# CEEn-2016CPST-011

# CINNAMON CREEK CAMPGROUND POWER SUPPLY FEASIBILTY STUDY

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# Introduction

## 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

Lower Hydroelectric


Upper Solar

# Design, Analysis & Results

SOLUTION

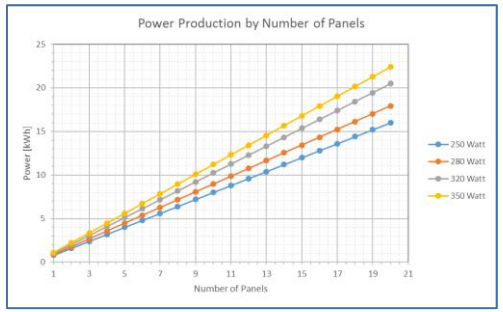
A Power Spout Hydroelectric turbine operating with eight 320 Watt solar panels will provide the necessary power of 12.5 KWh per day.

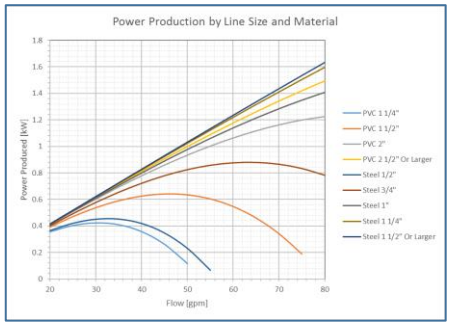
- Lower Hydroelectric: Proposed layout map of hydroelectric power production, storage, and distribution system.
- Upper Solar: Proposed layout map of solar power production, storage, and distribution system.
- Cost Estimate: Estimated cost information for a system designed to provide power for 20 years.
- 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.

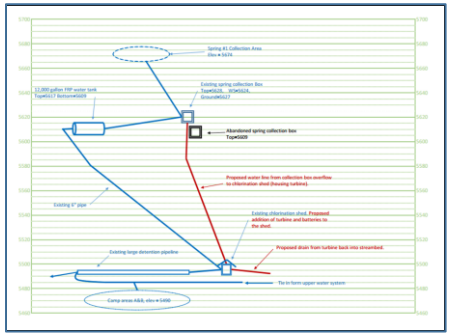
Cost estimates

| 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 |

Hydraulic grade profile



# Conclusions & Recommendations

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