Greenfields
IRRIGATION DISTRICT

Minutes from a Special Board Meeting on Monday, August 31, 2020 at 8:00 A.M. Those in attendance included President Tim Brunner, Commissioners Dave Gulick, and Chase Brady. Vice President Bill Norris was absent, and Commissioner Pat Brosten was running late, but would be coming. Manager Erling Juel and Board Secretary Jenny Gulick were also present. The meeting was called to order by President Brunner at 8:22 A.M.

The first item of discussion was the updated 2020 Budget, see handout provided by Manager Juel. Commissioner Brady asked if PSC repair costs were figured into the budget. Manager Juel answered that all that has been paid for figured into the budget was the geosynthetic for the project, which is currently listed in the inventory stores account, as it hasn't been used yet. Next the Board looked briefly at the budgeted vs. actual figures for grazing pasture lease revenue received. Manager Juel gave an explanation on why the figures differed. He then pointed out that 2 ½ months of Turnbull energy has generated approximately $120,000 revenue for GID. Gibson storage will likely be out by the middle of next week. Board approved a shut off date for Pishkun of September 20th, with drains continuing to run until October 1st.

The next item up for discussion was Agenda Item #1: How the Board/Management envision the Future of GID and to develop an appropriate strategy that gives the Manager adequate direction and sufficient tools to achieve those objectives. Manager Juel went on to explain how hydro power projects are something that he has been devoting much of his time to recently as a way to find ways to generate additional revenue without having to raise O&M rates or dip into GID's Reserves. He also clarified to the Board that he felt when he was hired by GID for the Manager position, his role was to help GID modernize and see to it that the District would be ready and able to deliver water years into the future. He agrees that what Charlie and his O&M crew do handles the day-to-day needs of the district, as well as ensures water is able to be delivered currently. He feels his attention would best be utilized focusing on how to ensure the infrastructure lasts well into the future, as well as developing strategies to help GID to recover the costs associated with doing so.

Manager Juel then gave example of some of the projects that GID has contemplated participating in. He explained that GID is fairly committed to pursue hydro power on Arnold Coulee, as we have previously demonstrated interest to the Bureau and told them that we are to have the first option to do so. There is a Turkish firm still interested in developing hydro at Arnold Coulee and A Drop. Manager Juel is currently working on a 2 million grant for Arnold Coulee and Pishkun Drop which would only cover the 1st phase of the project consisting of the infrastructure only. For the second phase of the project, GID would pursue a C-corp to cover the costs. It is his intentions to go after big grants for projects that need to be done and can't be covered by GID funds, as those are for covering everyday expenses. He reminded the Board that his intentions are to see to the replacement of the Sun River Bridge strictly through grant money.

See handout provided detailing the 4 potential hydro sites, as well as the anticipated cost estimates, the potential revenue to be generated and the funding options available. Commissioner Gulick asked how much water flows over Pishkun during the majority of the water season. Manager Juel answered that for the majority of the season 1350 CFS run over Pishkun, but even with a max of 1,000 GID would still be generating revenue. Gulick then asked if we did choose to partner with SREC and upgrade 4 miles of the line to 3-phase electricity, could we run both Arnold

Coulee and the PSC at the same time. The answer is no, we would need to put in transmission line in order to run them both. The anticipated cost to SREC to upgrade their single-phase line is $190,000. Manager Juel covers the options provided by SREC to partner with them on the line upgrade, as well as a cost comparison provided by both HDR and SREC for the line upgrade needed for Arnold Coulee, Pishkun Drop, as well as the future Gibson and Diversion Dam hydro upgrades. See attached for details. It is certain that if GID were to wait a few years to then upgrade the line, it would be looking at an additional million dollars plus to do so. We would need a conductor transmission line to add any other site whether it be Pishkun, Gibson or Diversion Dam hydro. GID could be looking at a $2 million revenue after expenses, once the transmission line is in and power is generated. Currently with 2% interest rates available on borrowed funds, now appears to be the time to act. If GID decides to support the 3-phase line upgrade with SREC, this would give GID an easement on properties involved.

Brunner expressed his agreement that GID needs to be looking at ways to ensure the future needs of GID are covered but feels strongly that the O&M fees should not be used to compensate for the additional needs. He also agrees that GID needs to keep up with making sure the infrastructure is kept up-to-date. Manager Juel explained how grants and studies take years to complete and receive funds for, so those are best suited for planning projects, not emergency failures. If we do the leg work now to get these hydropower projects online, then when the funds are available, we can be ready to roll with the project. President Brunner went on to explain that he and the Board are certainly behind hydro power projects, but there is some reservation with partnering with SREC unless GID knows what it is getting in return. Board feels that there should be some kind of agreement between the two that lays out specifically wheeling costs and terms of the partnership, as the partnership is mutually beneficial to both and would create revenue for both entities. Brunner again stressed the importance of having funding in place before a project is begun. Manager Juel reiterated his strategy in place for Arnold Coulee funding and informed Board that is the same strategy he would take with the funding of each of the other potential hydro projects.

It is then discussed that with the rate of return being so low currently, now may be the time to use some of our reserves and/or CDS or money market funds. Question was raised if there is in fact enough money in reserves to cover the cost of the SREC line upgrade proposal and Manager Juel confirms the funds are available. Board expressed thoughts that a special meeting with the SREC Board is warranted before it is able to make a decision whether or not to partner with SREC in the 4-mile line upgrade. The Board then gave Manager Juel and Board Secretary Gulick a brief overview of the development procedure when it worked to get Turnbull Hydro up and running. Turnbull currently brings GID a revenue of over $2/acre; Gibson Hydro would be able to run 365 days of the year. Commissioner Brady pointed out that GID crews were a big part of the Turnbull Hydro development process but believes we should project future hydro projects with the idea that contracted labor would need to be hired out for most if not all of the development. President Brunner asked that Manager Juel start keeping track of his hours spent working on the development of hydropower strategies. There is a meeting this Thursday with the Public Service Commissioners to discuss the importance of developing local sources of hydropower. Manager Juel encouraged President Brunner to attend.

President Brunner then requested that Manager Juel set-up a meeting with the SREC's Board to discuss a possible partnership between SREC and GID and what the specifics would look like.

President Brunner stated that funding revenue streams are likely different for a co-op then they are for a non-profit government entity. Manager Juel then encourage a philosophical partnership with SREC, not a financial one. Commissioner Gulick suggested we present them with an MOU to help encourage the fact that the partnership would be mutually beneficial.

Next up for discussion was Agenda Item #2: Neal vs. GID Lawsuit. Manager Juel informed the Board that we are at the early stage of discovery but haven't had a chance for GID to submit discovery questions of its own. GID is asking that the case be thrown out of state court so that we can name the Bureau of Reclamation co-defense and refile the case in Federal court.

May it be noted that Commissioner Brosten arrives at the meeting at 9:55 A.M. President Brunner summarizes the discussions had so far. Commissioner Brosten expressed his agreement with the Board's thoughts previously discussed.

Brief discussion on GID's current O&M rate and how it compares to other irrigation districts from around the state, see handout provided. Board decided it needs more time to contemplate whether or not to raise the rate for the 2021 year. Counties must receive the rate change if there is to be one by mid-September. Board tabled the decision until its next Regular Meeting on September 8th.

Motion was made to adjourn the meeting by Commissioner Brady and seconded by Commissioner Gulick. All in favor and the meeting is adjourned at 10:27 A.M.

Board President

Board Secretary

AGENDA FOR: Special meeting Monday, August 31st and 8 A.M.

CALL TO ORDER:

Public Comment: Prior to each agenda item…limited to 5 minutes…any Board action necessary will be addressed at the next regular meeting.

AGENDA

1) Work Session to determine how the Board/Management Envisions the Future of GID and develop an appropriate strategy while providing adequate direction to the Manager and sufficient tools to achieve those objectives

2) Discuss Neal vs. GID Lawsuit

CONSERVATIVE NATURE/ISSUES WITH HDR's COST ESTIMATES

1. **Option #3** – 3Ø using 4/0 ACSR and 35-foot distribution poles only. This is minimum line upgrade needed to get Arnold Coulee on-line.
    a. HDR Est. - $96,956.52/mile **(P1.9)**
    b. SREC Est. - $78,999.24/mile, 81% of HDR's estimate
    c. GID's Cost - $32,054.12/mile, 33% of HDR's estimate

2. **Option #2** – 65-foot transmission poles with 4/0 ACSR, 3-Ø underbuilt. No transmission conductor or related hardware. This line upgrade is midway between Options #2 and #5.
    a. HDR Est. - $314,545.46/mile **(P1.8)**
    b. SREC Est. - $126,378.09/mile, 40% of HDR's estimate
    c. GID's Cost - $79,432.97/mile, 25% of HDR's estimate

3. **Option #5** – 65-foot transmission poles with 336 ACSR transmission conductor and shield wire as well as 4/0 ACSR, 3-Ø underbuilt. This is configuration is needed when for both the Arnold Coulee and Pishkun Drop sites are are on-line as well as the future Gibson Hydro and Diversion Dam Hydro.
    a. HDR Est. - $314,545.46 **(P1.8)** + $54,415.58/mile **(P2.4)**= $368,961.04/mile
    b. SREC Est. - $155,237.14/mile, 42% of HDR's estimate
    c. GID's Cost - $108,292.02/mile, 29% of HDR's estimate

SREC's PROPOSED ALTERNATIVES FOR UPGRADING NEXT 4 MILES OF LINE

GID Options for Construction of Power Lines for Projects

- **The three phase distribution options still would require the additional regulation and sectionalizing stated in the HDR study. The costs listed are merely line construction costs.**
- **All options would be reduced by the amount shown in option number 4. This is the cost SREC would have expended on the original project.**

Option #1- $383,305.08 – $187,780.48 = $195,524.60 (GID's Cost)

Transmission poles of 65' will be set with no hardware attached. The underbuilt will be single phase distribution construction with cross arms supporting the 1/0 wire. This option gets the poles in place but when the transmission line is to be activated, hardware and wire would need to be added. The additional cost would need to be considered at the later time.

The member requesting electric irrigation service would be limited to an add-a-phase unit to allow for this consideration.

Option #2- $505,512.36 – $187,780.48 = $317,731.88 (GID's Cost)

Transmission poles of 65' will be set with no hardware attached. The underbuilt will be three phase distribution construction with cross arms supporting 4/0 wire. This option gets the poles in place but when the transmission line is to be activated, hardware would need to be added. The additional cost would need to be considered.

The member requesting irrigation service would be able to use the three-phase configuration for his pump service. The option would also allow for GID to pursue the Arnold Coulee development option using the distribution solution.

Option #3- $315,996.96 – $187,780.48 = $128,216.48 (GID's Cost)

This option is three phase distribution using 35' poles. The framing would use fiberglass arms and heavy-duty saddle pins to support 4/0 ACSR wire. This option allows for Arnold Coulee to be served with the distribution option and also allow for three phase irrigation and no special equipment for phase conversion.

Option #4- $187,780.48 (SREC's Cost), $0.00 (GID's Cost)

Option #4 is the single-phase option that would be what is currently required for service by Sun River Electric. If GID was not asking to be part of this project; this would be the cost to upgrade the current SREC system.

Option #5- $620,948.56 – $187,780.48 = $433,168.08 (GID's Cost)

Option #5 is the completed project using transmission and distribution. No additional work would be required if the project was completed in this manner. .

Doing Option #5 will save GID $1,042,063.68 off of HDR's estimate. We will not fully realize this benefit until the Pishkun Drop site is brought on-line.

Going the Option #2 route will cost GID at least $102,300 more over time than Option #5 but still roughly $940,500 less than the HDR estimate.

I think we should shoot for Option #2 at this time. This will get us ready for Arnold Coulee now and the bigger poles for future hydro site developments. With the 3-Ø underbuilt, SREC can most likely secure the necessary easements and save GID $56,170 in cash incentives that Tollhouse promised the landowner.

2020 SUMMARY OF ASSESSEMNTS FOR OTHER USBR DISTRICTS

Irrigation District	Phone Number	Type of Fee	Rate/Acre	Rate/Acre	Notes
Alfalfa Valley Irrigation District		O&M BOR			
Buffalo Rapids No. I	(406) 377-6799	O&M Other	$25.50 $20.50	$46.00	Allottment: 6 total Acre-ft/Acre
Buffalo Rapids No. II	(406) 635-5586	O&M Reserve	$52.00 $7.00	$59.00	Allotment: 2.5 Acre-ft/Acre
Dodson Irrigation District	(406) 654-1440	O&M Water	$21.00 $5.00	$26.00	
East Bench Irrigation District	(406) 683-2307	O&M	$18.00	$18.00	Allotment: 1.7 Acre-ft for Class 1 &2 Allotment: 2.1 Acre-ft for Class 3
Fort Belknap	(406) 262-4888	O&M	$18.00	$18.00	
Fort Shaw Irrigation District	(406) 264-5751	O&M	$25.50	$25.50	Proposed increase effective 2020/2 Acre-ft allotment
Glasgow Irrigation District	(406) 228-2346 David 263-1011	O&M R&B	$35.51 $6.75	$42.26	Allotment set annually depending on supply
Greenfields Irrigation District	(406) 467-2533	O&M	$23.50	$23.50	Allotment: 2 Acre-ft/acre
Harlem Irrigation District	(406) 353-2383	O&M BoR	$27.00 $1.00	$28.00	
Helena Valley Irrigation District	(406) 442-3292	O&M	$20.00	$20.00	Allotment: 3 Acre -ft/Acre
Huntley Project Irrigation District	(406) 967-3400	O&M	$39.00	$39.00	
Intake Irrigation District	(406) 433-1306	O&M	$41.50	$41.50	Allotment: 3 cfs/80 Acre
Lower Yellowstone Irrigation District No. I	(406) 433-1306	O&M	$44.00	$44.00	Allotment: 3 Acre-ft/Acre; 3 cfs/80 Acres
Lower Yellowstone Irrigation District No. II	(406) 433-1306	O&M	$40.00	$40.00	Lands located in ND
Malta Irrigation District	(406) 654-1440	O&M Loan Water	$24.46 $3.06 $8.50	$36.02	Allotment: 4.5 Acre-ft/Acre
Paradise Valley Irrigation District	(406) 247-7300	O&M BOR			
Savage Irrigation District	(406) 433-1306	O&M	$37.00	$37.00	Allotment: 3 cfs/80 Acre
Toston Irrigation District	(406) 266-4650	O&M	$37.00	$26.00	Allotment: 2 Acre-ft/Acre
West Bench Irrigation District	(406)683-9715	O&M			
Zurich Irrigation District	(406)399-7128	O&M	$5.00	$5.00	Users buy shares; $2-3 charge from Beaverhead Water Co
Pondera Canal Company	(406) 505-0381	Private shares	$28.00	$28.00	Average 9"/Acre
			AVE=	$32.44	

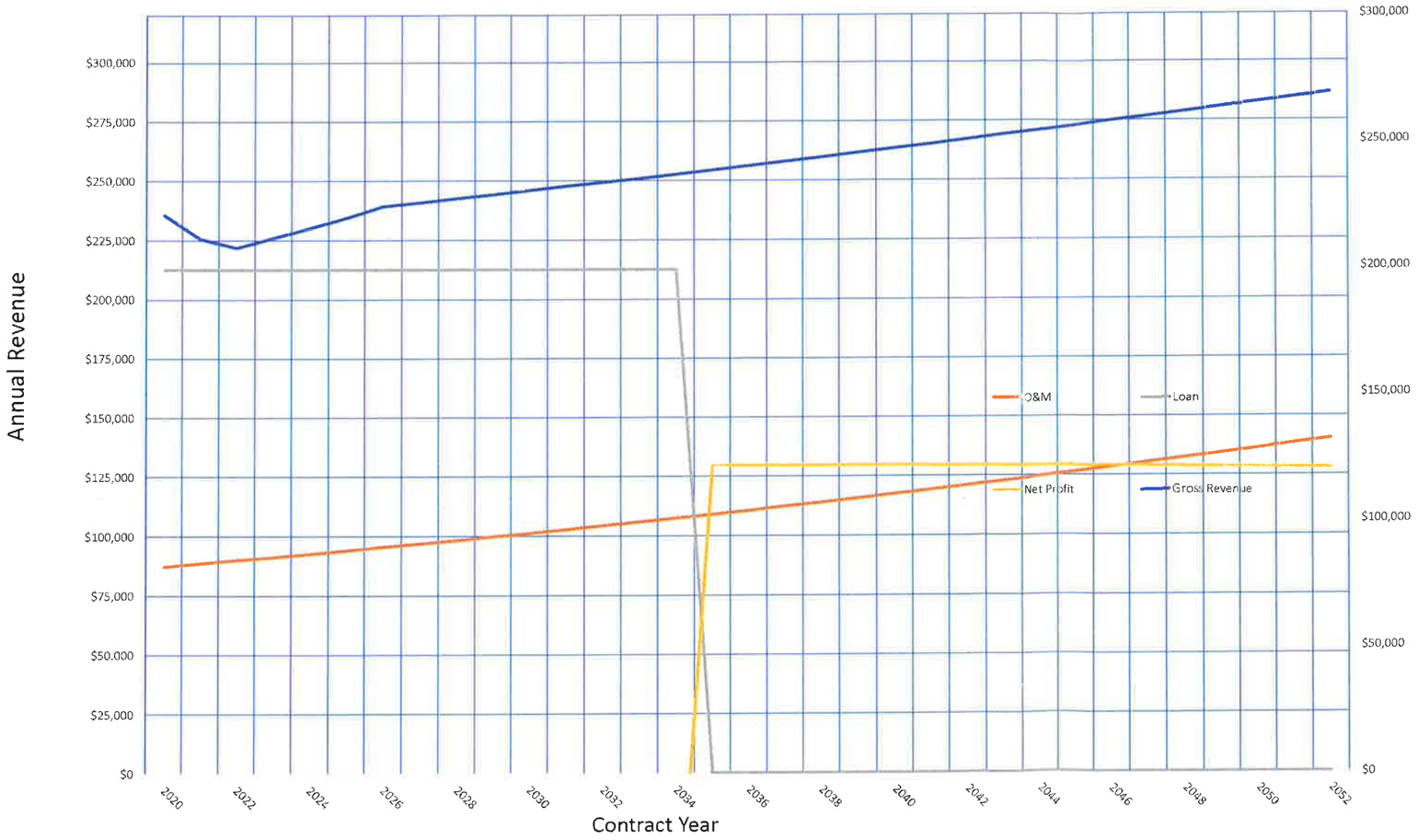
GREENFIELDS IRRIGATION DISTRICT ANNUAL BUDGET	2019 (Nov - Oct.)		2020 (Nov - Oct.)	
	Budget	Actual	REV.Budget	Actual
Assessed Acreage	81,600		81,680	As of
O&M Assessment	$22.00		$23.50	07/31/20
REVENUES				
Operations & Maint. Income				
310.1 O&M Assessments	$1,798,000	$1,792,070	$1,919,477	$1,921,330
311.1 O&M Penalties and Interest	$5,500	$7,441	$6,500	$5,816
312.1 WSCs on State Leases	$13,300	$13,288	$14,194	$15,052
312a. WSC Conversion Fees	$110,790	$110,790	$112,635	$112,635
313.1 Excess Water Sales	$6,500	$12,026	$9,500	-$535
314.1 Sales of Materials and Services	$155,000	$101,199	$110,000	$73,838
316.2 Grazing Lease Revenue	$165,000	$167,014	$167,000	$153,800
317.1 Finance Charges of Acc. Receivables	$500	$504	$500	$1,999
Total Operations & Maint. Income	**$2,254,590**	**$2,204,333**	**$2,339,806**	**$2,283,934**
Other Income & Misc. Receipts				
318.1 Capital Credit Refunds	$1,500	$1,675	$1,700	$1,710
327.1 Patronage Dividends	$500	$2,798	$2,100	$2,053
321.1 Big Coulee/ Beale Lining	$0	$230	$0	
321.2 Gibson Dam Access Road	$0	$15,000	$0	
330.1 Misc USBR Grants	$0	-$90,048	$0	
USBR GM-100 Headworks	$0		$97,000	$90,000
330.2 Misc DNRC Grants	$15,000	$5,000	$0	
DNRC Arnold Coulee LOOP PER	$0		$15,000	$15,000
DNRC Spr. Coulee Headworks PER	$0		$15,000	$15,000
DNRC SRS-71 Regulation PER	$0		$15,000	$15,000
DNRC GSC-62 Chute Replacement	$0		$15,000	$15,000
DNRC Willow Ck Outlet Gates Gates	$0		$10,000	$10,000
DNRC Willow Ck Feeder Canal Imps	$0		$0	
332.1 Proceeds From Sales of Assest	$1,250	$3,960	$27,500	$27,500
333.1 Proceeds From BS Book Sales	$0	$240	$0	$300
Misc. Income & Reimbursables				$15,593
350.1 Turnbull Hydro Project Income	$175,000	$200,166	$180,000	$104,018
399.1 Carry-over from Previous Year	$236,500		$100,000	
399.2 Transfer **FROM** GID Reserves	$135,000	$200,000	$0	
Total Other Income & Misc. Receipts	**$564,750**	**$339,022**	**$478,300**	**$311,174**
TOTAL REVENUES	**$2,819,340**	**$2,543,354**	**$2,818,106**	**$2,595,108**
Difference (Budget vs Actual)				
EXPENSES				
Employer/Labor Expense				
510.1 Wages	$1,125,000	$1,083,860	$1,100,000	$802,577
511.1 Group Health Insurance	$300,000	$329,816	$350,000	$256,672
512.1 Workers' Compensation Insurance	$50,000	$36,275	$39,500	$14,744
513.1 MPERD 8.37%	$87,000	$89,024	$90,000	$68,011
514.1 FICA/MediCare Tax 7.65%	$83,000	$83,055	$84,500	$61,397
515.1 State Unemployment Insurance	$5,200	$5,045	$6,000	$8,359
519.1 Severance Pay	$0	-$158	$0	
522.1 Misc. Payroll Expenses	$0	$100	$0	$0
Total Employer/Labor Expense	**$1,650,200**	**$1,627,017**	**$1,670,000**	**$1,211,761**

565.1 Telephone	$10,500	$10,298	$10,000	$7,617
570.1 MWRA Dues & Misc. Org Dues	$14,000	$9,975	$11,000	$5,040
570.2 SRWG Dues and Misc. Subscriptions	$0	$4,000	$12,000	$8,050
589.1 Misc. General Expenses	$107,500	$23,316	$15,000	$6,890
589.2 GID AG Scholarship	$0	$0	$2,500	$2,500
Total General Expense	**$276,650**	**$213,719**	**$231,100**	**$161,937**
Equipment & Operations				
610.1 Gasoline	$45,000	$40,273	$40,000	$30,650
611.1 Diesel Fuel	$35,000	$12,211	$22,500	$17,217
613.1 Grease, Oil & Propane	$5,000	$3,808	$4,500	$4,468
614.1 Tires	$12,500	$17,579	$18,000	$12,433
615.1 Repairs & Supplies	$100,000	$58,551	$65,000	$55,507
616.1 Shop Supplies	$26,500	$39,884	$30,000	$17,531
617.1 Equipment Rentals	$1,000	$1,103	$500	$175
619.1 Asset Purchase-Ford 3/4 ton P/U	$25,000	$30,612	$0	
619.1 Asset Purchase- 3 P/Us Dirkes	$0	$0	$80,500	$81,030
619.1 Asset Purchase-Loader	$0	$0	$158,000	$156,705
619.1 Asset Purchase-Case Tractor	$0	$0	$8,119	$8,819
Total Equipment & Operations	**$250,000**	**$204,022**	**$427,119**	**$384,535**
Stores & Supplies				
651.1 Cement	$7,000	$12,168	$1,500	$734
652.1 Coatings/Sealants/Admixtures	$1,000	$0	$0	
653.1 Hardware	$3,500	$0	$50	$41
654.1 Lumber	$4,000	$6,237	$4,500	$3,331
655.1 Pipe	$50,000	$8,819	$10,000	$6,640
656.1 Rebar	$3,500	$4,408	$6,500	$5,943
657.1 Steel	$3,000	$23,178	$6,500	$6,220
658.1 Weed Control Operations	$45,000	$32,688	$35,000	$30,004
659.1 Welding Supplies	$8,000	$3,371	$3,000	$2,434
660.1 Misc. Supplies	$0	$0	$0	$32,694
661.1 Gates	$7,500	$4,369	$14,000	$13,211
Total Stores & Supplies	**$132,500**	**$95,238**	**$81,050**	**$101,251**
Contracted Services				
710.1 Sand/Gravel/Rock	$10,000	$488	$4,500	$3,396
711.1 Ready Mix Concrete	$4,500	$1,982	$4,500	$17,024
712.1 Accounting	$15,000	$11,955	$12,500	$8,940
713.1 Gibson Dam Tending				$153
718.1 Other Misc.Contracted Services	$12,000	$21,338	$9,000	$6,854
719.1 Acreage Map Expenses	$5,000	$5,738	$6,000	$4,341
Total Contracted Services	**$46,500**	**$41,501**	**$36,500**	**$40,707**
Special Projects & Repairs				
725.1 Johnson Drop Replacement	$125,000	$92,618	$9,000	$2,476
726.1 Cold Storage Conversion	$12,500	$2,355	$0	
727.1 Willow Creek Feeder Canal Repairs	$7,500	$0	$0	
728.1 Arnold Coulee LOPP	$45,000	$19,690	$125,000	$15,250
729.1 Gibson Dam Rehab			$0	$403
730.1 Sun River Bridge Project	$0	$30,000	$0	
731.1 Gibson Dam Access Road	$0	$40,723	$0	
732.1 Mill Coulee Check	$0	$7,850	$0	

PISHKUN INLET DROP

Location:	Pishkun Reg Pond	Latitude:	N47°40'53"	Analyzed by:	EAJ
Flow Years:	2000 to 2019	Longitude:	W112°30'24"	Last Saved:	8/28/2020
Data Source:	USBR, GIBR, QJ_PSC USBR, PSHR, FB	Elevation:	4447 to 4411		
Turbine Style:	kaplan	Forebay FSL	4399.0	Approx. Penstock Length	350 feet
Max. Turbine Flow	1000 cfs	Tailrace FSL	4370.0 max, varies	Penstock Material	steel
Min. Turbine Flow	400 cfs	Design Static Head:	29.0 feet	Hazen-Williams. Coefff.	130
Turbine Eff.	0.95	Design Net Head	25.3 feet	Max. Penstock Velocity	12 fps
Generator Eff.	0.87	Ingress Coeff.	0.4	Min. Penstock Diam.	10.3 feet
Transmission Eff.	0.995	Egress Coeff.	1	Actual Penstock Diam.	10.5 feet
Comb. Eff.	0.82	Max. Head Loss	3.7 feet	Flow Area	86.59 ft^2
Max. Site Capacity	1770 kW			Actual Penstock Velocity	11.55 fps

ANNUAL REVENUE GENERATION
(based on NW Energy avoided costs)

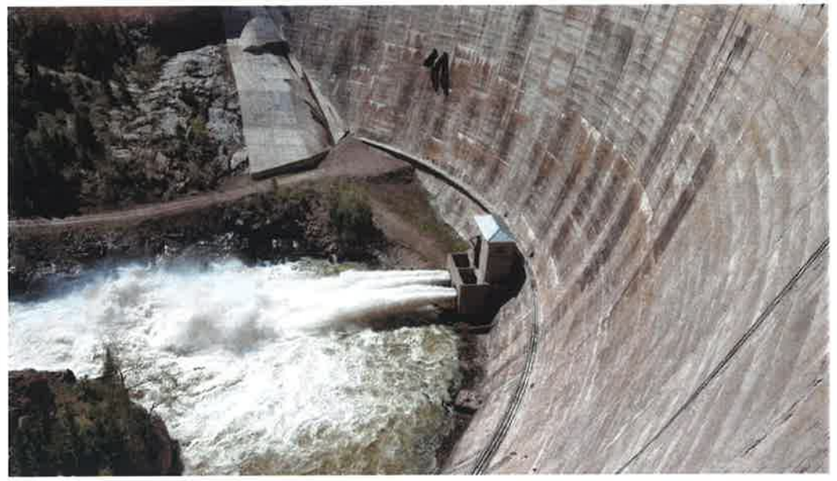


ENERGY GEN. USED IN ANALYSIS				
Ave ON-Peak =	1,249	MW-Hrs		
Ave OFF-Peak =	3,694	MW-Hrs		
Year	Revenue	O&M	Loan Payment	Net
2020	$220,879	$87,218	$212,469	($78,809)
2021	$211,559	$88,526	$212,469	($89,437)
2022	$207,947	$89,854	$212,469	($94,377)
2023	$211,830	$91,202	$212,469	($91,841)
2024	$215,652	$92,570	$212,469	($89,388)
2025	$219,732	$93,959	$212,469	($86,696)
2026	$224,306	$95,368	$212,469	($83,531)
2027	$225,822	$96,798	$212,469	($83,446)
2028	$227,437	$98,250	$212,469	($83,283)
2029	$229,003	$99,724	$212,469	($83,191)
2030	$230,655	$101,220	$212,469	($83,035)
2031	$232,221	$102,738	$212,469	($82,987)
2032	$233,786	$104,279	$212,469	($82,963)
2033	$235,241	$105,844	$212,469	($83,072)
2034	$236,856	$107,431	$212,469	($83,045)
2035	$238,514	$109,043	$0	$129,471
2036	$240,183	$110,678	$0	$129,505
2037	$241,865	$112,339	$0	$129,526
2038	$243,558	$114,024	$0	$129,534
2039	$245,263	$115,734	$0	$129,529
2040	$246,980	$117,470	$0	$129,510
2041	$248,708	$119,232	$0	$129,476
2042	$250,449	$121,021	$0	$129,429
2043	$252,203	$122,836	$0	$129,367
2044	$253,968	$124,678	$0	$129,290
2045	$255,746	$126,549	$0	$129,197
2046	$257,536	$128,447	$0	$129,089
2047	$259,339	$130,373	$0	$128,965
2048	$261,154	$132,329	$0	$128,825
2049	$262,982	$134,314	$0	$128,668
2050	$264,823	$136,329	$0	$128,494
2051	$266,677	$138,374	$0	$128,303
2052	$268,543	$140,449	$0	$128,094

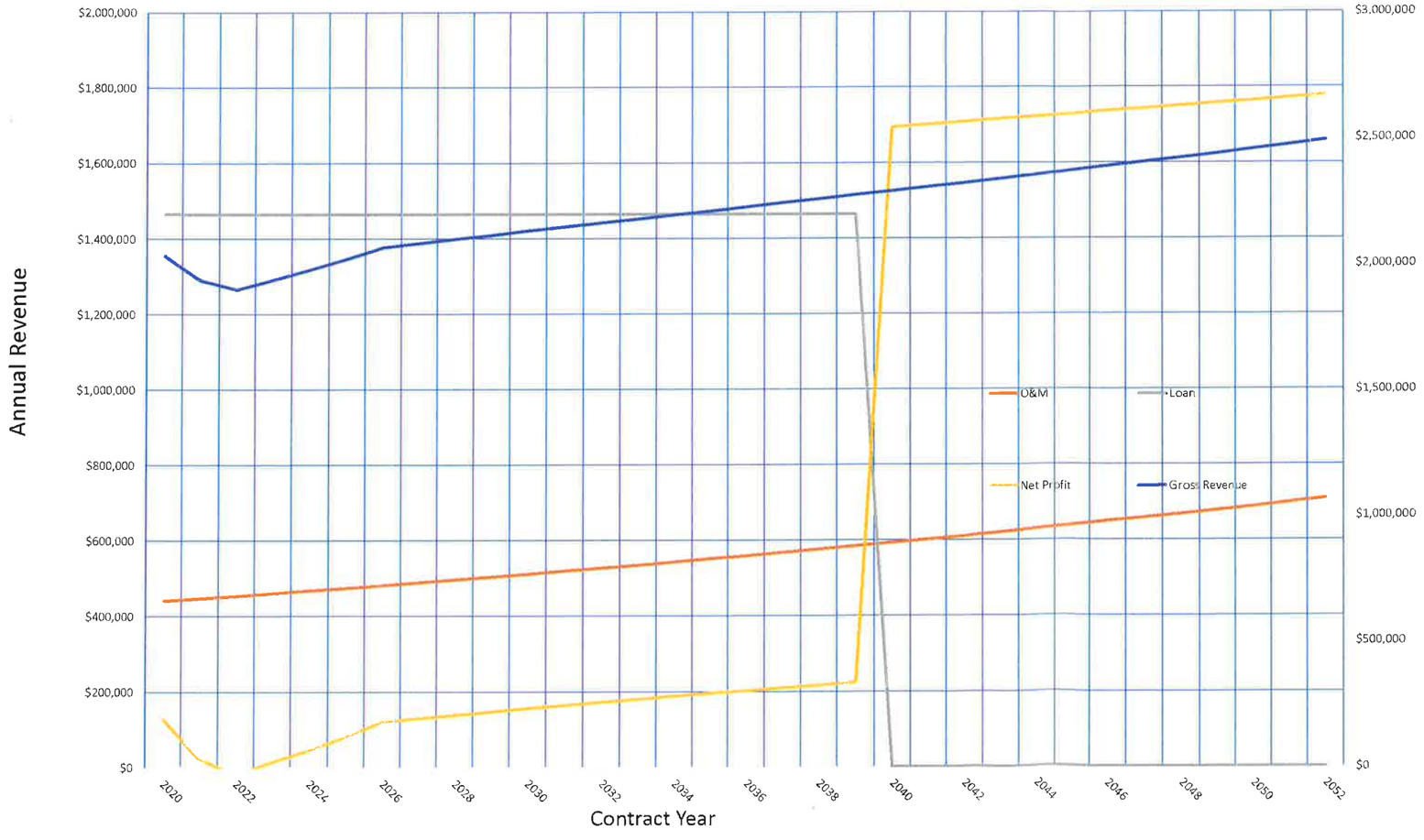
1st 15-YR AVE= $224,195

GIBSON DAM

Location:	Sun River	Latitude:	N47°40'34"	Analyzed by:	EAJ
Flow Years:	2000 to 2019	Longitude:	W112°29'43"	Last Saved:	8/28/2020
Data Source:	GIBR, FB, QJETD & QSD	Elevation:	4447 to 4411		
Turbine Style:	3-units	Forebay FSL	4724.0 max, varies	Approx. Penstock Length	150 feet
Max. Turbine Flow	3000 cfs	Tailrace FSL	4553.0	Penstock Material	steel
Min. Turbine Flow	100 cfs	Design Static Head:	171.0 feet	Hazen-Williams. Coefff.	120
Turbine Eff.	0.95	Design Net Head	155.1 feet	Max. Penstock Velocity	12 fps
Generator Eff.	0.87	Ingress Coeff.	0.2	Min. Penstock Diam.	17.84 feet
Transmission Eff.	0.995	Egress Coeff.	0.8	Equivalent Penstock Diam.	11.31 feet
Comb. Eff.	0.82	Max. Head Loss	15.9 feet	Flow Area	100.5 ft^2
Max. Site Capacity	32540 kW			Actual Penstock Diam.**	8 feet
				**=Dual Outlet Tubes	



ANNUAL REVENUE GENERATION
(based on NW Energy avoided costs)



ENERGY GEN. USED IN ANALYSIS				
Ave ON-Peak = 8,931 MW-Hrs				
Ave OFF-Peak = 45,449 MW-Hrs				
Year	Revenue	O&M	Loan Payment	Net
2020	$2,030,623	$440,329	$1,463,224	$127,069
2021	$1,934,383	$446,934	$1,463,224	$24,225
2022	$1,897,021	$453,638	$1,463,224	($19,842)
2023	$1,936,918	$460,443	$1,463,224	$13,251
2024	$1,976,223	$467,349	$1,463,224	$45,649
2025	$2,018,153	$474,360	$1,463,224	$80,569
2026	$2,065,166	$481,475	$1,463,224	$120,467
2027	$2,080,666	$488,697	$1,463,224	$128,744
2028	$2,097,182	$496,028	$1,463,224	$137,930
2029	$2,113,189	$503,468	$1,463,224	$146,497
2030	$2,130,130	$511,020	$1,463,224	$155,885
2031	$2,146,138	$518,685	$1,463,224	$164,228
2032	$2,162,145	$526,466	$1,463,224	$172,455
2033	$2,177,053	$534,363	$1,463,224	$179,466
2034	$2,193,569	$542,378	$1,463,224	$187,966
2035	$2,208,924	$550,514	$1,463,224	$195,185
2036	$2,224,386	$558,772	$1,463,224	$202,390
2037	$2,239,957	$567,153	$1,463,224	$209,579
2038	$2,255,637	$575,660	$1,463,224	$216,752
2039	$2,271,426	$584,295	$1,463,224	$223,906
2040	$2,287,326	$593,060	$0	$1,694,266
2041	$2,303,337	$601,956	$0	$1,701,382
2042	$2,319,461	$610,985	$0	$1,708,476
2043	$2,335,697	$620,150	$0	$1,715,547
2044	$2,352,047	$629,452	$0	$1,722,595
2045	$2,368,511	$638,894	$0	$1,729,617
2046	$2,385,091	$648,477	$0	$1,736,614
2047	$2,401,786	$658,204	$0	$1,743,582
2048	$2,418,599	$668,077	$0	$1,750,521
2049	$2,435,529	$678,099	$0	$1,757,431
2050	$2,452,578	$688,270	$0	$1,764,308
2051	$2,469,746	$698,594	$0	$1,771,152
2052	$2,487,034	$709,073	$0	$1,777,961

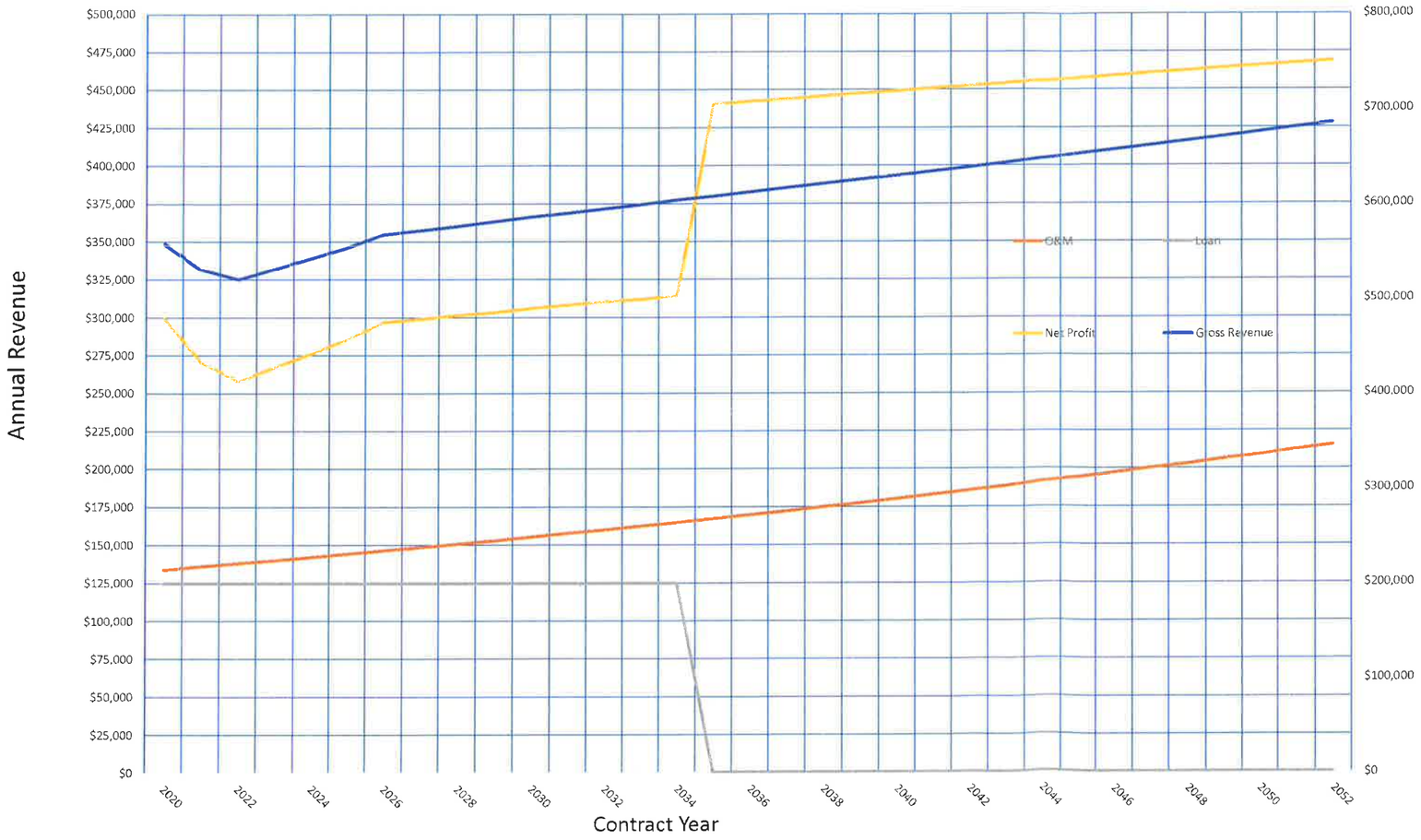
1st 15-YR AVE= $2,063,904
15-YR TOTAL= $30,958,560

DIVERSION DAM

Location:	Diversion Dam	Latitude:	N47°16' 00"	Analyzed by:	EAJ
Flow Years:	2000 to 2019	Longitude:	W112°42' 24"	Last Saved:	8/28/2020
Data Source:	USBR, SRDM, QRD	Elevation:	4374 to 4260		
Turbine Style:	francis	Forebay FSL	4374.0	Approx. Penstock Length	500 feet
Max. Turbine Flow	600 cfs	Tailrace FSL	4260.0	Penstock Material	steel
Min. Turbine Flow	120 cfs	Design Static Head:	114.0 feet	Hazen-Williams. Coefff.	130
Turbine Eff.	0.95	Design Net Head	109.2 feet	Design Max. Velocity	12 fps
Generator Eff.	0.87	Ingress Coeff.	0.4	Min. Diam. Required	8.0 feet
Transmission Eff.	0.995	Egress Coeff.	1	Actual Penstock Diam.	8 feet
Comb. Eff.	0.82	Max. Head Loss	4.8 feet	Flow Area	50.27 ft^2
Max. Site Capacity	4585 kW			Actual Penstock Velocity	11.94 fps

2@-300cfs
40% of one

ANNUAL REVENUE GENERATION
(based on NW Energy avoided costs)



ENERGY GEN. USED IN ANALYSIS

Ave ON-Peak = 2,138 MW-Hrs
Ave OFF-Peak = 12,125 MW-Hrs

Year	Revenue	O&M	Loan Payment	Net
2020	$557,959	$133,813	$124,521	$299,625
2021	$530,945	$135,820	$124,521	$270,604
2022	$520,455	$137,857	$124,521	$258,077
2023	$531,644	$139,925	$124,521	$267,198
2024	$542,669	$142,024	$124,521	$276,124
2025	$554,429	$144,155	$124,521	$285,753
2026	$567,614	$146,317	$124,521	$296,777
2027	$571,957	$148,512	$124,521	$298,925
2028	$576,585	$150,739	$124,521	$301,325
2029	$581,071	$153,000	$124,521	$303,550
2030	$585,820	$155,295	$124,521	$306,004
2031	$590,306	$157,625	$124,521	$308,160
2032	$594,791	$159,989	$124,521	$310,281
2033	$598,970	$162,389	$124,521	$312,060
2034	$603,598	$164,825	$124,521	$314,253
2035	$607,824	$167,297	$0	$440,526
2036	$612,078	$169,807	$0	$442,272
2037	$616,363	$172,354	$0	$444,009
2038	$620,677	$174,939	$0	$445,738
2039	$625,022	$177,563	$0	$447,459
2040	$629,397	$180,227	$0	$449,171
2041	$633,803	$182,930	$0	$450,873
2042	$638,240	$185,674	$0	$452,566
2043	$642,707	$188,459	$0	$454,248
2044	$647,206	$191,286	$0	$455,920
2045	$651,737	$194,155	$0	$457,581
2046	$656,299	$197,068	$0	$459,231
2047	$660,893	$200,024	$0	$460,869
2048	$665,519	$203,024	$0	$462,495
2049	$670,178	$206,069	$0	$464,109
2050	$674,869	$209,160	$0	$465,709
2051	$679,593	$212,298	$0	$467,295
2052	$684,350	$215,482	$0	$468,868

1st 15-YR AVE= $567,254
15-YR TOTAL= $8,508,814

ARNOLD COULEE DROP	
FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$927,000
2nd Phase Finish Buildout	$2,275,500
Transmission/Electrical Costs	$2,150,000
Total Construction Costs	$5,352,500
DNRC RRGL Grant	$125,000
USBR WaterSmart Grant	$2,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$500,000
Tax Credit (30% of Equip)	$682,650
DOE Incentive ($0.018/kW-hr)	$520,869
GID In-Kind Services	$600,000
Unfunded Balance	$1,444,850
LOAN OPTION	
Interest Rate	2.00%
Loan Length, Years	15
Annual Payment	$112,446
Total Payment Over Loan	$1,686,692
Total Interest Over Loan	$241,842

Year	Revenue	O&M	Loan Payment	Net
2020	$250,226	$87,437	$112,446	$50,342
2021	$239,446	$88,749	$112,446	$38,251
2022	$235,267	$90,080	$112,446	$32,741
2023	$239,754	$91,431	$112,446	$35,877
2024	$244,171	$92,803	$112,446	$38,922
2025	$248,886	$94,195	$112,446	$42,246
2026	$254,172	$95,608	$112,446	$46,118
2027	$255,922	$97,042	$112,446	$46,434
2028	$257,787	$98,497	$112,446	$46,843
2029	$259,594	$99,975	$112,446	$47,173
2030	$261,502	$101,474	$112,446	$47,582
2031	$263,310	$102,997	$112,446	$47,867
2032	$265,117	$104,541	$112,446	$48,130
2033	$266,797	$106,110	$112,446	$48,242
2034	$268,662	$107,701	$112,446	$48,515
2035	$270,543	$109,317	$0	$161,226
2036	$272,436	$110,957	$0	$161,480
2037	$274,343	$112,621	$0	$161,723
2038	$276,264	$114,310	$0	$161,954
2039	$278,198	$116,025	$0	$162,173
2040	$280,145	$117,765	$0	$162,380
2041	$282,106	$119,532	$0	$162,574
2042	$284,081	$121,325	$0	$162,756
2043	$286,069	$123,145	$0	$162,925
2044	$288,072	$124,992	$0	$163,080
2045	$290,088	$126,867	$0	$163,222
2046	$292,119	$128,770	$0	$163,349
2047	$294,164	$130,701	$0	$163,463
2048	$296,223	$132,662	$0	$163,561
2049	$298,297	$134,652	$0	$163,645
2050	$300,385	$136,671	$0	$163,713
2051	$302,487	$138,721	$0	$163,766
2052	$304,605	$140,802	$0	$163,803

PISHKUN INLET DROP	
FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$1,200,000
2nd Phase Finish Buildout	$2,000,000
Transmission/Electrical Costs	$3,200,000
Total Construction Costs	$6,400,000
DNRC RRGL Grant	$125,000
USBR WaterSmart Grant	$2,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$500,000
Tax Credit (30% of Equip)	$600,000
DOE Incentive ($0.018/kW-hr)	$444,924
GID In-Kind Services	$600,000
Unfunded Balance	$2,730,076
LOAN OPTION	
Interest Rate	2.00%
Loan Length, Years	15
Annual Payment	$212,469
Total Payment Over Loan	$3,187,042
Total Interest Over Loan	$456,966

Year	Revenue	O&M	Loan Payment	Net
2020	$220,879	$87,218	$212,469	($78,809)
2021	$211,559	$88,526	$212,469	($89,437)
2022	$207,947	$89,854	$212,469	($94,377)
2023	$211,830	$91,202	$212,469	($91,841)
2024	$215,652	$92,570	$212,469	($89,388)
2025	$219,732	$93,959	$212,469	($86,696)
2026	$224,306	$95,368	$212,469	($83,531)
2027	$225,822	$96,798	$212,469	($83,446)
2028	$227,437	$98,250	$212,469	($83,283)
2029	$229,003	$99,724	$212,469	($83,191)
2030	$230,655	$101,220	$212,469	($83,035)
2031	$232,221	$102,738	$212,469	($82,987)
2032	$233,786	$104,279	$212,469	($82,963)
2033	$235,241	$105,844	$212,469	($83,072)
2034	$236,856	$107,431	$212,469	($83,045)
2035	$238,514	$109,043	$0	$129,471
2036	$240,183	$110,678	$0	$129,505
2037	$241,865	$112,339	$0	$129,526
2038	$243,558	$114,024	$0	$129,534
2039	$245,263	$115,734	$0	$129,529
2040	$246,980	$117,470	$0	$129,510
2041	$248,708	$119,232	$0	$129,476
2042	$250,449	$121,021	$0	$129,429
2043	$252,203	$122,836	$0	$129,367
2044	$253,968	$124,678	$0	$129,290
2045	$255,746	$126,549	$0	$129,197
2046	$257,536	$128,447	$0	$129,089
2047	$259,339	$130,373	$0	$128,965
2048	$261,154	$132,329	$0	$128,825
2049	$262,982	$134,314	$0	$128,668
2050	$264,823	$136,329	$0	$128,494
2051	$266,677	$138,374	$0	$128,303
2052	$268,543	$140,449	$0	$128,094

FIRST TWO SITES ON THE PSC	
FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$2,127,000
2nd Phase Finish Buildout	$4,275,500
Transmission/Electrical Costs	$5,350,000
Total Construction Costs	$11,752,500
DNRC RRGL Grant	$250,000
USBR WaterSmart Grant	$4,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$1,000,000
Tax Credit (30% of Equip)	$1,282,650
DOE Incentive ($0.018/kW-hr)	$965,793
GID In-Kind Services	$1,200,000
Unfunded Balance	$4,174,926

Year	Revenue	O&M	Loan Payment	Net
2020	$471,104	$174,655	$324,916	$28,466
2021	$451,005	$177,275	$324,916	$51,186
2022	$443,214	$179,934	$324,916	$61,636
2023	$451,584	$182,633	$324,916	$55,964
2024	$459,823	$185,373	$324,916	$50,465
2025	$468,619	$188,153	$324,916	$44,450
2026	$478,478	$190,976	$324,916	$37,413
2027	$481,745	$193,840	$324,916	$37,011
2028	$485,224	$196,748	$324,916	$36,439
2029	$488,597	$199,699	$324,916	$36,017
2030	$492,157	$202,694	$324,916	$35,453
2031	$495,530	$205,735	$324,916	$35,120
2032	$498,904	$208,821	$324,916	$34,833
2033	$502,038	$211,953	$324,916	$34,830
2034	$505,518	$215,132	$324,916	$34,530
2035	$509,056	$218,359	$0	$290,697
2036	$512,620	$221,635	$0	$290,985
2037	$516,208	$224,959	$0	$291,249
2038	$519,822	$228,334	$0	$291,488
2039	$523,460	$231,759	$0	$291,702
2040	$527,125	$235,235	$0	$291,889
2041	$530,815	$238,764	$0	$292,051
2042	$534,530	$242,345	$0	$292,185
2043	$538,272	$245,980	$0	$292,292
2044	$542,040	$249,670	$0	$292,370
2045	$545,834	$253,415	$0	$292,419
2046	$549,655	$257,216	$0	$292,439
2047	$553,503	$261,075	$0	$292,428
2048	$557,377	$264,991	$0	$292,386
2049	$561,279	$268,966	$0	$292,313
2050	$565,208	$273,000	$0	$292,208
2051	$569,164	$277,095	$0	$292,069
2052	$573,148	$281,251	$0	$291,897

GIBSON DAM FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$5,500,000
2nd Phase Finish Buildout	$21,500,000
Transmission/Electrical Costs	$6,445,000
Total Construction Costs	$33,445,000
DNRC RRGL Grant	$125,000
USBR WaterSmart Grant	$2,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$500,000
Tax Credit (30% of Equip)	$6,450,000
DOE Incentive ($0.018/kW-hr)	$4,894,183
GID In-Kind Services	$2,000,000
Unfunded Balance	$23,925,817
LOAN OPTION	
Interest Rate	2.00%
Loan Length, Years	20
Annual Payment	$1,463,224
Total Payment Over Loan	$29,264,489
Total Interest Over Loan	$5,338,672

DIVERSION DAM FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$2,225,000
2nd Phase Finish Buildout	$3,000,000
Transmission/Electrical Costs	$400,000
Total Construction Costs	$5,625,000
DNRC RRGL Grant	$125,000
USBR WaterSmart Grant	$2,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$500,000
Tax Credit (30% of Equip)	$1,283,633
DOE Incentive ($0.018/kW-hr)	$900,000
GID In-Kind Services	$500,000
Unfunded Balance	$1,600,000
LOAN OPTION	
Interest Rate	2.00%
Loan Length, Years	15
Annual Payment	$124,521
Total Payment Over Loan	$1,867,811
Total Interest Over Loan	$267,811

ALL FOUR WESTERN SITES FUNDING STRATEGY/OPTIONS	
1st Phase Infrastructure Costs	$9,852,000
2nd Phase Finish Buildout	$28,775,500
Transmission/Electrical Costs	$12,195,000
Total Construction Costs	$50,822,500
DNRC RRGL Grant	$500,000
USBR WaterSmart Grant	$8,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$2,000,000
Tax Credit (30% of Equip)	$9,016,283
DOE Incentive ($0.018/kW-hr)	$6,759,976
GID In-Kind Services	$3,700,000
Unfunded Balance	$29,700,744

Year	Revenue	O&M	Loan Payment	Net
2020	$2,030,623	$440,329	$1,463,224	$127,069
2021	$1,934,383	$446,934	$1,463,224	$24,225
2022	$1,897,021	$453,638	$1,463,224	($19,842)
2023	$1,936,918	$460,443	$1,463,224	$13,251
2024	$1,976,223	$467,349	$1,463,224	$45,649
2025	$2,018,153	$474,360	$1,463,224	$80,569
2026	$2,065,166	$481,475	$1,463,224	$120,467
2027	$2,080,666	$488,697	$1,463,224	$128,744
2028	$2,097,182	$496,028	$1,463,224	$137,930
2029	$2,113,189	$503,468	$1,463,224	$146,497
2030	$2,130,130	$511,020	$1,463,224	$155,885
2031	$2,146,138	$518,685	$1,463,224	$164,228
2032	$2,162,145	$526,466	$1,463,224	$172,455
2033	$2,177,053	$534,363	$1,463,224	$179,466
2034	$2,193,569	$542,378	$1,463,224	$187,966
2035	$2,208,924	$550,514	$1,463,224	$195,185
2036	$2,224,386	$558,772	$1,463,224	$202,390
2037	$2,239,957	$567,153	$1,463,224	$209,579
2038	$2,255,637	$575,660	$1,463,224	$216,752
2039	$2,271,426	$584,295	$1,463,224	$223,906
2040	$2,287,326	$593,060	$0	$1,694,266
2041	$2,303,337	$601,956	$0	$1,701,382
2042	$2,319,461	$610,985	$0	$1,708,476
2043	$2,335,697	$620,150	$0	$1,715,547
2044	$2,352,047	$629,452	$0	$1,722,595
2045	$2,368,511	$638,894	$0	$1,729,617
2046	$2,385,091	$648,477	$0	$1,736,614
2047	$2,401,786	$658,204	$0	$1,743,582
2048	$2,418,599	$668,077	$0	$1,750,521
2049	$2,435,529	$678,099	$0	$1,757,431
2050	$2,452,578	$688,270	$0	$1,764,308
2051	$2,469,746	$698,594	$0	$1,771,152
2052	$2,487,034	$709,073	$0	$1,777,961

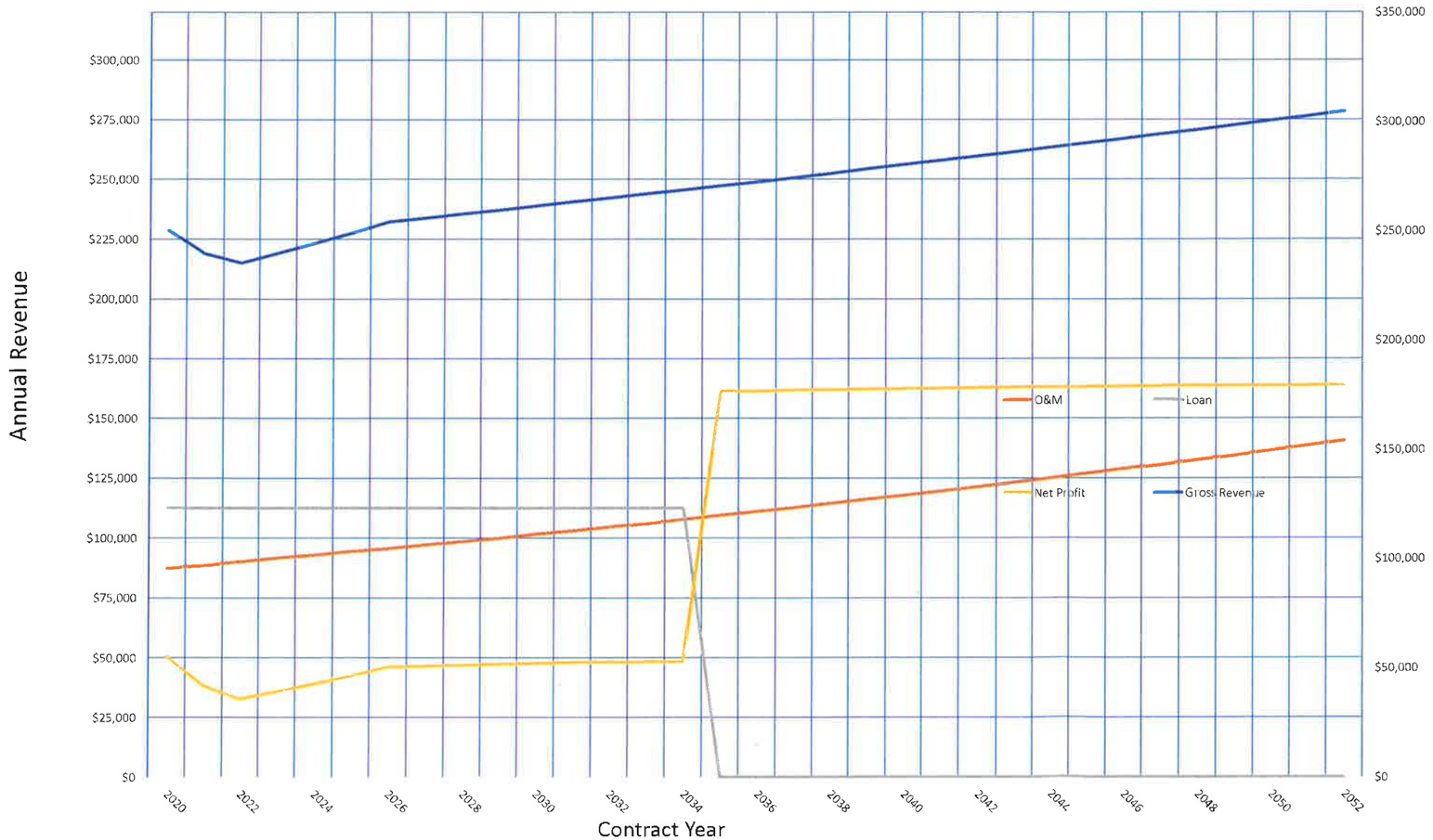
Year	Revenue	O&M	Loan Payment	Net
2020	$557,959	$133,813	$124,521	$299,625
2021	$530,945	$135,820	$124,521	$270,604
2022	$520,455	$137,857	$124,521	$258,077
2023	$531,644	$139,925	$124,521	$267,198
2024	$542,669	$142,024	$124,521	$276,124
2025	$554,429	$144,155	$124,521	$285,753
2026	$567,614	$146,317	$124,521	$296,777
2027	$571,957	$148,512	$124,521	$298,925
2028	$576,585	$150,739	$124,521	$301,325
2029	$581,071	$153,000	$124,521	$303,550
2030	$585,820	$155,295	$124,521	$306,004
2031	$590,306	$157,625	$124,521	$308,160
2032	$594,791	$159,989	$124,521	$310,281
2033	$598,970	$162,389	$124,521	$312,060
2034	$603,598	$164,825	$124,521	$314,253
2035	$607,824	$167,297	$0	$440,526
2036	$612,078	$169,807	$0	$442,272
2037	$616,363	$172,354	$0	$444,009
2038	$620,677	$174,939	$0	$445,738
2039	$625,022	$177,563	$0	$447,459
2040	$629,397	$180,227	$0	$449,171
2041	$633,803	$182,930	$0	$450,873
2042	$638,240	$185,674	$0	$452,566
2043	$642,707	$188,459	$0	$454,248
2044	$647,206	$191,286	$0	$455,920
2045	$651,737	$194,155	$0	$457,581
2046	$656,299	$197,068	$0	$459,231
2047	$660,893	$200,024	$0	$460,869
2048	$665,519	$203,024	$0	$462,495
2049	$670,178	$206,069	$0	$464,109
2050	$674,869	$209,160	$0	$465,709
2051	$679,593	$212,298	$0	$467,295
2052	$684,350	$215,482	$0	$468,868

Year	Revenue	O&M	Loan Payment	Net
2020	$3,059,686	$748,797	$1,912,661	$398,228
2021	$2,916,334	$760,029	$1,912,661	$243,643
2022	$2,860,690	$771,430	$1,912,661	$176,599
2023	$2,920,147	$783,001	$1,912,661	$224,484
2024	$2,978,715	$794,746	$1,912,661	$271,308
2025	$3,041,201	$806,668	$1,912,661	$321,872
2026	$3,111,258	$818,768	$1,912,661	$379,830
2027	$3,134,367	$831,049	$1,912,661	$390,658
2028	$3,158,991	$843,515	$1,912,661	$402,815
2029	$3,182,857	$856,168	$1,912,661	$414,029
2030	$3,208,108	$869,010	$1,912,661	$426,437
2031	$3,231,974	$882,045	$1,912,661	$437,268
2032	$3,255,840	$895,276	$1,912,661	$447,904
2033	$3,278,061	$908,705	$1,912,661	$456,696
2034	$3,302,685	$922,336	$1,912,661	$467,689
2035	$3,325,804	$936,171	$1,463,224	$926,409
2036	$3,349,084	$950,213	$1,463,224	$935,647
2037	$3,372,528	$964,466	$1,463,224	$944,837
2038	$3,396,136	$978,933	$1,463,224	$953,978
2039	$3,419,909	$993,617	$1,463,224	$963,067
2040	$3,443,848	$1,008,522	$0	$2,435,326
2041	$3,467,955	$1,023,649	$0	$2,444,306
2042	$3,492,231	$1,039,004	$0	$2,453,227
2043	$3,516,676	$1,054,589	$0	$2,462,087
2044	$3,541,293	$1,070,408	$0	$2,470,885
2045	$3,566,082	$1,086,464	$0	$2,479,618
2046	$3,591,045	$1,102,761	$0	$2,488,284
2047	$3,616,182	$1,119,303	$0	$2,496,879
2048	$3,641,495	$1,136,092	$0	$2,505,403
2049	$3,666,986	$1,153,133	$0	$2,513,852
2050	$3,692,655	$1,170,430	$0	$2,522,224
2051	$3,718,503	$1,187,987	$0	$2,530,516
2052	$3,744,533	$1,205,807	$0	$2,538,726

ARNOLD COULEE DROP

Location:	Pishkun Supply Canal	Latitude:	N47°39'45"	Analyzed by:	EAJ
Flow Years:	2000 to 2019	Longitude:	W112°34'55"	Last Saved:	8/28/2020
Data Source:	USBR, GIBR, QJ_PSC	Elevation:	4447 to 4411		
Turbine Style:	kaplan	Forebay FSL	4440.0	Approx. Penstock Length	382 feet
Max. Turbine Flow	1000 cfs	Tailrace FSL	4402.0	Penstock Material	steel
Min. Turbine Flow	300 cfs	Design Static Head:	38.0 feet	Hazen-Williams. Coefff.	130
Turbine Eff.	0.95	Design Net Head	33.4 feet	Max. Penstock Velocity	12 fps
Generator Eff.	0.87	Ingress Coeff.	0.4	Min. Penstock Diam.	10.3 feet
Transmission Eff.	0.995	Egress Coeff.	1	Actual Penstock Diam.	10 feet
Comb. Eff.	0.82	Max. Head Loss	4.6 feet	Flow Area	78.54 ft^2
Max. Site Capacity	2334 kW			Actual Penstock Velocity	12.73 fps

ANNUAL REVENUE GENERATION
(based on NW Energy avoided costs)



ENERGY GEN. USED IN ANALYSIS			
Ave ON-Peak =	1,389	MW-Hrs	
Ave OFF-Peak =	4,398	MW-Hrs	

Year	Revenue	O&M	Loan Payment	Net
2020	$250,226	$87,437	$112,446	$50,342
2021	$239,446	$88,749	$112,446	$38,251
2022	$235,267	$90,080	$112,446	$32,741
2023	$239,754	$91,431	$112,446	$35,877
2024	$244,171	$92,803	$112,446	$38,922
2025	$248,886	$94,195	$112,446	$42,246
2026	$254,172	$95,608	$112,446	$46,118
2027	$255,922	$97,042	$112,446	$46,434
2028	$257,787	$98,497	$112,446	$46,843
2029	$259,594	$99,975	$112,446	$47,173
2030	$261,502	$101,474	$112,446	$47,582
2031	$263,310	$102,997	$112,446	$47,867
2032	$265,117	$104,541	$112,446	$48,130
2033	$266,797	$106,110	$112,446	$48,242
2034	$268,662	$107,701	$112,446	$48,515
2035	$270,543	$109,317	$0	$161,226
2036	$272,436	$110,957	$0	$161,480
2037	$274,343	$112,621	$0	$161,723
2038	$276,264	$114,310	$0	$161,954
2039	$278,198	$116,025	$0	$162,173
2040	$280,145	$117,765	$0	$162,380
2041	$282,106	$119,532	$0	$162,574
2042	$284,081	$121,325	$0	$162,756
2043	$286,069	$123,145	$0	$162,925
2044	$288,072	$124,992	$0	$163,080
2045	$290,088	$126,867	$0	$163,222
2046	$292,119	$128,770	$0	$163,349
2047	$294,164	$130,701	$0	$163,463
2048	$296,223	$132,662	$0	$163,561
2049	$298,297	$134,652	$0	$163,645
2050	$300,385	$136,671	$0	$163,713
2051	$302,487	$138,721	$0	$163,766
2052	$304,605	$140,802	$0	$163,803

1st 15-YR AVE= $254,041

ARNOLD COULEE DROP

ENERGY GEN. (MWhrs)													Annual
Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2000	0	0	0	307	1642	1506	1728	1113	0	0	0	0	6,296
2001	0	0	0	0	1206	1646	1728	599	0	0	0	0	5,179
2002	0	0	0	26	1318	1141	1728	1357	321	0	0	0	5,892
2003	0	0	0	189	1042	1672	1728	333	0	0	0	0	4,964
2004	0	0	0	419	1013	1644	1728	1051	193	0	0	0	6,048
2005	0	0	0	0	1149	932	1728	796	0	0	0	0	4,605
2006	0	0	0	0	1254	1485	1728	646	0	0	0	0	5,113
2007	0	0	283	498	1284	1652	1728	159	0	0	0	0	5,605
2008	0	0	0	210	1341	1130	1728	1329	557	0	0	0	6,295
2009	0	0	0	0	850	1653	1721	924	1009	0	0	0	6,157
2010	0	0	0	0	985	1358	1728	1240	0	0	0	0	5,311
2011	0	0	0	0	456	517	1728	1653	1007	97	0	0	5,458
2012	0	0	0	135	1530	1619	1728	1562	26	0	0	0	6,599
2013	0	0	0	422	1456	1498	1672	819	0	0	0	0	5,867
2014	0	0	0	714	560	1543	1728	1315	530	21	0	0	6,411
2015	0	0	0	438	1251	1405	1722	271	0	0	0	0	5,086
2016	0	0	0	614	1305	1672	1693	25	0	0	0	0	5,309
2017	0	0	0	205	1368	1672	1728	1090	0	0	0	0	6,063
2018	0	0	0	0	1262	1311	1728	1502	378	0	0	0	6,181
2019	0	0	0	0	1158	1571	1728	1130	0	0	0	0	5,588
2020													0
Ave.	0	0	283	348	1,172	1,431	1,723	946	503	59	0	0	
Total	0	0	283	4,177	23,433	28,626	34,458	18,915	4,020	118	0	0	114,030

0 Total= 114030 MWhrs

Year	January On-Peak	January Off-Peak	February On-Peak	February Off-Peak	July On-Peak	July Off-Peak	August On-Peak	August Off-Peak	December On-Peak	December Off-Peak	Total On-Peak	Total Off-Peak	Total MWhrs
2000	0	0	0	0	864	864	556	556	0	0	1,420	4,876	6,296
2001	0	0	0	0	864	864	300	300	0	0	1,164	4,015	5,179
2002	0	0	0	0	864	864	679	679	0	0	1,543	4,349	5,892
2003	0	0	0	0	864	864	167	167	0	0	1,031	3,934	4,964
2004	0	0	0	0	864	864	526	526	0	0	1,390	4,658	6,048
2005	0	0	0	0	864	864	398	398	0	0	1,262	3,343	4,605
2006	0	0	0	0	864	864	323	323	0	0	1,187	3,926	5,113
2007	0	0	0	0	864	864	80	80	0	0	944	4,661	5,605
2008	0	0	0	0	864	864	664	664	0	0	1,528	4,767	6,295
2009	0	0	0	0	861	861	462	462	0	0	1,323	4,835	6,157
2010	0	0	0	0	864	864	620	620	0	0	1,484	3,827	5,311
2011	0	0	0	0	864	864	827	827	0	0	1,691	3,768	5,458
2012	0	0	0	0	864	864	781	781	0	0	1,645	4,954	6,599
2013	0	0	0	0	836	836	409	409	0	0	1,246	4,622	5,867
2014	0	0	0	0	864	864	657	657	0	0	1,521	4,890	6,411
2015	0	0	0	0	861	861	136	136	0	0	996	4,090	5,086
2016	0	0	0	0	846	846	13	13	0	0	859	4,450	5,309
2017	0	0	0	0	864	864	545	545	0	0	1,409	4,654	6,063
2018	0	0	0	0	864	864	751	751	0	0	1,615	4,566	6,181
2019	0	0	0	0	864	864	565	565	0	0	1,429	4,158	5,588
2020	0	0	0	0	0	0	0	0	0	0	0	0	0
										Total Ave for years shown	1,334	4,367	5,701
										Average for last 10 years	1,389	4,398	5,787
										Used In Aanalysis	1,389	4,398	5,787

Day	Light Hours	Heavy Hours	Total
Mon	10	14	24
Tues	10	14	24
Wed	10	14	24
Thur	10	14	24
Fri	10	14	24
Sat	10	14	24
Sun	24	0	24
Total	84	84	168

On-Peak Ratio= 0.50

Per NW Energy, "On-Peak Hours" means the Heavy Load hours for the months of January, February, July, August, and December. This a 50-50 ratio of On-Peak & Off-Peak for those 5 months.

NW Energy Avoided Energy and Capacity for Hydropower (eff. August 5, 2019)		
Contract Length Years	Off-Peak Rate ($/kWhr)	On-Peak Rate ($/kWhr)
1	$0.03063	$0.08728
2	$0.02873	$0.08542
3	$0.02799	$0.08471
4	$0.02877	$0.08552
5	$0.02954	$0.08631
6	$0.03036	$0.08716
7	$0.03128	$0.08811
8	$0.03158	$0.08844
9	$0.03190	$0.08879
10	$0.03221	$0.08913
11	$0.03254	$0.08948
12	$0.03285	$0.08982
13	$0.03316	$0.09016
14	$0.03345	$0.09047
15	$0.03377	$0.09082

ARNOLD COULEE DROP 2020 to 2034 PROJECTED REVENUE GENERATION					
	$$ per MWhr		Ave. MWhrs (2000-2019)		Revenue Based on Ave MWhrs (2000-2019)
Year	Off=Peak	On-Peak	Off=Peak	On-Peak	
2020	$30.63	$87.28	4,367	1,334	$250,226
2021	$28.73	$85.42	4,367	1,334	$239,446
2022	$27.99	$84.71	4,367	1,334	$235,267
2023	$28.77	$85.52	4,367	1,334	$239,754
2024	$29.54	$86.31	4,367	1,334	$244,171
2025	$30.36	$87.16	4,367	1,334	$248,886
2026	$31.28	$88.11	4,367	1,334	$254,172
2027	$31.58	$88.44	4,367	1,334	$255,922
2028	$31.90	$88.79	4,367	1,334	$257,787
2029	$32.21	$89.13	4,367	1,334	$259,594
2030	$32.54	$89.48	4,367	1,334	$261,502
2031	$32.85	$89.82	4,367	1,334	$263,310
2032	$33.16	$90.16	4,367	1,334	$265,117
2033	$33.45	$90.47	4,367	1,334	$266,797
2034	$33.77	$90.82	4,367	1,334	$268,662
				Total	$3,810,614

ARNOLD COULEE DROP 2020 to 2034
PROJECTED REVENUE GENERATION

Year	$$ per MWhr Off=Peak	$$ per MWhr On-Peak	Ave. MWhrs (2000-2019) Off=Peak	Ave. MWhrs (2000-2019) On-Peak	Revenue Based on Ave MWhrs (2000-2019)
2020	$30.63	$87.28	4,367	1,334	$250,226
2021	$28.73	$85.42	4,367	1,334	$239,446
2022	$27.99	$84.71	4,367	1,334	$235,267
2023	$28.77	$85.52	4,367	1,334	$239,754
2024	$29.54	$86.31	4,367	1,334	$244,171
2025	$30.36	$87.16	4,367	1,334	$248,886
2026	$31.28	$88.11	4,367	1,334	$254,172
2027	$31.58	$88.44	4,367	1,334	$255,922
2028	$31.90	$88.79	4,367	1,334	$257,787
2029	$32.21	$89.13	4,367	1,334	$259,594
2030	$32.54	$89.48	4,367	1,334	$261,502
2031	$32.85	$89.82	4,367	1,334	$263,310
2032	$33.16	$90.16	4,367	1,334	$265,117
2033	$33.45	$90.47	4,367	1,334	$266,797
2034	$33.77	$90.82	4,367	1,334	$268,662
				Total	$3,810,614

ARNOLD COULEE DROP
ESTIMATED ANNUAL O&M COSTS

SREC Wheeling Fees	$28,937
Property Taxes	$0
LOPP Fees	$0
Legal	$1,500
Engineering	$2,500
Accounting	$5,000
Insurance	$25,000
Operator Oversight	$22,000
Emergency Maint.	$2,500
Life-Cycle Costs	$0
TOTAL	$87,437

SREC Wheel Rate $0.005 kW/hr

ARNOLD COULEE DROP
FUNDING STRATEGY/OPTIONS

1st Phase Infrastructure Costs	$927,000
2nd Phase Finish Buildout	$2,275,500
Transmission/Electrical Costs	$2,150,000
Total Construction Costs	$5,352,500
DNRC RRGL Grant	$125,000
USBR WaterSmart Grant	$2,000,000
DNRC RDGP Grant	$0
USDA REAP Grant	$500,000
Tax Credit (30% of Equip)	$682,650
DOE Incentive ($0.018/kW-hr)	$520,869
GID In-Kind Services	$600,000
Unfunded Balance	$1,444,850

LOAN OPTION	
Interest Rate	2.00%
Loan Length, Years	15
Annual Payment	$112,446
Total Payment Over Loan	$1,686,692
Total Interest Over Loan	$241,842

Year	Revenue	O&M	Loan Payment	Net
2020	$250,226	$87,437	$112,446	$50,342
2021	$239,446	$88,749	$112,446	$38,251
2022	$235,267	$90,080	$112,446	$32,741
2023	$239,754	$91,431	$112,446	$35,877
2024	$244,171	$92,803	$112,446	$38,922
2025	$248,886	$94,195	$112,446	$42,246
2026	$254,172	$95,608	$112,446	$46,118
2027	$255,922	$97,042	$112,446	$46,434
2028	$257,787	$98,497	$112,446	$46,843
2029	$259,594	$99,975	$112,446	$47,173
2030	$261,502	$101,474	$112,446	$47,582
2031	$263,310	$102,997	$112,446	$47,867
2032	$265,117	$104,541	$112,446	$48,130
2033	$266,797	$106,110	$112,446	$48,242
2034	$268,662	$107,701	$112,446	$48,515
2035	$270,543	$109,317	$0	$161,226
2036	$272,436	$110,957	$0	$161,480
2037	$274,343	$112,621	$0	$161,723
2038	$276,264	$114,310	$0	$161,954
2039	$278,198	$116,025	$0	$162,173
2040	$280,145	$117,765	$0	$162,380
2041	$282,106	$119,532	$0	$162,574
2042	$284,081	$121,325	$0	$162,756
2043	$286,069	$123,145	$0	$162,925
2044	$288,072	$124,992	$0	$163,080
2045	$290,088	$126,867	$0	$163,222
2046	$292,119	$128,770	$0	$163,349
2047	$294,164	$130,701	$0	$163,463
2048	$296,223	$132,662	$0	$163,561
2049	$298,297	$134,652	$0	$163,645
2050	$300,385	$136,671	$0	$163,713

ARNOLD COULEE DROP

ACTUAL FLOW (cfs)					Year 2019					DATA= GIBR QJ_PSC		
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	455	1,325	1,325	0	0	0	0
2	0	0	0	0	271	576	1,325	1,325	0	0	0	0
3	0	0	0	0	561	659	1,325	1,325	0	0	0	0
4	0	0	0	0	561	743	1,325	1,325	0	0	0	0
5	0	0	0	0	561	809	1,325	1,139	0	0	0	0
6	0	0	0	0	561	844	1,325	1,032	0	0	0	0
7	0	0	0	0	561	883	1,325	1,003	0	0	0	0
8	0	0	0	0	624	945	1,325	976	0	0	0	0
9	0	0	0	0	924	945	1,325	945	0	0	0	0
10	0	0	0	0	1,028	1,099	1,325	812	0	0	0	0
11	0	0	0	0	1,028	1,178	1,325	761	0	0	0	0
12	0	0	0	0	1,028	1,177	1,325	761	0	0	0	0
13	0	0	0	0	1,028	1,178	1,325	761	0	0	0	0
14	0	0	0	0	1,144	1,270	1,325	761	0	0	0	0
15	0	0	0	0	1,209	1,292	1,325	794	0	0	0	0
16	0	0	0	0	1,209	1,292	1,325	847	0	0	0	0
17	0	0	0	0	1,209	1,292	1,325	869	0	0	0	0
18	0	0	0	0	1,209	1,314	1,325	869	0	0	0	0
19	0	0	0	0	975	1,325	1,325	835	0	0	0	0
20	0	0	0	0	617	1,325	1,325	802	0	0	0	0
21	0	0	0	0	528	1,325	1,325	738	0	0	0	0
22	0	0	0	0	528	1,325	1,325	694	0	0	0	0
23	0	0	0	0	528	1,325	1,325	463	0	0	0	0
24	0	0	0	0	528	1,325	1,325	104	0	0	0	0
25	0	0	0	0	528	1,325	1,325	0	0	0	0	0
26	0	0	0	0	482	1,325	1,325	0	0	0	0	0
27	0	0	0	0	362	1,325	1,325	0	0	0	0	0
28	0	0	0	0	345	1,325	1,325	0	0	0	0	0
29	0		0	0	346	1,325	1,325	0	0	0	0	0
30	0		0	0	347	1,325	1,325	0	0	0	0	0
31	0		0		389		1,325	0		0		0
AVE.	0	0	0	0	684	1,128	1,325	686	0	0	0	0

ARNOLD COULEE DROP

NET TURBINE HEAD (ft)						Year 2019						
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.0	0.0	0.0	0.0	0.0	37.0	33.4	33.4	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	36.4	33.4	33.4	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	36.5	36.0	33.4	33.4	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	36.5	35.4	33.4	33.4	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	36.5	34.9	33.4	33.4	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	36.5	34.7	33.4	33.4	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	36.5	34.4	33.4	33.4	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	36.2	33.9	33.4	33.6	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	34.0	33.9	33.4	33.9	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	33.4	33.4	33.4	34.9	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	33.4	33.4	33.4	35.3	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	33.4	33.4	33.4	35.3	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	33.4	33.4	33.4	35.3	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	33.4	33.4	33.4	35.3	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	33.4	33.4	33.4	35.1	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	33.4	33.4	33.4	34.7	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	33.4	33.4	33.4	34.5	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	33.4	33.4	33.4	34.5	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	33.6	33.4	33.4	34.8	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	36.2	33.4	33.4	35.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	36.7	33.4	33.4	35.5	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	36.7	33.4	33.4	35.7	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	36.7	33.4	33.4	37.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	36.7	33.4	33.4	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	36.7	33.4	33.4	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	36.9	33.4	33.4	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	37.4	33.4	33.4	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	37.4	33.4	33.4	0.0	0.0	0.0	0.0	0.0
29	0.0		0.0	0.0	37.4	33.4	33.4	0.0	0.0	0.0	0.0	0.0
30	0.0		0.0	0.0	37.4	33.4	33.4	0.0	0.0	0.0	0.0	0.0
31	0.0		0.0		37.3		33.4	0.0		0.0		0.0
AVE.	0.0	0.0	0.0	0.0	33.2	33.9	33.4	25.6	0.0	0.0	0.0	0.0

K_{in}= 0.4
K_{out}= 1
C_{hw}= 130
Diam.= 10 ft
Length= 382 ft
Area= 78.54 ft^2

Q_{min} 300 Q_{max} 1000

ARNOLD COULEE DROP

TURBINE FLOW(cfs)					Year 2019					DATA= GIBR QJ_PSC		
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	455	1,000	1,000	0	0	0	0
2	0	0	0	0	0	576	1,000	1,000	0	0	0	0
3	0	0	0	0	561	659	1,000	1,000	0	0	0	0
4	0	0	0	0	561	743	1,000	1,000	0	0	0	0
5	0	0	0	0	561	809	1,000	1,000	0	0	0	0
6	0	0	0	0	561	844	1,000	1,000	0	0	0	0
7	0	0	0	0	561	883	1,000	1,000	0	0	0	0
8	0	0	0	0	624	945	1,000	976	0	0	0	0
9	0	0	0	0	924	945	1,000	945	0	0	0	0
10	0	0	0	0	1,000	1,000	1,000	812	0	0	0	0
11	0	0	0	0	1,000	1,000	1,000	761	0	0	0	0
12	0	0	0	0	1,000	1,000	1,000	761	0	0	0	0
13	0	0	0	0	1,000	1,000	1,000	761	0	0	0	0
14	0	0	0	0	1,000	1,000	1,000	761	0	0	0	0
15	0	0	0	0	1,000	1,000	1,000	794	0	0	0	0
16	0	0	0	0	1,000	1,000	1,000	847	0	0	0	0
17	0	0	0	0	1,000	1,000	1,000	869	0	0	0	0
18	0	0	0	0	1,000	1,000	1,000	869	0	0	0	0
19	0	0	0	0	975	1,000	1,000	835	0	0	0	0
20	0	0	0	0	617	1,000	1,000	802	0	0	0	0
21	0	0	0	0	528	1,000	1,000	738	0	0	0	0
22	0	0	0	0	528	1,000	1,000	694	0	0	0	0
23	0	0	0	0	528	1,000	1,000	463	0	0	0	0
24	0	0	0	0	528	1,000	1,000	0	0	0	0	0
25	0	0	0	0	528	1,000	1,000	0	0	0	0	0
26	0	0	0	0	482	1,000	1,000	0	0	0	0	0
27	0	0	0	0	362	1,000	1,000	0	0	0	0	0
28	0	0	0	0	345	1,000	1,000	0	0	0	0	0
29	0		0	0	346	1,000	1,000	0	0	0	0	0
30	0		0	0	347	1,000	1,000	0	0	0	0	0
31	0		0		389		1,000	0		0		0
AVE.	0	0	0	0	641	929	1,000	635	0	0	0	0

ARNOLD COULEE DROP

POWER CAPACITY (kW)						Year 2019						
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	1172	2323	2323	0	0	0	0
2	0	0	0	0	0	1461	2323	2323	0	0	0	0
3	0	0	0	0	1426	1649	2323	2323	0	0	0	0
4	0	0	0	0	1426	1832	2323	2323	0	0	0	0
5	0	0	0	0	1426	1968	2323	2323	0	0	0	0
6	0	0	0	0	1426	2037	2323	2323	0	0	0	0
7	0	0	0	0	1426	2113	2323	2323	0	0	0	0
8	0	0	0	0	1571	2227	2323	2282	0	0	0	0
9	0	0	0	0	2189	2227	2323	2227	0	0	0	0
10	0	0	0	0	2323	2323	2323	1974	0	0	0	0
11	0	0	0	0	2323	2323	2323	1869	0	0	0	0
12	0	0	0	0	2323	2323	2323	1869	0	0	0	0
13	0	0	0	0	2323	2323	2323	1869	0	0	0	0
14	0	0	0	0	2323	2323	2323	1869	0	0	0	0
15	0	0	0	0	2323	2323	2323	1937	0	0	0	0
16	0	0	0	0	2323	2323	2323	2043	0	0	0	0
17	0	0	0	0	2323	2323	2323	2086	0	0	0	0
18	0	0	0	0	2323	2323	2323	2086	0	0	0	0
19	0	0	0	0	2280	2323	2323	2020	0	0	0	0
20	0	0	0	0	1555	2323	2323	1954	0	0	0	0
21	0	0	0	0	1348	2323	2323	1821	0	0	0	0
22	0	0	0	0	1348	2323	2323	1726	0	0	0	0
23	0	0	0	0	1348	2323	2323	1192	0	0	0	0
24	0	0	0	0	1348	2323	2323	0	0	0	0	0
25	0	0	0	0	1348	2323	2323	0	0	0	0	0
26	0	0	0	0	1238	2323	2323	0	0	0	0	0
27	0	0	0	0	942	2323	2323	0	0	0	0	0
28	0	0	0	0	899	2323	2323	0	0	0	0	0
29	0		0	0	901	2323	2323	0	0	0	0	0
30	0		0	0	904	2323	2323	0	0	0	0	0
31	0		0		1009		2323	0		0		0
AVE.	0	0	0	0	1,557	2,182	2,323	1,519	0	0	0	0

Maximum Capacity 2323 kW

ARNOLD COULEE DROP

STATIC HEAD DIFF. (ft)						Year 2019						
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.0	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	38.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
29	0.0		0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
30	0.0		0.0	0.0	38.0	38.0	38.0	0.0	0.0	0.0	0.0	0.0
31	0.0		0.0		38.0		38.0	0.0		0.0		0.0
AVE.	0.0	0.0	0.0	0.0	35.5	38.0	38.0	28.2	0.0	0.0	0.0	0.0

ARNOLD COULEE DROP

ENERGY GEN. (MW*hrs)						Year 2019						
Date	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	28	56	56	0	0	0	0
2	0	0	0	0	0	35	56	56	0	0	0	0
3	0	0	0	0	34	40	56	56	0	0	0	0
4	0	0	0	0	34	44	56	56	0	0	0	0
5	0	0	0	0	34	47	56	56	0	0	0	0
6	0	0	0	0	34	49	56	56	0	0	0	0
7	0	0	0	0	34	51	56	56	0	0	0	0
8	0	0	0	0	38	53	56	55	0	0	0	0
9	0	0	0	0	53	53	56	53	0	0	0	0
10	0	0	0	0	56	56	56	47	0	0	0	0
11	0	0	0	0	56	56	56	45	0	0	0	0
12	0	0	0	0	56	56	56	45	0	0	0	0
13	0	0	0	0	56	56	56	45	0	0	0	0
14	0	0	0	0	56	56	56	45	0	0	0	0
15	0	0	0	0	56	56	56	46	0	0	0	0
16	0	0	0	0	56	56	56	49	0	0	0	0
17	0	0	0	0	56	56	56	50	0	0	0	0
18	0	0	0	0	56	56	56	50	0	0	0	0
19	0	0	0	0	55	56	56	48	0	0	0	0
20	0	0	0	0	37	56	56	47	0	0	0	0
21	0	0	0	0	32	56	56	44	0	0	0	0
22	0	0	0	0	32	56	56	41	0	0	0	0
23	0	0	0	0	32	56	56	29	0	0	0	0
24	0	0	0	0	32	56	56	0	0	0	0	0
25	0	0	0	0	32	56	56	0	0	0	0	0
26	0	0	0	0	30	56	56	0	0	0	0	0
27	0	0	0	0	23	56	56	0	0	0	0	0
28	0	0	0	0	22	56	56	0	0	0	0	0
29	0		0	0	22	56	56	0	0	0	0	0
30	0		0	0	22	56	56	0	0	0	0	0
31	0		0		24		56	0		0		0
AVE.	0	0	0	0	37	52	56	36	0	0	0	0
Total	0	0	0	0	1158	1571	1728	1130	0	0	0	0

2019 Total= 5588 MWhrs

CONSTRUCTION COST ESTIMATE

Greenfields Irrigation District 28-Aug-2020

Arnold Coulee Drop Hydro I Projects\LOPP\[1st Four Sites Summary.xlsx]Sheet1

ITEM	DESCRIPTION	QNTY	UNIT	UNIT PRICE	AMOUNT
	INTAKE & PENSTOCK				
A	Excavtion For Intake & Penstock	5,200	CY	$2.50	$13,000
B	Rock Excavation Surcharge	400	CY	$12.50	$5,000
C	Foundation & Penstock Bedding	800	CY	$25.00	$20,000
D	11-ft dia. Penstock	400	LF	$650.00	$260,000
E	Penstock Reducer & Vents	1	LS	$35,000.00	$35,000
F	Penstock Install, Welding & Crane	1	LS	$65,000.00	$65,000
G	Reinforced Concrete	950	CY	$450.00	$427,500
H	Roller Gates and Controls	2	Each	$45,000.00	$90,000
I	Approach Canal Rehab	1	LS	$6,000.00	$6,000
J	Site Prep & Site Reclamation	1	LS	$5,500.00	$5,500
					$927,000
	POWERHOUSE				
A	Foundation Excavation and Prep	1	LS	$2,500.00	$2,500
B	Metal Building	1,600	SF	$65.00	$104,000
C	Floor Slab	1,600	SF	$12.50	$20,000
D	DC Battery System	1	LS	$12,000.00	$12,000
E	Switchgear	1	LS	$160,000.00	$160,000
F	Terminal Box & Voltage Regulator	1	LS	$22,000.00	$22,000
F	Electrical Wiring	1	LS	$180,000.00	$180,000
					$500,500
	MECHANICAL				
A	Kaplan Turbine/Generator & brushless Exciter	1	LS	$1,300,000.00	$1,300,000
B	Hydraulic Power Unit	1	LS	$25,000.00	$25,000
C	Fabricated Metal	1	LS	$50,000.00	$50,000
D	Mechanical Install	1	LS	$300,000.00	$300,000
E	Trash Removal System	1	LS	$100,000.00	$100,000
					$1,775,000
	PERMITTING & PLANNING				
A	Reclamation Oversight	1	LS	$60,000.00	$60,000
B	Engineering	1	LS	$250,000.00	$250,000
C	Cultural & Environment Documents	1	Est	$8,000.00	$8,000
D	Legal & Misc. Costs	1	LS	$10,000.00	$10,000
E	Misc. Fees & Permits	1	LS	$10,000.00	$10,000
					$338,000
	5% Contingency				$177,025
	TOTAL ESTIMATED PROJECT COSTS				$3,389,525

TRANSMISSION COST ESTIMATE

Greenfields Irrigation District Last Updated: 8/28/2020

Arnold Coulee Drop Hydro

ITEM	DESCRIPTION	QNTY	UNIT	UNIT PRICE	AMOUNT	ACTUAL COSTS
	INTAKE & PENSTOCK					
P1.1	Bypass North Augusta Substation regulators and install individual feeder regulation on platforms outside of North Augusta Substation	1	LS	$150,000	$150,000	
P1.2	Install a new three phase 150 amp line voltage regulator bank at G1-61	1	LS	$45,000	$45,000	
P1.3	Replace single phase regulator with a new 150 amp three phase regulator bank at G2-57	1	LS	$45,000	$45,000	
P1.4	Install a new three phase regulator bank on new tap north of G2-132	1	LS	$45,000	$45,000	
P1.5	Relocate single phase line voltage regulator from G2-121A to G2-142	1	LS	$5,000	$5,000	
P1.6	Replace G2-10 recloser with a three phase electronic recloser with transfer tripping scheme	1	LS	$30,000	$30,000	
P1.7	Install a three phase electronic recloser with transfer tripping scheme north of G2-132	1	LS	$30,000	$30,000	
P1.8	Construct 7.7 miles of three phase 4/0 ACSR distribution line on new transmission line framed for TP-69 and 336 ACSR. Retire existing line in shared right of way.	7.7	Miles	$314,546	$2,422,000	
P1.9	Construct 2.3 miles of three phase 4/0 ACSR distribution line to Arnold Coulee	2.3	Miles	$96,957	$223,000	
P1.10	Single phase reclosers with electronic single phase reclosers (not shown)	1	LS	$10,000	$10,000	
P1.11	Relocate three phase regulator bank from G6-90 to G6-65 (not shown)	1	LS	$10,000	$10,000	
					$3,015,000	$0

Due to "Piggy-Backing" with SREC upgrades, My Estimate is $2,150,000

X:\Infrastructure\Special Projects\LOPP\[1st Four Sites Summary.xlsx]Sheet1