Kaweah Pump, Inc.
General Engineering Contractor
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The following document is being introduced to The CPUC for information only. In reading the Draft EIR Report, it is not clear whether actual/true pump, electrical and irrigation infrastructure replacement costs were factored into the report or even considered. Since water, and the machinery and pipelines required to deliver the water, is an integral part of growing and maintaining crops, the costs to replace the infrastructure that is displaced or disrupted by Edison's Proposed Route 1 should be considered in the overall cost to Proposed Route 1.

Respectively submitted,
Bill Gargan
Owner, Kaweah Pump Inc.

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ESTIMATED COSTS TO REPLACE EXISTING WATER WELLS, PUMP ELECTRICAL SERVICE, DEEP WELL TURBINE PUMPS, IRRIGATION FILTER STATIONS, BOOSTER PUMPS AND PIPELINE INFRASTRUCTURE

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WATER WELLS AND WELL DEVELOPMENT

There are many variables when discussing water wells, size, depth, location type of well etc.... No two wells are alike. Drilling a well is generally accomplished by using one of two methods. Driving casing into the ground until a suitable landing is found and continuing down with a drill bit or bailer until sufficient water bearing formations are exposed, is known as **Casing Driven** wells. A **Gravel Envelope** well is literally "drilled". The procedure involves drilling the appropriate size bore hole using water and drilling mud as support, sampling the formations to determine the final depth and water bearing potential, installing perforated casing at the appropriate water bearing locations and blank casing elsewhere, then pumping or placing an engineered gravel around the annulus between the casing and the exposed earth, swabbing the gravel into place and then circulating out the mud and water that had been used as support during the drilling process.

A well is not complete until it has been pump developed. This involves installing a turbine pump with an engine as the prime mover, into the new well. Pump developing accomplishes several things. It removes the sand that is generally in most casing driven wells, cleans the water bearing areas that become infused with drilling fluids in gravel packed wells, settles and packs the gravel annulus in gravel packed wells and in both casing driven and gravel packed wells, develops the water bearing strata. During development of the well, data is generated that allows the pump contractor to adequately design a pump that fits that specific wells yield.

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Casing Driven Wells	
6"/8" Steel Cased Open Bottom Well @ 400 ft	$11,000.00/$14,000.00
10" Steel Cased Open Bottom Well @ 400 ft	$18,000.00
12" Steel Cased Open Bottom Well @ 400 ft	$21,000.00
Well Development	
30 hrs Well Development; Pump Setting @ 200 ft	$13,500.00
Estimated Cost for New 12" Steel Cased Open Bottom 400 ft Well, Completed and Developed	**$34,500.00**
Direct/Reverse Rotary Gravel Envelope Well	
10" 400 ft Gravel Packed Well Perforated To 200 ft	$38,000.00
12" 400 ft Gravel Packed Well Perforated To 200 ft	$40,000.00
16" 400 ft Gravel Packed Well Perforated To 200 ft	$49,000.00
Well Development	
30 hrs Well Development; Pump Setting @ 200 ft	$13,500.00
Estimated Cost for New 12" Gravel Envelope 400 ft Well, Completed and Developed	**$53,500.00**

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PUMP ELECTRICAL SERVICE AND DEEP WELL TURBINE PUMPS

Every pump plant, unless it is an engine driven pump, requires an electrical service. This service generally includes a power pole, meter service, pump starting panel and wire from the electrical supplier to the meter and wire and conduit from the pump starter to the electric motor on the pump. Horsepower varies from very small, 5 hp or less, to very large, 200 hp or greater. All pump electrical service is built specifically for a particular pumping plant. At times, a pump service may involve the additional installation of underground conduit from the electrical supplier to a remote pump location.

Typical Turbine Pump Electrical Service Cost
Pump service consists of, 25 ft pole, meter-can, pump starter panel, wire and conduit

5hp/10hp	$2,275.00
15hp/25hp	$2,385.00
30hp	$3,120.00
50hp/75hp	$3,340.00
100hp	$4,250.00

TURBINE PUMPS

The name "turbine pump" is a generic term. It actually is a centrifugal pump in a well that is driven by a shaft enclosed in a tube or pipe and driven by an engine or electric motor at the top and is generally referred to as a Vertical Deep Well Turbine. A "turbine pump" can also be a submersible centrifugal pump where the pump is driven by a motor connected directly to the pump and both are submerged under water in the well. This is generally referred to, simply, as a Submersible Pump. Both have pipe connected to them that conveys the water to the surface. Regardless of which type, Deep Well Turbine, or Submersible Pump, both are highly engineered pieces of machinery that have been designed specifically for a particular duty in a specific well.

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Since both types of pumps are designed for a specific well under specific operating conditions and set at varying depths in the well, determining cost is, again, specific to that particular pump. Following are general costs for deep well pumps in our region.

10hp-20hp Vertical Pump	$18,000.00/$25,000.00+
25hp/30hp Vertical Pump	$20,000.00/$30,000.00+
50hp Vertical Pump	$28,000.00/$35,000.00+
75hp Vertical Pump	$34,000.00/$50,000.00+
5hp-71/2hp Submersible Pump	$4,700.00/$8,500.00+
10hp	$4,700.00/$9,000.00+
15hp	$5,000.00/$9,000.00+
20hp	$7,500.00/$12,000.00+
25hp	$9,000.00/$15,000.00+

Generally speaking, most pump applications requiring 30hp or more, a vertical turbine pump would be used.

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IRRIGATION FILTER STATIONS, BOOSTER PUMPS AND PIPELINE INFRASTRUCTURE

Citrus groves in our area, and most tree crops, are irrigated by highly sophisticated irrigation systems. These systems are designed for a particular crop on a particular field utilizing a set flow from a well water source and/or irrigation district. The primary focus of these systems is irrigation; most have a secondary function as frost protection. The most common type of irrigation system in our trade area is micro-irrigation. Micro-irrigation is a term given to highly engineered irrigation systems that utilize water conserving emitters and spray jets. These systems are made up of the same components regardless of size or shape of the field. The components include a pump, filter station, underground pipe lines, irrigation tubing down the tree rows and low-flow emitters or jets attached to the tubing. These systems are considered permanent!

The variables to these systems are that they are all unique. For example, one system may have a Self Cleaning gravity Screen Filter, 10gph micro-sprinklers and ¾" tubing, and a 30 hp booster pump connected to a deep well pump. Another may have a 4 barrel Sand Media Filter, 15gph micro-sprinklers, dual tubing, and a 50 hp booster pump connected to the irrigation district. Or other systems could contain screen filters, sand separators, fertigation and chemigation capabilities, auto timers, dual pumps, self flushing, auto flushing etc, etc, etc.... The point being, not one system is identical to any other system.

System costs are as variable as the systems themselves. Most are approximately $2,100.00 to $4,500.00 per acre for a complete system So a 20 acre orange grove could have a $90,000.00 irrigation system. Filter costs, for replacement, vary in price from $12,000.00 to $60,000.00 installed. Pipeline infrastructure costs vary from $3.00/ft to $12.00/ft installed. Every system has a booster pump. What size? That depends on the system. Some have 5hp and 7 1/2hp pumps, others have 30hp up to 150hp.

If an irrigation system were to be cut in half, so to speak, the old system would have to be abandoned and new systems, for "both" halves, would have to be engineered and reinstalled. In a sense, the cost to design and install irrigation systems for both halves of what once was a single grove will be approximately twice the cost of the original irrigation system.