamental decision to proceed with the new water supply project and how to set user rates to pay for the project. In fact, Davis was required to hold a referendum on the project before it could officially proceed; in March of 2013, voters approved the project 54% to 46%.[10]

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[4] Dennis Diemer (General Manager, Woodland-Davis Clean Water Agency), phone correspondence with author. September 8, 2016.
[5] Yost, James and Gilbert, Jerry. *Technical Memorandum: Davis-Woodland Water Supply Project – Project Delivery Analysis and Recommendation*. West Yost Associates. October 19, 2010.
[6] *Request for Proposals for Davis Woodland Water Supply Project Design-Build-Operate.* Woodland-Davis Clean Water Agency. December 20, 2012.
[7] *Update on the Woodland-Davis Water Supply Project*. Woodland-Davis Clean Water Agency Presentation. June 20, 2013.
[8] Dennis Diemer (General Manager, Woodland-Davis Clean Water Agency), phone correspondence with author. June 16, 2016.
[9] *Davis Woodland Water Supply Project Procurement Documents – Addendum No.1*. Woodland-Davis Clean Water Agency. April 15, 2013. http://www.wdcwa.com/images/uploadsdoc/Addendum_No_1.pdf
[10] *Briefing Notes CWSRF Financing for the Davis-Woodland Water Supply/Water Quality Improvement Project.* California State Water Resources Control Board. March 18, 2014.

Even after the referendum passed, the City of Davis faced additional public challenges. In anticipation of the project cost, the City of Davis proposed a sizable rate increase (ultimately the project was predicted to triple the average household bill over a number of years) along with an innovative new rate structure that shifted how costs were apportioned among customers. California law provides voters with opportunities to challenge and ultimately reject rate increases. The combination of a new rate structure, magnified by the increased revenue needs, led a group of Davis citizens to form an organization that filed suit challenging the adopted rate structure. In June 2014, the citizen organization successfully led a referendum petition that overturned the new rates.[11] By August 2014, the City and those opposed to the new rate structure eventually came to an agreement over a simpler rate structure that would provide sufficient revenue for the project.

Timeline

Table 2. Project milestones

Date	Milestone
September 2009	The Cities of Woodland and Davis establish the Woodland-Davis Clean Water Agency to oversee the regional water supply project
January 2011	The Agency issues Request for Qualifications
April 2011	The Agency receives Statements of Qualifications and develops short list of three firms eligible to propose
October 2011	The Agency sends draft Request for Proposals to selected firms to solicit comments
December 2012	The Agency issues final Request for Proposals for DBO contract
June 2013	Agency receives final proposals
July 2013	CH2M submits priced proposal
August/September 2013	The Agency Board is authorized to proceed with negotiations
October 2013	The Agency awards DBO contract to CH2M; project design and permitting begin
October 2014	State Water Resources Control Board approves project financing agreement with the Agency
June 2016	Plant enters into service and begins to supply water to cities

[11] Ryan, Dave. *Voters say no to water rates, yes to sales tax hike.* The Davis Enterprise. June 4, 2014. http://www.davisenterprise.com/local-news/voters-say-no-to-water-rates-yes-to-sales-tax-hike/

Key Financial Features and Outcomes

DBO Initial Capital Payment

The agreement between the Agency and CH2M provides for separate payments for the design build portion of the contract and facility operation (see next section for discussion of annual service fee). The Agency agreed to pay a "Fixed Base Design Build Price" of $141,152,177 to CH2M that covers the design and building of the new treatment plant, new raw water transmission line, and new distribution lines to take water to Davis and Woodland.[12]

The agreement allocated certain construction and permitting risks to CH2M. As such, the Agency required CH2M to provide 10% of the financing for the project during construction in the form of a 10% holdback of each progress payment until construction was completed. Once completed, the Agency would pay the withheld amount to CH2M, thus satisfying CH2M's financing responsibilities under the agreement. Overall, most of the financing risk remained with the Agency as it remained responsible for 100% of the project funding requirement.[13] Table 3 below summarizes risk allocations throughout the project.

Over the course of project planning, project leaders considered several different sources of capital financing for the DBO agreement and other capital components of the overall water supply project. The initial project delivery analysis memo prepared by West Yost recommended using publically acquired financing in the form of revenue bonds and grants, if available, over the use of long-term privately acquired financing due to the anticipated higher interest rates.[14]

Ultimately, the Agency and its member cities were able to access State Revolving Fund (SRF) loans from the State Water Resources Control Board. The Water Resources Control Board authorized a $95.5 million Clean Water State Revolving Fund (CWSRF) loan for the City of Davis' shares of water project (30-year term; 1.7% interest rate). The City of Woodland was awarded a $111.4 million Safe Drinking Water State Revolving Fund loan for the regional project with an interest rate of 1.785% for a term of 20 years.[15] The loan proceeds were used for both the initial DBO payment as well as for other capital components of the overall project. Additionally both Woodland and Davis obtained separate additional SRF loans totaling $67 million to cover the costs of the local distribution system improvement projects needed by the communities to fully integrate the new surface water supply.

Incorporating SRF loans into DBO projects is uncommon, making their use one of the most unique aspects of this project. SRF managers across the country report a variety of difficulties in funding DBO projects, including capacity driven or state imposed limits on the size of individual loans they can make.[16] The Agency was able to use SRF funds only after a state law was changed to permit funding for this type of project.[17] The State was also able to issue CWSRF loans (which are reserved for wastewater facilities) for a drinking water project because the project design would reduce salt loads in wastewater discharges (in addition to lower salt levels in surface water, planners expected a reduction in customer point of use water softeners due to softer surface water).[18] The ability to access financing from the SRFs, which were not funded from bond proceeds, allowed the Cities of Woodland and Davis to secure below market rate

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[12] *Service Contract for the Design, Construction, and Operation of the Woodland-Davis Regional Water Treatment Facility and Related Facilities*. Woodland-Davis Clean Water Agency and CH2M-Hill. October 10, 2013.

[13] *Service Contract for the Design, Construction, and Operation of the Woodland-Davis Regional Water Treatment Facility and Related Facilities*. Woodland-Davis Clean Water Agency and CH2M-Hill. October 10, 2013.

[14] Yost, James and Gilbert, Jerry. *Technical Memorandum: Davis-Woodland Water Supply Project – Project Delivery Analysis and Recommendation*. West Yost Associates. October 19, 2010.

[15] *Woodland and Davis Receive Initial Installments of State Funding for Water Supply Project.* Woodland-Davis Clean Water Agency. February 16, 2015. http://www.wdcwa.com/images/uploadsdoc/WDCWA_MediaRelease_SRF__FundsReceived_21615.pdf

[16] Informal Poll of SRF Managers carried out by author. Annual State Revolving Fund Conference in Tampa, FL. November 2, 2015.

[17] Wolk, Lois. *State Water Board approves financing agreement with the Woodland-Davis Clean Water Agency.* http://sd03.senate.ca.gov/news/2014-10-21-state-water-board-approves-financing-agreement-woodland-davis-clean-water-agency

[18] *State Water Resources Control Board Resolution No. 2014-XX.* State Water Resources Control Board Resolution. March 18, 2014.

financing. They also avoided the higher financing costs associated with the public issuance of tax-exempt private activity bonds or – in the absence of a private activity bond volume cap allocation - taxable bonds.

Table 3. Project Risks for Public and Private Entities.[19]

Risk Category	Responsible Parties	Description
Permitting	Woodland-Davis Clean Water Agency	Responsible for initial environmental permits and providing "limited" permitting assistance
	CH2M	Responsible for obtaining all development and operating permits
Construction	Woodland-Davis Clean Water Agency	Responsible for significant penalties for delayed construction Responsible for any construction cost increases due to the use of SRF Responsible for sudden extreme price fluctuations in raw materials up to $500,000
	CH2M	Responsible for all aspects of integrated design and construction
Operations & Maintenance	Woodland-Davis Clean Water Agency	Major renewal and replacement (R&R) costs are paid from a ratepayer-funded repair and replacement fund. Operating costs due to changes in law may be added to agreement payments.
	CH2M	Responsible for most operational costs and capital costs under $25,000 with the exception of certain pass-through costs (e.g. chemical and electricity)
Revenue/Demand	Woodland-Davis Clean Water Agency	Responsible for paying operating fees that are largely fixed but which can be adjusted modestly on an annual basis
	CH2M	Guaranteed significant operating revenue even if demand for water from the facility is lower than anticipated
Finance/Debt	Woodland-Davis Clean Water Agency	Responsible for all long-term debt financing for the project
	CH2M	Responsible for financing of 10% of DBO price during construction period due to payment withholding requirement

DBO Operating Expenditures

[19] Yost, James and Gilbert, Jerry. *Technical Memorandum: Davis-Woodland Water Supply Project – Project Delivery Analysis and Recommendation*. West Yost Associates. October 19, 2010.

Under the agreement, operating and maintenance costs are paid through an annual service fee. The fee is comprised of a fixed base operating charge and a smaller variable component. The base operating charge depends on which of the four annual finished water demand levels the Agency elects prior to a given contract year. In other words, the Agency can forecast what its water needs will be and have some control over what it pays to CH2M. This fixed component is designed to cover most operating costs including labor, supplies, and some chemicals. The fixed component at the start of the agreement ranges from $2,850,552 for a demand level of 12 million gallons per day (MGD) to $3,626,869 for a demand level of 28.5 MGD. The relatively low variation in prices for very different demand levels shields CH2M from excessive revenue risk (see risks outlined in Table 3).

The variable component of the service fee is designed to cover the provided water in a given year that exceeds the pre-selected level. The variable component also includes several incentive payments, such as the right to a portion of electricity savings due to innovations by CH2M.[20] The Agency remains responsible for paying for electricity up to a guaranteed maximum electricity use.

Apart from the contractual service fee payment, CH2M will have access to a Repair and Replacement (R&R) account to cover major capital repairs and replacements which exceed $25,000 and which are approved by the Agency. The agreement requires the Agency to deposit $362,338 each year into the fund; this money will remain as the property of the Agency until an authorized expenditure occurs. Both the R&R payment and the base component of the annual service fee are modified each year through a cost inflation index system laid out in the agreement.

Nothing about this arrangement fundamentally changed the way rates are set by the Cities of Woodland and Davis. Woodland and Davis are responsible for all aspects of rate setting in their jurisdictions. This requires that rates take into consideration revenue requirements linked to the incurred debt and the operating charges for the new facilities.[21] See appendix A for a schematic of the financial flows associated with this project.

Financial Impact

Since the project proceeded with only one procurement option and there was ultimately only one final bidder, it is impossible to accurately quantify the financial impact of the decision to use the DBO method in relation to other options the Agency could have followed. However, the Agency and the Facilities Procurement Committee studied the results of DBO efforts across the country and incorporated the "anticipated savings" into their procurement process by setting ambitious not-to-exceed caps below the estimated cost of doing the project as a design bid build project. In the end, the price of the project met the price caps the Agency introduced.

Figure 1 shows a schematic prepared by the Agency that highlights what it believed to be the cost reductions that resulted from the implementation choices made during the overall water supply project, including the DBO agreement. (The DBO costs were also only one component of a larger project that included other investments.) In 2011, West Yost Associates estimated that the project would have cost $350 Million if it were built as it was originally conceived using a traditional design bid and build approach. The subsequent cost estimates shown in the figure take into account a combination of engineering changes and procurement decisions.

[20] *Service Contract for the Design, Construction, and Operation of the Woodland-Davis Regional Water Treatment Facility and Related Facilities*. Woodland-Davis Clean Water Agency and CH2M-Hill. October 10, 2013.

[21] *Amended and Restated Woodland-Davis Clean Water Agency Joint Powers Agreement.* Woodland-Davis Clean Water Agency. February 26, 2013.

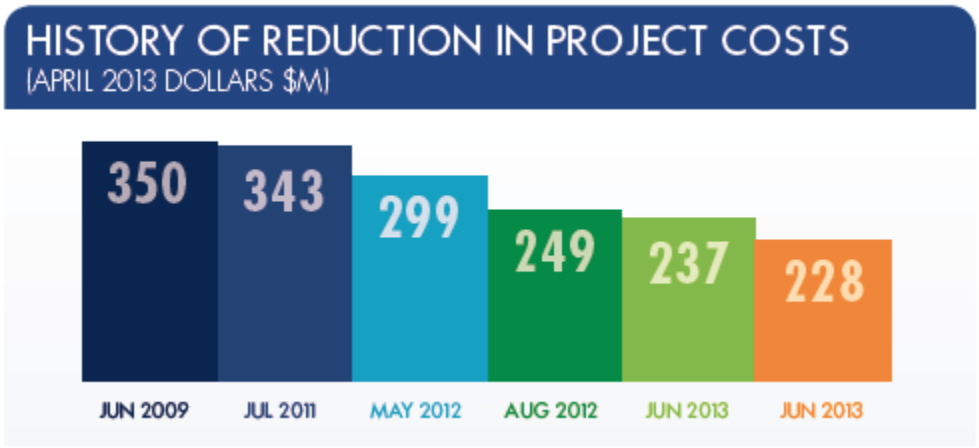

Figure 1. History of estimated reductions in project costs.[22]

The decrease in cost shown between July 2011 and May 2012 includes an assumed 10% reduction in estimated DBO portion of the capital costs attributed to the initial decision to use the DBO method. The decrease in cost between August 2012 and June 2013 includes a documented 10% reduction ($14.6 Million) due to a price cap set for the proposal bid that was required by the Agency in anticipation of there being only one final bidder.

The project began supplying water to the Cities of Woodland and Davis in June of 2016, three months earlier than the contractual project deadline that had already been set based on optimistic projections. The Agency General Manager estimates the DBO process shaved at least a year off the project schedule.[23]

[22] *History of Reduction in Project Costs*. Woodland-Davis Clean Water Agency. January 21, 2014. http://www.wdcwa.com/images/uploadsdoc/WDCWA_HistoryofProjectCostReductions_1_21_14.pdf

[23] Dennis Diemer (General Manager, Woodland-Davis Clean Water Agency), phone correspondence with author. June 16, 2016.

Appendix A. Simplified Project Financial Flows

Figure 2. Flow of Initial Project Outlays

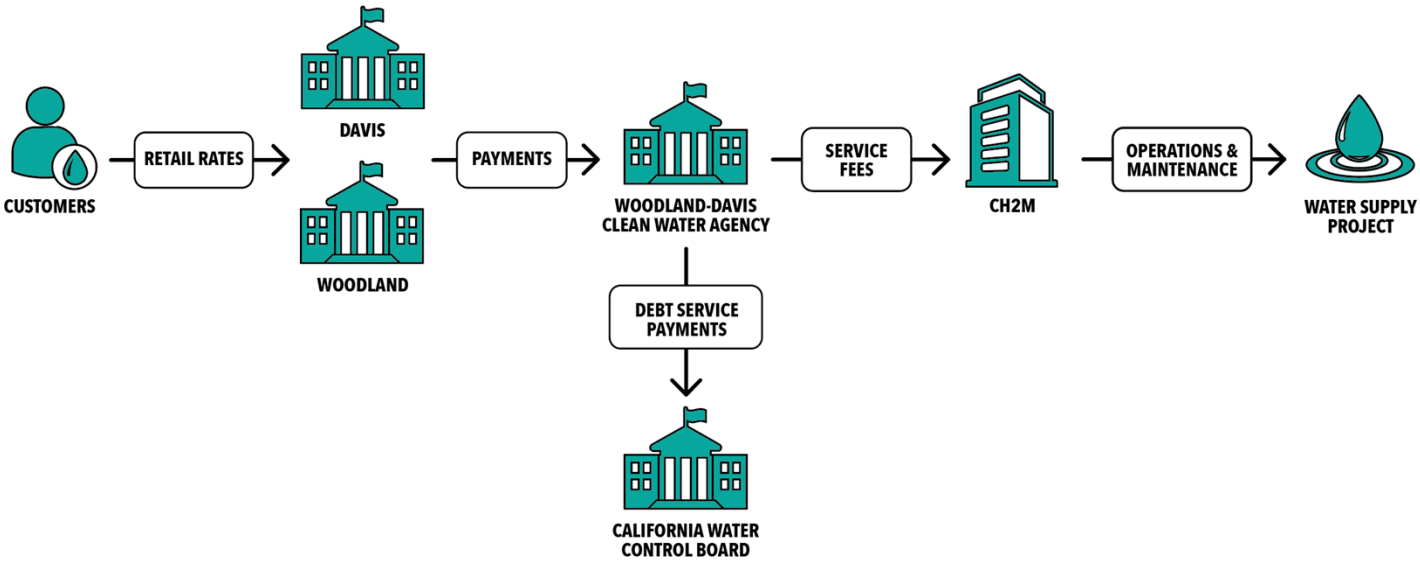

Figure 3. Recurring Financial Flows

Acknowledgements

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Cover photo: Aerial View of Davis Woodland Water Supply Facility Used with permission from: https://www.ucdavis.edu/news/preparing-campuss-new-water-supply

† Jeff Hughes is a member of the United States Environmental Protection Agency's Environmental Finance Advisory Board.

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