MONTEREY COUNTY WATER RESOURCES AGENCY

New Source Water Supply Study

Final Report / September 28, 2018

Monterey One Water
Providing Cooperative Water Solutions

RAFTELIS

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September 28, 2018

David Chardavoyne, General Manager
Monterey County Water Resources Agency
1441 Schilling Place
North Building
Salinas, CA 93901

Subject: New Source Waters Study Report

Dear Mr. Chardavoyne,

Raftelis Financial Consultants, Inc. is pleased to provide this New Source Waters Study Report (Study) for Monterey County Water Resources Agency (MCWRA) and Monterey One Water (M1W) to evaluate alternative source waters for use in the Castroville Seawater Intrusion Project (CSIP) and associated costs and impacts to existing agricultural users (Growers). In particular, this Study contains thorough details on the following:

1. Existing and future interagency agreements on water supply source and cost allocations.
2. Estimates of operating and maintenance (O&M) costs and capital costs of new source waters.
3. Scenario analyses integrating new source waters with existing recycled water sources.
4. Additional long-term cost considerations effecting recycled water distribution.

It has been a pleasure working with you and we thank you, David Chardavoyne, as well as MCWRA and M1W staff for the support provided during the course of this Study.

Sincerely,
Raftelis Financial Consultants, Inc.

Habib Isaac
Senior Manager

Kevin Kostiuk
Senior Consultant

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1. EXECUTIVE SUMMARY

1.1 STUDY BACKGROUND

The Monterey County Water Resources Agency (MCWRA) and Monterey One Water (M1W), formerly known as Monterey Regional Water Pollution Control Agency (PCA), entered into an Amended and Restated Water Recycling Agreement (Restated Agreement), which included consideration of the financing, design, construction, operation, maintenance, and replacement of New Source Water Facilities to provide approximately 4,381 acre-feet per year (AFY) of additional recycled water to MCWRA for use in the existing Castroville Seawater Intrusion Project (CSIP), a coastal irrigation project[1]. In addition, M1W would be provided approximately 4,320 AFY of new source water to supplement the Pure Water Monterey Groundwater Replenishment Project which has been developed to provide drinking water. Based on the Restated Agreement, there are certain conditions related to the use of New Source Waters, which are further explained in Chapter 4.

MCWRA currently obtains water from three sources: recycled wastewater from the Salinas Valley Reclamation Project (SVRP) (which has included agricultural wash water since 2015), surface water from the Salinas River Diversion Facility (SRDF), and water from CSIP supplemental groundwater wells as shown in Table 1-1. The objective of obtaining new source waters is to reduce the use of water from CSIP groundwater wells ("supplemental wells"). Per the Restated Agreement, the new source waters consist in total of the following:

- Agricultural Wash Water (referred to hereafter as Industrial Wash Water (IWW)[2] and currently being utilized)
- Blanco Drain
- Reclamation Ditch
- Tembladero Slough
- Monterey Storm Water
- Salinas Storm Water

[1] Total estimated new source water of 8,701 AFY split 50.3 percent to MCWRA and 49.7 percent to MRWPCA/M1W. Annual allocation of 4,320 AFY to M1W shall have first priority and the estimated remainder of 4,381 AFY to WRA.

[2] Per the Produce Wash Water Utilization Agreement Extension, April 1, 2015 and section 4.02 of the Restated Agreement

Table 1-1: Existing and New Source Water Summary

Source Water	Supply (AF)	Funding Source	Comments	Fiscal Impact
Existing				
Treated WW (Recycled) *Includes 1,423 AF IWW	13,186	Assessments	Funding is constant through Assessments	N/A
SRDF	Varies (Wet, Avg, Dry)	Utility Charge ($67.82)	High Quality; preferred water source by growers	Reduces need for wells and associated costs
Supplemental Wells	Varies	Assessments Cover (1,858 AF)	High Cost	Covers remaining demand
New Source Water				
Blanco Drain	Varies	Portion of Capital covered by grant	Part of Analysis	Case Study
Reclamation Ditch	Varies	Portion of Capital covered by grant	Part of Analysis	Case Study
Ag Wash Water (IWW)	Varies	Portion paid by City of Salinas[2]	Part of Analysis	Case Study
Tembladero Slough	-	-	Not Part of Analysis	
Monterey Storm Water	-	-	Not Part of Analysis	-
Salinas Storm Water	-	-	Not Part of Analysis	-

In 2017, MCWRA and M1W contracted with Raftelis Financial Consultants, Inc. (Raftelis) to conduct a New Source Waters Study (Study). The purpose of the Study, and this report, is to provide a cost analysis for the operation, maintenance, and capital costs for New Source Water Facilities to determine specific rates and charges for final consideration. Through discussions with MCWRA the new source waters evaluated in this Study were narrowed to Blanco Drain and Reclamation Ditch, including existing source waters of treated wastewater, supplemental wells and IWW. The Salinas Pond Water Return Facilities will be considered independently and are discussed in Section 9 of this report.

This report includes capital, operations, maintenance, and repair and replacement costs associated with developing New Source Water Facilities and provides incremental costs for CSIP operations under four different scenarios developed by MCWRA and M1W based on climate conditions and water rights for each water supply.

1.2 STUDY OBJECTIVES

The major objectives of the Study include the following:

1. Identify currently estimated operational costs of existing water sources.
2. Review how historical demand has been accommodated by available source waters, including treated recycled water, Salinas River Diversion Facility (SRDF) surface water, and groundwater from supplemental wells.
3. Determine the operational costs of new source waters.
4. Review and confirm capital costs of new source waters.
5. Calculate the marginal cost of new source waters above existing customers (growers) charges (Utility Charges).

6. Evaluate various water supply blend scenarios to meet demand during a year with low rainfall (dry year), average rainfall (normal year), high rainfall (wet year), and low rainfall (dry year) with separate water rights compared to the historical baseline (base case).
7. Derive the change in utility rates for each scenario while identifying the change in groundwater pumping to pursue the future sustainability goal of the basin.
8. Determine appropriate funding levels for both capital costs and operational costs associated with New Source Waters, which may require different funding mechanisms based on type of improvements and benefits conferred.

2. EXISTING GROWER DEMAND

For the four (4) scenarios and comparisons identified in Section 7 of this Report, the total water demand for each scenario is 20,866 based on the more recent ten-year average (2008-2017) and Table 2-1: Existing Source Water provides historical average over the last ten-years.
The water supplies include 13,186 acre-feet (AF) of treated recycled water, 1,423 AF of IWW, 1,866 AF of water from the SRDF, with the remaining demand covered by 5,814 AF from supplemental wells, as shown in Table 2-1.

Table 2-1: Existing Source Water

Source Water	Supply (AF)
Treated WW (Recycled)	11,763
IWW	1,423
SRDF	1,866
Supplemental Wells	5,814
Total	**20,866**

The 2015 and 2017 coastal Salinas Valley seawater intrusion contours continue to show the advancement of seawater intrusion into the Salinas Valley groundwater basin. As a result, recommendations were developed by MCWRA staff, to slow further seawater intrusion. These recommendations have led to County Ordinances 5302 and 18-008 prohibiting new wells in a defined "Area of Impact" where seawater intrusion is evident and in deep aquifers in the Salinas Valley Groundwater Basin. Exceptions to these ordinances include wells for municipal drinking water supply, wells operating under CSIP, and monitoring wells owned by MCWRA or other water management agencies. In addition, an investigation to determine the long-term viability of the deep aquifers has been suggested for water resource planning and decision-making purposes.

Due to the intrusion of seawater into the groundwater basin, new water sources are an option to reduce the use of water from CSIP's supplemental wells.

3. NEW SOURCE WATERS FROM AMENDED AND RESTATED RECYCLED WATER AGREEMENT

As specified in Section 1, the Restated Agreement identifies several new sources of water. The three sources included in this Study are:

- Agricultural Wash Water (IWW) – currently 1,432 AFY being utilized
- Blanco Drain
- Reclamation Ditch

Based on the Request for Proposals (RFP) sent by MCWRA, the Blanco Drain and Reclamation Ditch were selected as the new sources of water for evaluation. In addition, modifications to the existing SVRP Facilities will allow for year-round use of treated recycled water when it is required. This is important and beneficial during years with below average rainfall. Accordingly, in this report, all costs associated with the modification of this facility are spread over the current amount of treated recycled water supply (13,186 AFY).

It is expected that these new sources will reduce the amount of water supplied by CSIP supplemental wells.

Brief descriptions for the new source waters in this analysis are provided below. For more detailed descriptions of each source please see the Technical Memorandum: *Cost Analysis of New Source Water Projects* by West Yost Associates (West Yost Technical Memo).

Salinas Valley Reclamation Project Winter Modifications: include costs of two 30-inch motorized sluice gates at the chlorine contact basins, one 72-inch motorized sluice gate at the storage pond, pipe connections to structure, and 860 feet of 30-inch pipeline crossing the existing pond from the inlet to the outlet.

Blanco Drain: 2,738 gallons per minute (gpm) pump station, 7,700 feet of 18-inch diameter pipe, and intake screen/wet well.

Reclamation Ditch: 2,693 gpm pump station and 43 ft of 6-inch and 12-inch diameter discharge pipe.

The costs of constructing the facilities required to produce water from each of the new sources are provided in the Restated Agreement and are summarized in Table 3-1. The values in this table reflect design and construction estimates from 2015.

Table 3-1: Summary of New Source Water Capital Costs – Restated Agreement

Source Water	MCWRA	M1W	Total
Blanco Drain Water	$2,300,000	$2,700,000	**$5,000,000**
Reclamation Ditch	$500,000	$600,000	**$1,100,000**
Salinas Pond Water Return Facilities	$1,300,000	$1,500,000	**$2,800,000**
Modifications to Regional Treatment Facility	$600,000	$700,000	**$1,300,000**
TOTAL	**$4,700,000**	**$5,500000**	**$10,200,000**

As part of the Study, Raftelis updated and confirmed capital costs for the new source water facilities. Values were estimated with a combination of contractor bids, State Revolving Fund (SRF) loan documents, and costs provided by MCWRA and M1W. Revised capital costs are presented in Table 3-2. Note Salinas Pond is excluded from the total as the source is not included in the CSIP scenarios evaluated. Salinas Pond costs are discussed in Section 9.

Blanco Drain is estimated at $8,852,000 per the Final Budget Approved Form of the SRF signed July 21, 2017. Reclamation Ditch is estimated at $2,695,861 based upon construction budget documents. Modifications to the Salinas Valley Reclamation Project (SVRP) for winter operations are estimated at $1,493,000 from West Yost Associates opinion of probable construction costs. The treatment plant modifications support existing recycled water production and are included in the costs to produce recycled/IWW water. Total capital costs, without any grant funding, are estimated at $13,040,861 Capital costs are distributed between the two agencies based on the capital cost allocation from the Restated Agreement of 45.1 percent to MCWRA and 54.9 percent to M1W.

Table 3-2: Summary of New Source Water Capital Costs - Updated

Source Water	MCWRA	M1W	Total
Blanco Drain	$3,992,252	$4,859,748	$8,852,000
Reclamation Ditch	$1,215,833	$1,480,028	$2,695,861
Modifications to Regional Treatment Facility	$673,343	$819,657	$1,493,000
TOTAL	**$5,881,428**	**$7,159,433**	**$13,040,861**

Table 3-3 provides a detail of the three new source water capital costs. For additional detail please see the West Yost Technical Memo.

Table 3-3: New Source Water Capital Costs Detail

Cost Component	Blanco Drain	Reclamation Ditch	SVRP Winter Modifications
Construction Contract	$5,891,900	$1,445,850	$1,194,000
Land Purchase	125,000	86,000	25% Allowance[3]
Planning	17,091	0	
Design	748,638	257,974	
Contingencies	688,344	167,433	
Construction Management	642,981	156,399	
Administration	738,046	582,205	
Total Capital Project Cost	**$8,852,000**	**$2,695,861**	**$1,493,000**

[3] An allowance of 25 percent for design, construction management, project administration, and environmental review costs (Footnote 3 no environmental review needed for SVRP modifications, PWM EIR included these modifications) was added, representing a relatively low amount for these other project costs based on the nature of the work and the amount of design already completed.

4. COST SHARING

The Monterey County Water Resources Agency (MCWRA) and Monterey One Water (M1W), formerly known as Monterey Regional Water Pollution Control Agency (PCA), entered into an Amended and Restated Water Recycling Agreement (Restated Agreement), which included consideration of the financing, design, construction, operation, maintenance, and replacement of New Source Water Facilities to provide approximately 4,381 acre-feet per year (AFY) of additional recycled water to MCWRA[4] for use in the existing Castroville Seawater Intrusion Project (CSIP), a coastal irrigation project. In addition, M1W would be provided approximately 4,320 AFY of new source water to supplement the Pure Water Monterey Groundwater Replenishment Project which has been developed to provide drinking water. Based on the Restated Agreement, there are certain conditions related to the use of New Source Waters that need to be met prior to their use:

16.15 Conditions Precedent for New Source Water Facilities

The portions of this Water Recycling Agreement applicable to the New Source Water Facilities shall not become effective until the following conditions are met:

1. Water Rights for the Blanco Drain and Reclamation Ditch are obtained from the California State Water Resources Control Board; and
2. A fully executed, and California Public Utilities Commission approved, Water Purchase Agreement, between PCA, Monterey Peninsula Water Management District, and California American Water is approved by the California Public Utilities Commission and executed by the parties thereto; and
3. Written findings are made by the Regional Water Quality Control Board that utilization of the Blanco Drain dry weather flows as New Source Water meets all treatment requirements for the aforesaid dry weather flows; and
4. An independent third-party review of proposed capital and operating costs and preparation of an Engineer's Report is approved by the WRA Board of Directors and Board of Supervisors. The costs of the aforesaid third-party review shall be shared equally between WRA and PCA; and
5. A successful assessment or Proposition 218 process for rates and charges related to the operation and maintenance of the New Source Water Facilities and proportional primary and secondary treatment charges; and
6. Inclusion of Salinas Pond Water Return Facilities as New Source Water Facilities requires execution of a separate agreement between the Parties.

The Restated Agreement also allows for an alternative approach to allocating the New Source Waters if certain conditions precedent cannot be met. In summary, M1W will have the right to use the full allocation of Blanco Drain and Reclamation Ditch waters and be responsible for all associated costs of that water. MCWRA will retain the right to use all IWW. If this latter option is chosen, then a new agreement specific to New Source Waters would need to be in place before proceeding. The relevant section of the Restated Agreement is stated below:

[4] Total estimated new source water of 8,701 AFY split 50.3 percent to MCWRA and 49.7 percent to MRWPCA/M1W. Annual allocation of 4,320 AFY to M1W shall have first priority and the estimated remainder of 4,381 AFY to WRA.

16.16 Use of New Source Water

If Conditions Precedent in Section 16.15 (1) and 16.15 (2) are met, but Conditions Precedent in Section 16.15 (3) and/or Section 16.15 (4) and/or Section 16.15 (5) are not met:

1. WRA will allow use by PCA of its water rights of 6,500 acre-ft entitlement from Application Nos. 32263A, 322638, and 32263C. PCA will pay WRA the cost of obtaining and maintaining those water rights.
2. WRA will retain rights to utilize Agricultural Wash Water from the City of Salinas.
3. WRA and PCA will incorporate the provisions of this Section 16.16 in a separate agreement should Section 16.16 become operable.

Table 4-1 summarizes the cost sharing of the existing and new source water supplies. The operations and maintenance (O&M) costs of primary and secondary treatment of domestic wastewater (W/W) are provided by the M1W ratepayers. The costs for the industrial wash water (IWW) are provided by the city of Salinas. MCWRA is responsible for the operations and maintenance costs for tertiary treatment of domestic wastewater and IWW. Water from CSIP supplemental wells are of high enough water quality to not require treatment. Surface water from the SRDF requires screening and chlorine disinfection. Since the facilities for the treatment and production of the existing water supply are already built, there are no associated capital costs.

MCWRA and M1W will share the O&M costs to provide primary and secondary treatment of water from the Blanco Drain and Reclamation Ditch. However, MCWRA will be solely responsible for the O&M costs associated with tertiary treatment of the new source waters based on the amount of water taken for use. MCWRA's share of the capital costs of building the new source water facilities is 45.1 percent (45.1%), while M1W is responsible for the remaining 54.9 percent (54.9%). It should be noted that the capital cost for the new source water supplies to MCWRA are fixed regardless of usage. In other words, even in years when water is not required or available from the Blanco Drain or Reclamation Ditch, repayments for capital facilities will still be incurred.

Table 4-1: Cost Sharing Summary

Water Supply	Primary/Secondary	Tertiary	Capital Cost
Domestic W/W	Member Agencies	MCWRA	Built
Wells	-	-	Built
SRDF	-	-	Built
Ag Wash (IWW)	Salinas	MCWRA	Built
Blanco Drain	MCWRA/M1W	MCWRA	MCWRA – 45.1% M1W – 54.9%
Reclamation Ditch	MCWRA/M1W	MCWRA	MCWRA – 45.1% M1W – 54.9%
Modifications to Regional Treatment Facility	-	-	MCWRA – 45.1% M1W – 54.9%

5. OPERATIONS & MAINTENANCE COSTS

O&M costs consist of costs related to different phases of treatment, energy, replacement repairs, and general operations. Raftelis has derived unit costs related to variable O&M costs as well as the portion of fixed annual O&M costs for new source waters and existing water sources. This section details those calculations including primary/secondary treatment, tertiary treatment, pumping/energy, other variable O&M, and fixed O&M.

5.1 PRIMARY/SECONDARY TREATMENT O&M– NEW SOURCE WATERS

Primary and Secondary costs are modified calculations derived from MRWPCA (M1W) Interruptible Service Rates prepared by Bartle Wells Associates. Table 5-1 shows the estimated flow and strength by source. The three parameters are wastewater flow (flow), biochemical oxygen demand (BOD), and total suspended solids (TSS). Flow and strength loadings are given values with flow expressed in million gallons per day (mgd) and strength (BOD and TSS) expressed in milligrams per liter (mg/L).

Table 5-1: O&M – Flow and Strength, by Source

Estimated Flow & Loadings	Flow (mgd)	BOD (mg/L)	TSS (mg/L)	Evaluated
Ag Wash Water (IWW)	3.332	**735**	**282**	Yes
Blanco Drain	2.339	**0**	**48**	Yes
Reclamation Ditch	1.359	**8**	**55**	Yes
Pond Water	0.271	14	38	No
Tembladero Slough	0.001	7	150	No
SW Salinas Storm Water	0.201	9	24.5	No
Lake Estero	0.001	14	18	No
Total	**7.504**	**787**	**615.5**	

Table 5-2 shows strength weighting by new sources evaluated in this Study. The BOD and TSS weighting are the percentage of the evaluated new sources relative to the sum of all new source waters, of which several were not selected and, therefore, are not included in this analysis[5].

Table 5-2: O&M –Strength Weightings, by Evaluated New Sources

Estimated Flow & Loadings	BOD Weighting (Evaluated/Total)	TSS Weighting (Evaluated/Total)
New Source Water		
Ag Wash Water (IWW) **Blanco Drain** **Reclamation Ditch**	94% (743/787)	63% (385/615.5)

Table 5-3: O&M –New Source Water BOD and TSS Percent Allocationshows the percent of BOD and TSS relative to the sum of all evaluated new sources. This table also shows the percentage of the sum of all evaluated new sources relative to all new sources listed in Table 5-1.

[5] Additional new source waters evaluated as part of the Bartle Wells Interruptible Rates Study include Pond Water, Tembladero Slough, Salinas Storm Water, and Lake El Estero in addition to the three new sources included in this report as shown in Table 5-1

Table 5-3: O&M –New Source Water BOD and TSS Percent Allocation

Estimated Flow & Loadings	BOD (mg/L)	% of New Source BOD	% of Total BOD	TSS (mg/L)	% of New Source TSS	% of Total TSS
Ag Wash Water (IWW)	735	98.9%	93.39%	282	73.2%	45.82%
Blanco Drain	0	0.0%	0.00%	48	12.5%	7.80%
Reclamation Ditch	8	1.1%	1.02%	55	14.3%	8.94%
Total	**743**	**100%**		**385**	**100%**	

Table 5-4 details the unit costs of treatment for the three parameters**.** Overhead costs are removed from the calculations to isolate direct treatment costs only. Maintenance costs are not considered as updated maintenance costs were derived by West Yost through their review on costs of the new source waters**.** Flow and strength loadings are given values from the Bartle Wells report.

Table 5-4: Flow and Strength Parameters Unit Cost Calculations

	Chemical	Power	Repair	Sludge	Total
Expenses w/ Overhead	$1,166,200	$1,636,600	$315,630	$982,203	$4,100,633
Less Overhead	(168,595)	(236,600)	(45,630)	(141,995)	(592,820)
Expenses w/out Overhead	$997,605	$1,400,000	$270,000	$840,208	**$3,507,813**
	Flow	**BOD**	**TSS**		**Total**
Expense Cost Allocation	$1,400,000	$997,605	$1,110,208		$3,507,813
Flow & Loadings	17 mgd	420 mg/L	398 mg/L		
Rate per Unit	**$82,352**	**$139.47**	**$163.80**		

Table 5-5 shows the calculation to derive the weighted unit costs for BOD and TSS. The unit costs from Table 5-4 are multiplied by the final BOD and TSS percent allocations.

Table 5-5: O&M – Flow and Strength Parameters Unit Cost Calculations, Weighted

	BOD % Allocation	TSS % Allocation	Weighted BOD Unit Cost	Weighted TSS Unit Cost
Ag Wash Water	93.39%	45.82%	$130.26	$75.05
Blanco Drain	0.00%	7.80%	$0.00	$12.77
Rec. Ditch	1.02%	8.94%	$1.42	$14.64

Table 5-6 derives the cost of each source in dollars per AF. Flow is derived by multiplying the flow in Table 5-1 by the unit cost of flow in Table 5-4. BOD and TSS are calculated by multiplying the weighted unit cost in Table 5-5 by the flow and the strength in Table 5-1 for each source. The sum of each source ("Total" column in Table 5-6) is divided by the daily flow and number of days in the year

to derive the unit cost in $/mgd. The value is then converted from a unit of flow per time into a unit of volume, expressed as $/AF. The primary and secondary treatment costs for Blanco Drain and Reclamation Ditch are estimated at $73.94 per AF and $74.12 AF, respectively. Ag Wash Water (IWW) primary and secondary costs are currently paid for by the City of Salinas and are not included in the new source O&M.

Table 5-6: O&M – Primary/Secondary Treatment Calculations

New Source	$/mgd flow	BOD ($)	TSS ($)	Maint. ($)	Total ($)	Unit Cost ($/mgd)	Unit Cost ($/AF)
Ag Wash Water	$273,917	$319,007	$70,515	$5,911	$669,349	$550.37	$179.34
Blanco Drain	$192,284	$0	$1,434		$193,718	$226.91	$73.94
Rec. Ditch	$111,720	$15	$1,094		$112,830	$227.46	$74.12
Total	**$577,921**	**$319,022**	**$73,043**	**$5,911**	**$975,897**		

5.2 TERTIARY TREATMENT O&M – NEW SOURCE WATERS

All tertiary treatment costs are paid for by MCWRA. Tertiary treatment costs for existing recycled water production as well as new source waters are estimated by MCWRA at $65.74 AF based on Fiscal Year 2016-2017 actuals.

Table 5-7: O&M Tertiary Treatment

New Source	Unit Cost ($/AF)
Ag Wash Water	$65.74
Blanco Drain	$65.74
Rec. Ditch	$65.74

5.3 OTHER VARIABLE O&M

In addition to treatment costs, new source waters production will incur additional variable O&M related to electrical costs of pumping. West Yost estimated variable O&M costs for Blanco Drain and Reclamation Ditch using presumed capital equipment and assumptions on energy costs at $0.15/kilowatt-hour (kW-hr). Blanco Drain variable O&M is estimated at $41.28 per AF and Reclamation Ditch is estimated at $11.69 per AF. For additional detail on these estimates please refer to the West Yost Technical Memo.

For existing sources of supply, there are no treatment costs associated with water from CSIP supplemental wells. The treatment costs for water from the SRDF include chlorine. Additionally, MCWRA is responsible for the operation and maintenance costs of these sources (e.g. costs related to pumping) totaling $102.42 per AF for the supplemental wells and $50.00 per AF for the SRDF. These costs were estimated based on historical incurred costs and provided by MCWRA staff. Table 5-8 summarizes the variable O&M for each source in the analysis.

Table 5-8: Other Variable O&M

O&M & Treatment Costs	Variable O&M ($/AF)
Supplemental Wells	$102.42
SRDF	$50.00
Blanco Drain	$41.28
Reclamation Ditch	$11.69

5.4 TOTAL VARIABLE O&M

Table 5-9 aggregates the variable O&M components for primary/secondary treatment, tertiary treatment, and pumping/other variable O&M. The summation of the components represents the variable O&M cost per AF for each source.

As previously discussed, MCWRA will be responsible for the incremental operations and maintenance costs for primary, secondary, and tertiary treatment of their share of water from the new sources, excluding agricultural wash water, in addition to operations and maintenance costs associated with operating the new source water supplies. The total operations and maintenance costs for the Blanco Drain and Reclamation Ditch are $180.96 and $151.55 per acre-foot, respectively and is shown in Table 5-9.

Table 5-9: O&M and Treatment Cost Summary

Source	Primary/ Secondary	Tertiary	Pumping/ Other O&M	Total O&M ($/AF)
Wells	-	-	$102.42	**$102.42**
SRDF	-	-	$50.00	**$50.00**
Treated RW (includes 1,423 AFY IWW)	-	$65.74	-	**$65.74**
Blanco Drain	$73.94	$65.74	$41.28	**$180.96**
Reclamation Ditch	$74.12	$65.74	$11.69	**$151.55**

5.5 FIXED O&M COSTS (MAINTENANCE)

In addition to the variable O&M calculated in the preceding section, new source waters will include a fixed O&M cost, irrespective of production volumes. These costs include direct maintenance labor, parts, tools, and supplies associated with routine maintenance and repair of equipment. Replacement costs were also considered using a useful life of 75-years for pipelines and structures, 25-years useful life for equipment, and a discount rate of 1% reflecting rate of investment equal to the interest rate of the SRF loans. Table 5-10: Annualized Replacement Costs

Table 5-10: Annualized Replacement Costs

Equipment	Capital Original Costs	Escalated to Sept. 2018	Replacement Cost less land and planning	Annual Net Present Value (@ 1.0 %)
Blanco Drain Pipeline	$2.963M	$3.103M	$2.761M	$24,893
Blanco Drain Structure	$3.783M	$3.962M	$3.898M	$35,145
Blanco Drain Equipment	$2.106M	$2.205M	$2.156M	$76,337
Blanco Drain Total	-	-	-	**$136,375**
Reclamation Ditch Structure	$1,503M	$1.574M	$1.523M	$13,732
Reclamation Ditch Equipment	$1.193M	$1.250M	$1.209M	$42,807
Reclamation Ditch Total				**$56,539**
Regional Plant Modification[6]	$1.493M	N/A	N/A	N/A

Blanco Drain: Labor is estimated at a blended rate of $100 per hour, fully burdened. Staff time is estimated at two members, four hours per trip, for a total of eight hours per month for pump station facilities. Parts, tools, and supplies for these activities are estimated at $5,000 per year. Maintenance and inspection of pipelines is assumed at 4,000 linear feet per day by a staff of two and estimated at $12,000 per year (120 hours of labor). A small additional cost for electrical loading is estimated at $600 per year. Total annual maintenance O&M is estimated at $17,600.

Reclamation Ditch: Labor is estimated at a blended rate of $100 per hour, fully burdened. Staff time is estimated at two members, four hours per trip, for a total of eight hours per month for pump station facilities. Parts, tools, and supplies for these activities are estimated at $5,000 per year. Maintenance is assumed to be performed by a staff of two, four hours per day, eight hours per month, for a total of $9,600 per year (96 hours of labor). A small additional cost for electrical loading is estimated at $300 per year. Total annual maintenance O&M is estimated at $14,900.

Table 5-11 summarizes the fixed O&M costs for routine maintenance of new source water facilities.

Table 5-11: Fixed O&M

	Blanco Drain	Reclamation Ditch
Routine Maintenance	$12,000	$9,600
Supplies and Materials	$5,000	$5,000
Additional Electrical Loading	$600	$300
Total Fixed O&M	**$17,600**	**$14,900**

[6] Annual replacement cost for Regional Plant Modification is assumed to be covered in the overall treatment plant existing cost recovery through rates, fees, and assessments,

6. NEW SOURCE CAPITAL COSTS

As previously discussed in Section 3, the Restated Agreement provides capital costs from 2015 for the design and construction of new source water facilities. Table 6-1 displays the new source water capital costs as of 2017. Recall capital costs are split 45.1 percent to MCWRA and 54.9 percent to M1W.

Table 6-1: New Source Water Original Capital Cost Summary

Source Water	Capital (MCWRA/M1W)
Blanco Drain	$5,000,000
Reclamation Ditch	$1,100,000
Modification to Plant	$1,300,000
Total	**$7,400,000**

Between the signing of the Restated Agreement and the commencement of this Study, the capital costs for new source waters were updated to reflect the probable costs of construction from bids received through the review of West Yost. The updated cost for construction of the Blanco Drain, Reclamation Ditch, and the modification to the treatment plant are $8,852,000, $2,695,861, and $1,493,000, respectively. These updated costs are confirmed by the Final Approved Budget for the SRF loan application for Blanco Drain and Reclamation Ditch as well as probable construction costs calculations by West Yost Associates for treatment plant modifications. Updated new source water capital costs are summarized in Table 6-2.

The changes represent a significant increase of $3.852 million for the Blanco Drain, $1.596 million for the Reclamation Ditch, and $193,000 for the treatment plant modification.

Table 6-2: New Source Water Updated Capital Cost Summary

Source Water	Capital (MCWRA/M1W)
Blanco Drain	$8,852,000
Reclamation Ditch	$2,695,861
Modification to Plant	$1,493,000
Total	**$13,040,861**

This study assumes that all capital costs would be financed with state revolving fund (SRF) loans with an interest rate of one percent (1%) and a term of 30 years. Based on these assumptions, the annual debt payments were calculated for the Blanco Drain, the Reclamation Ditch, and the modification to the treatment plant and are shown in Table 6-3. As previously mentioned, MCWRA's share of capital cost is 45.1 percent based on the Restated Agreement. The remaining cost of the debt repayment would be covered by M1W.

Table 6-3: New Source Water Capital Repayment

		Capital Cost Allocation (%)		Capital Cost Allocation ($)		Total Annual	Annual Capital Cost
	Project Cost [$]	M1W	WRA	M1W	WRA	Debt Payment	WRA
Blanco Drain	$8,852,000	54.9%	45.1%	$4,859,748	$3,992,252	$342,998	$154,692
Reclamation Ditch	$2,695,861	54.9%	45.1%	$1,480,028	$1,215,833	$104,460	$47,111
Treatment Plant Mod.	$1,493,000	54.9%	45.1%	$819,657	$673,343	$57,851	$26,091
Total	**$13,040,861**			**$7,159,433**	**$5,881,428**	**$505,309**	**$227,894**

M1W obtained $10 million in state grant funding from the Proposition 1 Stormwater Grant Program to help fund the new source water facilities. MCWRA and M1W anticipate $600,000 in grants for the construction of Blanco Drain facilities and $1,700,000 for the construction of Reclamation Ditch facilities. The revised net capital costs after grant funding would be reduced to $8,252,000 and $995,861 for Blanco Drain and Reclamation Ditch, respectively. Net capital costs are presented in Table 6-4.

Table 6-4: Grant Funding Summary

Source Water	Capital Cost	Grant Funding	Net Capital After Grants
Blanco Drain	$8,852,000	$600,000	$8,252,000
Reclamation Ditch	$2,695,861	$1,700,000	$995,861
Modification to Plant	$1,493,000	$0	$1,493,000
Total	**$13,040,861**	**$2,300,000**	**$10,740,861**

The share of annual debt payments for WRA associated with the Blanco Drain and the Reclamation Ditch are estimated at $144,207 and $17,403, respectively. The total debt obligation, including the Treatment Plan Modification, is equal to $187,701.

Table 6-5: New Source Water Capital Repayment – Net of Grants

		Capital Cost Allocation (%)		Capital Cost Allocation ($)		Total Annual	Annual Capital Cost
	Net Project Cost [$]	M1W	WRA	M1W	WRA	Debt Payment	WRA
Blanco Drain	$8,252,000	54.9%	45.1%	$4,530,348	$3,721,652	$319,749	$144,207
Reclamation Ditch	$995,861	54.9%	45.1%	$546,728	$449,133	$38,588	$17,403
Treatment Plant Mod.	$1,493,000	54.9%	45.1%	$819,657	$673,343	$57,851	$26,091
Total	**$10,740,861**			**$5,896,733**	**$4,844,128**	**$416,188**	**$187,701**

7.WATER SUPPLY SCENARIOS

MCWRA requested that Raftelis model the costs for CSIP operation under four different cases (scenarios). The purpose of evaluating each scenario is to examine the financial impact of incorporating new source waters under various annual climatic conditions (i.e. rainfall and surface water flow). The main goal of obtaining new source waters is to reduce the use of water from supplemental wells and, thereby mitigate any further intrusion of seawater into the groundwater basin.

The supply mix scenarios were calculated with the inclusion of grant funding which reduces capital costs for new source waters. Grant funding does not affect existing source costs or Base Case costs.

All of the scenarios assume the average amount of recycled water (12,495 AFY) will be used and available from the treatment plant. This future use of wastewater is a reduction from historical uses based on existing entitlements that may be utilized in the near future. The Base Case uses the historical 10-year average demand consisting of 5,675 AFY from supplemental wells, 1,866 AFY from the SRDF, and 13,186 AFY of recycled water[7] to meet total grower demand.

Scenario Number 1 assumes that no surface water is available from the SRDF, an increased amount of water is pumped from the supplemental wells relative to the Base Case, and that new source waters are used to meet the remaining demand. This scenario describes a dry year with very little or below average rainfall, hence the lack of water available from the SRDF and a high volume of water necessary from the wells to meet average demand.

Scenario Number 2 assumes 4,295 AF of water is available from the SRDF based on historical average when the facility has been in use, a reduced amount of well pumping is required, and new source waters are used to meet the remaining demand. This scenario describes a normal or average year where there is adequate rainfall to provide water from the SRDF.

Scenario Number 3 assumes that maximum water is available from the SRDF, which minimizes well pumping, and new source waters are used to meet the remaining demand. This scenario describes a wet year where there has been above average rainfall to provide abundant surface water from the SRDF.

Scenario Number 4 is a variation of Scenario 1 (dry year) but utilizes the separate water rights option for each agency, as described in the Restated Agreement, if certain conditions precedent are not met. Scenario 4 assumes that no surface water is available from the SRDF, well pumping is maximized relative to other scenarios, and that new source waters are not available for MCWRA from the Blanco Drain and Reclamation Ditch. An amount of IWW is available to supplement recycled water and well pumping.

The assumptions for each of the scenarios are outlined in Table 7-1.

[7] Consists of 11,763 AFY of recycled water from domestic wastewater and 1,423 AFY of IWW

Table 7-1: Cases for CSIP Operation

Cases Based on 20,866 (AFY)	Supplemental Wells	SRDF	Recycled Water (Base includes 1,423 AF IWW)	New Source Water
Base (HISTORICAL) 10-Year Average Demand Schedule	5,814	1,866	13,186	-
Case No. 1 (DRY) No SRDF, Increase Well, New Source	6,029	-	12,495	Blanco Drain (B) – 542 Rec. Ditch (REC) – 430 IWW – 1,370
Case No. 2 (NORMAL) SRDF, Reduced Well, New Source	2,147	4,295	12,495	Blanco Drain (B) – 686 Rec. Ditch (REC) – 272 IWW – 971
Case No. 3 (WET) Max SRDF, Min Well, New Source	854	6,084	12,495	Blanco Drain (B) – 581 Rec. Ditch (REC) – 230 IWW – 622
Case No. 4 (DRY) Separate Rights, No SRDF, Max Well, New Source	6,634	-	12,495	Blanco Drain (B) – 0 Rec. Ditch (REC) – 0 IWW – 1,737

Each of the following subsections calculate the marginal cost of existing and new source waters based on supply availability associated with the various rainfall scenarios described above. Variable O&M rates, fixed O&M costs, and capital costs described in previous sections of this report are used in conjunction with the 3-year average demand of 20,866 AFY to calculate the cost per acre-foot of each water source and to calculate a total cost per acre-foot for all sources used to meet demand in a given scenario.

7.1 BASE CASE

Table 7-2 details the 10-year average for the three existing water sources. The cost per AF of supplemental wells, the SRDF, and recycled water are $27.86, $4.47, and $41.54, respectively, for a total cost of $73.87 per AF. The base case represents reality for CSIP operations and the groundwater basin and approximates the existing utility charges of growers of $73.65[8] per AF.

As indicated, it is not sustainable to extract groundwater out of the basin at a rate of 5,814 AFY. If new sources of water are not implemented, the groundwater will not be able to sufficiently recharge, and seawater intrusion will continue to advance inland toward Salinas municipal supply wells in the basin.

[8] CSIP water service charge of $5.83 per AF plus the SRDF delivery charge of $67.82.

Table 7-2: Base Case (10-Year Average)

	Wells	SRDF	Recycled Water
Supply Use (AF)	**5,814**	**1,866**	**13,186**
O&M Variable Rate ($/AF)	$102.42	$50.00	$65.74
O&M Variable Cost ($)	$595,470	$93,300	$866,848
Subtotal	**$595,470**	**$93,300**	**$866,848**
Total Grower Demand (AF)	20,866	20,866	20,866
Source Cost($/AF)	**$28.54**	**$4.47**	**$41.54**
Scenario Cost ($/AF)			**$74.55**
Existing Utility Charges			$73.65
Change ($/AF)			***$0.90***

7.2 SCENARIO 1 – DRY YEAR

Scenario 1 is detailed in Table 7-3. This scenario assumes a year with below average rainfall and, therefore, no water is available from the SRDF, 542 AF from the Blanco Drain and 430 AF from the Reclamation Ditch are available as new sources. The remainder is supplied by 12,495 AF of recycled water, 1,370 AF from IWW, and 6,029 AF from the supplemental wells. The cost per AF for the supplemental wells, recycled water, Blanco Drain water, Reclamation Ditch water, and IWW is shown in the table below, for a total cost of $100.90 per AF. This is an increase of $27.25 per AF compared to existing utility charges, while increasing well demand by 354 AF (6.2%) compared to the base case.

Table 7-3: Scenario 1 – Dry Year

	Wells	SRDF	Recycled Water	Blanco Drain	Rec. Ditch	IWW
Supply Use (AF)	**6,029**	**-**	**12,495**	**542**	**430**	**1,370**
O&M Variable Rate ($/AF)	$102.42	$50.00	$65.74	$180.96	$151.55	$65.74
O&M Variable Cost ($)	$617,490	-	$821,421	$98,080	$65,167	$90,064
Capital Cost ($)	-	-	$26,091	$144,207	$17,403	-
O&M Fixed Cost ($)	-	-	-	$17,600	$14,900	-
New Source Replacement Costs	-	-	-	$136,375	$56,539	-
Subtotal	**$617,490**	**-**	**$847,512**	**$396,262**	**$154,009**	**$90,064**
Total Grower Demand (AF)	20,866	20,866	20,866	20,866	20,866	20,866
Cost per AF ($/AF)	**$29.59**	**$0.00**	**$40.62**	**$18.99**	**$7.38**	**$4.32**
Scenario Cost ($/AF)						**$100.90**
Existing Utility Charges						$73.65
Change ($/AF)						***$27.25***

7.3 SCENARIO 2 – NORMAL YEAR

Scenario 2 is detailed in Table 7-4. This scenario assumes a year with average rainfall with water available from all sources (existing and new source water) to meet average demand. Supply from the SRDF is 4,295 AF and recycled water is 12,495 AF. Supply from new sources is 686 AF from Blanco Drain and 272 AF from the Reclamation Ditch. 971 AF comes from IWW. The remaining 2,147 AF is supplied by the supplemental wells. The cost per AF for the supplemental wells, the SRDF, recycled water, Blanco Drain water, Reclamation Ditch water, and IWW is shown in the table below, for a total cost of $90.98 per AF. This results in a net increase of $17.33 per AF while reducing the dependence on wells by 3,528 AF (62%) compared to the base case.

Table 7-4: Scenario 2 – Normal Year

	Wells	SRDF	Recycled Water	Blanco Drain	Rec. Ditch	IWW
Supply Use (AF)	**2,147**	**4,295**	**12,495**	**686**	**272**	**971**
O&M Variable Rate ($/AF)	$102.42	$50.00	$65.74	$180.96	$151.55	$65.74
O&M Variable Cost ($)	$219,896	$214,750	$821,421	$124,139	$41,221	$63,834
Capital Cost ($)	-	-	$26,091	$144,207	$17,403	-
O&M Fixed Cost ($)	-	-	-	$17,600	$14,900	-
New Source Replacement Costs	-	-	-	$136,375	$56,539	-
Subtotal	**$219,986**	**$214,750**	**$847,512**	**$422,321**	**$130,064**	**$63,834**
Total Grower Demand (AF)	20,866	20,866	20,866	20,866	20,866	20,866
Cost per AF ($/AF)	**$10.54**	**$10.29**	**$40.62**	**$20.24**	**$6.23**	**$3.06**
Scenario Cost ($/AF)						**$90.98**
Existing Utility Charges						$73.65
Change ($/AF)						***$17.33***

7.4 SCENARIO 3 – WET YEAR

Scenario 3 is detailed in Table 7-5. This scenario assumes a year with above average rainfall with water available from all sources (existing and new source water) to meet average demand. 6,084 AF is supplied from the SRDF, 12,495 AF from recycled water, 581 AF from Blanco Drain, 230 AF from Reclamation Ditch, and 622 AF from IWW. In a wet year pumping from the supplemental wells is minimized. The cost per AF for the supplemental wells, SRDF, recycled water, Blanco Drain water, Reclamation Ditch water, and IWW is shown in the table on the following page, for a total cost of $86.60 per AF. This results in a net increase of $12.95 per AF while reducing supplemental well use by 4,821 AF (85.0%).

Table 7-5: Scenario 3 – Wet Year

	Wells	SRDF	Recycled Water	Blanco Drain	Rec. Ditch	IWW
Supply Use (AF)	**854**	**6,084**	**12,495**	**581**	**230**	**622**
O&M Variable Rate ($/AF)	$102.42	$50.00	$65.74	$180.96	$151.55	$65.74
O&M Variable Cost ($)	$87,467	$304,200	$821,421	$105,138	$34,857	$40,890
Capital Cost ($)	-	-	$26,091	$144,207	$17,403	-
O&M Fixed Cost ($)	-	-	-	$17,600	$14,900	-
New Source Replacement Costs	-	-	-	$136,375	$56,539	-
Subtotal	**$87,467**	**$304,200**	**$847,512**	**$403,320**	**$123,699**	**$40,890**
Total Grower Demand (AF)	20,866	20,866	20,866	20,866	20,866	20,866
Cost per AF ($/AF)	**$4.19**	**$14.58**	**$40.62**	**$19.33**	**$5.93**	**$1.96**
Scenario Cost ($/AF)						**$86.60**
Existing Utility Charges						$73.65
Change ($/AF)						***$12.95***

7.5 SCENARIO 4 – DRY YEAR WITH SEPARATE WATER RIGHTS

Scenario 4 is detailed in Table 7-6. This scenario is a special case of Scenario 1 and represents a "what-if" analysis where M1W has rights to all new source water from the Blanco Drain and the Reclamation Ditch and WRA only receives an IWW entitlement to supplement recycled water and well production in a dry year. Same as Scenario 1, Scenario 4 assumes a year with below average rainfall and, therefore, no water is available from the SRDF. Supply from recycled water is 12,495 AF and IWW is 1,737 AF. The remainder is supplied by well pumping at 6,634 AF. The cost per AF for the supplemental wells, recycled water, and IWW are shown in the table below, for a total cost of $78.65 per AF (6.8%). This results in a net increase of $5.00 per AF while increasing supplemental well use by 959 AF (16.9%). As MCWRA has no rights to new source water there is no responsibility in capital or operating costs for Blanco Drain and Reclamation Ditch unlike Scenario 1.

Table 7-6: Scenario 4 – Dry Year – Separate Water Rights

	Wells	SRDF	Recycled Water	Blanco Drain	Rec. Ditch	IWW
Supply Use (AF)	**6,634**	**-**	**12,495**	**-**	**-**	**1,737**
O&M Variable Rate ($/AF)	$102.42	$50.00	$65.74	$180.96	$151.55	$65.74
O&M Variable Cost ($)	$679,454	-	$821,421	-	-	$114,190
Capital Cost ($)	-	-	$26,091	-	-	-
O&M Fixed Cost ($)	-	-	-	$-	$-	-
New Source Replacement Costs	-	-	-	-	-	-
Subtotal	**$679,454**	**$0**	**$847,512**	**$0**	**$0**	**$114,190**
Total Grower Demand (AF)	20,866	20,866	20,866	20,866	20,866	20,866
Cost per AF ($/AF)	**$32.56**	**$0**	**$40.62**	**$0**	**$0**	**$5.47**
Scenario Cost ($/AF)						**$78.65**
Existing Utility Charges						$73.65
Change ($/AF)						***$5.00***

8. RESULTS

8.1 SCENARIO COMPARISONS

Table 8-1 summarizes the scenario outcomes from Section 7 and the changes in costs and supplemental well pumping in each scenario.

Table 8-1: Scenario Summary Comparisons

	Case No. 1 (DRY)	Case No. 2 (NORMAL)	Case No. 3 (WET)	Case No. 4 (Sep Rights)
Scenario Cost	$100.90	$90.98	$86.60	$78.65
Existing Charges	$73.65	$73.65	$73.65	$73.65
Difference ($)	**$27.25**	**$17.33**	**$12.95**	**$5.00**
Difference $ (%)	37.0%	23.5%	17.6%	6.8%
Increase / (Decrease) Supp. Wells (AF)	354	(3,528)	(4,821)	959
Difference AF Supp. Wells (%)	6.2%	(-62.2%)	(-85.0%)	16.9%

8.2 PROJECTED COST ESTIMATES

In order to develop a long-term charge that provides certainty each year, Raftelis analyzed the three scenarios with different probabilities of recurrence. MCWRA staff identified the probabilities associated with each scenario. Based on eight years of actual operations, staff estimates a 37.5 percent likelihood in any given year of a dry year, a 50 percent likelihood of a normal year, and a 12.5 percent likelihood of a wet year.

Table 8-2 provides an estimate on the expected cost of providing water. The scenario specific costs are multiplied by the respective probability to calculate a weighted cost. The weighted costs for each of the three scenarios are summed to yield the expected cost. This estimate represents the most likely per AF cost over the long term. In wet years when costs are lower the fund will increase its balance and hold reserves for dry years when costs exceed assessments. Other options may exist such as landowners pay capital costs, including Blanco Drain landowners, etc. Reference future assessment study is necessary as per section 16.15 and will investigate options further.

Table 8-2: Expected Cost Outcome

Scenario	Probability (%)	Cost ($/AF)	Weighted Cost ($/AF)
Scenario 1 – Dry	37.5%	$100.90	$37.84
Scenario 2 – Normal	50%	$90.98	$45.49
Scenario 3 – Wet	12.5%	$86.60	$10.83
Expected Cost ($/AF)			**$94.16**
Existing Utility Charges			$73.65
Change ($/AF)			**$20.51**
Difference $ (%)			27.8%

8.3 SUPPLEMENTAL WELL SCENARIO COMPARISONS

Groundwater pumping is 100 percent variable and represents an avoidable cost. As less groundwater is pumped from the basin O&M costs decrease, and as more water is produced, O&M costs increase. Groundwater pumping is part of the existing supply mix for CSIP growers and a portion of the current assessments assumes a certain level of pumping. MCWRA identified that current utility assessment revenues cover 1,858 AFY of supplemental well use, or in dollar terms, approximately $190,000 annually. This amount represents a revenue neutral volume of water when comparing to new source water scenarios. To account for the increase or decrease in O&M costs and, therefore, the cost of CSIP water under each scenario, Raftelis calculated the change in supplemental well costs for each scenario. When supplemental well pumping is reduced below the revenue neutral volume of 1,858 AFY, it represents a cost savings. Table 8-3 shows the calculation of additional savings generated in scenario 3 (Wet Year). Savings are shown in both absolute dollar terms and cost per AF. The total savings of $102,829 could be used for other revenue needs, such as, deferred maintenance.

Table 8-3: Supplemental Well Cost Calculations

	Case No. 3 (WET)
Baseline Well Pumping (AFY)	**1,858**
Supplemental Well Production AFY (Scenario 3 – Wet Year)	**854**
Supplemental Well Costs ($/AF)	$102.42
Total Cost (Scenario 3 – Wet Year)	$87,467
Total Cost (Baseline)	$190,296
Supplemental Wells Additional Costs/(Savings)	**($102,829)**
Demand	20,866
Cost/(Savings) $/AF	**($4.93)**

9. ADDITIONAL CONSIDERATIONS

Alternative Scenarios: This Study incorporated the best available data and information known at the time and focused on three likely supply scenarios. The electronic model that has been developed to evaluate new source waters for CSIP operations has the ability to run an infinite number of scenarios by changing the existing and new source water supply mix, capital costs, grant funding, O&M costs, supplemental well inputs, and grower demand. Two additional alternative scenarios proposed by the growers at the November 29, 2017 meeting are: 1) 10,000 AFY from SRDF in normal and wet conditions and 2) maximizing recycled water/IWW above 13,186 AFY. Raftelis can efficiently run these scenarios with additional information from MCWRA staff. Necessary information includes maximum production of recycled water[9]/IWW, changes to water supply sources when additional recycled water is available, and changes to water supply sources when 10,000 AFY is available from the SRDF.

Salinas Industrial Wastewater Treatment Facility Ponds Water: The ponds could produce an additional 100 AFY or more in new source water during the irrigation season upon completion of the Salinas Storm Water Grant projects. The City is requesting payment of up to $300,000 annually for use of the Salinas pond. Given existing grower demand of 20,866 AFY and MCWRA's responsibility for 45.1 percent of the cost, the lease would add an additional $6.48[10] per AF to water deliveries under all scenarios, if costs are applicable.

Indirect Cost Allocation: MCWRA pays M1W's indirect costs of overhead including administration, information technology, human resources, finance, regional treatment plant administration, and safety through M1W's (MRWPCA's) cost allocation plan (CAP). Once Pure Water Monterey comes online, the CAP should be amended to reflect the additional entity and MCWRA's share of costs will be updated. At this time, no estimate of future cost allocations are available. For reference total M1W indirect costs for FY 2016 totaled $3,370,283.

[9] Salinas Valley Reclamation Plant (SVRP) is the recycled water plant and has capacity of 29.6 mgd (33,154 AFY).

[10] 45.1% of $300,000 is $135,300. $135,300 divided by demand of 20,866 AFY equals $6.48.

APPENDIX A:

West Yost Technical Memo

WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: September 25, 2018

Project No.: 738-20-17-02
SENT VIA: EMAIL

TO: Habib Isaac, Raftelis Financial Consultants

FROM: Jeff Pelz, PE, RCE #46088

REVIEWED BY: Robert D. Whitley, PE, RCE #18263

SUBJECT: Cost Analysis of New Source Water Projects

West Yost Associates (West Yost) was retained to review capital and operation and maintenance (O&M) costs for several projects under the New Source Water program for Monterey County and Monterey One Water. The purpose of this review is to provide a basis for creating or updating a rate structure for recovering appropriate costs from the users of the water. This technical memorandum (TM) documents the sources of information, assumptions and conclusions of our analysis. Each of the following projects were reviewed and are addressed in this TM:

- Blanco Drain Pump Station
- Reclamation Ditch Pump Station
- Treatment Plant Modifications

West Yost was also asked to estimate an equivalent annual replacement cost for the pump station facilities.

BLANCO DRAIN PUMP STATION

The Blanco Drain Diversion Pump Station (or Blanco Drain Pump Station) is designed to pump water from the Blanco Drain and deliver it for treatment as a new source of recycled water. The pump station will house three 85 horsepower (hp) submersible pumps installed in a new wet well. The project includes a surge tank and air compressor, intake box with trash screen, valve vault, and a flow meter in a vault. General site grading will be required, as well as removal and reinstallation of an existing floating debris barrier to facilitate construction. An 8,500 foot long, 16-inch diameter pipeline will also be constructed as part of the project.

Blanco Drain Capital Costs

Capital costs are defined by the Final Approved Budget for the State Revolving Fund Loan being used to finance construction. The largest component of the capital cost is the construction contract ($5,891,900), which was bid and awarded in 2017. The Blanco Drain Pump Station and the Reclamation Ditch Pump Station were bid as a single combined project; however, separate budgets were developed for each project. Table 1 presents the components of capital cost for the Blanco Drain Pump Station, which total $8,852,031. The Reclamation Ditch Pump Station project is described later in this memorandum.

Table 1. Blanco Drain and Reclamation Ditch Pump Station Capital Costs

Cost Component	Blanco Drain, dollars	Rec Ditch, dollars
Construction Contract	5,891,900	1,445,850
Land Purchase	125,000	86,000
Planning	17,091	-
Design	748,638	257,974
Contingencies	688,344	167,433
Construction Management	642,981	156,399
Administration	738,077	582,205
Total Project Cost	**$8,852,031**	**$2,695,861**

Source: State Revolving Fund Final Budget Approval Form for each project.

Blanco Drain O&M Costs

O&M costs include electrical energy costs and maintenance costs.

Electrical Energy Costs

Estimated electrical costs for major equipment to be installed at the Blanco Drain Pump Station are described in the following paragraphs. For all electrical costs, an energy unit cost of $0.15/kW-hr was assumed.

Three, 85 hp submersible pumps are to be installed at the Blanco Drain Pump Station. The average energy consumption for these pumps was estimated using the following assumptions:

- Average pumped flow of 4.6 cubic feet per second (cfs)
- Average pressure of 155 feet of water (67 pounds per square inch [psi])
- 60 percent overall pump efficiency

The average flow and pressure were derived from information provided on drawing G-3.3 of the MRWPCA Pure Water Monterey – GWR Project Blanco Drain and Reclamation Ditch Diversion Facilities (2016) drawing set. Submersible pumps typically have an efficiency of 60 to 65 percent. An efficiency of 60 percent was assumed for this analysis to obtain a reasonable estimate of energy consumption.

Other electrical loads, though minor, were also considered. These include:

- Air compressor to maintain the proper air cushion in the hydropneumatic tank. The air compressor will not run continuously. A 15 hp air compressor will be installed, and it is assumed to be in operation a cumulative one hour per day.
- Magnetic flow meter, requiring very little energy. Information from a prominent magnetic flow meter manufacture indicates that power consumption is a maximum of 15 watts.
- Refrigerated autosampler, assumed to have an overall power requirement of 1.5 hp, based on information obtained from Hach, a representative manufacturer.

Based on the above assumptions, the estimated electrical load is $40 per acre-foot (AF) of water pumped, plus a small additional annual cost associated with the small loads of $600.

Maintenance Costs

The cost of maintenance labor was estimated assuming a blended maintenance labor rate of $100 per hour. The maintenance cost estimate is detailed in Table 2.

Routine maintenance activities include testing alarms, recording readings, inspecting screens, and general site and equipment upkeep, which are expected to occur monthly. It is also assumed that two staff members will perform the monthly maintenance in four hours including travel time, for a total of eight labor-hours per month. Parts, tools and supplies associated with routine maintenance and repair of equipment was assumed to be $5,000 per year.

Periodic maintenance of pipelines and manholes will be required. It is good practice to inspect these facilities approximately every five years. It has been assumed that on average, 2,000 linear feet of pipeline can be inspected per day using closed-circuit television equipment. Prior to inspection of the pipelines, they would be cleaned with a hydro-jet cleaning system. It has been assumed that on average, 4,000 linear feet of pipeline can be cleaned per day by a two-person crew. Therefore, over a five-year period, approximately 120 labor hours would be devoted to these operations, or an average of 24 hours annually.

The total annual maintenance cost is estimated to be $17,000.

Therefore, the combined annual electrical and maintenance cost for the Blanco Drain Pump Station is estimated to be $17,600 annually, plus $40 per AF of pumped water.

Table 2. Estimated Maintenance Costs

Equipment	Recommended Frequency	Activities per Year	Staff Members Required	Hours per Staff Member	Total Hours	Hourly Rate, $/hour	Annual Cost, $/year
Blanco Drain Pump Station							
Station Maintenance Record Readings Exercise Pumps Check for Vandalism Check Bar Screens Check Panel Lights Test Area Lighting Exercise Valves Test Station Alarms	Monthly	12	2	4	96	100.00	9,600
Routine Maintenance Parts, Tools and Supplies	-	-	-	-	-	-	5,000
CCTV Inspection of Pipes	Every 5 years	0.2	2	40	16	100.00	1,600
Hydro-jet Pipes and Maintenance Holes	Every 5 years	0.2	2	20	8	100.00	800
						Total	$17,000
Reclamation Ditch Pump Station							
Station Maintenance Record Readings Exercise Pumps Check for Vandalism Check Bar Screens Check Panel Lights Test Area Lighting Exercise Valves Test Station Alarms	Monthly	12	2	4	96	$ 100.00	9,600
Routine Maintenance Parts, Tools and Supplies	-	-	-	-	-	-	5,000
						Total	$14,600

RECLAMATION DITCH PUMP STATION

The Reclamation Ditch Pump Station will draw water from the Reclamation Ditch and deliver it for treatment and reuse via the existing collection system. The pump station will house three 10 hp submersible pumps installed in a new wet well. The project includes a new intake structure, trash rack, fish screen, valve vault and a flow meter in a vault.

Reclamation Ditch Capital Costs

Capital costs are defined by the Final Approved Budget for the State Revolving Fund Loan being used to finance construction. The largest component of the capital cost is the construction contract ($1,445,850), which was bid and awarded in 2017. The Blanco Drain Pump Station and the Reclamation Ditch Pump Station were bid as a single combined project; however, separate budgets were developed for each project. Table 1 presents the components of capital cost for the Reclamation Ditch Pump Station, which total $2,695,861.

Reclamation Ditch O&M Costs

The O&M costs for the Reclamation Ditch Pump Station were calculated using similar methods to those used for the Blanco Drain Pump Station. Only short segments of onsite piping are included in the project, so a separate cost for pipeline maintenance does not apply to this facility. Renewal and replacement costs are accounted for in separate documentation.

Electrical Energy Costs

Estimated electrical costs for major equipment to be installed at the Reclamation Ditch Pump Station are described in the following paragraphs. For all electrical costs, an energy unit cost of $0.15/kW-hr was assumed.

Three 10 hp submersible pumps are to be installed at the Reclamation Ditch Pump Station. The average energy consumption for these pumps was estimated by assuming the following:

- Average pumped flow of 6 cfs
- Average pressure of 17.3 psi
- 60 percent overall pump efficiency

The average flow and pressure were derived from information provided on drawing G-3.3 of the MRWPCA Pure Water Monterey – GWR Project Blanco Drain and Reclamation Ditch Diversion Facilities (2016) drawing set. Submersible pumps typically have an efficiency of 60 to 65 percent. An efficiency of 60 percent was assumed for this analysis to obtain a reasonable estimate of energy consumption.

Other electrical loads, though minor, were also considered. These include:

- Magnetic flow meter, requiring very little energy. Information from a prominent magnetic flow meter manufacture indicates that power consumption is a maximum of 15 watts.
- Refrigerated autosampler which was assumed to have an overall power requirement of 1.5 hp, based on information obtained from Hach, a representative manufacturer.
- Fish Screen which has a substantial motor (5 hp), but will run infrequently.

Based on the above assumptions, the estimated electrical load is $10 per AF of water pumped, plus a small additional annual cost associated with the small loads of $300.

Maintenance Costs

The cost of maintenance labor was estimated assuming a blended maintenance labor rate of $100 per hour. The maintenance cost estimate is detailed in Table 2.

Routine maintenance activities include testing alarms, recording readings, inspecting screens, and general site and equipment upkeep, which are expected to occur monthly. It is also assumed that two staff members will perform the maintenance in four hours including travel time, for a total of eight hours per month. Parts, tools and supplies associated with routine maintenance and repair of equipment was assumed to be $5,000 per year.

The total annual maintenance cost is estimated to be $14,600.

Therefore, the combined annual electrical and maintenance cost for the Blanco Drain Pump Station is estimated to be $14,900 annually, plus $10 per AF of pumped water.

REPLACEMENT COSTS

The costs to replace the two pumping facilities and pipeline were estimated using three facility component categories, each with its own assumed useful life:

- Pipeline
- Structure
- Equipment

The replacement costs were generally assumed to be equal to the current capital costs, however land purchase and planning costs, which were included in the cost of the original project, were excluded from the replacement cost estimates. Capital costs as bid in 2017 were escalated to September 2018 costs using the 20-city average Construction Cost Index, obtained from the Engineering News Record (March 2017 = 10,667; September 2018 = 11,170) to calculate the replacement costs. The costs were allocated to the three component categories using the contractor's bid form. A rate of 1.0 percent was used as the annual return on investment for the calculation of an annual payment to build a replacement fund, per the direction received from

Raftelis. A useful life of 75 years was assumed for the pipeline and structures, and a useful life of 25 years was assumed for the equipment.

Replacement costs are summarized in Table 3.

Table 3. Cost Summary

New Source Water Facility	Capital Costs, $			Replacement Costs, $	
	Original (Total)	Original (Component)	Escalated to Sept. 2018	Total (2018$, no future inflation)	Annual, @ 1.0% ROI
Blanco Drain Pump Station	8,852,000				
Blanco Drain Pipeline		2,963,000	3,103,000	2,761,000	24,893
Blanco Drain Structure		3,783,000	3,962,000	3,898,000	35,145
Blanco Drain Equipment		2,106,000	2,205,000	2,156,000	76,337
Subtotal, Blanco Drain PS & Pipeline					136,375
Reclamation Ditch Pump Station	2,696,000				
Reclamation Ditch Structure		1,503,000	1,574,000	1,523,000	13,732
Reclamation Ditch Equipment		1,193,000	1,250,000	1,209,000	42,807
Subtotal, Reclamation Ditch PS					56,539
Regional Treatment Plant Modifications	1,493,000	1,493,000	N/A	N/A	N/A

Notes:
1. Replacement cost excludes some minor costs associated with original construction. Inflation is not taken into consideration.
2. 75-year life assumed for pipeline and structures, 25 year average life assumed for equipment.
3. Annual Replacement Cost is assumed to be invested at the stated ROI each year for the duration of the assumed life.

TREATMENT PLANT MODIFICATIONS

The treatment plant modifications include installation of concrete inlet and outlet control boxes and gates at the existing pond and chlorine contact basins and connection pipes to facilitate using the existing chlorine contact basins for equalization storage and delivery of tertiary treated water directly to the CSIP pipeline. Water would bypass the larger storage pond during winter months, and water will instead be stored in the contact basins. Use of the contact basins for storage will allow for tertiary treatment of effluent, even when CSIP demands are low. Without these modifications, it is not possible to operating the tertiary treatment system during low demand periods.

The modifications include:

- Installation of two 30-inch gates and wall penetrations between the chlorine contact tanks and the reclaimed water channel effluent chamber walls.
- Installation of one 18-inch gate, two wall penetrations and short segment of buried 18-inch pipe between the western chlorine contact tank and the overflow channel.
- Removal of a short 18-inch pipe and valve.
- Installation of two level sensors, one in each chlorine contact tank.

- Construction of a rectangular extension at the storage pond inlet and outlet structures, each with a 36-inch motor operated gate.
- Construction of 805 lineal feet of steel pipe between the storage pond inlet and outlet structures.

For the treatment plant modifications, electrical costs will be negligible, and other routine O&M costs are assumed to be a very small incremental cost that would be absorbed in normal plant-wide O&M costs. To account for this very small cost increase, an assumed annual fixed cost of $1,000 is recommended.

Capital costs were estimated at a planning level based on a preliminary design drawing for the work at the chlorine contact tanks, and conceptual sketches for the pond inlet, outlet and pipeline. West Yost's opinion of probable construction cost is $1,194,000. An allowance of 25 percent for design, construction management, project administration and environmental review costs was added, representing a relatively low amount for these other project costs based on the nature of the work and the amount of design already completed. The total capital cost is therefore estimated to be $1,493,000.

Costs throughout this memorandum are expressed in terms of current (2017) dollars. The capital cost estimate for the Treatment Plant Modifications does not include an allowance for inflation between now and the time the project is bid. Furthermore, actual costs at the time of construction will be affected by economic conditions that may cause the cost of equipment, materials and labor to vary significantly. Therefore, the project cost may be substantively lower or higher than estimated.

SUMMARY

Three new source water projects represent capital and O&M costs potentially recovered through rates. Cost estimates were prepared for these three projects, including a planning-level cost estimate for the Treatment Plant Modifications, a summary of actual bid prices and other project costs for the Blanco Drain and Reclamation Ditch Pump Station projects, and O&M costs. O&M costs have a fixed annual component as well as a per-acre foot component for the pump stations. O&M costs for the Treatment Plant Modifications are negligible as an incremental increase in treatment plant O&M.

Treatment costs are not included in the estimates, as these costs are accounted for separately. For water sourced at the Blanco Drain and Reclamation Ditch Pump Stations, the cost of primary, secondary and tertiary treatment must be added to the unit cost for the water. Only the cost of tertiary treatment should be added to water sourced through the Treatment Plant Improvements, as the source is secondary effluent for which the cost of treatment has already been accounted.

The costs are summarized in Table 4.

Table 4. Cost Summary

New Source Water Facility	Operation and Maintenance Costs		Capital Costs, $
	Fixed, $/year	Variable, $/AF	
Blanco Drain Pump Station	17,600	40	8,852,000
Reclamation Ditch Pump Station	14,900	10	2,696,000
Treatment Plant Modifications	1,000	-	1,493,000

Notes:
1. Assumed energy cost of $0.15/kw-hr.
2. Blended maintenance labor rate of $100/hr.
3. Costs current for 2017.