

MEMORANDUM

TO: Water Right Permit File 77-14353

FROM: Daniel A. Nelson

DATE: August 16, 2018

SUBJECT: Addressing Concerns About the Measurement

This permit was field examined by Rachael Smith with my assistance. In review of the draft license, a question was raised on whether or not combined limitations were required for this water use.

The measurement made on this system was performed right above the power units, so there is no irrigation water being diverted through the pipeline below the measurement point. This location was the best place to measure the system with the least amount of digging. At the measurement point, a portion of the pipe did need to be excavated, but not as much as would be needed further up in the system. The power generation is also regulated by ball valves directly below the point where the measurement was made, so this allowed us to determine the maximum amount of water actually being diverted to the power generators.

There is a control box below the point of diversion that allows water to be diverted for irrigation for a number of fields to the southwest of the home and west of the pond, and a line to the irrigation around the home and a small field northwest of the home. Please see the maps provided in the field exam to see the fields being irrigated. Depending on the flow in the creek, this diversion can easily provide all of the water needed to provide all of the irrigation water and the water needed to generate the power use. There may be times when the creek gets low that the water may need to be shared, but the system can provide all of the water needed for all the irrigation and power needs during the majority of the year. Therefore, there should be no need for combined limitations for diversion rate for this proposed license.

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 77-14353
Exam Date: 7/23/18

1. Current Owner:
LOON CREEK LAND CO LLC C/O JOHN R WILLIAMS
523 W MESA GRANDE LN BOISE ID 83702 (208) 386-0303 And
JOHN SHORT 4799 BALSAM DR PARK CITY UT 87098 (801) 706-3154
2. Accompanied by: John Williams
Phone No: (208) 386-0303
Address: 523 W Mesa Grande Ln Boise ID 83703
Relationship to Permit Holder: Manager for Loon Creek Land Co
3. **SOURCE:**
DEER CREEK

TRIBUTARY:
LOON CREEK

B. OVERLAP REVIEW

1. Other water rights with the same place of use (POU):

WR#	Owner	Source	Use
77-14286	DEMOREST, JOHN P; DIAMOND D RANCH PARTNERSHIP; JOHN H SHORT REVOCABLE TRUST U/A/D	DEER CREEK TRAIL CREEK	IRRIGATION

Notes: Water right 77-14286 is used for irrigation so overlap with 77-14353 is not a concern.

2. Other water rights with the same point-of-diversion (POD):

WR#	Owner	Source	Use
77-14285	DIAMOND D RANCH PARTNERSHIP; LOON CREEK LAND CO LLC	DEER CREEK	IRRIGATION
77-14286	DEMOREST, JOHN P; DIAMOND D RANCH PARTNERSHIP; JOHN H SHORT REVOCABLE TRUST U/A/D	DEER CREEK	IRRIGATION

Notes: The two water rights listed above divert from the same POD as 77-14353; however they are used for irrigation purposes. The license will be conditioned to address this overlap.

C. DIVERSION AND DELIVERY SYSTEM**1. LOCATION OF POINT(S) OF DIVERSION:**

DEER CREEK NW¼NE¼ Sec. 15, Twp 14N, Rge 13E, B.M. CUSTER County

Method of Determination: GPS at the time of the field exam, verification with ArcMap and satellite imagery

2. PLACE OF USE: POWER

Twp	Rge	Sec	NE				NW				SW				SE				Total s
			N E	N W	S W	S E	N E	N W	S W	S E	N E	N W	S W	S E	N E	N W	S W	S E	
14N	13E	15				X													

Method of Determination: GPS at the time of the field exam, verification with ArcMap and satellite imagery

3. MAPS

Delivery System Diagram Attached (required). Indicate all major components and distances between components.

X

Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be

X

1:24,000 or greater.

☒ Aerial Photo Attached (required for irrigation of 10+ acres).

☒ Photo of Diversion and System Attached

4. POWER GENERATION INFORMATION:

Turbine make	Range of Discharge (cfs)	Size	Nozzle Size
Harris Pelton Turbine	0.01-0.56 (each)	48V	3/8 inch

D. FLOW MEASUREMENTS

Panometrics Flow Measurement: **0.11 cfs** (see attached)

E. FLOW CALCULATIONS

1. Theoretical flow based on the nozzle flow chart: **0.3 cfs**

☒ Additional Computation Sheets Attached

The theoretical calculation for *one* turbine (4 nozzles) based on a design head of 120 feet was **0.3 cfs**. This theoretical calculation assumes 119.2 feet of effective dynamic head and four 3/8 inch nozzles. Effective dynamic head only accounts for friction loss in uniform pipe size and does not include any friction loss from valves or varying pipe sizes.

The theoretical and measured flows were compared to Harris Hydroelectric System charts (attached). For 120 feet of head and 0.11 cfs (approximately 50 gallons per minute as measured by the Panometrics), 620 watts of output would be expected. Although this number seems low, the operator of the system said the cabin uses minimal power and there is backup solar power available. Propane is also available; however it is typically only used for emergency purposes. There is not a dump load for excess power and as shown in the picture of the inverter, the voltage level of the batteries during the field exam was about 50% and the load (demand) was only about 20%.

Factors that may contribute to the flow measurement being lower than the theoretical calculation are the various splits and valves in the piping, varying pipe sizes and clogged nozzles. At the time of the field exam, one of the nozzles was removed (though most were glued on in addition to being clamped), and the nozzle was significantly blocked with sediment. Also, the drinking water for a house and sprinklers for a lawn *may* be split from the piping higher up from where the flow was measured (see attached correspondence) which would further decrease the flow rate. The flow rate of 0.11 cfs as measured during the field exam is recommended for the license.

F. VOLUME CALCULATIONS

$$V = 0.11 \text{ cfs} \times 120 \text{ Days} \times 1.9835 = 26 \text{ AFA}$$

This system is typically used from June to September so annual volume was calculated for these four months of usage. 26 AFA is recommended for the license.

G. NARRATIVE/REMARKS/COMMENTS

System Description

An Application for Permit was submitted by Loon Creek Land Co LLC and John Short in 2013. The application requested a diversion of 0.33 cfs from Deer Creek in Custer County for existing hydropower use at a cabin. The site is located on the west side of Loon Creek Road approximately a quarter of a mile northwest of the Loon Creek Guard Station. Proof of beneficial use and the associated fee were received by the department in June 2014.

Water is diverted from Deer Creek, tributary of Look Creek, via a headgate and 24" culvert, followed by a ditch which flows through a debris screen connected to a 4" pipe. After approximately 1,200 feet of piping, there is an opening in the pipe allowing the water to bubble at the surface for pressure relief. There is also a split with two valves dividing the water between two irrigation water rights and this hydropower right. The two Harris hydroturbines are located approximately 2,200 feet from the point of diversion.

There is overlap at the POU with water right 77-14286; however this water right is for irrigation use. PODs overlaps exist in the NWNE of Section 15 for water rights 77-14286 and 77-14285 upstream of the POD for this water permit.

The permitted rate of diversion is 0.33 cfs. A rate of 0.11 cfs was measured at the time of the field exam and will be recommended for the license. The annual volume was calculated based on the measured flow rate and the four months of the year that the system is used. 26 AFA will be recommended.

Conditions/ Recommendations

- Condition 3 (027), 4 (029) and 5 (195), 6 (196), 7 (197), 8 (198) and 10 (025) will be retained for the license.
- Condition 9 (004) will be removed as Loon Creek Land Company owns the POD, POU and the land between.
- Condition 11 (01N), 12 (08A) and 14 (17H) will be removed for licensing.
- Condition 13 (171) will be changed to the current hydropower subordination condition R22.
- Condition 15 (17M) will be changed to 916 with a review date of 3/22/2043 as 17M is no longer active.
- Condition 16 (D08) will be retained for licensing.
- Condition F06 will be added to address the POD overlap.

Have conditions of permit approval been met? X Yes No

H. RECOMMENDATIONS

1. Recommended Amounts

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
POWER	01/01 to 12/31	0.11 CFS	26 AFA
	<u>Totals:</u>	0.11 CFS	26 AFA

2. Recommended Amendments

<u> </u> Change POD as reflected above	<u> </u> Add POD as reflected above	<u> X </u> None
<u> </u> Change POU as reflected above	<u> </u> Add POU as reflected above	<u> X </u> None

I. AUTHENTICATION - Rachael Smith, Water Resource Agent Sr.

Field Examiner's Name

[Signature]

Date

8/9/18

Reviewer

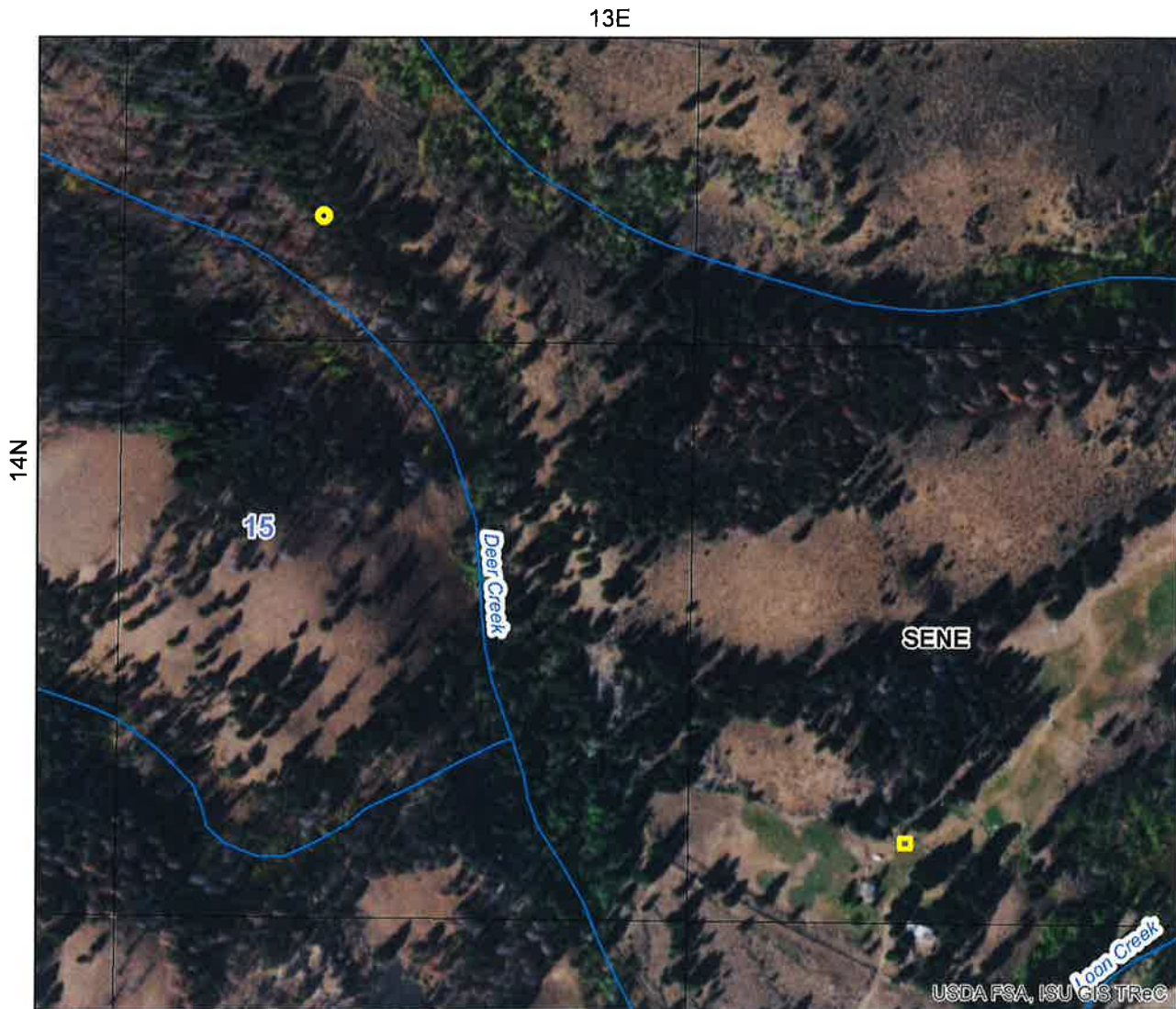
[Signature]

Date

8-9-18

State of Idaho
Department of Water Resources
Attachment to Field Exam
77-14353

This map depicts the POWER place of use boundary
for this water right and is attached solely for illustrative purposes.

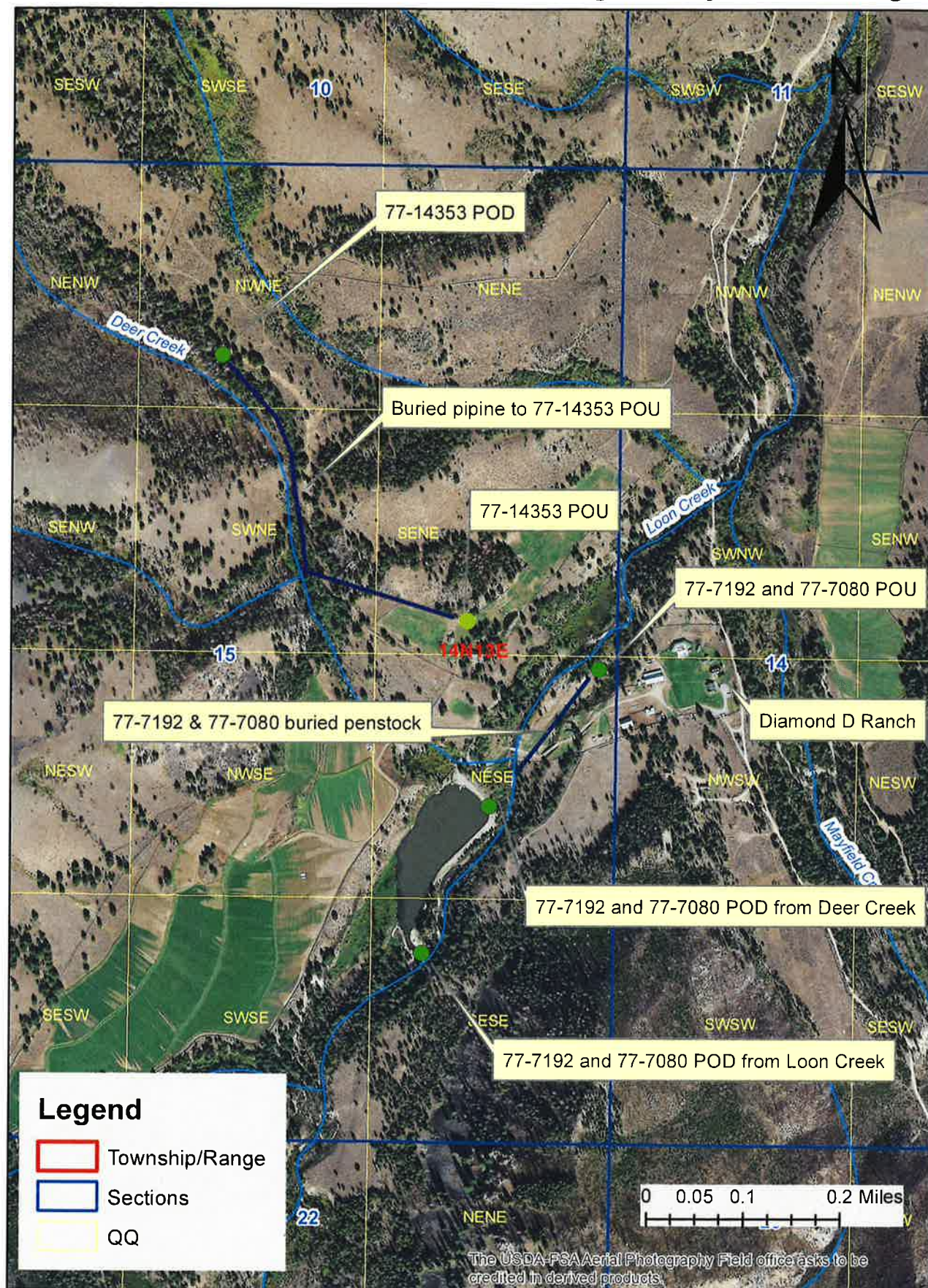


-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections

0 0.05 0.1 0.2 Miles



Loon Creek Hydropower Water Rights System Diagram



Pipe Friction Loss- Head Loss in ft/100 ft of Sch 40			
PVC Pipe Loss (4.5" diameter pipe)	Flow (gpm)		
	40	44.9	50
4	0.11		0.16
4.5	0.08	0.09	0.11
5	0.04		0.05

Head	Feet of Piping	Loss of Head	Effective Dynamic Head
120	904	0.8	119.2

**Overall there is 320 feet of head from the POD to the POU; however, a little over halfway through the piping, there is a bubbler and screen to relieve pressure. Therefore, the elevation loss from that point to the POU was used.*

Flow Calculations

Effective Dynamic Head	3/8 Nozzle Flow (gpm)	4 nozzles- total gpm	equivalent cfs	Panometrics calc cfs
119.2	30.3	121	0.3	0.11 (49.3 gpm)

Panometrics measurement
Theoretical calculation

cfs	days used	AFA
0.11	120	26
0.3	120	71

GE Panametrics PT878 Ultrasonic Flow Meter Measurements

File Name:	77-14353			
Start Time:	7/23/2018 14:32			
End Time:	7/23/2018 14:43			
Interval:	60			
Records:	11			
Cyclic Flags:	2			
Error Flags:	8208			
Date/Time	Velocity (ft/s)	Volume (gal/m)	Volume (cfs)	(+)Total (gal)
7/23/2018 14:32	1.1	49.3	0.1	873,930.5
7/23/2018 14:33	1.1	48.8	0.1	873,978.7
7/23/2018 14:34	1.1	48.8	0.1	874,027.6
7/23/2018 14:35	1.1	48.8	0.1	874,075.6
7/23/2018 14:36	1.1	49.4	0.1	874,125.9
7/23/2018 14:37	1.1	49.9	0.1	874,175.4
7/23/2018 14:38	1.1	49.5	0.1	874,226.2
7/23/2018 14:39	1.1	49.7	0.1	874,272.4
7/23/2018 14:40	1.1	49.5	0.1	874,323.4
7/23/2018 14:41	1.1	50.1	0.1	874,374.7
7/23/2018 14:42	1.1	48.9	0.1	874,423.2
			gpm	49.3
0.002228009	gpm to cfs		cfs	0.11

Harris Hydroelectric

Pelton Turbines

This hydroelectric battery charger uses a cast bronze Pelton wheel and a brushless permanent magnet alternator on a white powder-coated aluminum housing.

- Head range: 20 to 600 feet
- Flow range: 4 to 250 gpm
- Maximum 12-volt power: 700 watts
- Maximum 24-volt power: 1400 watts
- Maximum 48-volt power: 2500 watts

They are available with one, two or four nozzles, depending on water flow and power requirements. (PVC manifold with one shut-off valve on two-nozzle machines and 3 shut-off valves on 4-nozzle machines is available). These turbines can be fitted with nozzles up to 1/2" in diameter. Each hydroelectric system is custom-built to match your site specifications. Please tell us your head, flow, pipe size and length, electrical transmission line length and battery voltage when ordering. The new permanent magnet (PM) brushless alternator pictured here is 15-30% more efficient than the automotive alternator used in the past; and they last longer. Allow 5 to 6 weeks for delivery. 1-year warranty.



Description	Item code	Price
Harris PM 1-Nozzle 12/24V/48V	017-01030	\$2,300
Harris PM 2-Nozzle 12/24V/48V	017-01032	\$2,387
Harris PM 4-Nozzle 12/24V/48V	017-01034	\$2,555
Fan kit (recommended when producing over 500W)	017-01092	\$70

ES&D

ES&D's micro hydro systems employ high-efficiency, precision-cast parts and non-corrosive alloys for long life and durability. A digital multimeter accompanies each turbine for measuring output amperage. These units can be used in off-grid/standalone or grid-tie systems.

Stream Engine Turbines

ES&D hydroelectric battery chargers use a cast bronze turgo runner to drive a long-life, brushless permanent magnet alternator.

- Head Range: 5 to 200 feet
- Flow range: 10 to 400 gpm
- Maximum Power: 1000 watts
- Voltage from 12 to 48 VDC



A simple change of wiring in the junction box allows this turbine to

charge 12, 24, or 48-volt battery systems. These turbines come with cut-to-size nozzles that can be user-set for up to 1", allowing a very large flow in low head situations. They can operate on heads as low as five feet with a flow of 40 gpm.

Description	Item code	Price
ES&D 2-Nozzle Stream Engine	017-03241	\$3,493
ES&D 4-Nozzle Stream Engine	017-03244	\$3,920

Water Baby

- Head Range: 50 to 500 feet
- Flow range: 3 to 30 gpm
- Max Power: 350 watts
- Voltage from 12 to 48 VDC



This new tiny turbine, a miniature version of the Stream Engine above, is ideal for sites with good head but with very little flow.

Two models are available; one for 12- to 48-volt charging and one for high voltage transmission. At 3 gpm and 100 feet of head, the Water Baby will charge at 25 watts. Comes with a selection of nozzles.

Description	Item code	Price
ES&D 1-Nozzle Water Baby – 12 - 24V	017-03245	\$1,945
ES&D 2-Nozzle Water Baby – 12 - 24V	017-03247	\$2,095
ES&D 4-Nozzle Water Baby – 12 - 24V	017-03249	\$2,395
ES&D 1-Nozzle Water Baby – 48V	017-03252	\$2,095
ES&D 2-Nozzle Water Baby – 48V	017-03254	\$2,245
ES&D 4-Nozzle Water Baby – 48V	017-03256	\$2,645

Water Flow Information for Pumping and Hydroelectric Design

Flow Through Nozzles

The table below shows the flow in gallons per minute (gpm) through various diameter nozzles at a range of heads from 5 feet to 400 feet. Use table to choose what nozzle size to use and how many nozzles a turbine must have to give the required flow to use all of the water available in the system.

Head		Flow in gpm through these nozzle diameters:											Rpm for 4" turbine
feet	psi	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1.0"	
5	2.2	-	-	-	-	6.18	8.4	11	17.1	24.7	33.6	43.9	460
10	4.3	-	-	3.88	6.05	8.75	11.6	15.6	24.2	35	47.6	62.1	650
15	6.5	-	2.68	4.76	7.4	10.7	14.6	19	29.7	42.8	58.2	76	800
20	8.7	1.37	3.09	5.49	8.56	12.4	16.8	22	34.3	49.4	67.3	87.8	925
30	13	1.68	3.78	6.72	10.5	15.1	20.6	26.9	42	60.5	82.4	107	1140
40	17.3	1.94	4.37	7.76	12.1	17.5	23.8	31.1	48.5	69.9	95.1	124	1310
50	21.7	2.17	4.88	8.68	13.6	19.5	26.6	34.7	54.3	78.1	106	139	1470
60	26	2.38	5.35	9.51	14.8	21.4	29.1	38	59.4	85.6	117	152	1600
80	34.6	2.75	6.18	11	17.1	24.7	33.6	43.9	68.6	98.8	135	176	1850
100	43.3	3.07	6.91	12.3	19.2	27.6	36.6	49.1	76.7	111	150	196	2070
120	52	3.36	7.56	13.4	21	30.3	41.2	53.8	84.1	121	165	215	2270
150	65	3.76	8.95	15	23.5	33.8	46	60.1	93.9	135	184	241	2540
200	86.6	4.34	9.77	17.4	27.1	39.1	53.2	69.4	109	156	213	278	2930
250	108	4.86	10.9	19.9	30.3	43.6	59.4	77.6	121	175	238	311	3270
300	130	5.32	12	21.3	33.2	47.8	65.1	85.1	133	191	261	340	3590
400	173	6.14	13.8	24.5	38.3	55.2	75.2	98.2	154	221	301	393	4140

PVC Pipe Loss Table

Use the table below to determine what pipe size is required to efficiently allow necessary flow for your power need. Once you know the required flow for your system (gpm), find the head loss for various pipe sizes. Multiply the head loss number by the length of the pipe divided by 100 and you will get the loss of head for that pipe size. The actual head minus the head loss will give you the effective dynamic head in the system.

Pipe Friction Loss Table – Head Loss in Feet per 100 Feet of Schedule 40 PVC Pipe																									
		Flow (gallons per minute)																							
		1	2	3	4	5	7	10	15	20	25	30	40	50	60	70	80	100	150	200	250	300	400	500	
Pipe diameter (inches)	1/2	2.08	4.16	8.7	14.8	23.5	43																		
	3/4	0.51	1.02	2.2	3.7	5.73	10.5	20.1	42.5																
	1	0.1	0.55	0.68	1.15	1.72	3.17	6.02	12.8	21.8	32.9	46.1													
	1-1/4	0.03	0.14	0.19	0.31	0.44	0.81	1.55	3.28	5.59	8.45	11.9	22	30.5	45.6										
	1-1/2		0.07	0.08	0.13	0.22	0.38	0.72	1.53	2.61	3.95	5.53	9.43	14.3	20	28.6	36.7								
	2			0.03	0.05	0.07	0.11	0.21	0.45	0.76	1.15	1.62	2.75	4.16	5.84	7.76	9.94	15.1	34.8	59.3					
	2-1/2				0.03	0.04	0.05	0.09	0.19	0.32	0.49	0.68	1.16	1.75	2.46	3.27	4.19	6.33	13.4	25.0	37.8	46.1			
	3						0.02	0.03	0.07	0.11	0.17	0.23	0.4	0.6	0.85	1.13	1.44	2.18	4.63	7.88	11.9	18.4	40.1		
	4										0.04	0.06	0.11	0.16	0.22	0.3	0.38	0.58	1.22	2.08	3.15	4.41	7.52		
	5											0.03	0.04	0.05	0.07	0.1	0.13	0.19	0.4	0.69	1.05	1.46	2.49	3.76	
6													0.02	0.03	0.04	0.05	0.08	0.16	0.28	0.43	0.6	1.01	1.53		

THE HARRIS HYDROELECTRIC SYSTEM

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P.M. Alternator Output in Watts

Feet of Net Head

G/M	25	50	75	100	200	300
3					45	80
6		20	30	45	130	180
10	20	50	80	105	225	350
15	35	85	115	170	350	520
20	63	120	170	240	480	700
30	100	175	270	360	675	1000
50	150	310	450	620	1100	1500
100	300	560	850	1100	1500	
200		725	1050	1300		

Maximum Wattage at Various Voltages

12 volt	24 volt	48 volt
750	1500	1500

Maximum Efficient Flow at Various Heads

HOW TO DETERMINE OUTPUT

Turbine output is determined by 4 factors:

1. Head, or vertical drop from source to turbine nozzle:

Head can be measured with a transit or level and a measuring stick of known length in successive steps. A quick pipe can be assembled from numerous garden hoses and the pressure can be measured with the hoses full of water. This, too, can be done in successive steps.

0.43 P.S.I. = 1 foot of head:
2.3 feet = 1 psi

2. Flow in gallons per minute passing through nozzle:

A temporary dam can be built to measure flow. By timing the filling of a container of known volume, the flow can be determined. Care should be taken to not dry up creeks, but to leave enough water to maintain natural environmental balances.

3. Diameter, length, and condition of feeder pipe:

**Figures in gallons/min
Feet of Net Head**

# of Nozzles	25	50	75	100	200	300
1	17	25	30	35	50	60
2	35	50	60	70	100	120
3	52	75	90	105	150	
4	70	100	120	140	200	

Generally, single nozzle systems with under 2000 feet of feeder pipe require a 2" pipe. A two nozzle system needs a 3" pipe, and a 4 nozzle system requires a 4" pipe. This will keep pipe losses under 25%. Please inquire about specific pipe losses for your site.

4. Turbine efficiency:

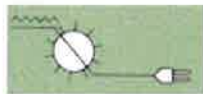
Alternator systems are between 30% and 70% efficient.

Site Evaluation

The following information will assist in selecting the best system for your site:

1. Head, or drop in elevation from source to turbine site
2. Flow in gallons per minute to be used
3. Length, size, and condition of pipe to be used
4. Distance from turbine to point of power use
5. Desired system voltage (12v, 24v, or 48v)

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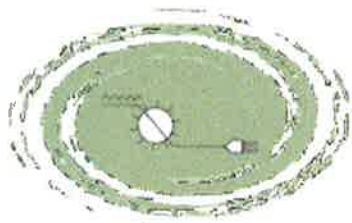


LoPower Engineering-The Harris Hydro
3673 Sunset View Drive
Fortuna, CA 95540
(707) 617-0923

Web design by: oncallofficesolutions.com

THE HARRIS HYDROELECTRIC SYSTEM

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A HYDROELECTRIC SYSTEM FOR HOME USE

ADJUSTABLE PERMANENT MAGNETIC ALTERNATOR

OPERATES EFFICIENTLY ON 25 TO 300 FEET OF HEAD

OPERATES EFFICIENTLY ON 2 TO 250 GALLONS/MINUTE OF FLOW

HOW IT WORKS

The Harris system is an efficient, durable battery-charging pelton turbine. It is designed to produce usable household power from springs and creeks that are too small to sustain the same level of useful power from a conventional A.C. generating system. Because D.C. power can be stored, the system is collecting power 24 hours a day, a little at a time, to be used as needed.

The average American household (not using electricity to produce heat) requires about 12,000 watt-hours a day, or about 500 watts on a continuous basis. This can be reduced to about 300 watts by just turning lights off when not needed. There are times, however, when as much as 10,000 watts are needed, such as when a refrigerator or vacuum cleaner is started. Because A.C. systems cannot store energy, they must be sized to meet this peak load (requiring up to 40 times as much water as a similarly useful D.C. system). Smaller sized systems save money. D.C. systems are matched to extract power the way that nature delivers it, slowly and steadily.



A 4-nozzle P.M. Generator-equipped turbine

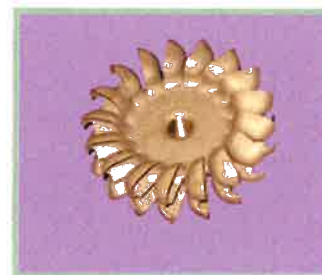
Multiple nozzle arrangement allows much more water to impact the runner, resulting in greater output at any head, and usable power at a much lower head. All turbines include an output-optimizing circuit allowing maximum efficiency at any flow rate. Multi-nozzle systems include a manifold kit and ball valves for each nozzle.



The 4-nozzle arrangement allows for maximum flow conditions and provides for seasonal flow adjustments.

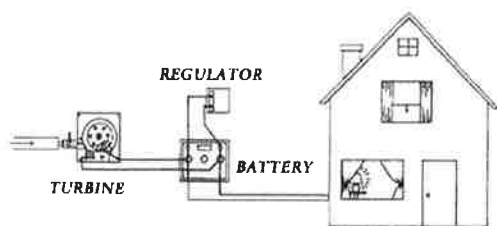
Pelton Type Runner

The pelton type runner is a lost wax cast of silicon bronze. The wheel is 70 to 90% efficient, depending on nozzle size and head. The bucket shape allows high efficiency for nozzles and provides a flow range of over 100 to 1. The wheel has a hydraulic diameter of just over 4.0 inches and each wheel is individually balanced.



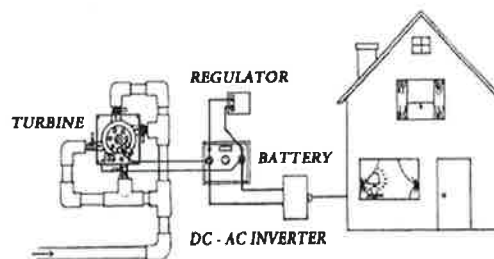
There are two basic system configurations:

Mountain Cabin-DC Direct



The basic system is suitable where battery power can be used directly. Cabins using 12-volt lights, portable radios, televisions, and recreational vehicle type D.C. appliances are easily adapted to the basic system.

Conventional House-110 volt



This configuration is suitable where higher output is needed and 110-volt, 60-cycle A.C. power is required to operate conventional appliances. Both configurations are compatible with other D.C. charging systems of 12, 24, 48 volts, including photovoltaic cells, wind charging systems and generator operated battery chargers.

Loon Creek Land Company
Water Right 77-14353
Field Exam Completed: 7/23/18
IDWR Staff: Rachael Smith and Dan Nelson



Headgate and point of diversion from Deer Creek



Valve box for 77-71353 and 77-14286



4 inch piping and valves/ lines for two turbines



Two Harris turbines



Harris Pelton turbine with four 3/8 inch nozzles



second Harris Pelton turbine with four 3/8 inch nozzles



Channel downstream of turbines



Battery bank



Inverter (DC to AC)



Battery status

Smith, Rachael

From: J.R. Williams <diamonddgustranch@mac.com>
Sent: Monday, July 30, 2018 1:03 PM
To: Smith, Rachael
Subject: Re: water rights field exams

Sure,

For the large turbine, it is used year round. At times in the winter, it may be shut off for 6-8 hours at a time to let the lake refill. It generally needs about the same cfs to operate. For the smaller system, it is only 3-4 months per year, running at the same speed you observed.

No problem! Come see us anytime!

J.R.

On Jul 30, 2018, at 12:36, Smith, Rachael <Rachael.Smith@idwr.idaho.gov> wrote:

Hi John,

I hope you had a great weekend! I'm currently working on the reports for the two hydropower sites and I think we have all the information needed except for the annual volume calculations. My notes on typical season of use for each system are lacking (I think I was distracted with getting flow measurements). Could you estimate what the longest season of use would be for each system and to what capacity they are used during different times of the year?

Thanks again, I really appreciate your time and help!

Rachael

From: J.R. Williams [<mailto:diamonddgustranch@mac.com>]
Sent: Thursday, July 19, 2018 4:03 PM
To: Smith, Rachael <Rachael.Smith@idwr.idaho.gov>
Subject: Re: water rights field exams

It sure does! I'll be watching for you!

On Jul 19, 2018, at 15:37, Smith, Rachael <Rachael.Smith@idwr.idaho.gov> wrote:

Hi John,

We're planning to be at the ranch around 11:30AM on Monday. Does that still work for you?

Smith, Rachael

From: J.R. Williams <diamonddgustranch@mac.com>
Sent: Tuesday, August 07, 2018 2:25 PM
To: Smith, Rachael
Subject: Re: water rights field exams

Most days in the winter, the system is running 24/7 at a reduced flow. Some days, we must shut down and let the lake refill to generate head/flow. Only had to do that a few times last year.

Regarding the other system, I do believe the drinking water for the house comes off of there as well, and perhaps a few sprinklers as well.

Thank you!

J.R.

On Aug 7, 2018, at 14:13, Smith, Rachael <Rachael.Smith@idwr.idaho.gov> wrote:

Good afternoon,

As Dan was reviewing my report, he noticed that my calculations for annual water usage were different than how he understood them the day we were out at the ranch. How often during the winter do you think the system may be shut off to let the lake refill? Or maybe a better way to ask/calculate that is how many hours per day do you think the system is running in the winter? And when the system is operating during the wintertime, is it at full capacity or at reduced flow?

Also, looking at the smaller system for the cabin, I know that there is a split for irrigation and hydropower where you showed us the valves, but are there any other splits lower down (such as for irrigating the lawn with sprinklers)? We were just thinking about that and wondering if any of the flow is lost above the two turbines.

Thanks again! I keep on working on other projects and coming back to these files. Sometime soon I will be done with them.

Rachael

From: Smith, Rachael
Sent: Monday, July 30, 2018 12:37 PM
To: 'J.R. Williams' <diamonddgustranch@mac.com>
Subject: RE: water rights field exams

Hi John,

I hope you had a great weekend! I'm currently working on the reports for the two hydropower sites and I think we have all the information needed except for the annual volume calculations. My notes on typical season of use for each system are lacking (I think I was distracted with getting flow