

Application for a New License **Major Project – Existing Dam**

Exhibit D **Statement of Project Costs and Financing**

Security Level: Public

Yuba River Development Project
FERC Project No. 2246



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List of Attachments

None.

EXHIBIT D

PROJECT ECONOMICS AND FINANCING

1.0 Introduction

The Yuba County Water Agency (YCWA or Licensee) has prepared this Exhibit D, Project Economics and Financing, as part of its Application for New License from the Federal Energy Regulatory Commission (FERC or Commission) for the Yuba River Development Project (Project), FERC Project No. 2246. This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (C.F.R.), Subchapter B (Regulations Under the Federal Power Act), Part 5 (Integrated Licensing Process), Section (§) 5.18(5)(iii) (License for Major Project – Existing Dam). In particular, Section 5.18(5)(iii) requires that Exhibit D meet the requirements of 18 C.F.R. Section 4.51(e). As a reference, this section states:

The [Exhibit D] statement must contain:

- (1) If the application is for an initial license, a tabulated statement providing the actual or approximate original cost (approximate costs must be identified as such) of:
 - (i) Any land or water right necessary to the existing project; and
 - (ii) Each existing structure and facility described under paragraph (b) of this section (Exhibit A).
- (2) If the applicant is a licensee applying for a new license, and is not a municipality or a state, an estimate of the amount which would be payable if the project were to be taken over pursuant to section 14 of the Federal Power Act upon expiration of the license in effect [see 16 U.S.C. 807], including:
 - (i) Fair value;
 - (ii) Net investment; and
 - (iii) Severance damages.
- (3) If the application includes proposals for any new development, a statement of estimated costs, including:
 - (i) The cost of any land or water rights necessary to the new development; and
 - (ii) The cost of the new development work with a specification of:
 - (A) Total cost of each major item;
 - (B) Indirect construction costs such as costs of construction equipment, camps, and commissaries;
 - (C) Interest during construction; and
 - (D) Overhead, construction, legal expenses, taxes, administrative and general expenses, and contingencies.
- (4) A statement of the estimated average annual cost of the total project as proposed, specifying any projected changes in the costs (life-cycle costs) over the estimated financing or licensing period if the applicant takes such changes into account, including:
 - (i) Cost of capital (equity and debt);
 - (ii) Local, state, and Federal taxes;
 - (iii) Depreciation or amortization;
 - (iv) Operation and maintenance expenses, including interim replacements, insurance, administrative and general expenses, and contingencies; and
 - (v) The estimated capital cost and estimated annual operation and maintenance expense of each proposed environmental measure.

- (5) A statement of the estimated annual value of project power, based on a showing of the contract price for sale of power or the estimated average annual cost of obtaining an equivalent amount of power (capacity and energy) from the lowest cost alternative source, specifying any projected changes in the cost of power from that source over the estimated financing or licensing period if the applicant takes such changes into account.
- (6) A statement specifying the source and extent of financing and annual revenues available to the applicant to meet the costs identified in paragraphs (e)(3) and (4) of this section.
- (7) An estimate of the cost to develop the license application.
- (8) The on-peak and off-peak values of project power, and the basis for estimating the values, for projects which are proposed to operate in a mode other than run-of-river.
- (9) The estimated average annual increase or decrease in project generation, and the estimated average annual increase or decrease of the value of project power due to a change in project operations (i.e., minimum bypass flows, limits on reservoir fluctuations).

Besides this introductory section, this Exhibit D includes 12 sections. Section 2.0 describes the approach to estimating Project economics. Sections 3.0 and 4.0 address the cost of the original Project and cost related to takeover of the Project by another party, respectively. Section 5.0 describes existing annual Project cost of operations and gross power benefits. Section 6.0 provides similar cost and power value for the Project as proposed by YCWA in this application for new license. Section 7.0 compares the amount of power and value of power under the existing Project and YCWA's proposed Project. Section 8.0 describes how YCWA would finance continued Project operations and maintenance (O&M). Section 9.0 describes the need in the region for the Project power. Section 10.0 describes other developmental benefits of the Project. The last major section, 11.0, describes the consequences should FERC not issue a new license to YCWA. Section 12.0 includes a list of references cited.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit C for a construction history and a construction schedule, and Exhibit E for a discussion of potential environmental effects and YCWA's proposed resource management measures. Project design drawings and Project maps are included in Exhibit F and G, respectively. Exhibit H contains a detailed description of the need for the electricity provided by the Project, the availability of electrical energy alternatives and other miscellaneous information.

2.0 Project Economics Approach

2.1 Current Cost Approach

Under the Commission's approach to evaluating the economics of hydropower projects as articulated in the Commission's Order Issuing a New License to the Mead Corporation (FERC 1995), the Commission employs a "current cost approach" in that all costs are presented in current dollars (e.g., no consideration for potential future power costs, inflation, escalation, or deflation beyond the license issuance date; and costs to be expended over the license term are summed and normalized as current dollars). The Commission's current cost economic analysis

provides a general estimate of the potential developmental benefits and costs¹ and non-developmental benefits and costs of a project.² YCWA has prepared this Exhibit D using the Commission's current cost method.

Most costs in this exhibit are provided in United States (U.S.) dollars to, at least, the nearest \$1,000, unless otherwise specified.

This Exhibit D provides economic information regarding two alternatives:³

- No Action Alternative.⁴ This is the current operation of the Project under its existing license and the current waterway environment. Under the No Action Alternative, the inflow to the Project is the same as it has been historically (i.e., with the existing licenses for the upstream water projects), and downstream water demands are the same as they have been historically. In addition, under the No Action Alternative, there are no changes to existing Project facilities, and no change in existing Project operations.
- Costs under the No Action Alternative are YCWA's best estimate of the costs to operate the Project in the future. While YCWA has relied somewhat on historic costs, it has not used those costs without adjustment because Pacific Gas and Electric Company, under its May 1966 power purchase contract with YCWA, has absorbed much of the costs to operate the Project. PG&E reimburses YCWA annually for YCWA's bond payments associated with the construction of the Project and for major Project repairs. Since historic costs are underestimates, YCWA has made its best estimate of the costs to operate the Project in the future.
- Power benefits under the No Action Alternative are based on modeled generation from water year (WY) 1970 through WY 2010 and on current market prices. YCWA has not used historic generation or its existing power purchase contract to estimate power benefits because these would be misleading for this analysis. Under the contract, PG&E receives the entire electric output of the Project, excluding the New Bullards Bar Minimum Flow Powerhouse in return for PG&E's contract payments to YCWA.⁵ YCWA and PG&E entered into a separate Qualifying Facilities (QF) contract for New Bullards Bar Minimum Flow Powerhouse. YCWA is in the process of exploring new power purchase contracts.

¹ Developmental benefits of the Project include power generation, water supply, flood control, irrigation and river navigation.

² Non-developmental benefits of a waterway include fish and wildlife resources, recreational opportunities and other aspects of environmental quality.

³ Though not described in this Exhibit D, YCWA also developed Water Balance/Operations Model runs for YCWA's proposed Project (Future) conditions. The model run is provided in Appendix G-1 and Exhibit E.

⁴ No Action Alternative is synonymous with the "baseline" (FERC 1991). YCWA's relicensing Water Balance/Operations Model considers the No Action Alternative to be the "Base Case Scenario" or "Base Case Model Run."

⁵ One aspect of the power purchase contract is that PG&E dispatches water through the Project's Narrows 2 Powerhouse and PG&E's Narrows 1 Powerhouse, which is not part of the Project, based on facility capacity and facility efficiency as well as a preference for California Renewable Portfolio Standards (RPS), power at the Narrows 1 Powerhouse (i.e., no consideration to the respective water rights of YCWA and PG&E), but not based on the relative priorities of the water rights for the two powerhouses. This dispatching is considered part of the No Action Alternative.

- Since the revenue from the existing power purchase contract and QF contract are not reasonable estimates for the value of the power generated by the Project and YCWA has not entered into a new power purchase contract that could be used to provide a reasonable estimate the value of the Project power, YCWA estimated the unit value of the Project power under the No Action Alternative using published information in the current California electricity market and estimated generation under the No Action Alternative conditions.
- YCWA’s Proposed Project. This is YCWA’s proposed Project, including YCWA’s proposed conditions, which is described in YCWA’s Application for a New License. YCWA’s proposed Project scenario in this Application for New License assumes water would be dispatched between Narrows 2 and Narrows 1 powerhouse as it is dispatched today.⁶
- Costs under YCWA’s proposed Project are similar to the costs under the No Action Alternative, with the exception of YCWA’s proposed additions to the Project and proposed protection, mitigation and enhancement (PM&E) conditions.

For ease of comparison, power benefits under YCWA’s proposed Project were estimated in the same manner that power benefits were estimated for the No Action Alternative – using published information in the current California electricity market for the unit value of the power (i.e., same unit values used in the No Action Alternative), and estimated generation under YCWA’s proposed Project conditions.

Basic economic assumptions used by YCWA in developing costs and benefits under both the No Action Alternative and YCWA’s proposed Project are summarized in Table 2.1-1.

Table 2.1-1. Assumptions YCWA used in developing costs and power benefits under the YCWA proposed Project.

Assumption	Value
Period of Analysis	30 Years
Term of Financing	30 Years
Insurance Rate	0%
Base Year for Costs and Benefits	2013
Interest Rate	2.0%
Discount Rate	5.0%

While FERC’s current cost approach requires an applicant to base costs in Exhibit D on a 30-year license term, as described in the Initial Statement of YCWA’s Application for New License, YCWA requests, with good cause, from the Commission a new license with a term of 50 years.

⁶ YCWA and PG&E are in the process of negotiating a new agreement for the operations of the Narrows 1 and Narrows 2 powerhouses for the period beginning on May 1, 2016 (after expiration of YCWA’s current power purchase agreement with PG&E on April 30, 2016). This new agreement may change the allocations of flows through the Narrows 1 and Narrows 2 powerhouses beginning on May 1, 2016.

3.0 Cost of Original Project

The initial license for the Project, issued by the Federal Power Commission, FERC's predecessor, to YCWA on June 24, 1963, was effective on May 1, 1963, for a term ending April 30, 2013. The Federal Power Commission's May 6, 1966, Order Amending License changed the license's effective date to May 1, 1966, for a term ending on April 30, 2016.

Because this is not an application for an initial license, a tabulated statement of the actual original cost of Project land, water rights, structures and facilities is not required to be included in YCWA's application for a new license.

4.0 Cost of Project Takeover

YCWA is a municipality, established under the laws of the State of California, within the meaning of Section 3(7) of the Federal Power Act; since YCWA is a State subdivision, the Project is not subject to the takeover provisions of Section 14 of the Federal Power Act (16 U.S.C. § 807). Accordingly, an estimate of the amount which would be payable if the Project was taken over pursuant to Section 14 is not required to be included in YCWA's application for a new license.

5.0 Annual Cost of Operations and Gross Power Benefits Under the No Action Alternative

Section 5 is divided into three major sections, each of which addresses the No Action Alternative. Section 5.1 discusses Project costs, Section 5.2 discusses Project power benefits, and Section 5.3 provides a summary of costs and benefits.

5.1 Cost of Operations

This annual cost reflects past investment costs owed on the Project, anticipated future investment costs, and current O&M costs. Specifically, this section provides annual cost estimates for: 1) unrecovered past capital additions (i.e., the depreciated plant in-service costs); 2) costs related to management of the existing power purchase contract; 3) local, State of California and federal fees and payments unrelated to environmental and recreation measures; 4) capital costs unrelated to environmental and recreation measures; 5) normal O&M expenses unrelated to environmental and recreation measures; 6) capital costs related to environmental and recreation measures; and 7) normal O&M costs related to environmental and recreation measures. As shown in Table 5.1-1, the estimated annual cost of Project operation under the No Action Alternative is \$27,776,000. Each of the cost components is discussed in the subsections below.

Table 5.1-1. Yuba County Water Agency’s estimated average annual costs over 30 years in 2013 U.S. dollars for the No Action Alternative.

Item	Total Capital, One-Time, or Repeating Costs Over 30 Years (2013 U.S. Dollars)	Average Annual Expenses (2013 U.S. Dollars)	Average Annual Cost ¹ (2013 U.S. Dollars)
COSTS UNRELATED TO EXISTING ENVIRONMENTAL AND RECREATION CONDITIONS			
Depreciated Plant In-Service Costs ²	--	\$2,800,000	\$2,800,000
Power Purchase Contract Management Costs ³	--	\$500,000	\$500,000
Local, State and Federal Fees and Payments ⁴	--	\$2,000,000	\$2,000,000
Capital Additions Costs ⁵	--	\$7,500,000	\$7,500,000
Normal O&M Costs ⁶	--	\$10,500,000	\$10,500,000
FERC License Application Costs ⁷	--	\$900,000	\$900,000
Operating Reserve ⁸	--	\$1,667,000	\$1,667,000
Transmission Costs ⁹	--	\$100,000	\$100,000
<i>Subtotal</i>	--	\$25,967,000	\$25,967,000
COSTS RELATED TO EXISTING ENVIRONMENTAL AND RECREATION CONDITIONS			
Normal O&M Costs Related to Environmental and Recreation Conditions ¹⁰	--	\$1,809,000	\$1,809,000
<i>Subtotal</i>	--	\$1,809,000	\$1,809,000
Total	--	\$27,776,000	\$27,776,000

¹ Average Annual Cost is calculated by summing Total Capital, One-Time or Repeating Costs Over 30 Years and the total of Annual Expenses over 30 years, and dividing the sum by 30 years.

² This item is also considered Net Book Value, and is described in Section 5.1.1.

³ As described in Section 5.1.2.

⁴ As described in Section 5.1.3.

⁵ As described in Section 5.1.4.

⁶ As described in Section 5.1.5.

⁷ As described in Section 5.1.6.

⁸ As described in Section 5.1.7.

⁹ As described in Section 5.1.8.

¹⁰ As described in Section 5.1.9.

5.1.1 Depreciated Plant In-Service Costs

The original Yuba River Development Project facilities were constructed with funds from the issuance of \$185,000,000 in A and B bonds with a maturity date of 2016 and an interest rate of 4 to 6 percent. The annual debt service for principal and interest was \$7,700,000.

YCWA depreciated Project plant and equipment using the straight-line method over the estimated useful lives of the following facilities: 100 years for dams; 50 years for plants and turbines; 20 to 35 years for major equipment; and 5 to 10 years for accessory equipment.

As of December 2013, the total replacement cost of plant and equipment of the Project was approximately \$400,000,000, and the annual depreciation expense was \$2,800,000.

YCWA does not propose any changes to the Project that would change the estimate of current depreciation plant in-service costs.

5.1.2 Power Purchase Contract Management Costs

Under the existing PG&E power purchase contract, YCWA efforts related to a power purchase contract are mostly related to coordinating flow releases with PG&E.

Over the term of the new license, YCWA intends to seek out and enter into short-term power purchase contracts for the sale of Project’s power. Besides the costs of soliciting proposals, YCWA must also manage the new contracts. The cost for these activities (i.e., periodically soliciting and entering into a power purchase contract, managing the contracts, and settlements) is estimated to average \$500,000 annually over the term of the new license.

5.1.3 Local, State and Federal Fees and Payments Unrelated to Environmental and Recreation Measures

As a public agency, YCWA is generally exempt from public taxation. However, YCWA pays various fees to federal, State of California, and local governments for Project-related support services unrelated to environmental or recreation measures. Table 5.1-2 includes a list of the fees and payments unrelated to environmental or recreation measures paid by YCWA in Calendar Year 2013. These annual fees and payments total \$1,376,000.

Table 5.1-2. Federal, State, and local fees and payments in 2013 U.S. dollars unrelated to environmental or recreation measures paid by Yuba County Water Agency in Calendar Year 2013.¹

Agency to which Payment Was Made	Description of Payment	Annual Payment (2013 U.S. Dollars)
Federal Energy Regulatory Commission	Use of Federal Land, including National Forest System (NFS) Land and Land Managed by the United States Army Corps of Engineers	\$303,000 ²
Federal Energy Regulatory Commission	Project Administration	\$772,000
California State Water Resources Control Board (SWRCB)	Water Rights	\$80,000
United States Army Corps of Engineers (USACE)	Payment for Storage of Water in Englebright Reservoir	\$100,000
California Division of Safety of Dams	Dam Safety	\$121,000
Total	--	\$1,376,000

¹ Federal State and local sales tax on capital improvement equipment is included in the costs for the capital improvement equipment shown in Sections 5.1.4 and 5.1.6.

² Based on 3,834.470 acres of Zone F federal land in the FERC Project Boundary, per FERC’s most recent Statement of Use Annual Charges for U.S. Lands.

YCWA anticipates local, state and federal fees will increase from the existing annual costs to approximately \$2,000,000. In part, this increase is due to payments to the federal government for use of Englebright Dam in accordance with FPA § 11.4.

5.1.4 Capital Addition Costs Unrelated to Environmental and Recreation Measures

Under the existing power purchase contract, YCWA’s Project capital expenses have averaged approximately \$6,000,000 annually.

With the termination of the PG&E power purchase contract, YCWA anticipates its annual capital addition costs will average approximately \$7,500,000. The costs will vary from year to year based on the scheduling of capital work, which will include life cycle costs such as runner replacements, generator rewinds, and oil circuit breakers replacements, building replacements

and routine replacement of vehicles and tools. The costs do not include contingency for unexpected repair work that are covered under the Operating Reserve (Section 5.1.7).

5.1.5 Normal O&M Costs Unrelated to Environmental and Recreation Measures

In 2013, YCWA's expenses to operate the Project, excluding costs associated with environmental and recreation items, were approximately \$7,562,000. The expenses include YCWA's O&M staff time, interim replacement costs, insurance, administration and general expenses.

YCWA anticipates normal O&M in the future will expand to include at least a 24-hr-per-day/7-days-per-week control room function, snow survey and hydrologic forecasting, and the addition of management and engineering staff. YCWA anticipates that the normal average annual O&M costs will be \$10,500,000.

5.1.6 FERC License Application Costs

To date, YCWA has expended about \$22,000,000 to prepare its application. These costs include YCWA's internal administrative costs, costs spent on outside consultants including the cost to complete the relicensing studies, and the cost for the pre-filing consultation process with the resource agencies and other Relicensing Participants through late 2013. YCWA's cost to complete the relicensing process may be as high as an additional \$5,000,000 if, as provided under the Energy Policy Act, evidentiary trial-type hearings occur and parties choose to offer alternative measures. Therefore, the total cost for relicensing is estimated to be \$27,000,000. Assuming these costs are recovered over a 30-year term, the average annual cost is \$900,000. YCWA plans to recover these costs from the Project over the term of the new license.

5.1.7 Operating Reserve

YCWA plans to build an operating reserve of \$25,000,000. As parts or all of this reserve are expended, the reserve will be re-established. Assuming the reserve is built-up, totally depleted and built-up again over 30 years, the annualized cost of creating and replenishing the reserve is \$1,667,000 annually.

5.1.8 Transmission Line Access Costs

For continued Project O&M and delivery of Project power, YCWA must obtain transmission access.⁷ The special facilities charge for transmission line access and capacity through a third party is assumed to be a monthly tariff set at 1.14 percent of transmission line capital investment, including transmission line permitting/licensing costs. This is assumed to be \$100,000 annually based on access over existing PG&E transmission lines.

⁷ The Project itself contains no transmission lines. Refer to Section 2.3 of Exhibit H, *Miscellaneous Filing Material*, for a description of how Project power enters the California electric grid.

5.1.9 Costs Related to Environmental and Recreation Measures

From 2008 through 2012, YCWA expended \$250,000 for recreation facilities improvements (e.g., upgrades to the water treatment plant, purchase of a boat for United States Department of Agriculture, Forest Service, construction and installation of bear boxes, and placement of vehicular barriers). The average annual expenditure was approximately \$50,000.⁸

The current FERC license for the Project includes articles for the protection, mitigation and enhancement of environmental resources and recreation. Table 5.1-3 provides YCWA best estimate of normal O&M annual average costs associated with the primary measures. Over the past 5 years, these costs averaged \$1,809,000 annually.

Table 5.1-3. Yuba County Water Agency’s estimated average annual costs in 2013 U.S. dollars for implementation of existing environmental and recreation measures.

Article or Measure	Description	Average Annual Costs (2013 U.S. Dollars)
CURRENT FERC LICENSE		
Article 6	Activities related to gaging, such as coordination with the United States Geological Survey for reservoir and streamflow gaging, including payment for publication of data and gage rating; and YCWA staff time and expenses to O&M gages	\$135,000
Article 7	Activities related to keeping reservoir and Project facilities safe for public use and consistent with environmental issues, such as keeping the reservoir free of floating material, placing log booms and managing for species listed under the Federal Endangered Species Act, controlling non-native invasive species, participation in a water temperature advisory committee, and management of hazardous materials.	\$230,000
Article 33	Maintaining Minimum Streamflows and Ramping Rates	\$20,000
Article 34	Activities related to adherence to the New Bullards Bar minimum pool requirement.	\$1,000
Article 46	Activities related to coordination of the Project operations with the USACE for flood control	\$10,000
Article 56	Activities related to the O&M of the Project recreation facilities. This includes payments to the Forest Service and Emerald Cove Marina, Inc. for concessionaire-type services, YCWA staff time for concessionaire-type work, and payments to the County Sheriff for patrols.	\$663,000
<i>subtotal</i>		<i>\$1,059,000</i>
LOWER YUBA RIVER ACCORD		
--	Annual funding of the Lower Yuba River Accord Yuba River Management Team (RMT)	\$750,000
<i>Subtotal</i>		<i>\$750,000</i>
Total		\$1,809,000

5.2 Gross Power Benefits

Gross power benefits reflect the avoided cost of replacing the Project’s energy generation and dependable capacity with equally reliable energy and capacity from an alternative source.

This section is divided into four subsections. Section 5.2.1 provides an estimate of energy generation under the No Action Alternative from three sources: 1) historical actual generation from 2008 through 2012; 2) modeled generation from WY 1970 through WY 2010 using the most recent version of YCWA’s Yuba River Development Project Water Balance/Operations

⁸ The estimate does not include capital improvements made by the Forest Service directly from Forest Service funds, or by YCWA and/or the Forest Service through grants.

Model (Operations Model), which is provided in Exhibit E, Appendix E6, of YCWA’s Application for New License; and 3) modeled ancillary service from WYs 1970 through 2010 using YCWA’s Operations Model. Section 5.2.2 estimates Project authorized installed capacity and dependable capacity. Installed capacity is FERC’s authorized installed capacity (i.e., nameplate rating), and dependable capacity is provided as historical dependable capacity and modeled dependable capacity, the latter using YCWA’s Operations Model. Section 5.2.3 provides an estimate of the unit value of power for capacity; energy, including off peak, peak, partial peak and super peak energy; and ancillary services. Section 5.2.4 estimates the value of the power under the No Action Alternative using modeled energy generation provided in Sections 5.2.1 and 5.2.2 and the market prices of energy and capacity provided in Section 5.2.3. Section 5.2.4 also provides an estimate of the cost of the Project’s power if it was provided by simple-cycle natural gas-fired generation, the most likely replacement power alternative.

5.2.1 Energy Generation

5.2.1.1 Historical Energy Generation

Table 5.2-1 shows the historical monthly gross generation in megawatt-hours (MWh) at New Colgate, New Bullards Bar Minimum Flow, and Narrows 2 powerhouses each, and the combined gross generation from these powerhouses from Calendar Year 2008 through 2012.

Table 5.2-1. Total and average monthly gross generation in megawatt-hours for Calendar Years 2008 through 2012 at each powerhouse in the Yuba River Development Project.

Month	Monthly Total Generation (MWh)					Average Annual Generation (MWh)
	2008	2009	2010	2011	2012	
NEW COLGATE POWERHOUSE						
January	44,963	31,794	38,092	181,483	40,731	67,413
February	44,722	17,369	44,826	115,626	30,660	50,641
March	28,435	11,267	42,161	174,549	56,089	62,500
April	63,529	86,042	53,317	205,378	150,595	111,772
May	88,951	150,474	114,061	221,565	135,021	142,014
June	81,679	135,506	207,853	228,706	112,936	153,336
July	107,230	140,703	211,577	233,779	147,477	168,153
August	91,074	130,479	158,872	196,310	144,413	144,230
September	58,147	53,531	57,543	55,500	66,610	58,266
October	641	43,377	46,344	42,615	58,063	38,208
November	0	48,695	45,238	48,977	57,198	40,022
December	17,497	37,015	135,605	44,149	103,692	67,592
<i>Subtotal</i>	<i>626,868</i>	<i>886,252</i>	<i>1,155,489</i>	<i>1,748,637</i>	<i>1,103,485</i>	<i>1,104,147</i>
NEW BULLARDS BAR MINIMUM FLOW POWERHOUSE						
January	71	92	79	99	91	86
February	70	61	87	53	84	71
March	99	96	102	71	66	87
April	71	91	96	93	76	85
May	0	95	96	101	90	76
June	0	93	98	92	93	75
July	0	104	96	98	95	79
August	57	62	84	98	94	79
September	95	92	95	94	95	94
October	76	89	99	94	98	91
November	102	95	90	96	83	93
December	83	88	83	98	75	85
<i>Subtotal</i>	<i>724</i>	<i>1,058</i>	<i>1,105</i>	<i>1,087</i>	<i>1,040</i>	<i>1,001</i>

Table 5.2-1. (continued)

Month	Monthly Total Generation (MWh)					Average Annual Generation (MWh)
	2008	2009	2010	2011	2012	
NARROWS 2 POWERHOUSE						
January	11,361	0	6,781	34,571	1,765	10,896
February	11,030	4,613	11,425	22,188	44	9,860
March	0	5,297	13,436	35,940	13,664	13,667
April	11,762	18,099	16,101	37,839	30,066	22,773
May	18,392	35,465	23,891	39,228	24,030	28,201
June	13,628	17,369	37,281	37,749	11,637	23,533
July	18,513	19,987	34,290	37,164	18,133	25,617
August	16,077	15,658	20,213	27,849	17,349	19,429
September	372	121	80	442	0	203
October	2,787	185	1,499	3,590	858	1,784
November	1,436	0	2,265	9,781	6,589	4,014
December	0	0	29,573	8,083	29,632	13,458
<i>Subtotal</i>	<i>105,358</i>	<i>116,794</i>	<i>196,835</i>	<i>294,424</i>	<i>153,767</i>	<i>173,435</i>
TOTAL PROJECT						
January	56,395	31,886	44,952	216,153	42,587	78,395
February	55,822	22,043	56,338	137,867	30,788	60,572
March	28,534	16,660	55,699	210,560	69,819	76,254
April	75,362	104,232	69,514	243,310	180,737	134,630
May	107,343	186,034	138,048	260,894	159,141	170,291
June	95,307	152,968	245,232	266,547	124,666	176,944
July	125,743	160,794	245,963	271,041	165,705	193,849
August	107,208	146,199	179,169	224,257	161,856	163,738
September	58,614	53,744	57,718	56,036	66,705	58,563
October	3,504	43,651	47,942	46,299	59,019	40,083
November	1,538	48,790	47,593	58,854	63,870	44,129
December	17,580	37,103	165,261	52,330	133,399	81,135
Total	732,950	1,004,104	1,353,429	2,044,148	1,258,292	1,278,583

Some of the generated power is used at the Project’s powerhouses for station use. Station energy use annually is about 1 MWh at New Colgate Powerhouse and less than 0.1 MWh at New Bullards Bar Minimum Flow and Narrows 2 powerhouses each.

5.2.1.2 Modeled Energy Generation

YCWA has operated the Project since 1970. However, Project operations have changed through time. Therefore, in some cases historical information may not provide the best picture of existing conditions. To better describe existing energy generation over a range of hydrologic conditions, YCWA developed the Operations Model. Table 5.2-2 provides a summary of annual generation by powerhouse based on a run of the Operations Model under the No Action Alternative.

Table 5.2-2. Yuba County Water Agency’s estimated average annual generation in megawatt-hours for water years 1970 through 2010 at each powerhouse in the Yuba River Development Project under the No Action Alternative.

Powerhouse	Average Annual Generation Under Existing Conditions (MWh/yr)					Maximum Average Annual Generation (MWh/yr) ¹
	Peak	Partial Peak	Off Peak	Super Off Peak	Total	
New Colgate Powerhouse	172,870	439,850	526,218	86,826	1,225,764	2,199,093
New Bullards Bar Minimum Flow	82	284	423	158	947	940

Table 5.2-2. (continued)

Powerhouse	Average Annual Generation Under Existing Conditions (MWh/yr)					Maximum Average Annual Generation (MWh/yr) ¹
	Peak	Partial Peak	Off Peak	Super Off Peak	Total	
Narrows 2 Powerhouse	14,583	53,426	78,275	29,256	175,540	366,803
Total	187,535	493,560	604,916	116,240	1,402,251	2,566,836

Source: No Action Alternative Model Run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA's Application for New License.

¹ The maximum powerhouse capability is the maximum average annual generation for that powerhouse from WY 1970 through WY 2010 under the No Action Alternative. The maximum occurred at all three powerhouses in 1983.

The Project's average annual generation from WY 2008 through WY 2012 listed in Table 5.2-1 of 1,278,583 MWh is less than the Project average annual generation of 1,402,251 MWh listed in Table 5.2-2 because: 1) the total of Table 5.2-1 is historical data and Table 5.2-2 is Operations Model data, and the period of record for these two averages is not the same; 2) releases from the Project for WYs 2008 through 2012 were somewhat lower than the average releases of the Operations Model period of WYs 1970 through 2010 due to drier hydrology; and 3) the historical WY 2008 included several months when the New Colgate Powerhouse was shut down for maintenance and installation of a penstock guard valve, which was not represented in the Operations Model.

Table 5.2-3 shows definitions of time blocks for peak, partial peak, off peak and super off peak that are used in the remainder of this exhibit. These time blocks are defined by PG&E pursuant to California Public Utility Commission (CPUC) Decision D.10-12-035 (PG&E Short-Run Avoided Cost (SRAC) Energy Prices for Qualifying Facilities). YCWA uses these time blocks in this exhibit because the Project resides within the PG&E load service area.

Table 5.2-3. Time block definitions used in Table 5.2-2.¹

Time of Use Periods	Time Blocks			Days Applicable
	Period A—Summer (May 1–October 31)	Period B—Winter (November 1–April 30)		
Peak	Noon–6:00 p.m.	NA		Weekdays
Partial-Peak	8:30 a.m.–Noon	8:30 a.m.–9:30 p.m.		Weekdays
	6:00 p.m.–9:30 p.m.			Weekdays
Off-Peak	9:30 p.m.–1:00 a.m.	9:30 p.m.–1:00 a.m.		Weekdays
	5:00 a.m.–8:30 a.m.	5:00 a.m.–8:30 a.m.		Weekdays
	5:00 a.m.–1:00 a.m.	5:00 a.m.–1:00 a.m.		Weekends
Super Off-Peak	1:00 a.m.–5:00 a.m.	1:00 a.m.–5:00 a.m.		All days

¹ Actual time blocks include exceptions for holidays that are not used in the table calculations of this Exhibit D.

Table 5.2-4 shows the estimated monthly average generation in MWh for WYs 1970 through 2010 by time block for the three Project powerhouses and the Project overall under the No Action Alternative based on results of the Operations Model.

Table 5.2-4. Estimated average monthly generation in megawatt-hours for water years 1970 through 2010 by time block for the three Project powerhouses and the Project overall under the No Action Alternative.

Month	Peak (MWh)	Partial-Peak (MWh)	Off-Peak (MWh)	Super Off Peak (MWh)	Total (MWh)
NEW COLGATE POWERHOUSE					
January	0	47,556	42,490	7,478	97,524
February	0	50,658	48,271	9,674	108,603
March	0	55,229	55,504	13,634	124,367
April	0	53,341	52,081	8,587	114,009
May	38,549	34,601	67,005	13,100	153,255
June	38,130	37,885	69,806	16,514	162,335
July	37,448	36,195	57,178	10,643	141,464
August	32,998	29,142	43,360	3,364	108,864
September	15,332	18,160	18,430	0	51,922
October	10,413	18,403	21,219	40	50,075
November	0	27,738	22,847	544	51,129
December	0	30,942	28,027	3,248	62,217
<i>Subtotal</i>	<i>172,870</i>	<i>439,850</i>	<i>526,218</i>	<i>86,826</i>	<i>1,225,764</i>
NEW BULLARDS BAR MINIMUM FLOW POWERHOUSE					
January	0	33	38	14	85
February	0	30	34	13	77
March	0	31	36	14	81
April	0	28	33	12	73
May	12	14	30	11	67
June	11	13	28	10	62
July	13	16	33	12	74
August	15	17	37	14	83
September	15	17	38	14	84
October	16	18	39	15	88
November	0	33	38	14	85
December	0	34	39	15	88
<i>Subtotal</i>	<i>82</i>	<i>284</i>	<i>423</i>	<i>158</i>	<i>947</i>
NARROWS 2 POWERHOUSE					
January	0	6,793	7,809	2,920	17,522
February	0	7,848	9,018	3,373	20,239
March	0	9,349	10,649	4,000	23,998
April	0	7,829	9,103	3,387	20,319
May	4,404	5,138	11,000	4,108	24,650
June	4,060	4,736	10,076	3,774	22,646
July	2,905	3,389	7,284	2,716	16,294
August	2,034	2,373	5,074	1,896	11,377
September	656	766	1,642	613	3,677
October	524	612	1,372	501	3,009
November	0	1,231	1,379	522	3,132
December	0	3,362	3,869	1,446	8,677
<i>Subtotal</i>	<i>14,583</i>	<i>53,426</i>	<i>78,275</i>	<i>29,256</i>	<i>175,540</i>
TOTAL PROJECT					
January	0	54,382	50,337	10,412	115,131
February	0	58,536	57,323	13,060	128,919
March	0	64,609	66,189	17,648	148,446
April	0	61,198	61,217	11,986	134,401
May	42,965	39,753	78,035	17,219	177,972
June	42,201	42,634	79,910	20,298	185,043
July	40,366	39,600	64,495	13,371	157,832
August	35,047	31,532	48,471	5,274	120,324
September	16,003	18,943	20,110	627	55,683
October	10,953	19,033	22,630	556	53,172
November	0	29,002	24,264	1,080	54,346
December	0	34,338	31,935	4,709	70,982
Total	187,535	493,560	604,916	116,240	1,402,251

Source: No Action Alternative Model Run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA's Application for New License.

5.2.1.3 Modeled Ancillary Services

Ancillary services are provided by the New Colgate Powerhouse. These capacity products include regulation-up, regulation-down and spinning reserve. The California energy market does have other ancillary services, such as non-spinning reserve, but these other products are minor or not of significant value as compared with regulation-up, regulation-down and spinning reserve, which are the primary ancillary services of the Project.

The Operations Model does not calculate ancillary services directly. Rather, YCWA used a post process analysis to determine the hourly capacity for each product. The new Colgate Powerhouse generating units can go from no load to full capacity in the time required to qualify the full generating capacity of the powerhouse for regulation and spinning reserve. The hourly theoretical capacity for each product is only limited by the full capacity of the powerhouse and the amount of energy already committed for that hour. For regulation-up, the theoretical amount of capacity available is the full powerhouse capacity minus the generation committed that day. For regulation-down, it is the committed generation that day, theoretically allowing the unit to reduce to zero energy. Spinning reserve theoretical capacity is the same calculation as regulation-up. For determining the hourly value of each of the ancillary service products, other limits are imposed to ensure the pricing assumptions used in the valuation are valid. YCWA's determination of ancillary services value is described in more detail in Section 5.2.4.1.1. Table 5.2-5 provides estimated monthly ancillary services opportunities for New Colgate Powerhouse.

Table 5.2-5. Estimated average monthly ancillary services opportunities in megawatt-hours for water years 1970 through 2010 by market for the New Colgate Powerhouse under the No Action Alternative.

Month	Regulation-Up (MWh)	Regulation-Down (MWh)	Spinning Reserve (MWh)
January	23,448	19,153	91,598
February	19,081	20,912	74,127
March	19,953	23,697	78,738
April	22,521	21,426	96,839
May	17,836	28,096	76,944
June	14,815	29,488	63,859
July	19,959	26,054	85,998
August	25,552	20,609	108,112
September	34,282	10,536	142,481
October	35,914	10,867	146,841
November	33,026	10,990	132,890
December	30,551	12,549	120,504
Total	296,938	234,377	1,218,931

Source: No Action Alternative Model Run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA's Application for New License, and post-processing.

5.2.2 Project Capacity

5.2.2.1 FERC Authorized Installed Capacity

The Project has three powerhouses and one of the powerhouses, New Colgate, has two generating units. Table 5.2-6 shows the FERC total authorized installed capacity in kilowatts (kW) for each powerhouse and the total FERC-authorized installed nameplate capacity for the Project, based on a June 10, 1992 FERC order.

Table 5.2-6. FERC-authorized installed nameplate capacity in kilowatts for the Yuba River Development Project by powerhouse.

Powerhouse	FERC-Authorized Nameplate Capacity (kW)
New Colgate, Unit 1	157,500
New Colgate, Unit 2	157,500
New Bullards Bar Minimum Flow, Unit 1	150
Narrows 2, Unit 1	46,750
Total	361,900

Under favorable conditions, historical generation from the Project has at times exceeded the Project’s total authorized installed capacity by as much as approximately 10 percent.

5.2.2.2 Historical Dependable Capacity

The dependable capacity of a generating facility is defined as “*the generating capacity that the plant can deliver under the most adverse water supply conditions to meet the needs of an electric power system with a given maximum demand.*” (Elliott et al. 1997). One of the critical parameters for defining dependable capacity is the period over which the capacity must be provided. Traditionally, a year or season from time of maximum storage to minimum storage is used for the time period over which capacity is calculated. For a peaking plant, the dependable capacity critical period is less precisely defined and is specific to the plant demand and constraints.

For base load generation, the time period of the most adverse hydrology was WY 1977, characterized by the most extreme 1-year drought conditions in the hydrologic period of record, which also followed WY 1976, also a dry WY. The annual unimpaired runoff of the Yuba River measured at the Smartsville Gage, which is located on the Yuba River downstream of Narrows 2 Powerhouse, was 370,000 acre-feet (ac-ft) in WY 1977, which was about a 1-in-200 year occurrence. In WY 1977, the amount of inflow to New Bullards Bar Reservoir, including diversions from the Middle Yuba River and Oregon Creek, totaled about 164,000 ac-ft of water, or an annual average flow rate of 226 cubic feet per second (cfs).

For peaking facilities such as the New Colgate Powerhouse, the typical time period for assessing dependable capacity in the California power system is the most critical 6 hour time period. Unless New Bullards Bar Reservoir runs dry or is at the minimum pool with insufficient inflow, the full capacity of 315 megawatts (MW) of New Colgate Powerhouse is available for any 6 hour time period. However, a powerhouse’s capacity is affected by a range of the variables of head, power factor, flow and efficiency.

Table 5.2-7 shows the estimated dependable capacity at each powerhouse and the overall Project.

Table 5.2-7. Historical dependable annual capacity in kilowatt for New Colgate, Narrows 2, and the New Bullards Bar Minimum Flow powerhouses.

Powerhouse	WY of Lowest Available Capacity	Dependable Capacity in that WY
New Colgate Powerhouse ¹	1977	292,702 kW
Narrows 2 Powerhouse ²	1977	0 kW

Table 5.2-7. (continued)

Powerhouse	WY of Lowest Available Capacity	Dependable Capacity in that WY
New Bullards Bar Minimum Flow ³	2001	70 kW
Total	--	292,772 kW

¹ New Colgate Powerhouse dependable capacity is full capacity (315 MW), limited by available head. New Bullards Bar Reservoir was drawn down to its FERC-minimum pool (elevation 1,732 ft) in November and December 1977.

² Because there are two powerhouses at Englebright Dam and the Narrows 1 Powerhouse is used in lower flow conditions, the Narrows 2 Powerhouse did not operate for extended periods in 1977, the critically dry period, due to all releases from Englebright Dam being made through the Narrows 1 Powerhouse.

³ The New Bullards Bar Minimum Flow Powerhouse operates with a continuous flow of about 5 cfs. Dependable capacity determined by computing the average hourly capacity for the low-generation month since January 2000 for September 2001.

5.2.2.3 Modeled Dependable Capacity

For WY 1977, storage in New Bullards Bar Reservoir played a significant role in augmenting the water supply available for release through the New Colgate Powerhouse. Modeling of the No Action Alternative as detailed in Technical Memorandum 2.2, *Water Balance/Operations Model*, which is contained in Exhibit E, Appendix E6 of YCWA’s Application for New License, provides results of releases and generation using current minimum flow requirements (i.e., the Lower Yuba River Accord) and current consumptive demands.

In WY 1977, the lowest modeled annual average flow through each of the Project powerhouses occurred. The total release through the New Colgate Powerhouse is 372,412 ac-ft, with an annual generation of 352,597 MWh of electricity, based on the Operations Model results. Because the New Colgate Powerhouse is a peaking facility, for the most critical 6 hour period, which is the typical time period for assessing dependable capacity in the California power system, the full capacity of 315 MW is available for dispatch and defines the dependable capacity of this powerhouse.

As with the historical capacity, the New Colgate Powerhouse modeled dependable capacity is based on a peaking powerhouse metric, which is the capacity over the most critical 6 hour period, with consideration to head.

As discussed in previous sections, the Narrows 2 Powerhouse is a base-loaded power generation facility. Therefore, the dependable capacity of the Narrows 2 Powerhouse is determined by the period of the most adverse hydrology, which was WY 1977. The annual flow volume at USACE’s Englebright Reservoir for WY 1977, based on the Operations Model results is 444,985 ac-ft. This included 376,394 ac-ft of releases from New Bullards Bar Reservoir and the remaining amount from local accretions from the Middle Yuba and South Yuba rivers.

In WY 1977, the modeled operations of the Project results in no flow at Englebright Dam available for power generation through the Narrows 2 Powerhouse, because the model assumes that all of this water would be used to generate power at Narrows 1 Powerhouse. As described above, for the No Action Alternative, the determination of releases through the powerhouses is based on required release rate, facility capacity and facility efficiency as well as a preference for

RPS,⁹ power at the Narrows 1 Powerhouse. For WY 1977, the maximum Englebright Reservoir release rate is 817 cfs. The Operations Model uses the Narrows 1 Powerhouse plus releases through the Narrows 2 Full Bypass for flows from zero to 900 cfs from Englebright Dam. Under the No Action Alternative, the model does not consider the relative priorities of the water rights for the Narrows 1 and Narrows 2 powerhouses.^{10,11}

The New Bullards Bar Minimum Flow Powerhouse is a base-loaded powerhouse. Its dependable capacity is calculated as the modeled minimum-daily average generation, in kilowatt-hours (kWh), divided by 24, which occurred on March 10, 1995.

Table 5.2-8 provides modeled dependable capacity by powerhouse and for the Project overall.

Table 5.2-8. Modeled dependable capacity in kilowatts (kW) for New Colgate, Narrows 2 and New Bullards Bar Minimum Flow powerhouses.

Powerhouse	WY of Lowest Available Capacity	Dependable Capacity in that WY
Narrows 2 Powerhouse	1977	0 kW
New Bullards Bar Minimum Flow	1995	57 kW
New Colgate Powerhouse	1977	287,309 kW
Total	--	287,366 kW

Source: No Action Alternative Model Run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA’s Application for New License.

The difference between the historical dependable capacity of 292,772 kW shown in Table 5.2-7 and the modeled dependable capacity of 287,366 kW shown in Table 5.2-8 is minor and is due to the No Action Alternative’s assumption that New Bullards Bar Reservoir’s water surface elevation would be reduced below the FERC minimum pool in 1977.

5.2.3 Unit Value of Power¹²

5.2.3.1 Market Price of Capacity

There are two categories of capacity products that are provided by the Project - Resource Adequacy and Ancillary Services. For the California power market, the CPUC has established that sufficient capacity to serve expected load must be provided by load serving entities as Resource Adequacy (California Public Utilities Code Section 380). However, there is no

⁹ Senate Bill X1-2, signed by Governor Brown in April 2011.

¹⁰ YCWA and PG&E are in the process of negotiating a new agreement for the coordinated operations of the Narrows 1 and Narrows 2 powerhouses, and the allocation of revenues from the power generated by these powerhouses, for the period beginning on May 1, 2016 (after expiration of YCWA’s current power purchase agreement with PG&E on April 30, 2016). If the parties enter into such a new agreement, then it may change this programming constraint and thus the amount of future dependable capacity for the Narrows 2 Powerhouse. If the parties do not enter into such a new agreement, then this programming constraint probably will change.

¹¹ For modeling and evaluation purposes, Project operations are assumed to be similar to current operations and the value of the generation from the Narrows 1 and Narrows 2 powerhouses is assumed to be split according to water rights. Future operations and future revenues to YCWA from the Narrows 2 Powerhouse may change if YCWA and PG&E do not enter into such a new agreement, or if the new agreement contains different terms for operations or revenue sharing.

¹² Any use of the market prices of installed and dependable capacity and energy information in this Exhibit D for forecasting current or future value of Project power is speculative, may be inappropriate, and is subject to the user’s assumptions and risk.

transparent market for Resource Adequacy because each load serving entity provides and acquires the necessary resources through the development of bilateral negotiations. In addition to market value unknowns, Resource Adequacy has a system wide and a local component of value that further clouds its valuation. Due to the limitations on determining the market for capacity and the availability of capacity values, this element of the benefits of the Project cannot be determined.

Ancillary services are firm capacity products that are offered over various time horizons, where some or all of the available capacity of the generating facility is provided to respond to uncertainties in system load and generation resulting in regulation and stabilization of the energy grid. For Ancillary Services, these capacity products are provided by the New Colgate Powerhouse, and historical prices for these products and their use in determining Project value are described in the sections below.

5.2.3.2 Market Price of Energy

Under California's RPS regulations, California investor-owned utilities, electric service providers, and community choice aggregators must increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2030. One of the Project's powerhouses qualifies as an RPS-eligible generating unit (nameplate capability of less than 30 MW) - New Bullards Bar Minimum Flow Powerhouse, which has a FERC nameplate rating of 150 kW). One powerhouse, the Narrows 2 Powerhouse, is not RPS-eligible and is not used for ancillary services, which are discussed below. The third Project powerhouse, New Colgate Powerhouse, is not RPS-eligible and is used for ancillary services. YCWA's approach to valuing energy generated by each of the powerhouses is discussed below.

5.2.3.2.1 Narrows 2 Powerhouse – Peak, Partial Peak, Off-Peak and Super Off Peak Power Values

The California Independent System Operator (CAISO) publishes historical prices for each of the several thousand nodes within its electrical balancing area using a web based system called Open Access Same-time Information System (OASIS). In OASIS, settled prices are provided for the various markets run by the CAISO, including the Day-Ahead Market, which provides for hourly pricing of energy and ancillary services. The Narrows 2 Powerhouse is represented as a node in the system, and a Locational Marginal Price (LMP) is published for each hour of the day for this node. To determine prices to be used with the energy generation under the No Action Alternative resulting from YCWA's Operations Model, 3 years of hourly LMPs from July 2009 to June 2012 were averaged to obtain a single representative year of recent historical hourly values. Table 5.2-9 lists a summary of Narrows 2 Powerhouse LMPs in dollars per MWh, averaged by month for the four CPUC time blocks.^{13,14}

¹³ Table 5.2-3 describes the time blocks used in Table 5.2-8.

¹⁴ Narrows 2 Powerhouse is a base load facility and does not operate for peaking; however, peak hour prices are applied to the generation that occurs during the peak hours to obtain the total power value for each hour.

Table 5.2-9. California Independent System Operator published monthly average of Day-Ahead hourly Locational Marginal Prices for Narrows 2 Powerhouse by the California Public Utility Commission Time Block based on historical data from 2009 through 2012.

Month	Peak (Dollar/MWh)	Partial Peak (Dollar/MWh)	Off Peak (Dollar/MWh)	Super Off Peak (Dollar/MWh)
January	--	\$37.43	\$34.13	\$26.19
February	--	\$35.43	\$32.65	\$24.05
March	--	\$30.96	\$28.00	\$18.10
April	--	\$24.03	\$21.59	\$14.47
May	\$28.72	\$26.09	\$23.37	\$14.18
June	\$35.27	\$28.95	\$23.05	\$9.55
July	\$42.70	\$33.99	\$28.22	\$19.81
August	\$40.46	\$33.16	\$29.54	\$22.89
September	\$42.95	\$37.30	\$33.61	\$25.96
October	\$39.29	\$38.61	\$34.34	\$26.15
November	--	\$36.00	\$32.57	\$25.56
December	--	\$40.19	\$37.53	\$28.46

5.2.3.2.2 New Colgate Powerhouse - Peak, Partial Peak, Off-Peak and Super Off Peak Power Values

As with the Narrows 2 Powerhouse, the New Colgate Powerhouse is represented as a node in the OASIS system, and a LMP is published for each hour of the day for this node. To determine prices to be used with the energy generation under the No Action Alternative resulting from YCWA’s Operations Model, 3 years of hourly LMPs from July 2009 to June 2012 were averaged to obtain a single representative year of hourly power values. Table 5.2-10 lists a summary of New Colgate Powerhouse LMP values averaged by month for the four CPUC time blocks.

Table 5.2-10. California Independent System Operator published monthly average of Day-Ahead hourly Locational Marginal Prices for New Colgate Powerhouse by the California Public Utility Commission time block based on historical data from 2009 through 2012.

Month	Peak (Dollar/MWh)	Partial Peak (Dollar/MWh)	Off Peak (Dollar/MWh)	Super Off Peak (Dollar/MWh)
January	--	\$37.59	\$34.97	\$26.54
February	--	\$35.45	\$33.24	\$24.18
March	--	\$31.33	\$28.90	\$18.32
April	--	\$27.45	\$25.45	\$16.14
May	\$29.85	\$27.20	\$25.24	\$14.69
June	\$35.95	\$29.51	\$25.22	\$9.76
July	\$42.95	\$34.22	\$30.40	\$20.16
August	\$40.26	\$33.12	\$30.93	\$23.15
September	\$41.99	\$36.55	\$34.23	\$25.71
October	\$38.81	\$38.10	\$34.81	\$25.90
November	--	\$35.60	\$32.87	\$25.39
December	--	\$39.98	\$37.91	\$28.51

5.2.3.2.3 New Bullards Bar Minimum Flow Powerhouse - Peak, Partial Peak, Off-Peak and Super Off Peak Power Values

The power prices used in valuing generation for the New Bullards Bar Minimum Flow Powerhouse are the Short-Run Avoided Cost (SRAC) energy prices published by PG&E for Qualifying Facilities (QF) to represent recent power prices for the energy generated from this

powerhouse. The power purchase contract for this powerhouse is separate from the rest of the Project and runs for several years beyond the termination of the Project power purchase contract with PG&E. Although the powerhouse rated capacity of 0.15 MW is less than the maximum limit of 30 MW for a RPS qualifying generating facility and might qualify for the higher prices for RPS energy, the current contract is for market power and not for RPS credited power; therefore, the SRAC prices are used for the No Action Alternative. Table 5.2-11 lists the SRAC prices by month and time block for the New Bullards bar Minimum Flow Powerhouse.

Table 5.2-11. PG&E Published Short-Run Avoided Cost Energy Prices for Qualifying Facilities by CPUC time block based on historical data from 2009 through 2012.

Month	Peak (Dollar /MWh)	Partial Peak (Dollar /MWh)	Off Peak (Dollar /MWh)	Super Off Peak (Dollar /MWh)
January	--	\$43.00	\$38.19	\$32.76
February	--	\$41.06	\$36.61	\$31.72
March	--	\$38.18	\$33.89	\$29.50
April	--	\$38.01	\$34.08	\$29.86
May	\$39.20	\$36.63	\$32.78	\$28.23
June	\$42.35	\$39.48	\$35.06	\$29.90
July	\$43.92	\$40.94	\$36.60	\$30.99
August	\$45.05	\$41.94	\$36.80	\$31.39
September	\$41.71	\$38.82	\$34.71	\$29.05
October	\$43.17	\$40.12	\$35.10	\$29.62
November	--	\$41.86	\$36.94	\$31.21
December	--	\$43.32	\$38.24	\$32.15

5.2.3.3 Market Price of Ancillary Services

Prices for ancillary services are published by the CAISO on the OASIS system just as energy prices are published. Three ancillary service products that are provided by the New Colgate Powerhouse are used to quantify the current ancillary service value of the project. These ancillary services are: 1) regulation up; 2) regulation down; and 3) spinning reserve. The analysis of ancillary service benefits uses a single year of hourly ancillary service prices that are based on the average of 3 years of CAISO Day-Ahead market prices for the period from July 2009 to June 2012. Table 5.2-12 summarizes the ancillary services prices as average monthly prices for regulation up, regulation down and spinning reserve.

Table 5.2-12. California Independent System Operator published monthly average of Day-Ahead hourly Ancillary Service Prices for New Colgate Powerhouse based on historical data from 2009-2012.

Month	Regulation Up (Dollar /MW)	Regulation Down (Dollar /MW)	Spinning Reserve (Dollar /MW)
January	\$5.49	\$3.91	\$3.66
February	\$4.25	\$3.68	\$2.50
March	\$ 6.40	\$4.21	\$3.96
April	\$10.21	\$6.17	\$6.92
May	\$10.59	\$7.04	\$8.07
June	\$10.10	\$7.28	\$7.95
July	\$7.57	\$6.33	\$6.05
August	\$5.42	\$4.65	\$4.16
September	\$3.81	\$5.10	\$2.94
October	\$4.89	\$5.24	\$3.69
November	\$4.89	\$5.26	\$3.42
December	\$4.88	\$5.93	\$3.23

5.2.4 Gross Power Benefits

5.2.4.1 Power Benefits Based on Market Prices

Power benefits were calculated based on WYs 2009 through 2012-averaged actual CAISO market prices and modeled generation, as calculated by YCWA’s Operations Model for the New Colgate Powerhouse, the New Bullards Bar Minimum Flow Powerhouse, and the Narrows 2 Powerhouse under the No Action Alternative. The resulting energy generation power benefit by powerhouse is listed in Table 5.2-13. Due to the differences in operations of the powerhouses, the calculation of power benefits also differs for these facilities.

Table 5.2-13. Simulated average annual gross power benefits in 2013 U.S. dollars by powerhouse for the No Action Alternative.

Powerhouse	Average Annual Gross Power Benefits (2013 U.S. Dollars)					Total
	Energy					
	Peak	Partial Peak	Off Peak	Super Off Peak	Ancillary Services	
New Colgate	\$6,393,862	\$15,822,170	\$17,517,654	\$1,820,563	\$6,495,661	\$48,049,910
Narrows 2	\$557,476	\$1,791,584	\$2,338,369	\$623,488	\$0	\$5,310,918
New Bullards Bar Minimum Flow	\$9,333	\$32,510	\$45,060	\$16,822	\$0	\$103,725
<i>Subtotal</i>	<i>\$6,960,671</i>	<i>\$17,646,264</i>	<i>\$19,901,083</i>	<i>\$2,460,873</i>	<i>\$6,495,661</i>	<i>--</i>
Total		\$46,968,891			\$6,495,661	\$53,464,552

The following describes the calculations used to derive the power benefits of the Project for each Project powerhouse.

5.2.4.1.1 New Colgate Powerhouse

New Colgate Powerhouse provides energy generation and ancillary services. YCWA’s Operations Model that was used to determine energy generation of the powerhouse does not have the capability to schedule generation on an hourly or daily basis to maximize power benefits based on market conditions, while operating within the system constraints. The New Colgate Powerhouse can produce power on a peak demand schedule as long as system constraints are satisfied. To approximate the peaking capability of the powerhouse, post processing of model output was done to determine the optimal energy generation schedule for each hour of each day of model output generation and by optimizing the generation for total power value of the 24 hour period. Once the optimization of energy generation was done, ancillary services opportunity benefit was calculated using a simplified set of assumptions regarding constraints of these products. The assumptions used to optimize generation and determine ancillary services capacity included perfect foresight of pricing to optimize generation, a limit on the quantity of regulation, and full utilization of capacity for spinning reserve.

Ancillary services values were determined once generation was allocated to optimize energy values each day of the period of simulation. With generation for each hour determined, the amount of regulation-up and regulation-down capacity that would be bid into the market was calculated as the minimum of either the available capacity (i.e., remaining powerhouse capacity

above generation for regulation-up, and generation down to a minimum value of 0 MW for regulations-down) or a selected pricing elasticity limit. Since historical market prices are used in the analysis and since in many hours the capacity of regulation at New Colgate Powerhouse bid into the market can significantly impact prices, a limit of 60 MW for regulation was selected as the limit of regulation capacity for which the use of historical market prices would no longer be a valid assumption. This is due to the elasticity of market prices with capacity supply bid into the market. The resulting regulation-up and -down capacity for each hour is multiplied times the historical hourly market price for that capacity product.

Spinning reserve capacity value was calculated by multiplying the remaining capacity after regulation-up capacity is determined times the historical hourly price for spinning reserve.

The above assumptions result in a very simplified analysis compared to actual market bidding and award conditions as well as other market complexities, but provide a reference for the relative value of the powerhouse output under the No Action Alternative. Resulting energy generation and ancillary service benefits for the New Colgate Powerhouse are listed in Table 5.2-13.

5.2.4.1.2 Narrows 2 Powerhouse

For this powerhouse, which operates in a base load configuration and does not provide ancillary services, the only power benefit is energy generation. The energy generation benefit is determined by multiplying the market based hourly value as described in Table 5.2-9 times the mean-daily modeled generation described in Table 5.2-4 divided into 24 hours of equal generation. Resulting energy generation for the Narrows 2 Powerhouse is listed in Table 5.2-13. There are no ancillary services for this powerhouse.

5.2.4.1.3 New Bullards Bar Minimum Flow Powerhouse

This powerhouse runs continuously at a relatively constant release rate to maintain the required minimum flow below the dam, and therefore produces an almost constant rate of energy generation. Because power pricing for the New Bullards Bar Minimum Flow Powerhouse is only for two time blocks, peak and off-peak prices, and the other two powerhouses having pricing for four time blocks, the peak RPS prices are applied to both the peak and partial peak periods defined in Table 5.2-3 and the off peak RPS price is applied to the off-peak and super off-peak time periods of Table 5.2-3. The power benefit for this powerhouse is based on multiplying the estimated peak and off-peak RPS power prices broken out into the four time blocks, times the mean-daily modeled generation divided into 24 hours of equal generation. Resulting energy generation for the New Bullards Bar Minimum Flow Powerhouse is listed in Table 5.2-13. There are no ancillary services for this powerhouse.

5.2.4.2 Power Benefits Based on Replacement Power

Replacing the output of the Project would be accomplished in one of two ways: 1) importing power into the region from an out-of-state facility; or 2) constructing a new generation facility within Northern California.

While importing power into the region to offset Project generation would be possible during some seasons, imports will be impossible during some seasons and hydrologic year types given the physical limits of the current transmission grid. To the extent that imported generation is available, it would be priced at CAISO market prices and would therefore yield a price consistent with the market rate estimate provided above.

For a new generation facility within Northern California, it is likely that replacement power would be produced by a combined cycle natural gas-fired generating facility. The CPUC's MPR process (CPUC 2011 at <http://www.cpuc.ca.gov/PUC/energy/Renewables/mpr>) includes a model and process to estimate long-term price of electricity for a combined cycle natural gas-fired facility. Utilizing the CPUC model and process, with updated assumptions, the MPR methodology yields a levelized power value of \$0.0751/kWh.

In addition, capital and O&M costs for a new gas pipeline and electric transmission, both of which are unknown at this time since they depend on the location of the new facility, would need to be added to the overall cost of the alternative. However, siting a combined cycle natural gas-fired plant in Northern California would be challenging given the limited availability of emission offsets in the region.

If a combined cycle natural gas-fired generating facility were to be sited to replace the power generation of the Project and the CPUC market Pricing Ruling cost of \$0.751/kW is used, the annual average cost of replacement power would be \$105,700,000.

5.3 Summary of No Action Alternative Costs and Power Benefits

Table 5.3-1 summarizes the Project's costs and power benefits under the No Action Alternative, based on the information provided above.

Table 5.3-1. Yuba County Water Agency's estimate of average annual costs and power benefits in 2013 U.S. dollars under the No Action Alternative.

Value	No Action Alternative
AVERAGE ANNUAL GROSS POWER BENEFITS	
Capacity	--
Installed ¹	361,900 kW
Dependable ²	287,366 kW
<i>Subtotal - Value in 2013 Dollars</i>	\$0
Energy	--
Peak Energy ³	187,535 MWh
Partial Peak Energy ³	493,560 MWh
Off-Peak Energy ³	604,915 MWh
Super Off-Peak ³	116,240 MWh
<i>Subtotal - Value in 2013 Dollars⁴</i>	\$46,968,891
Ancillary Services	--
Regulation-Up ⁵	296,938 MWh
Regulation-Down ⁵	234,377 MWh
Spinning Reserve ⁵	1,218,931 MWh
<i>Subtotal - Value in 2013 Dollars⁴</i>	\$6,495,661
Total - Value in 2013 Dollars⁴	\$53,464,552

Table 5.3-1. (continued)

Value	No Action Alternative
AVERAGE ANNUAL COSTS	
Non-Environmental/Recreational ⁶	\$25,967,000
Environmental/Recreational ⁶	\$1,809,000
Total - Value in 2013 Dollars⁶	\$27,776,000
AVERAGE ANNUAL NET BENEFIT	
Total 2013 U.S. Dollars⁷	\$25,688,552

¹ From Table 5.2-6.

² From Table 5.2-8.

³ From Table 5.2-2.

⁴ From Table 5.2-13.

⁵ From Table 5.2-5.

⁶ From Table 5.1-1.

⁷ Calculate by subtracting Average Annual Costs from Average Annual Gross Power Benefits.

6.0 Annual Cost of Operations and Gross Power Benefits Under YCWA's Proposed Project

Section 6 is divided into four major sections, each of which addresses YCWA's proposed Project. Section 6.1 discusses YCWA's proposed new facilities, Section 6.2 discusses costs, Section 6.3 discusses power benefits, and Section 6.4 provides a summary of costs and benefits.

6.1 New Facilities

Besides the expansion of some Project recreation facilities, YCWA proposes to add two new facilities to the Project: 1) a tailwater depression system (TDS) to the New Colgate Powerhouse; and 2) a flood control outlet to New Bullards Bar Dam. The costs for each new facility are presented below.

YCWA does not propose to add to the Project any previously constructed, unlicensed water power structures or facilities.

6.1.1 New Colgate Powerhouse Tailwater Depression System

As described in Section 5.1.1.1 of Exhibit A, Project Facilities, of YCWA's Application for New License, the TDS will introduce compressed air into the New Colgate Powerhouse turbine discharge chamber to lower the tailwater to a level that does not interfere with turbine operation, which sometimes occurs now, thereby allowing continued turbine operation during high flows. The TDS will thus increase the production of energy, and have an added benefit of enhancing the ability to regulate flood releases from New Bullards Bar Reservoir.

Based on a preliminary design and feasibility study, YCWA estimates construction of the new TDS will cost roughly \$12,216,000. A breakdown of the construction costs is presented in Table 6.1-1. This results in an annualized cost of about \$407,200, assuming a 30-year license term.

Table 6.1-1. Yuba County Water Agency’s estimated costs in 2013 U.S. dollars for construction of the New Colgate Powerhouse Tailwater Depression System.

Description	Cost (2013 U.S. Dollars)
Pre-Construction and General	\$222,000
Compressed Air System	\$4,118,000
Turbine Modification	\$774,000
Civil Works	\$1,073,000
Electrical Works	\$1,089,000
Start-up and Testing	\$361,000
<i>Subtotal Construction Cost</i>	<i>\$7,637,000</i>
Allowance for Unlisted Items / Design Development / Regulatory Requirements	\$239,000
Construction Management & Construction Phase Engineering Services (10% of BCS)	\$764,000
Environmental Compliance / Permitting (3% of BCS) ¹	\$229,000
Environmental Mitigation (3% of BCS) ¹	\$229,000
Legal/Owner Admin (4% of BCS)	\$305,000
Foreign Exchange Contingency (15% of Seal and Compressor Direct Cost)	\$434,000
<i>Subtotal Estimated Cost</i>	<i>\$2,200,000</i>
Project Contingency (25% of BCS)	\$1,909,000
<i>Subtotal Estimated Cost with Contingency</i>	<i>\$11,746,000</i>
Financing Costs (2% of Subtotal)	\$470,000
Total	\$12,216,000

¹ Detailed costs for environmental compliance, environmental mitigation, and right-of-way acquisition not developed. Costs shown are considered placeholders pending input from environmental and right-of-way consultants.

6.1.2 New Bullards Bar Dam Flood Control Outlet

As described in Section 5.1.2.1 of Exhibit A, *Project Facilities*, of YCWA’s Application for New License, the new flood control outlet will be located south of the existing New Bullards Bar Dam spillway centerline in the upper left abutment area of the dam. The primary benefit of the new outlet is flood control. The outlet has no generation benefits.

Based on a preliminary design and feasibility study, YCWA estimates that construction of the new flood control outlet will cost roughly \$126,383,000. A breakdown of the construction costs is presented in Table 6.1-2. This results in an annualized cost of about \$4,213,000, assuming a 30-year license term.

Table 6.1-2. Yuba County Water Agency’s estimated costs in 2013 U.S. dollars for construction of the New Bullards Bar Dam new flood control outlet.

Description	Cost (2013 U.S. Dollars)
Pre-Construction and General	--
Mobilization/Demobilization & General Conditions	\$5,416,700
Site Works, Including Access Roads, Disposal/Laydown Areas, Utility Relocation	\$1,652,800
Clearing and Grubbing	\$57,500
<i>Subtotal</i>	<i>\$7,127,000</i>
Intake Structure	--
Excavation	\$905,400
Intake Structure Grouting	\$1,038,100
Rock Anchors	\$313,100
Reinforced Concrete	\$10,770,500
Structural Backfill	\$130,100
Dewatering and Care of Water	\$1,381,000
Temporary Support at Intake	\$1,000,000
<i>Subtotal</i>	<i>\$15,538,200</i>

Table 6.1-2. (continued)

Description	Cost (2013 U.S. Dollars)
Conveyance Tunnel	--
Outlet Portal Excavation	\$432,000
Structural Backfill	\$36,000
Tunnel Excavation	\$6,480,000
Shotcrete w/Wire Mesh	\$420,000
Rock Anchors, Including Tunnel Roof Anchors	\$1,153,700
Reinforced Concrete, Including Tunnel Lining and Tunnel Outlet	\$8,197,000
Tunnel Grouting	\$748,900
<i>Subtotal</i>	<i>\$17,467,600</i>
Approach Channel	--
Approach Channel Excavation	\$1,728,000
Reinforced Concrete	\$4,862,300
Rock Anchors	\$322,000
Structural Backfill	\$189,000
Riprap	\$69,100
Temporary Support at Approach Channel	\$1,125,000
<i>Subtotal</i>	<i>\$8,295,400</i>
Gates	--
Gates, Including Miscellaneous Embedded Steel	\$9,672,950
<i>Subtotal</i>	<i>\$9,672,950</i>
Electrical & Instrumentation	--
Electrical (Allowance)	\$750,000
<i>Subtotal</i>	<i>\$750,000</i>
<i>Subtotal Construction Cost</i>	<i>\$58,851,000</i>
Allowance for Unlisted Items / Design Development / Regulatory Requirements (25% of Subtotal)	\$14,713,000
<i>Base Construction Subtotal (BCS)</i>	<i>\$73,564,000</i>
Engineering for Detailed Design (10% of BCS)	\$7,356,400
Construction Management & Construction Phase Engineering Services (10% of BCS)	\$7,356,400
Environmental Compliance / Permitting (5% of BCS) ¹	\$3,678,000
Environmental Mitigation (10% of BCS) ¹	\$7,356,400
Right-of-Way Acquisition (Allowance) ¹	\$1,000,000
Legal/Owner Admin (4% of BCS)	\$2,943,000
<i>Subtotal Estimated Cost</i>	<i>\$103,254,000</i>
Project Contingency @ 20% (Including Construction Changes)	\$20,651,000
<i>Subtotal Estimated Cost with Contingency</i>	<i>\$123,905,000</i>
Financing Costs (2% of Subtotal)	\$2,478,000
Total	\$126,383,000

¹ Detailed costs for environmental compliance, environmental mitigation, and right-of-way acquisition not developed. Costs shown are considered placeholders pending input from environmental and right-of-way consultants.

6.2 Annual Cost of Operations

6.2.1 O&M Costs Unrelated to Environmental and Recreation Conditions

Table 5.1-1 provides a reasonable estimate of YCWA's average annual cost to operate the Project under YCWA's proposed Project, excluding cost for environmental and recreation conditions. Average annual costs related to operations of the new TDS and flood control outlet are considered *de minimis*.

6.2.2 O&M Costs Related to Environmental and Recreation Conditions

YCWA's proposed Project includes 40 Project-specific environmental/recreational resource management conditions. YCWA's estimate costs, including assumptions related to the costs for

each of these measures is provided by measure in Table 6.2-1. The annual cost to implement the conditions is \$2,738,000.

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Table 6.2-1. Yuba County Water Agency’s estimated costs in 2013 dollars related to implementation of YCWA’s proposed conditions as part of continued operation of the Yuba River Development Project. All costs are rounded up to at least the nearest \$1,000 unless otherwise specified.

YCWA’s Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
GENERAL					
GEN1	Meet with Agencies and Indian Tribes Annually	\$0	\$300,000	\$10,000	Preparation, participation and follow-up on one meeting each year at a cost of \$10,000 per year.
GEN2	Review Special-status Species Lists and Assess Newly-listed Species Annually	\$0	\$540,000	\$18,000	Gather/ review special-status species lists (including non-native invasive species lists) each year at cost of \$3,000 per year, and assume six studies over 30 years at cost of \$75,000 per study.
GEN3	Provide Environmental Training to Employees	\$0	\$60,000	\$2,000	Prepare for one environmental (including cultural) training meeting each year with all O&M staff at a cost of \$10,000 per meeting, and once with newly-hired staff (assume 30 new staff over 30 years) at a cost of \$1,000 per staff meeting.
GEN4	Develop and Implement a Coordinated Operations Plan for Yuba River Development Project and Narrows Project	\$0	\$375,000	\$13,000	One time cost of \$75,000 to develop a coordinated operations agreement, and average cost of \$10,000 per year for agreement implementation. Assumes no new equipment needed to implement condition.
<i>Subtotal</i>		--	<i>\$1,275,000</i>	<i>\$43,000</i>	--
GEOLOGY AND SOILS					
GS1	Implement Erosion and Sediment Control Plan	\$0	\$0	\$0	This condition implemented for a specific work, and the cost for implementation, which may include the development of site-specific plan for the work based on this condition, included at the time in the cost of the specific work.
GS2	Implement Our House and Log Cabin Diversion Dams Sediment Management Plan	\$500,000	\$11,039,000	\$385,000	For sediment pass-through, assumes one O&M staff at Our House Diversion Dam for two half days three times once every other year (\$1,800 every 2 years, or \$27,000 over 30 years), and two O&M staff at Log Cabin Diversion Dam for two half days twice every third year (\$1,200 every 3 years or \$12,000 over 30 years). Also, assumes \$500,000 for added maintenance of low level outlet due to sediment passing through the outlet. For sediment removal, assumes it would occur at Log Cabin Diversion Dam twice over a 30-year period at a cost of \$1,000,000 per event, and at Our House Diversion Dam three times over a 30-year period at a cost of \$3,000,000 per event.

Table 6.2-1. (continued)

YCWA's Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
GEOLOGY AND SOILS (continued)					
GS3	Pass Large Woody Material at Our House and Log Cabin Diversion Dams	\$500,000	\$900,000	\$47,000	Two O&M staff at Our House Diversion Dam for four days four times each year (\$20,000/yr), and two O&M staff at Log Cabin Diversion Dam for two days four times each year (\$10,000/yr). Assumes no new equipment needed to implement condition. Assumes \$500,000 for improvements to roads for placing LWM downstream of the dams.
GS4	Implement New Bullards Bar Reservoir Floating Material Management Plan	\$600,000	\$3,060,000	\$122,000	Eight O&M staff each year for 15 days in the spring to collect floating material and place it in coves for burning (\$72,000/yr); four O&M staff each year for 5 days in the fall to burn the material (\$24,000/yr); two O&M staff each year for 5 days to open and close the skid roads to the burn areas and stabilize the burn areas (\$6,000/yr); and replace boats/tugs/booms used to collect material three times over the term of the new license (\$600,000 over 30 years).
<i>Subtotal</i>		<i>\$1,600,000</i>	<i>\$14,999,000</i>	<i>\$553,000</i>	--
WATER RESOURCES					
WR1	Implement Hazardous Materials Management Plan	\$0	\$0	\$0	This condition implemented for a specific work, and the cost for implementation, which may include the development of site-specific plan for the work based on this condition, included at the time in the cost of the specific work.
WR2	Determine Water Year Types for Conditions Pertaining to Our House Diversion Dam, Log Cabin Diversion Dam and New Bullards Bar Dam	\$0	\$30,000	\$1,000	Gather appropriate information and determine Water Year Types each year at cost of \$1,000 per year.
WR3	Determine Water Year Types for Conditions Pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass	\$0	\$30,000	\$1,000	Gather appropriate information and determine Water Year Types each year at cost of \$1,000 per year.
WR4	Implement Streamflow and Reservoir Level Compliance Monitoring Plan	\$750,000	\$1,050,000	\$60,000	Maintain all gages at a cost of \$10,000 per year, and replace all gages twice at a cost of \$600,000 over 30 years. Increase the compliance-level measurement capacity of the weirs below New Bullards Bar Dam ,Our House Diversion Dam, and Log Cabin Diversion Dam at a cost of \$50,000 each.
WR5	Maintain New Bullards Bar Reservoir Minimum Pool	\$0	\$0	\$0	No new equipment needed and minimal labor.
WR6	Operate New Bullards Bar Reservoir for Flood Control	\$0	\$0	\$0	No new equipment needed and minimal labor.
<i>Subtotal</i>		<i>\$750,000</i>	<i>\$1,110,000</i>	<i>\$62,000</i>	--

Table 6.2-1. (continued)

YCWA's Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
AQUATIC RESOURCES					
AR1	Maintain Minimum Streamflows below Our House Diversion Dam, Log Cabin Diversion Dam and New Bullards Bar Dam	\$1,000,000	\$1,180,000	\$73,000	One staff person visit to Our House and Log Cabin diversion dams and New Bullards Bar Dam once each month for a half day to adjust valves for minimum flows, for a total of \$6,000 per year. Assumes \$1,000,000 to increase capacity of Our House, Log Cabin and New Bullards Bar dams fish release valves for new minimum flow requirements.
AR2	Control Project Spills at Our House Diversion Dam	\$0	\$120,000	\$4,000	Assumes a spill cessation event will occur 20 out of 30 years at Our House Diversion dam, and on average twice each year when they occur, and one staff will be on site a half day for 5 days for each event. Reporting for each event is assumed to be \$3,000. Assumes no new equipment needed to implement condition.
AR3	Maintain Minimum Streamflows at Narrows 2 Powerhouse and Narrows 2 Full Bypass	\$0	\$360,000	\$12,000	One staff person visit to Narrows 2 Powerhouse once each month to make adjustments for minimum flows, for a total of \$12,000 per year. Assumes no new equipment needed to implement condition.
AR4	Control Project Spills at New Bullards Bar Dam	\$0	\$18,000	\$1,000	One staff person to visit New Bullards Bar Dam spillway once a day for 10 additional days every 10 years.
AR5	Implement Aquatic Invasive Species Management Plan	\$40,000	\$215,000	\$9,000	Fabrication, installation and maintenance of informational signs at New Bullards Bar Reservoir at a total of \$40,000 over 30 years. Annual protocol surveys at New Bullards Bar at \$6,500/yr. BMPs for specific projects would be developed for the specific project, and the cost for development and implementation included at the time in the cost of the specific project.
AR6	Implement New Bullards Bar Reservoir Fish Stocking Plan	\$0	\$793,000	\$26,000	Two plantings per year, one for each fish species. Total of 833 pounds of rainbow trout (60 fish per pound) at \$20 per pound and 325 pounds of kokanee (200 fish per pound) at \$30 per pound. One delivery of each per year to the Cottage Creek Boat Ramp. Private hatchery prices.
AR7	Implement Upper Yuba River Aquatic Monitoring Plan	\$0	\$730,000	\$24,000	Assumes four stream fish and four FYLF each sampled four times at cost of \$9,000/site for stream fish and \$8,000/site for FYLF. Assumes three water quality sampling sites each sampled three times at cost of \$4,000/site. Assumes installing, maintaining and operating three continuous water temperature recorders for 25 years at cost of \$10,000/year. Assumes channel morphology and riparian vegetation monitoring at three sites each four times each at cost of \$8,000/site and \$6,000/site, respectively. Also assumes four reports at cost of \$10,000 per report and interaction with agencies as needed.
<i>Subtotal</i>		<i>\$1,040,000</i>	<i>\$3,416,000</i>	<i>\$149,000</i>	--

Table 6.2-1. (continued)

YCWA's Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
TERRESTRIAL RESOURCES					
TR1	Implement Integrated Vegetation Management Plan	\$0	\$1,150,000	\$38,300	Three surveys of all areas at \$150,000 and three surveys of just high use areas at \$50,000 on NFS land for NNIPs over 30 years. Treatment of NNIP on NFS land (currently known weeds at \$10,000 a year for each occurrence for five years and an assumed additional five occurrences at \$10,000 a year for each occurrence for 5 years). Re-vegetation of areas of Project-related ground-disturbing activities at \$100,000 (non-routine) (assume four projects at \$50,000 each for revegetation needs). Implementation of LOPs and other protection measures for sensitive areas (assume assorted costs of \$50,000 for this implementation and other general support).
TR2	Implement Bald Eagle and American Peregrine Falcon Management Plan	\$0	\$150,000	\$5,000	Peregrine falcon surveys are on an as needed basis, but for estimating cost, an average of one complete survey (two visits at a cost of \$5,000) every 3 years is assumed. One complete bald eagle nesting survey (3 visits at a cost of \$10,000) every 5 years is assumed. Installation of buoys for one nest buffer is assumed at \$2,000 annually.
TR3	Implement Ringtail Management Plan	\$0	\$120,000	\$4,000	Bi-annual inspection of exclusion measures assumed at \$2,500 annually. Installation and Maintenance of exclusion measures assumed at \$1,500 annually.
TR4	Implement Bat Management Plan	\$0	\$77,000	\$3,000	Installation and annual inspection of exclusion devices at \$2,000 per year, with facility inspections every two years at a cost of 1,100 per inspection
<i>Subtotal</i>		<i>\$0</i>	<i>\$1,497,000</i>	<i>\$50,000</i>	--
ESA-LISTED SPECIES					
TE1	Monitor Water Temperature Downstream of Narrows 2 Powerhouse	\$20,000	\$430,000	\$15,000	Monitor and download water temperature data once every three months at five sites at a cost of \$10,000 per year, and QA/QC and make data available on a publicly-accessible website such as CDEC, and replace/fix recorders at a cost of \$5,000 per year.
TE2	Monitor Chinook Salmon Downstream of Narrows 2 Powerhouse	\$240,000	\$6,800,000	\$235,000	Operate Vaki Riverwatcher™ (assumes full time equivalent, or FTE), conduct escapement & annual reports (assumes 1.5 FTE).
TE3	Establish Lower Yuba River Anadromous Fish Ecological Group	\$0	\$1,716,000	\$57,000	Three meetings each year at \$19,000 per meeting.
TE4	Control Project Ramping and Flow Fluctuations Downstream of Englebright Dam	\$0	\$2,340,000	\$78,000	For ramping, coordination requires four senior staff for 2 hours each week year round (\$52,000/yr). For flow fluctuation, coordination requires four senior staff 2 hours a week from September 1 through March 31 each year (\$26,000/yr). O&M staff time not included and assumes no new equipment needed.
<i>Subtotal</i>		<i>\$260,000</i>	<i>\$11,286,000</i>	<i>\$385,000</i>	--

Table 6.2-1. (continued)

YCWA's Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
RECREATION RESOURCES					
RR1	Implement Recreation Facilities Management Plan ⁴	--	--	--	The cost breakdown is provided by major facility, as requested by FERC in previous relicensings. Assumes the recreation road, parking area and camping spur costs are included in the Transportation System Management Plan and not the Recreation Plan. The O&M costs: 1) include YCWA staff time to operate facilities on YCWA land; 2) assumes the rest of the facilities on NFS land would be operated through concessionaire at no cost to YCWA, which is different than the current O&M cost agreement with the Forest Service whereby YCWA pays the Forest Service for actual Forest Service cost to O&M. In addition, O&M costs include annualized monitoring costs of \$9,000/year, which includes annual occupancy reports, 6-year observation surveys and reports and 12-year visitor surveys and reports). Note: About 83% of the total Condition RRI cost is for the rehabilitation and operation of existing recreation facilities over the term of the new license. The remaining 17% is for new and enhanced facilities and for recreation monitoring.
	Schoolhouse Campground	\$1,452,000	\$1,405,800	\$95,260	
	Dark Day Campground	\$392,000	\$769,500	\$38,717	
	Hornswoggle Campground	\$1,300,000	\$1,405,800	\$90,193	
	Cottage Creek Campground	\$1,400,000	\$1,278,000	\$89,267	
	Garden Point Boat-in Campground	\$530,000	\$652,500	\$39,417	
	Madrone Cove Boat-in Campground	\$242,000	\$652,500	\$29,817	
	Frenchy Point Boat-in Campground	\$25,000	\$0	\$833	
	Dark Day Picnic Area	\$575,000	\$766,800	\$44,727	
	Sunset Vista Point	\$231,000	\$511,200	\$24,740	
	Dam Overlook	\$48,000	\$255,600	\$10,120	
	Moran Road Day Use Area	\$114,000	\$639,000	\$25,100	
	Dark Day Boat Launch	\$1,860,000	\$1,533,600	\$113,120	
	Cottage Creek Boat Launch	\$997,000	\$1,533,600	\$84,353	
Water Supply System	\$1,805,000	\$625,500	\$81,017		
Electrical System (new)	\$2,371,000	\$625,500	\$99,883		
Floating Comfort Stations	\$752,000	\$125,100	\$29,237		
RR2	Provide Recreation Flow Information	\$0	\$150,000	\$5,000	Assumes no new equipment needed to implement condition, and information provided on CDEC, with some QA/QC.
<i>Subtotal</i>		<i>\$14,094,000</i>	<i>\$12,930,000</i>	<i>\$901,000</i>	--
LAND USE					
LU1	Implement Transportation System Management Plan	\$0	\$18,937,000	\$631,000	Includes annual O&M for all Project roads and trails, including recreation roads that serve four campgrounds, four day use areas, and access to three boat launches. Assumes repaving of existing asphalt roads at 20-year intervals. Includes periodic repairs of landslides and periodic replacement of culverts, signs and other road-related features as needed to maintain road safety and stability. Note: About 88% of the total Condition LU1 cost is for the rehabilitation and maintenance of existing Primary Project and recreation roads over the term of the new license. The remaining 12% is for the addition of eleven existing road segments and two short trails identified for exclusive use by YCWA for operation and maintenance of the Project.
LU2	Implement Fire Prevention and Response Plan	\$0	\$30,000	\$1,000	Assumes \$5,000/fire and six fires over term of license.
<i>Subtotal</i>		<i>\$0</i>	<i>\$18,967,000</i>	<i>\$632,000</i>	--

Table 6.2-1. (continued)

YCWA's Proposed Condition		Total Capital Cost Over 30 Years ¹ (2013 U.S. Dollars)	Total O&M Cost Over 30 Years (2013 U.S. Dollars)	Annualized Cost Over 30 Years ² Excluding Energy (2013 U.S. Dollars)	Assumptions Over 30 Years ³
Number	Description				
CULTURAL RESOURCES					
CR1	Implement Historic Properties Management Plan	\$0	\$1,200,000	\$40,000	NRHP evaluation of 13 archeological sites at \$25,000/site; NRHP of 20 built sites at \$7,500/site; and data recovery at one site at \$100,000/site. Assumes annual costs of \$5,000/yr for compliance report and \$4,000/yr for meetings with tribes and agencies; and once every 10 years meeting with tribes and agencies to review HPMP at a cost of \$10,000/meeting. Also, assumes if New Bullards Bar Reservoir drawn down so that inundated sites are exposed, NRHP evaluation of the 11 inundated archeological sites and survey for cultural resources in areas not surveyed during relicensing study (below El. 1,805 ft), with an additional \$50,000 for analysis of collections at University of California, Sacramento from two of the submerged sites.
<i>Subtotal</i>		\$0	\$1,200,000	\$40,000	--
AESTHETIC RESOURCES					
VR1	Implement Visual Resource Management Plan	\$0	\$60,000	\$2,000	Estimate for initial implementation is \$35,000. Follow up maintenance and or replacement is estimated at \$25,000 over the course of 30 years
<i>Subtotal</i>		\$0	\$60,000	\$2,000	--
Total of Capital and O&M Costs		\$17,744,000	\$66,740,000	\$2,817,000	--
Annual Lost Generation Cost Related to Implementation of YCWA's Conditions⁴		--	\$7,890,000	\$263,000	0.9% of No Action Alternative
Total Cost		\$17,744,000	\$74,630,000	\$3,080,000	--

¹ Capital cost include new facilities or equipment or replacement of existing facilities or equipment with facilities or equipment that extend the life expectancy of the existing facilities or equipment.

² Total annualized costs are calculated by summing Capital Cost and Total O&M Cost, and dividing the sum by 30.

³ Assumes cost of O&M staff is \$600 per day.

⁴ Individual recreation are costs for YCWA's proposed Condition RR1 were not rounded to the nearest \$1,000.

⁵ Annual value of lost generation cost calculated in Table 7.0-1. Total cost computed by multiplying annual lost generation cost by 30 years.

This estimate does not include costs related to implementation of potential measures that could be contained in “mandatory conditions” from: Forest Service’s FPA Section 4(e) conditions; USACE’s Federal Power Act (FPA) Section 4(e) conditions; United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) FPA Section 18 fishway prescriptions; NMFS’s and United States Departments of Interior, Fish and Wildlife Service’s (USFWS) measures that may be included in an Endangered Species Act Biological Opinion for the Project; and the SWRCB’s Clean Water Act Section 401 Water Quality Certificate. These potential conditions have not been provided to YCWA as yet. Implementation of these additional measures will likely result in significant increases to YCWA’s estimate of costs to implement YCWA’s proposed Project.

6.3 Annual Gross Power Benefits

6.3.1 Modeled Energy Generation

Table 6.3-1 provides a summary of annual generation by powerhouse for YCWA’s proposed Project based on a run of YCWA’s Operations Model.

Table 6.3-1. Yuba County Water Agency’s estimated average annual generation in megawatt-hours for WYs 1970 through 2010 at each powerhouse in the Yuba River Development Project for the proposed Project.

Powerhouse	Average Annual Generation Under Existing Conditions (MWh/yr)					Maximum Average Annual Generation (MWh/yr) ¹
	Peak	Partial-Peak	Off-Peak	Super Off-Peak	Total	
New Colgate Powerhouse	171,107	436,227	520,581	84,812	1,212,727	2,216,360
New Bullards Bar Minimum Flow	112	389	582	217	1,300	1,323
Narrows 2 Powerhouse	14,547	53,500	78,338	29,274	175,659	365,672
Total	185,766	490,116	599,501	114,303	1,389,686	2,583,355

Source: YCWA’s proposed Project Operations Model run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA’s Application for New License.

¹ The maximum powerhouse capability is the maximum average annual generation for that powerhouse from WY 1970 through WY 2010 under YCWA’s proposed Project. The maximum occurred at all three powerhouses in 1983.

YCWA estimates that approximately 6,822 MWh/yr of the New Colgate Powerhouse average annual power generation is a result of YCWA’s proposed TDS. As stated above, YCWA’s proposed new flood control outlet has no related generation benefits.

Table 5.2-3 shows definitions of time blocks for peak, partial-peak, off-peak and super off-peak.

Table 6.3-2 shows the estimated monthly average generation in MWh for WYs 1970 through 2010 by time block for the three Project powerhouses and the Project overall under the proposed Project based on results of the Operations Model.

Table 6.3-2. Estimated average monthly generation in megawatt-hours for water years 1970 through 2010 by time block for the three Project powerhouses and the Project overall under YCWA's proposed Project.

Month	Peak (MWh)	Partial-Peak (MWh)	Off-Peak (MWh)	Super Off Peak (MWh)	Total (MWh)
NEW COLGATE POWERHOUSE					
January	0	47,136	42,711	7,794	97,641
February	0	50,629	47,967	9,638	108,234
March	0	54,576	55,079	13,512	123,167
April	0	52,812	51,614	8,170	112,596
May	38,247	34,093	66,355	12,784	151,479
June	37,617	37,261	68,297	15,737	158,912
July	37,121	35,888	56,014	10,028	139,051
August	32,960	28,888	42,798	3,144	107,790
September	15,397	18,194	18,224	0	51,815
October	9,765	18,509	20,991	44	49,309
November	0	27,772	22,672	621	51,065
December	0	30,469	27,859	3,340	61,668
<i>Subtotal</i>	<i>171,107</i>	<i>436,227</i>	<i>520,581</i>	<i>84,812</i>	<i>1,212,727</i>
NEW BULLARDS BAR MINIMUM FLOW POWERHOUSE					
January	0	46	54	20	120
February	0	43	50	18	111
March	0	48	56	21	125
April	0	31	36	13	80
May	13	15	33	12	73
June	12	14	31	12	69
July	23	27	58	22	130
August	22	26	56	21	125
September	21	24	52	19	116
October	21	25	53	20	119
November	0	44	51	19	114
December	0	46	52	20	118
<i>Subtotal</i>	<i>112</i>	<i>389</i>	<i>582</i>	<i>217</i>	<i>1,300</i>
NARROWS 2 POWERHOUSE					
January	0	6,752	7,795	2,909	17,456
February	0	7,829	9,002	3,366	20,197
March	0	9,348	10,646	3,999	23,993
April	0	7,825	9,102	3,385	20,312
May	4,392	5,124	10,976	4,098	24,590
June	4,031	4,703	10,011	3,749	22,494
July	2,875	3,354	7,212	2,688	16,129
August	2,002	2,335	4,995	1,866	11,198
September	680	794	1,692	633	3,799
October	567	662	1,478	541	3,248
November	0	1,414	1,573	597	3,584
December	0	3,360	3,856	1,443	8,659
<i>Subtotal</i>	<i>14,547</i>	<i>53,500</i>	<i>78,338</i>	<i>29,274</i>	<i>175,659</i>
TOTAL PROJECT					
January	0	53,934	50,560	10,723	115,217
February	0	58,501	57,019	13,022	128,542
March	0	63,972	65,781	17,532	147,285
April	0	60,668	60,752	11,568	132,988
May	42,652	39,232	77,364	16,894	176,142
June	41,660	41,978	78,339	19,498	181,475
July	40,019	39,269	63,284	12,738	155,310
August	34,984	31,249	47,849	5,031	119,113
September	16,098	19,012	19,968	652	55,730
October	10,353	19,196	22,522	605	52,676
November	0	29,2230	24,296	1,237	54,763
December	0	33,875	31,767	4,803	70,445
Total	185,766	490,116	599,501	114,303	1,389,686

Source: YCWA's proposed Project Operations Model run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA's Application for New License.

6.3.2 Project Capacity

YCWA does not propose any changes to the Project that would affect the Project’s installed capacity, described in Section 5.2.2.1.

The methods described in Section 5.2.2.3 were used to determine the dependable capacity under the YCWA proposed Project, as shown in Table 6.3-3.

Table 6.3-3. Modeled dependable capacity in kilowatts for New Colgate, Narrows 2 and New Bullards Bar Minimum Flow powerhouses for the proposed Project.

Powerhouse	WY of Lowest Available Capacity	Dependable Capacity in that WY
Narrows 2 Powerhouse	1977	0 kW
New Bullards Bar Minimum Flow	1971	72 kW
New Colgate Powerhouse	1977	285,385 kW
Total	--	285,457 kW

Source: YCWA’s proposed Project Operations Model run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA’s Application for New License.

YCWA’s proposed new TDS and proposed new flood control outlet do not affect installed or dependable capacity.

6.3.3 Modeled Ancillary Services

The methods described in Section 5.2.1.3 were used to determine the ancillary services opportunities under the YCWA proposed Project. The resulting monthly opportunities are shown in Table 6.3-4.

Table 6.3-4. Estimated average monthly ancillary services opportunities in megawatt-hours for water years 1970 through 2010 by market for the New Colgate Powerhouse under the proposed Project.

Month	Regulation-Up (MWh)	Regulation-Down (MWh)	Spinning Reserve (MWh)
January	23,468	19,082	91,315
February	19,175	20,824	74,295
March	20,068	23,445	78,283
April	22,863	21,168	98,514
May	18,265	27,777	79,043
June	15,471	28,939	66,633
July	20,372	25,620	88,127
August	25,769	20,433	109,228
September	34,290	10,561	143,093
October	36,046	10,705	147,250
November	33,253	10,994	133,293
December	30,616	12,479	120,373
Total	299,656	232,027	1,229,447

Source: No Action Alternative Model Run of Yuba River Development Water Balance/Operations Model, which is in Exhibit E, Appendix E6, of YCWA’s Application for New License, and post-processing.

YCWA’s proposed new TDS and proposed new flood control outlet do not significantly affect ancillary services opportunities.

6.3.4 Gross Power Benefits

Based on the above estimation of capacity and energy and unit values for each of these, as defined in Section 5.2.3, Table 6.3-5 provides annual gross power benefits by powerhouse for YCWA’s proposed Project.

Table 6.3-5. Average annual gross power benefits in 2013 U.S. dollars by powerhouse for Yuba County Water Agency’s proposed Project.

Powerhouse	Average Annual Gross Power Benefits (2013 U.S. Dollars)					Total
	Energy					
	Peak	Partial Peak	Off Peak	Super Off Peak	Ancillary Services	
New Colgate	\$6,335,492	\$15,703,849	\$17,353,075	\$1,784,320	\$6,568,654	\$47,745,390
Narrows 2	\$556,070	\$1,793,998	\$2,340,227	\$623,904	\$0	\$5,314,199
New Bullards Bar Minimum Flow	\$12,859	\$44,385	\$61,640	\$23,013	\$0	\$141,897
<i>subtotal</i>	<i>\$6,904,421</i>	<i>\$17,542,232</i>	<i>\$19,754,942</i>	<i>\$2,431,237</i>	<i>\$6,568,654</i>	<i>--</i>
Total	\$46,632,832				\$6,568,654	\$53,201,486

YCWA estimates that approximately \$99,000 of the New Colgate Powerhouse off-peak average annual power value, and \$201,000 of the total average annual power value, is a result of YCWA’s proposed New Colgate Powerhouse TDS. YCWA’s proposed New Bullards Bar Flood Control Outlet has no related power benefits.

6.4 Summary of YCWA’s Proposed Project Costs and Power Benefits

Table 6.4-1 summarizes the Project’s costs and power benefits under YCWA’s proposed Project, based on the information provided above.

Table 6.4-1. Yuba County Water Agency’s estimate of annual costs and power benefits in 2013 U.S. dollars under the YCWA proposed Project.

Value	YCWA’s Proposed Project
AVERAGE ANNUAL GROSS POWER BENEFITS	
Capacity	--
Installed ¹	361,900 kW
Dependable ²	285,457 kW
<i>Subtotal - Value in 2013 Dollars</i>	<i>\$0</i>
Energy	--
Peak Energy ³	185,766 MWh
Partial Peak Energy ³	490,116 MWh
Off-Peak Energy ³	599,501 MWh
Super Off-Peak ³	114,303 MWh
<i>Subtotal - Value in 2013 Dollars⁴</i>	<i>\$46,632,832</i>
Ancillary Services	--
Regulation-Up ⁵	299,656 MWh
Regulation-Down ⁵	232,027 MWh
Spinning Reserve ⁵	1,229,447 MWh
<i>Subtotal - Value in 2013 Dollars⁴</i>	<i>\$6,568,654</i>
Total – Value in 2013 Dollars⁴	\$53,201,486

Table 6.4-1. (continued)

Value	YCWA's Proposed Project
AVERAGE ANNUAL COSTS	
Non-Environmental/Recreational ⁶	\$25,967,000
Addition of New Colgate Powerhouse Tailwater Depression System ⁷	\$407,200
Addition of New Bullards Bar Reservoir Flood Control Outlet ⁸	\$4,213,000
Environmental/Recreational ⁷	\$3,080,000
Total - Value in 2013 Dollars	\$33,667,200
AVERAGE ANNUAL NET BENEFIT	
Total 2013 U.S. Dollars⁹	\$19,534,286

¹ Section 6.3.2.

² From Table 6.3-3.

³ From Table 6.3-1.

⁴ From Table 6.3-5.

⁵ From Table 6.3-4.

⁶ From Section 6.2.1.

⁷ From Section 6.1.1.

⁸ From Section 6.1.2.

⁹ Calculate by subtracting Average Annual Costs from Average Annual Gross Power Benefits.

7.0 Changes in Project Power and Value

Table 7.0-1 compares the annual cost and power benefits of the No Action Alternative and YCWA's proposed Project.

Table 7.0-1. Comparison of annual power benefits, costs net benefits between No Action Alternative and YCWA' proposed Project.

Value	No Action Alternative ¹	YCWA's Proposed Project ²	Change ³
AVERAGE ANNUAL GROSS POWER BENEFITS			
Capacity	--	--	--
Installed	361,900 kW	361,900 kW	None
Dependable	287,366 kW	285,457 kW	-1,909 kW
<i>Subtotal - Value in 2013 Dollars</i>	<i>\$0</i>	<i>\$0</i>	<i>None</i>
Energy	--	--	--
Peak Energy	187,535 MWh	185,766 MWh	-1,769 MWh
Partial Peak Energy	493,560 MWh	490,116 MWh	-3,444 MWh
Off-Peak Energy	604,915 MWh	599,501 MWh	-5,414 MWh
Super Off-Peak	116,240 MWh	114,303 MWh	-1,937 MWh
<i>Subtotal - Value in 2013 Dollars</i>	<i>\$46,968,891</i>	<i>\$46,632,832</i>	<i>-\$336,059</i>
AVERAGE ANNUAL GROSS POWER BENEFITS			
Ancillary Services	--	--	
Regulation Up	296,939 MWh	299,656 MWh	2,717 MWh
Regulation Down	234,377 MWh	232,027 MWh	-2,350 MWh
Spinning Reserve	1,218,931 MWh	1,229,447 MWh	10,516 MWh
<i>Subtotal - Value in 2013 Dollars</i>	<i>\$6,495,661</i>	<i>\$6,568,654</i>	<i>\$72,993</i>
Total - Value in 2013 Dollars	\$53,464,552	\$53,201,486	-\$263,066
AVERAGE ANNUAL COSTS			
Non-Environmental/Recreational	\$25,967,000	\$25,967,000	None
Addition of New Colgate Powerhouse Tailwater Depression System	--	\$407,200	-\$407,200
Addition of New Bullards Bar Reservoir Flood Control Outlet	--	\$4,213,000	-\$4,213,000
Environmental/Recreational	\$1,809,000	\$3,080,000	-\$1,271,000
Total - Value in 2013 Dollars	\$27,776,000	\$33,667,200	-\$5,891,200

Table 7.0-1. (continued)

Value	No Action Alternative ¹	YCWA's Proposed Project ²	Change ³
AVERAGE ANNUAL NET BENEFIT			
Total 2013 U.S. Dollars	\$25,688,552	\$19,534,286	-\$6,154,266

¹ From Table 5.3-1.

² From Table 6.4-1.

³ Calculate by subtracting the No Action Alternative from YCWA's proposed Project value.

Under YCWA's proposed Project as compared to the No Action Alternative, no change in installed capacity would occur and dependable capacity would be reduced by 0.7 percent from 287,366 kW to 285,457 kW. Total energy generation would be reduced by 0.9 percent from 1,402,251 MWh to 1,389,686 MWh, with the greatest loss (i.e., 5,414 MWh) to off-peak energy. Energy benefits would be reduced by \$263,066, but ancillary benefits would increase by \$72,993. (Table 7.0-1.)

Under YCWA's proposed Project as compared to the No Action Alternative, Project costs increase by 21 percent, and overall Project net benefit decreases by \$6,154,266 (Table 7.0-1).

YCWA's proposed Project would maintain the current installed capacity value of the Project, enhance flood control and continue to provide a source of high-quality consumptive water to the region. YCWA's proposed Project would also provide numerous environmental benefits, some of which include: enhancing fish habitat, which already supports robust and healthy anadromous fish populations. In addition, YCWA's proposed Project would provide for the optimum development of recreational opportunity in the Project area consistent with the purpose of the Project.

8.0 Sources of Financing and Annual Revenues to Meet Project Costs

YCWA is financially able to operate and maintain the Project. In support of this statement, YCWA refers to its history of operating these facilities and the continued need for power and the many energy market opportunities in California. Historically the power output was contracted to PG&E; that contract will expire on April 30, 2016. YCWA is currently exploring new power purchase contracts.

9.0 Need for Power

The Project is located in the California-Mexico Power area of the WECC. According to the California Energy Commission (CEC), electricity consumption statewide is projected to grow at an annual average compound rate of 1.2 percent from 2010 through 2020 (CEC 2009). YCWA's proposed Project would continue to meet part of existing load requirements within the system, which is in need of resources.

In particular, New Colgate Powerhouse is a source of firm, dispatchable generation, which is useful for providing both peak summertime regional demands for energy and for providing

ancillary services to the regional grid (e.g., spinning reserve). These ancillary services will likely have increasing importance as other non-dispatchable sources of power generation (e.g., wind and photovoltaic solar generation) are incorporated into the regional grid to help meet renewable generation portfolio requirements.

Power from the Project could help to meet a need for power in the WECC region in both the short-term and long-term. The Project would provide low-cost power that may displace non-renewable, fossil-fired generation and contribute to a diversified generation mix. Displacing the operation of fossil-fired facilities avoids some power plant emissions and creates an environmental benefit.

10.0 Other Developmental and Non-Developmental Benefits

This section describes other developmental and non-development benefits.

10.1 Flood Management

The need for flood control on the Yuba River was the principle reason for the creation of the YCWA and the construction of New Bullards Bar Dam. Historically, the Marysville-Yuba City area experienced the ravages of a major flood about once every 10 years. The historic discharge of debris from placer mines in Nevada County compounded the flooding problems because it raised the river beds by many feet. Levees began providing flood control protection for Yuba City and Marysville as early as 1875, and are still heavily relied on for flood protection. This is primarily because there is no significant flood protection from the South Yuba and Middle Yuba rivers.

New Bullards Bar Dam and Reservoir are used to control about one half of the flood flows of the Yuba River, with the remainder of the runoff essentially un-controlled. The Project provides essential flood management by reducing the peak flood flow on the lower Yuba River and the Feather River in the Marysville-Yuba City area downstream to the Sacramento River.

In the 1997 flood, the major levee break was on the Feather River on the Yuba County side in the Arboga area, resulting in the flooding of the local residences and the surrounding rural/agricultural areas. In this flood, 1,000 acres of residential land, 15,500 acres of agricultural land and 1,700 acres of industrial lands were flooded; 322 homes were destroyed; and 407 homes suffered major damage. The economic cost of this flood was estimated at \$300 million. Only 11 years before, in 1986 a massive flood in Linda and Olivehurst, which resulted from a levee break on the Yuba River, flooded more than 3,000 homes and destroyed 895 homes, with an estimated cost of \$450 million.

Without New Bullards Bar Dam, the estimated peak flow for the 1 in 100 year flood is 260,000 cfs on the Yuba River at Marysville, and would result in approaching the crest of the levee in this area. With New Bullards Bar Dam, the peak flow for this flood event would be 153,000 cfs, which is well below the levee crest. Floods greater than the 1 in 100 unregulated conditions

would overtop the levee, while the Project reduces the flood peak to below the levee top for flood even larger than the 1 in 200 year event.

The reduction in flood flows by the Project primarily protects the urban areas of Marysville, Yuba City and reclamation District 784 as well as surrounding rural areas. The value of structures and contents in the Yuba City and Reclamation District 784, which includes the communities of Linda and Olivehurst, total more than \$8.5 billion, and these areas have a combined population of about 110,000.

YCWA's proposed Project would not only continue this valuable flood protection, but enhance it with the addition of the new flood control outlet at New Bullards Bar Dam and new TDS at New Colgate Powerhouse.

The new outlet would increase operational flexibility during storm events, which would result in lower flood stages downstream and provide flood system resiliency. Specifically, these benefits would include:

- Provide up to an additional 100,000 ac-ft of flood reservation that is currently not available because of the existing spillway elevation.¹⁵
- Increase the outlet capacity to 45,000 cfs at elevation 1,918 ft, the elevation of the bottom of current flood reservation space, and to 66,000 cfs at elevation 1,956 ft, the elevation at the top of flood reservation space.
- The outlet will be an integral part of operating the New Bullards Bar Reservoir under the Forecast-Based Operation¹⁶ during major flood events by creating additional storage space in the reservoir in advance of major floods.
- Provide greater flexibility in flood management operations in larger flood events along the Yuba, Feather and Sacramento river systems by allowing larger and earlier pre-storm releases at lower reservoir elevations from New Bullards Bar Reservoir, which will increase the ability of reservoir operators to maintain the objective flows in the Feather River for larger flood events (i.e., lower downstream flows).

Several outlet configurations have been studied and this option provides the greatest opportunity to provide system-wide benefits as identified in the California Department of Water Resources Central Valley Flood Protection Plan - State System-wide Investment Approach (SSIA).¹⁷

¹⁵ Additional flood space storage associated with a new flood control outlet would only result from pre-emptive releases as part Forecast-Based Operations in anticipation of very large storms. This magnitude of storm would be very infrequent, occurring less than once every 10 years.

¹⁶ Forecast-Based Operations is a program of coordinated reservoir operations between YCWA, the California Department of Water Resources, National Weather Service and the USACE, utilizing weather forecasts to inform coordinated operations for flood management between New Bullards Bar and Oroville reservoirs.

¹⁷ The State System-wide Investment Approach (SSIA) reflects the state of California's strategy for modernizing the State Plan of Flood Control to address current challenges and affordably meet the 2012 Central Valley Flood Protection Project goals. The preliminary approaches suggested a broad range of physical and institutional flood damage reduction actions to improve public safety and achieve economic, environmental, and social sustainability. The SSIA is an assembly of the most promising, affordable, and timely elements of the three preliminary approaches.

The new TDS would introduce compressed air into the New Colgate Powerhouse turbine discharge chamber to lower the tailwater to a level that does not interfere with turbine operation, thereby allowing continued turbine operation during high flows. The TDS will thus enhance the ability to regulate flood releases from New Bullards Bar Reservoir and increase the production of energy. The TDS was planned for, but not included in initial Project construction.

10.2 Irrigation

One of YCWA’s primary purposes is to provide a reliable water supply to farmers in Yuba County. Yuba River water is supplied through direct diversion of natural flow and by storage releases from New Bullards Bar Reservoir. Irrigation water is diverted under YCWA’s water right permits and delivered to Brophy Water District (BWD), Browns Valley Irrigation District (BVID), Cordua Irrigation District (CID), Dry Creek Mutual Water Company (DCMWC), Hallwood Irrigation Company (HIC), Ramirez Water District (RWD), South Yuba Water District (SYWD), and Wheatland Water District (WWD). In addition to YCWA water right permits several of the Member Units have their own water rights.

BVID receives water at the Pumpline Diversion Facility, located 1 mile upstream from Daguerre Point Dam. CID, HIC, and RWD receive water through the Hallwood-Cordua Canal (North Canal), located on the north abutment of Daguerre Point Dam. BWD, SYWD, DCMWC, and WWD receive water through the South Yuba Canal (South Canal), located on the south side of the Yuba River slightly upstream of the south abutment of Daguerre Point Dam. Contract allocations for each of the Member Units are summarized in Table 10.0-1.

Table 10.0-1. Yuba County Water Agency annual contract amounts.

Member Unit	Base Contract (ac-ft)	Supplemental Contract (ac-ft)	Total Contract (ac-ft)	District’s Water Rights (ac-ft)	Total Contract and Water Rights (ac-ft)
BROWN’S VALLEY IRRIGATION DISTRICT PUMPLINE DIVERSION FACILITY					
Browns Valley Irrigation District	9,500	-	9,500	24,462	33,962
SOUTH CANAL					
Brophy Water District	43,470	32,177	75,647	-	75,647
South Yuba Water District	25,487	18,843	44,330	-	44,330
Dry Creek Mutual Water Company	13,682	3,061	16,743	-	16,743
Wheatland Water District ¹	23,092	17,138	40,230	-	40,230
NORTH CANAL					
Cordua Irrigation District	12,000	-	12,000	60,000	72,000
Hallwood Irrigation Company	-	-	-	78,000	78,000
Ramirez Water District	14,790	10,311	25,101	-	25,101
Total	142,021	81,530	223,551	162,462	386,013

¹ Includes both Phase 1 and Phase 2 of the Wheatland Project.

BVID, CID, and HIC have water rights on the lower Yuba River. Under YCWA water right settlement contracts, BVID, CID and HIC receive surface water supplies as part of Project operations.

The total irrigated farmland acreage served from operations of the Project is about 90,000 acres. Yuba Counties productive farmland has an annual economic output of 213 million dollars in 2011, with the top three crops being rice, walnuts and dried plums (prunes) accounting for 70

percent of the total farmland production value.¹⁸ This production in turn provides over \$866 million to the local economy from processing, transportation, marketing and other farm related services directly or indirectly tied to agriculture.

YCWA's proposed Project would provide for the continued delivery of water to YCWA's Member Units in the near future. Under both the No Action and YCWA's proposed Project – Existing Water Deliveries alternatives Operation Model Runs, YCWA Member Units have very high reliability of water supplies; the only deficit under the model run occurred in 1977, when total delivery to the Member Units was 50 percent of demand (i.e., total demand under existing conditions is approximately 300,000 ac-ft/yr).

Under YCWA's proposed Project – 2062 Water Deliveries Operations Model Run - changes to Project inflows due to changes in upstream projects operations and water supply deliveries reflected a 2062-level of development, and YCWA Member Unit demand reached a full-build out - the Project was able to maintain the same level of water supply reliability that the Member Units experience under existing operations and demands (i.e., total demand under future conditions is approximately 320,000 ac-ft/yr).

10.3 Benefits of Yuba Accord

10.3.1 Anadromous Fish in the Yuba River Downstream of Englebright Dam

New Bullards Bar Reservoir stores a deep pool of cold water behind the 645-ft dam, and water from this pool ultimately is released to the Yuba River downstream of Englebright Dam. The New Bullards Bar Reservoir primary release point is through the New Colgate Powerhouse just upstream of Englebright Reservoir. Flow transit time through Englebright Reservoir is typically less than 1.5 days. Also, Englebright Dam is over 240 ft tall. As a result of the configuration of these Project and non-Project facilities, water released through the Narrows 2 Powerhouse typically has temperatures of 48° to 54°F year-round. Spring-run Chinook salmon reportedly were extirpated from the Yuba River in 1959 and, as reported by California Department of Fish and Game (1991), a population of spring-run Chinook salmon became re-established in the 1970s due to improved that habitat conditions that resulted from Project operations, fish stocking from the Feather River Fish Hatchery, and fish straying from the Feather River. Improved cold water conditions and higher and more-stable summer flows resulting from the Project contributed to, and possibly were fundamental to, this reestablishment.

YCWA has diligently pursued safeguarding flows in the Yuba River downstream of Englebright Dam. In 2002 through 2005, representatives of YCWA, Cal Fish and Wildlife, NMFS, USFWS, and several NGO's negotiated a set of minimum flow requirements (flow schedules) for the Yuba River downstream of Englebright Dam. These flow schedules were designed to provide the maximum possible benefit for the aquatic resources of the Yuba River, using available water supplies. The flow schedules settled a contested SWRCB water rights hearing and related litigation regarding lower Yuba River minimum flow requirements that had been pending for

¹⁸ 2012 Yuba County Crop Report, Yuba County Agricultural Commissioner

many years. The flow schedules developed by this group were included in the Yuba Accord Fisheries Agreement, which was one of three related agreements that together are known as the “Lower Yuba River Accord.” The second agreement, the Water Purchase Agreement, provided a long-term pathway for continued water transfers to help support statewide water supply needs. The third agreement, the Conjunctive Used Agreements, put in place a conjunctive use program to help ensure the local water supply.

During 2005-2007, YCWA conducted a comprehensive CEQA/NEPA process to analyze the environmental effects of the Yuba Accord, and in late 2007, YCWA certified its final EIR for the Yuba Accord. On May 20, 2008 the SWRCB adopted its Corrected Order WR 2008-0014, which amended YCWA’s water right permits to incorporate the Yuba Accord flow schedules. In total, YCWA expended more than \$8 million through the crafting of the Yuba Accord and completion of the CEQA/NEPA process.

As a requirement of the Fisheries Agreement, YCWA also has established the Yuba Accord River Management Team (RMT), which is comprised of representatives of YCWA, Cal Fish and Wildlife, NMFS, USFWS, and NGO’s. The primary purpose of the RMT is to evaluate the effects of implementation of the Yuba Accord on anadromous fish in the lower Yuba River. YCWA has funded a monitoring plan since 2007. YCWA’s direct expenditure on studies and science is over \$5 million, and YCWA’s expenditures including participation in the RMT and in-kind contributions total another \$2 million. YCWA’s commitment to direct and indirect funding of the RMT continues until the issuance of a new Project license.

YCWA’s proposed Project will preserve the numerous benefits developed through the Yuba Accord.

10.3.2 Statewide Water Supply and Funding for Local Flood Control Projects

Since 1989, YCWA has completed stored-water transfers by operating New Bullards Bar Reservoir to make additional releases as a way to provide needed supplemental water supplies for water-short areas of the State, and to provide a revenue stream that is used to fund flood control projects in Yuba County. With the implementation of the Yuba Accord, YCWA has been able to continue that practice and to make water available for transfer while providing environmental benefits. A portion of the Yuba Accord instream flows that are above an accounting baseline is available for transfer if the water can be successfully diverted by a downstream buyer. The transfer water provides the multiple benefits of water supply to downstream entities, inflow to the Delta and fishery habitat improvements on the Yuba River. Revenues received by YCWA for transfer water are used to fund local flood control projects or provide the local cost share for projects funded by the State and Federal government. An example of this is the Feather River Setback Levee Project where YCWA is guaranteeing \$78 million in bond sales repayment.

Since 2006, the first pilot year for the Yuba Accord in which YCWA operated to meet the Accord instream flows, through 2013, YCWA has transferred 607,000 ac-ft of surface water to other areas of the State under the Yuba Accord. About half of the transfer volume was supplied to the Environmental Water Account and successor programs to replaced water supplies that

were reduced due to environmental programs and regulatory actions in the Delta. The current agreement between YCWA and the California Department of Water Resources for Yuba Accord transfer water supplies extends until 2025.

11.0 Consequences of Denial of New License

If YCWA were not to receive a new license for the Project, YCWA would retain most Project facilities because they are used to provide consumptive water to YCWA's service territory and because YCWA holds the consumptive water rights for use of the Project facilities. However, YCWA would not receive the energy revenue from the Project, which would result in higher costs to its customers for consumptive water, and since Project revenues are used primarily to fund flood control projects in Yuba County, these flood control projects would not occur. In addition, the environmental and recreational benefits described above would not be realized.

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