

# CINNAMON CREEK CAMPGROUND POWER SUPPLY FEASIBILITY STUDY

The Church of JESUS CHRIST of latter-day saints

## TASK

A method for providing feasible power to camp facilities without the use of current gas generators

## PARAMETERS

- Design life of 20 years
- Power demand of 12.5 KWh per day
- Sunlight of 4 hours per day
- Spring flow of 30 gal per minute
- Solar panel options (250 W, 280 W, 320 W, 350 W)
- Camp open for 5 months per year
- 800 lumen 8W LED bulbs used for lighting

## SOLUTION

A Power Spout Hydroelectric turbine operating with eight 320 Watt solar panels will provide the necessary power of 12.5 KWh per day.

### Cost estimates

#### Lower Hydroelectric

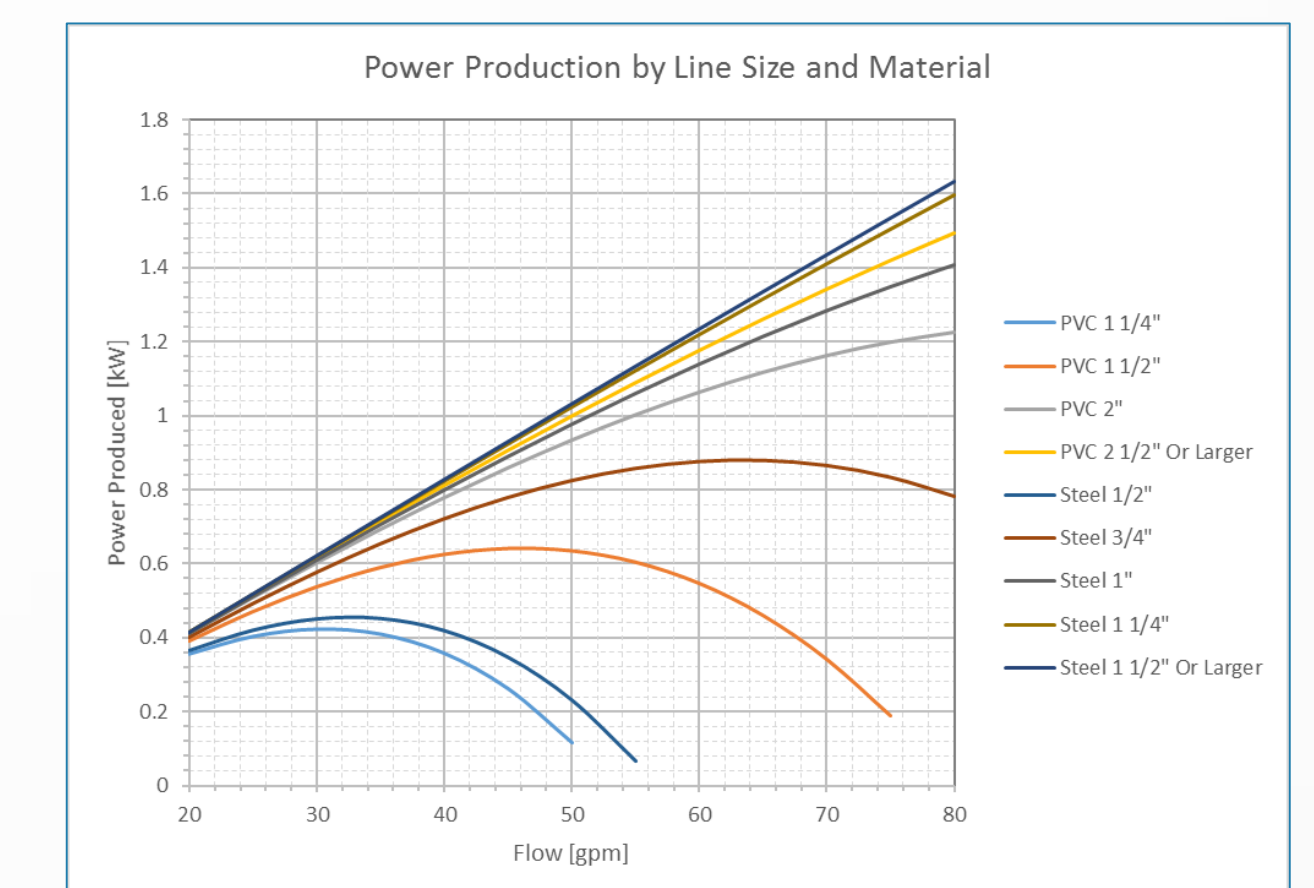
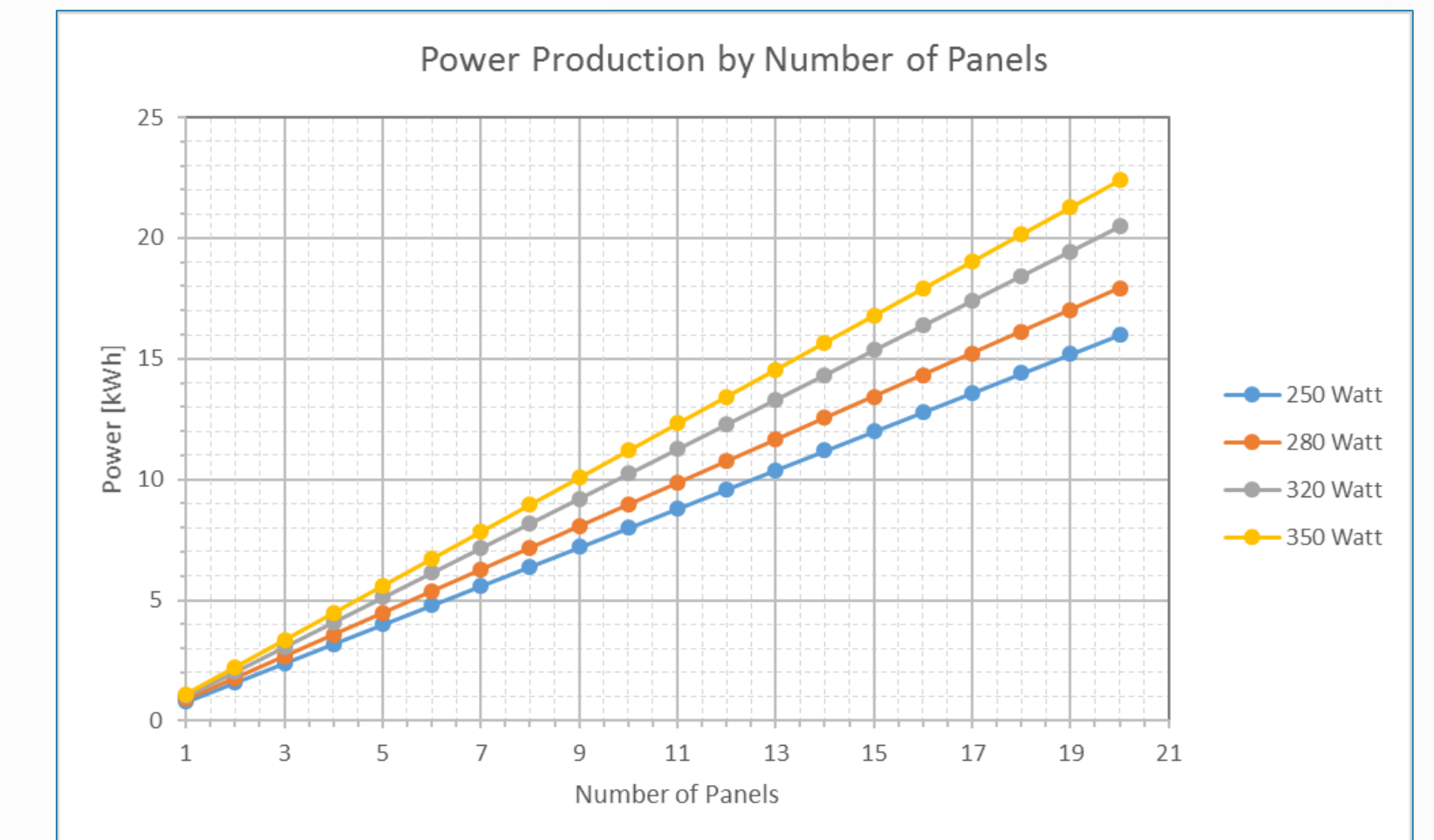


Solar/Hydro				
	250 Watt	280 Watt	320 Watt	350 Watt
Total Cost/yr/Watt	\$0.00201	\$0.00199	\$0.00197	\$0.00187
Total Cost	\$174,714.21	\$174,402.81	\$174,180.01	\$175,243.21
Cost/yr	\$8,735.71	\$8,720.14	\$8,709.00	\$8,762.16
Solar				
	250 Watt	280 Watt	320 Watt	350 Watt
Total Cost/yr/Watt	\$0.00180	\$0.00182	\$0.00172	\$0.00170
Total Cost	\$167,939.21	\$166,784.81	\$167,448.01	\$167,225.21
Cost/yr	\$8,396.96	\$8,339.24	\$8,372.40	\$8,361.26

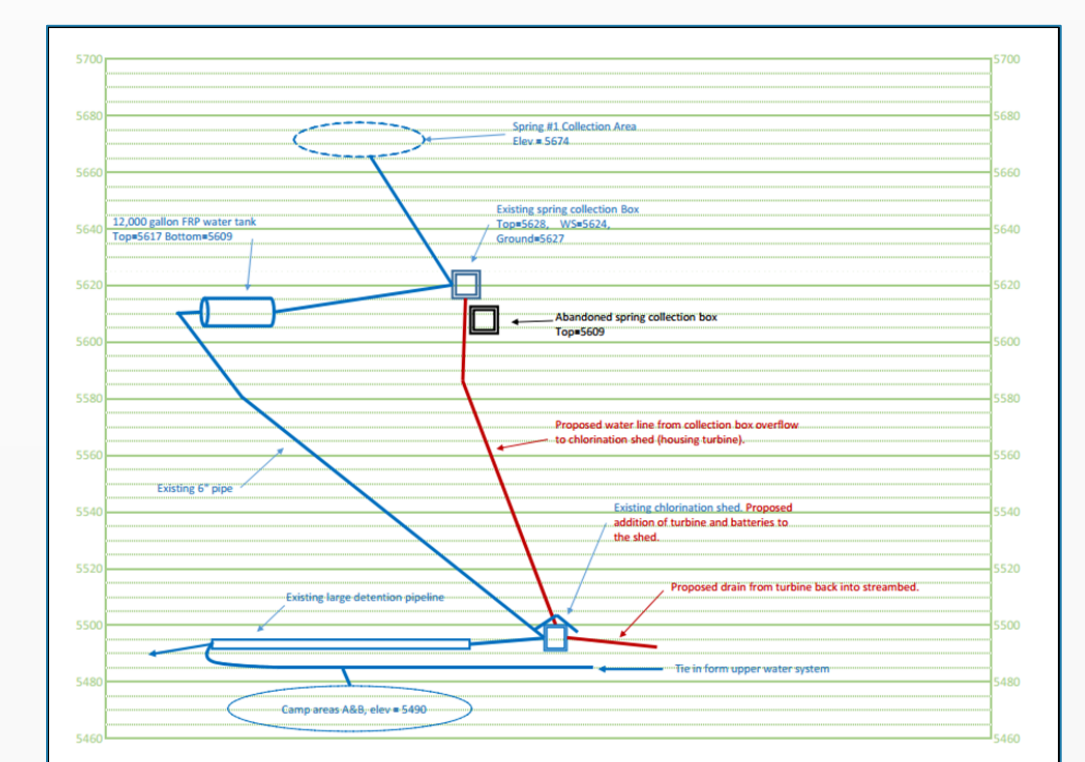
#### Upper Solar



- Lower Hydroelectric: Proposed layout map of hydroelectric power production, storage, and distribution system.
- Upper Solar: Proposed layout map of solar power production, storage, and distribution system.
- Cost Estimate: Estimated cost information for a system designed to provide power for 20 years.
- Power Production by Number of Panels: A relationship between number of panels, type of panel used, and power produced all based on four hours of direct sunlight per day.
- Power Production by Line Size and Material: A relationship between line size, material, spring water flow rate, and power production based on a turbine with 60% efficiency.
- Hydraulic Grade Profile: A depiction of major components of the water system of the lower camp area. Blue components are already in place while red components are proposed to provide this solution.



#### Hydraulic grade profile



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**BYU**

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