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TECHNICAL MEMORANDUM

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## IRWP Seasonal Storage Project Basis for Costs

PREPARED FOR: City of Santa Rosa

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### Background and Purpose

Evaluation of potential storage sites and subsequent development of conceptual designs for potential storage ponds were based on evaluation criteria reviewed by the City of Santa Rosa Board of Public Utilities (BPU) in October 2006. Cost is a preferential criterion and includes both capital and annual costs. The Notice of Preparation and Initial Study, reviewed by the BPU in January 2007, includes as a primary project objective maintaining a system and system components that can continue to be successfully financed and that are economically feasible.

The purpose of this Technical Memorandum is to summarize the methodology used for estimating costs and to provide the estimates of probable cost for each of the alternative storage ponds. The estimates of probable costs identify major costs associated with design, mitigation, construction and operation of the storage facilities. Because of the level of uncertainty at this time about the final scope and design detail for any of the projects, the cost estimate are considered preliminary and subject to revision in the future, once a project is selected and additional field investigations are performed for the detailed design.

### Conclusions and Recommendations

Estimates of Probable Cost have been developed for each of the proposed storage ponds located at four storage sites, including combinations of ponds located at a given site to account for shared costs and economy of scale. The costs have been refined over the course of the site evaluation process and conceptual design development and are based on the most current information available. Table 1 provides a summary of the present worth costs for each pond and the present worth cost per million gallons for each pond.

The West College and Alexander Valley Road Sites are not considered further due to the findings from the geotechnical investigations. Based on the geotechnical findings at these sites, both are considered infeasible as defined by CEQA Guidelines, as described in the TM *Geotechnical Evaluation, November 2007*.

**TABLE 1**  
Estimates of Probable Cost for Storage Pond Alternatives  
*IRWP Seasonal Storage Project – Basis for Costs*

<b>Pond ID</b>	<b>Storage Capacity (mg)</b>	<b>Present Worth Cost<sup>b</sup> (\$1,000)</b>	<b>Present Worth Cost<sup>b</sup> per MG (\$1,000)</b>
KF1 (Kelly Farm)	282	\$47,630	\$170
KF2 (Kelly Farm)	185	\$37,110	\$200
KF1&2 (Kelly Farm)	467	\$82,310	\$180
BF1 (Brown Farm)	226	\$39,420	\$170
BF2 (Brown Farm)	105	\$44,640	\$420
BF1&2 (Brown Farm)	331	\$79,170	\$240
AF1 (Alpha Farm)	146 <sup>a</sup>	\$38,600	\$260
PHR1 (Petaluma Hill Rd)	32	\$51,160	\$1,600
PHR2 (Petaluma Hill Rd)	49	\$46,350	\$950
PHR1&2 (Petaluma Hill Rd)	81	\$74,780	\$930

<sup>a</sup> For the pond at Alpha Farm, storage capacity is the additional capacity achieved by expanding existing storage capacity.

<sup>b</sup> Present worth costs are for 20 years at 4% discount and an ENRCCI of 9100 for San Francisco.

## Methodology

Conceptual designs were developed for each of the proposed ponds and storage sites and provide the basis for the estimated capital and annual costs. These conceptual designs include anticipated materials and methods of construction and approximate quantities of construction. These technical parameters are then translated to probable costs using historical bid data and published unit costs adjusted for anticipated site conditions and scaled to 2007 dollars. Cost estimates presented in this TM are “Class 5”<sup>1</sup> estimates prepared in accordance with the guidelines of the Association for the Advancement of Cost Engineering, International (AACE). AACE defines the “Class 5” estimate as follows:

Generally prepared on very limited information, where little more than proposed plan type, it’s location, and the capacity are known, and for strategic planning purposes such as but not limited to market studies, assessment of viability, evaluation of alternate schemes, project screening, location and evaluation of

<sup>1</sup> Some elements of the cost analysis may be consistent with a Class 4 cost estimate; however, the overall cost estimate and the corresponding project contingencies are consistent with a Class 5 cost estimate.

resource needs and budgeting, long-range capital planning, etc. Some examples of estimating methods used would include cost/capacity curves and factors, scale-up factors, and parametric and modeling techniques. Typically, very little time is expended in the development of this estimate. The typical expected accuracy ranges for this class estimate are -20% to -50% on the low side and +30% to +100% on the high side.

Estimated costs have an Engineering News Record Construction Cost Index (ENRCCI) of 9100, which is for heavy construction in the San Francisco area in 2007. The probable costs provided in this document can be scaled to a future date by adjusting the index to the projected ENRCCI at the date of interest.

Unit and lump sum prices are based on the use of standard equipment and conventional construction practices, and include contractor's overhead and profit. The prices are based on data current within the past 3 years from the following sources: 1) published and non-published bid data for similar types of facilities, 2) quotes from local and regional suppliers and manufacturers, 3) experience on recent dam projects, 4) published cost estimating data.

The estimates of probable costs contained herein are based on professional opinion. Actual costs will be affected by a number of factors beyond current control, such as supply and demand for the types construction required at the time of bidding and in the project vicinity; changes in material supplier costs; changes in labor rates; the competitiveness of contractors and suppliers; changes in applicable regulatory requirements; and changes in design standards. Therefore, conditions and factors that arise as project development proceeds through construction may result in costs that differ from the estimates provided in this TM.

## Capital Costs

The individual line items sum to produce component subtotals for the major project components. The major project components are as follows:

- Site Preparation
- Excavation/Foundation & Lining
- Embankment
- Drainage/Stabilization
- Drainage and Containment
- Pump Stations/Treatment
- Piping
- Site Improvements
- Administration and Construction Contingencies
- CTS and Land Acquisition costs

The component subtotals sum to the Total Capitol Costs with Contingencies. The individual line items are identified and described below.

### **Site Preparation**

**Demolition.** The demolition for the individual sites was included as a lump sum depending on the amount of demolition at the individual sites. Not all sites require demolition. The demolition occurs at most of the city sites due to removal of existing irrigation piping. This unit cost is a lump sum.

**Clearing and Grubbing.** The clearing and grubbing is based on a price per acre and is assumed to cover the entire temporary disturbed area.

**Topsoil Stripping & Stockpiling.** The cost assumes 12 inches of topsoil to be stripped and stockpiled onsite within the permanent disturbed areas. This unit cost is in acres.

**Temporary Erosion Controls.** This unit price is a lump sum cost, which is an approximate cost for an area in the range of 30-50 acres.

**Diversion and Water Control.** This unit price is a lump sum for an area in the range of 30-50 acres.

**Drain Existing Ponds.** This line item only applies to the AF1 site where the two existing ponds will require draining

**Dewatering.** This unit price is a lump sum cost for a 30-50 acres site and 20-250 gpm well points.

**Allowance for Construction Water.** It is assumed that untreated construction water for the project will be available to the site from the existing reuse system or Geysers pipeline. A lump sum of \$300,000 has been provided for each of the ponds, which includes temporary pipeline, pumping and ponds or tanks for storage.

**Replace Topsoil.** The replace topsoil assumes the replacement of 12-inches of topsoil over temporarily disturbed area minus the permanent disturbed area plus one-half the embankment area. This unit cost is in acres.

**Spread Excess Topsoil.** This item is provided as a unit cost in cubic yards. It was estimated based on the area of topsoil stripping and stockpiling minus the area where topsoil was replaced using a depth of 12-inches.

**Reclamation of Disturbed Areas.** The unit cost for the reclamation of disturbed areas is in acres and is equal to the area where the topsoil is replaced.

**Excavation/ Foundation & Lining.** The pond excavation to pond bottom, subexcavation for pond liner, foundation excavation and inspection/key trench excavation are provided for

information only to provide volumes to incorporate into the appropriate line items with unit costs.

**Foundation Overexc/Replacement.** The foundation overexcavation/replacement assumed 2% of the total excavation. The total excavation to the pond bottom and the inspection key trench excavation, which were computed for information only. The unit cost was in cubic yards.

**Embankment Foundation Preparation.** The unit cost for this line item is in square yards and is based on the area of the embankment footprint for each of the sites.

**Liner Subgrade Preparation.** This unit cost was in square yards and utilized the entire pond bottom area at 12-inches deep.

**Clay Liner (mix-in-place).** The liner cover material is in cubic yards and utilizes a two-foot thick depth of soil for the liner material with the existing soils mixed in place with a bentomat as an adder if required.

**Double Flexible Membrane Liner (FML) - Bottom and slope.** This unit cost is used for PHR1 and PHR2 sites only. It is based on a double FML such as High Density Polyethylene or Linear Low Density Polyethylene sandwiching a composite drainage membrane layer that would be used to collect any leakage through the upper liner. The unit cost is in square yards and includes the liner and an allowance for ancillary work such as leakage collection sumps and piping.

In cost estimates prior to this TM a Geosynthetic clay liner (GCL) system was utilized for the PHR sites along with a select liner subgrade material. The GCL liner system was revised to a FML for based on findings discussed in the TM *Groundwater Evaluation, November 2007*.

**Liner Cover Material.** A liner cover material was included for the pond sites with a clay liner mixed in place to provide protection to the clay liner. A two-foot thick liner cover material was estimated for this purpose over the entire area of the pond. This unit price is in cubic yards.

**Fine Grading Pond Bottom.** There is minimal slope on the pond bottom and it will have to be fine graded to avoid low spots for pooling of water when drained. The unit cost is in square yards to cover the entire pond bottom.

## **Embankment**

**Embankment Fill (onsite excavation).** This includes the volume of material found onsite, which can be used in the embankment. This unit is in cubic yards. At the time cost estimates were prepared a conservative assumption of 20% shrink swell factor was utilized in estimating overall cut and fill from the sites. The actual shrink swell factor for the sites will be re-evaluated as a site is selected for preliminary design.

**Embankment Fill (imported).** The includes the low permeability fill material which can not be found onsite and needs to be bought and imported to the pond site for use in construction of the embankment. This unit is in cubic yards.

**Excess Excavation for Disposal.** This includes excess material generated onsite from the cut material, which cannot be utilized in the embankment. This unit is in cubic yards.

**Unsuitable Excavation for Disposal.** This includes material generated onsite from the cut material, which is unsuitable for use in the embankment. Two percent of the total cut material was estimated as unsuitable material, which would require export from the site. This unit is in cubic yards.

**Chimney Drain.** The chimney drain is located in the embankment and constructed of sand. It was assumed 4 feet wide and is provided within the embankment where the height of the embankment is greater than 10 feet above existing grade. This unit is in cubic yards.

**Finger Drains.** The finger drains are located in the embankment and constructed of sand. The finger drains were 4 feet wide and two feet thick spaced every 10 feet. Is provided within the embankment where the height of the embankment is greater than 10 feet above existing grade. This unit is in cubic yards.

**Riprap Erosion Protection.** Riprap erosion is provided for all ponds. A 10-foot wide by 3-foot thick layer of 9-16 inch D50 rock over an 8-inch bedding was assumed to estimate the amount of riprap required. The unit price is in cubic yards.

**Gravel Surfacing on Crest.** A 20-foot wide 9-inch aggregate base road was assumed for the top of embankments. The unit price is in cubic yards.

**Toe Drains and Outfalls.** A 6-inch slotted drain in a filter blanket was assumed along the base of all of the pond embankments. The unit price is in lineal feet.

### **Drainage/Stabilization**

**Interceptor Drain (Main).** On the ponds where main interceptor drains are provided a 12-15 inch, slotted pipe in a filter envelope was provided. The unit cost is in lineal feet.

**Interceptor Drain (Laterals).** In ponds where laterals are provided a 6-inch slotted pipe in a filter envelope was provided. The unit cost is in lineal feet.

**Uplift Protection System Interceptor Drain (Main and Laterals).** This unit cost is used for PHR1 and PHR2 sites only. A liner uplift protection system is required to provide protection of the liner in the event the groundwater is above the bottom of the pond. This unit price is in lineal feet of pipe.

**Dam Instrumentation Allowance.** This allowance provides for piezometers, weir boxes and survey monuments required for all of the pond sites. The unit cost is a lump sum.

### **Drainage and Containment**

**Standpipe Spillway & Piping.** The unit cost is a lump sum and includes trash rack, hanging baffle energy dissipater and piping. This type of drainage containment is provided each of the pond sites.

**Outlet Structure and Piping.** The unit cost is a lump sum and includes trash rack and outlet piping which assumed 400 feet.

### **Pump Stations/Treatment**

**Relocate Existing Irrigation Pump Station.** The unit cost is a lump sum and is provided for AF1 pond site only where an existing irrigation pump station located on the existing pond berms will be relocated and reconnected.

**Outboard Pump Station and Inboard Pump Station.** This unit cost is a lump sum and is based on the components required to construct the pump stations as shown in the Figures provided in the *TM Pump Stations Evaluations, November 2007*.

**Treatment System.** This unit cost is a lump sum and is based on a prorated cost of a treatment plant originally estimated in the *IRWP Santa Rosa Urban Reuse Project – Feasibility Study, October 2006*. The cost is provided for the PHR1 and PHR2 pond sites only. Treatment might require chlorination and filtration for algae removal before discharge into the high pressure Reuse Line.

**Offsite Pump station Upgrades.** This unit cost is a lump sum and it provided for the PHR1 and PHR2 pond sites. The cost is required for increased horsepower at existing pump stations to provide for operation at the new pond sites.

### **Piping**

**Fill/Drain Piping.** The unit cost for this is in lineal feet. The cost is based on \$12/inch diameter of pipe. AF1 pond site will utilize an existing 16-inch diameter pipe. 24-inch diameter pipes where considered for all of the remaining pond sites.

**Miscellaneous Yard Piping.** The unit cost for this is in lineal feet. The cost is based on \$12/inch diameter of pipe.

**Offsite Conveyance Pipeline.** This cost is based on \$12/inch diameter of pipe. It is the pipeline required to connect to an existing pipeline for pond operation. This pipeline is located offsite of the property and it utilized PHR1 and PHR2 pond site only. The unit cost for this is in lineal feet.

**Valves and Appurtenances.** This provides for additional cost for miscellaneous valves and pipe appurtenances. The unit cost is a lump sum and is the same for all of the pond sites.

## Site Improvements

**Gravel Access Road.** A 16-foot access road with a 6-inch, Class II Aggregate base (AB) was utilized for this unit cost. The unit cost is in lineal feet.

**Paved Access Road.** A 16-foot paved access road with 4-inch aggregate concrete over 6-inch Class II AB. Paved access road is provided at BF1 and BF2 pond sites. The unit cost is in lineal feet.

**Site Fencing.** A 6-foot high chain link fence with 3-strand barbed wire was assumed around the pond perimeter for all of the pond sites except PHR1 and PHR2 sites. Limited access to the private properties will be provided through a fenced pump station. The unit cost is in lineal feet.

**Monitoring Wells.** Monitoring wells will be required at the pond sites. The unit price is lump sum and is the same for all pond sites.

## Administration and Contingency Costs

**Construction Contingency.** A 30% contingency on the capital costs has been included as an adder for several minor cost items, unforeseen project components, or for components which could not be completely evaluated at this time.

**Engineering, Administration and Legal.** A 23% contingency has been included on the capital cost to account for professional fees for engineering and geotechnical, legal and administrative services and other minor technical services, which would be necessary for the design, and administration necessary for any projects.

The presence of faults and landslides at the PHR1, and PHR2 sites requires performing additional geotechnical analysis before detailed design efforts occur. The additional analysis is required to satisfy the Division of Safety of Dams (DSOD) requirements regarding the period since the faults were active and to map the locations and depths of landslides for the detailed designs.

The contingency was increased to 25% for the PHR sites to provide for the additional analysis.

## CTS Mitigation and Land Cost

**CTS Mitigation.** Mitigation costs for disturbing habitat of the California tiger salamander are included and allow for a mitigation ratio of 2:1 based on the *Draft Memorandum of Agreement and Implementation Plan by and among the U.S. Fish And Wildlife Service, California Department of Fish and Game, County of Sonoma, the City of Santa Rosa, the City of Rohnert Park, the Town of Windsor and the City of Cotati Regarding the Santa Rosa Plain Conservation Strategy (Draft Implementation Plan)*. The cost for mitigation approximates the March 2007 cost for purchasing credits from a mitigation bank. The unit price for CTS mitigation is in acres and multiplied by the ratio as required.

**Land Acquisition.** Land acquisition costs are based on an average land value for open farmland. The acreage of land required for purchase was considered to be the area that will temporarily be disturbed for construction. The unit cost is in acres and is required for the Petaluma Hill Road pond sites only.

**Land Contingency.** The cost of mitigation will fluctuate based on supply and demand in the County and will likely vary during the implementation schedule for the seasonal storage project. The Kelly, Brown and AF1 sites include mitigation costs for disturbing California tiger salamander habitat, a 50% contingency has been included to account for this fluctuation and for land acquisition.

## Annual Operations and Maintenance

In addition to capital costs, each pond site would have long term operational and maintenance costs. These would include costs pond and pipeline maintenance, pumping costs, and treatment plant operations and maintenance where required.

### Pond(s)

**Labor.** ½ a percent of the construction costs for the pond was estimated for labor at the ponds. The unit price is a lump sum.

**Maintenance.** ½ a percent of the construction costs for the pond was estimated for maintenance. The unit price is a lump sum.

### Pump Station(s)

**Labor.** The labor for the pump stations was estimated to be

**Maintenance.** The maintenance on the pump station is based on the horsepower requirements for the pump station. The unit price is per horsepower.

**Power.** The annual power costs are based on the energy required for normal filling and draining of the ponds. The unit price is in kw-hrs.

**Treatment.** The annual operations and maintenance costs for a treatment plant to provide chlorination and filtration was estimated to be approximately 2.5 % of the cost for the treatment plant.

## Present Worth Value

Present worth costs are based on both construction costs and operations and maintenance costs projected to a present worth value based on annual cost of borrowed money at 4 percent for 20 years and an ENRCCI of 9100 for San Francisco.

## Estimate of Probable Costs

Table 2 provides a summary of the estimates of probable cost for each alternative storage pond. The detailed cost breakdowns are provided in Tables 3 through 12 attached.

TABLE 2  
Summary of Estimates of Probable Costs for Alternative Storage Ponds  
*IRWP Seasonal Storage Project – Basis for Costs*

Pond ID	Engineering and Construction	Mitigation and Land	Total Capital	Annual O&M	Total Present Worth Value
KF1	\$17,760,000	\$27,450,000	\$45,220,000	\$180,000	\$47,630,000

**TABLE 2**  
Summary of Estimates of Probable Costs for Alternative Storage Ponds  
*IRWP Seasonal Storage Project – Basis for Costs*

<b>Pond ID</b>	<b>Engineering and Construction</b>	<b>Mitigation and Land</b>	<b>Total Capital</b>	<b>Annual O&amp;M</b>	<b>Total Present Worth Value</b>
KF2	\$14,070,000	\$21,150,000	\$35,210,000	\$140,000	\$37,110,000
KF1&2	\$29,840,000	\$48,600,000	\$78,440,000	\$280,000	\$82,310,000
BF1	\$15,830,000	\$21,600,000	\$37,420,000	\$150,000	\$39,420,000
BF2	\$23,700,000	\$18,450,000	\$42,150,000	\$180,000	\$44,640,000
BF1&2	\$35,690,000	\$39,600,000	\$75,290,000	\$290,000	\$79,170,000
AF1	\$15,560,000	\$20,840,000	\$36,390,000	\$160,000	\$38,600,000
PHR1	\$40,500,000	\$3,940,000	\$44,430,000	\$500,000	\$51,160,000
PHR2	\$36,050,000	\$3,520,000	\$39,570,000	\$500,000	\$46,350,000
PHR1&2	\$59,470,000	\$6,300,000	\$65,770,000	\$660,000	\$74,780,000

**TABLE 3**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 1 (KF1) - Storage Volume = 282.2 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 37,000	\$ 37,000
Clearing and Grubbing	89	AC	\$ 2,000	\$ 178,000
Topsoil Stripping & Stockpiling	61	AC	\$ 3,000	\$ 183,000
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	39	AC	\$ 6,000	\$ 232,080
Spread Excess Topsoil	36,010	CY	\$ 4	\$ 126,034
Reclamation of Disturbed Areas	39	AC	\$ 3,000	\$ 116,040
<b>Subtotal, General</b>				<b>\$ 1,459,654</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	399,758	CY	n/a	
Subexcavation for Pond Liner	221,010	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	20,826	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	8,412	CY	\$ 19	\$ 155,616
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	103,382	SY	\$ 3	\$ 310,147
Liner Subgrade Preparation	189,438	SY	\$ 3	\$ 568,313
Clay Liner (mix-in-place)	189,438	SY	\$ 6	\$ 1,136,626
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	126,292	CY	\$ 5	\$ 631,459
Fine Grading Pond Bottom	189,438	SY	\$ 2	\$ 378,875
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 3,181,036</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	411,657	CY	\$ 5	\$ 2,058,285
Embankment Fill (imported)	11,899	CY	\$ 25	\$ 297,475
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	8,412	CY	\$ 15	\$ 126,175
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	8,330	CY	\$ 57	\$ 474,810
Finger Drains	1,195	CY	\$ 57	\$ 68,115
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	13,016	CY	\$ 80	\$ 1,041,280
Gravel Surfacing on Crest	3,124	CY	\$ 50	\$ 156,200
Toe Drains and Outfalls	6,320	LF	\$ 50	\$ 316,000
<b>Subtotal, Embankment</b>				<b>\$ 4,538,340</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>

**TABLE 3**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 1 (KF1) - Storage Volume = 282.2 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 80 hp	1	LS	\$ 1,000,000	\$ 1,000,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 1,000,000</b>
<b>Piping</b>				
Fill/Drain Piping	400	LF	\$ 288	\$ 115,200
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 215,200</b>
<b>Site Improvements</b>				
Gravel Access Road	3,560	LF	\$ 20	\$ 71,200
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing	6,320	LF	\$ 34	\$ 214,880
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 386,080</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 11,110,309</b>
Construction Contingency	1	LS	30%	\$ 3,333,093
Engineering, Administration and Legal	1	LS	23%	\$ 3,321,982
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 6,655,075</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	61	AC	\$ 300,000	\$ 18,300,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 9,150,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 27,450,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 45,215,385</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 55,552	\$ 55,552
Maintenance	1	LS	\$ 55,552	\$ 55,552
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 111,103</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	80	HP	\$ 50	\$ 4,000
Power	353,425	KW-Hrs	\$ 0.12	\$ 42,411
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 66,411</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 177,514</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 47,627,859</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get t favorable price for the project. We have seen the market value flucuate from \$135k-\$400k in the past year.

**TABLE 4**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 2 (KF2) - Storage Volume = 185 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 28,600	\$ 28,600
Clearing and Grubbing	63	AC	\$ 2,000	\$ 126,540
Topsoil Stripping & Stockpiling	47	AC	\$ 3,000	\$ 141,000
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	25	AC	\$ 6,000	\$ 147,000
Spread Excess Topsoil	36,300	CY	\$ 4	\$ 127,050
Reclamation of Disturbed Areas	25	AC	\$ 3,000	\$ 73,500
<b>Subtotal, General</b>				<b>\$ 1,231,190</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	278,230	CY	n/a	
Subexcavation for Pond Liner	151,105	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	17,948	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	5,924	CY	\$ 19	\$ 109,586
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	82,280	SY	\$ 3	\$ 246,840
Liner Subgrade Preparation	129,518	SY	\$ 3	\$ 388,555
Clay Liner (mix-in-place)	129,518	SY	\$ 6	\$ 777,110
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	86,346	CY	\$ 5	\$ 431,728
Fine Grading Pond Bottom	129,518	SY	\$ 2	\$ 259,037
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 2,212,856</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	255,806	CY	\$ 5	\$ 1,279,030
Embankment Fill (imported)	0	CY	\$ 25	\$ -
Excess Excavation for Disposal	22,424	CY	\$ 15	\$ 336,360
Unsuitable Excavation for Disposal	5,924	CY	\$ 15	\$ 88,853
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	7,179	CY	\$ 57	\$ 409,203
Finger Drains	900	CY	\$ 57	\$ 51,300
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	11,218	CY	\$ 80	\$ 897,440
Gravel Surfacing on Crest	2,700	CY	\$ 50	\$ 135,000
Toe Drains and Outfalls	5,440	LF	\$ 50	\$ 272,000
<b>Subtotal, Embankment</b>				<b>\$ 3,469,186</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>

**TABLE 4**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 2 (KF2) - Storage Volume = 185 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 80 hp	1	LS	\$ 1,000,000	\$ 1,000,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 1,000,000</b>
<b>Piping</b>				
Fill/Drain Piping	200	LF	\$ 288	\$ 57,600
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 157,600</b>
<b>Site Improvements</b>				
Gravel Access Road	5,500	LF	\$ 20	\$ 110,000
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing	5,440	LF	\$ 34	\$ 184,960
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 394,960</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 8,795,793</b>
Construction Contingency	1	LS	30%	\$ 2,638,738
Engineering, Administration and Legal	1	LS	23%	\$ 2,629,942
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 5,268,680</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	47	AC	\$ 300,000	\$ 14,100,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 7,050,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 21,150,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 35,214,472</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 43,979	\$ 43,979
Maintenance	1	LS	\$ 43,979	\$ 43,979
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 87,958</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	80	HP	\$ 50	\$ 4,000
Power	231,857	KW-Hrs	\$ 0.12	\$ 27,823
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 51,823</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 139,781</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 37,114,138</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get t favorable price for the project. We have seen the market value flucuate from \$135k-\$400k in the past year.

**TABLE 5**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 1 & 2 (KF1&2) - Storage Volume = 467.1 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 65,600	\$ 65,600
Clearing and Grubbing	147	AC	\$ 2,000	\$ 293,460
Topsoil Stripping & Stockpiling	108	AC	\$ 3,000	\$ 324,000
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	58	AC	\$ 6,000	\$ 348,000
Spread Excess Topsoil	80,667	CY	\$ 4	\$ 282,333
Reclamation of Disturbed Areas	58	AC	\$ 3,000	\$ 174,000
<b>Subtotal, General</b>				<b>\$ 2,074,893</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	677,988	CY	n/a	
Subexcavation for Pond Liner	372,115	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	38,774	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	14,335	CY	\$ 19	\$ 265,202
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	185,662	SY	\$ 3	\$ 556,987
Liner Subgrade Preparation	318,956	SY	\$ 3	\$ 956,868
Clay Liner (mix-in-place)	318,956	SY	\$ 6	\$ 1,913,736
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	212,637	CY	\$ 5	\$ 1,063,187
Fine Grading Pond Bottom	318,956	SY	\$ 2	\$ 637,912
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 5,393,892</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	667,463	CY	\$ 5	\$ 3,337,315
Embankment Fill (imported)	0	CY	\$ 25	\$ -
Excess Excavation for Disposal	10,525	CY	\$ 15	\$ 157,875
Unsuitable Excavation for Disposal	14,335	CY	\$ 15	\$ 215,029
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	15,509	CY	\$ 57	\$ 884,013
Finger Drains	2,095	CY	\$ 57	\$ 119,415
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	24,234	CY	\$ 80	\$ 1,938,720
Gravel Surfacing on Crest	5,824	CY	\$ 50	\$ 291,200
Toe Drains and Outfalls	11,760	LF	\$ 50	\$ 588,000
<b>Subtotal, Embankment</b>				<b>\$ 7,531,567</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>

**TABLE 5**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Kelly Farm Pond 1 & 2 (KF1&2) - Storage Volume = 467.1 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	2	LS	\$ 230,000	\$ 460,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 460,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 80 hp each pond	2	LS	\$ 1,000,000	\$ 2,000,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 2,000,000</b>
<b>Piping</b>				
Fill/Drain Piping	600	LF	\$ 288	\$ 172,800
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Piping</b>				<b>\$ 372,800</b>
<b>Site Improvements</b>				
Gravel Access Road	6,520	LF	\$ 20	\$ 130,400
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing	11,760	LF	\$ 34	\$ 399,840
Monitoring Wells	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Site Improvements</b>				<b>\$ 730,240</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 18,663,392</b>
Construction Contingency	1	LS	30%	\$ 5,599,018
Engineering, Administration and Legal	1	LS	23%	\$ 5,580,354
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 11,179,372</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	108	AC	\$ 300,000	\$ 32,400,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition		AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 16,200,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 48,600,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 78,442,763</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 93,317	\$ 93,317
Maintenance	1	LS	\$ 93,317	\$ 93,317
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 186,634</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	160	HP	\$ 50	\$ 8,000
Power	585,282	KW-Hrs	\$ 0.12	\$ 70,234
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 98,234</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 284,868</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 82,314,209</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get t favorable price for the project. We have seen the market value flucuate from \$135k-\$400k in the past year.

**TABLE 6**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
Brown Farm Pond 1 (BF1) - Storage Volume = 225.7 MG  
IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 35,500	\$ 35,500
Clearing and Grubbing	76	AC	\$ 2,000	\$ 151,260
Topsoil Stripping & Stockpiling	48	AC	\$ 3,000	\$ 142,530
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 100,000	\$ 100,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	38	AC	\$ 6,000	\$ 230,940
Spread Excess Topsoil	14,552	CY	\$ 4	\$ 50,933
Reclamation of Disturbed Areas	38	AC	\$ 3,000	\$ 115,470
<b>Subtotal, General</b>				<b>\$ 1,339,133</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	455,054	CY	n/a	
Subexcavation for Pond Liner	148,564	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	18,159	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	9,464	CY	\$ 19	\$ 175,089
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	100,333	SY	\$ 3	\$ 301,000
Liner Subgrade Preparation	127,340	SY	\$ 3	\$ 382,021
Clay Liner (mix-in-place)	127,340	SY	\$ 6	\$ 764,042
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	84,894	CY	\$ 5	\$ 424,468
Fine Grading Pond Bottom	127,340	SY	\$ 2	\$ 254,681
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 2,301,301</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	426,406	CY	\$ 5	\$ 2,132,030
Embankment Fill (imported)	0	CY	\$ 25	\$ -
Excess Excavation for Disposal	28,648	CY	\$ 15	\$ 429,720
Unsuitable Excavation for Disposal	9,464	CY	\$ 15	\$ 141,964
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	7,415	CY	\$ 57	\$ 422,655
Finger Drains	1,037	CY	\$ 57	\$ 59,109
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	11,350	CY	\$ 80	\$ 908,000
Gravel Surfacing on Crest	2,781	CY	\$ 50	\$ 139,050
Toe Drains and Outfalls	5,580	LF	\$ 50	\$ 279,000
<b>Subtotal, Embankment</b>				<b>\$ 4,511,528</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>

**TABLE 6**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Brown Farm Pond 1 (BF1) - Storage Volume = 225.7 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 60 hp	1	LS	\$ 800,000	\$ 800,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 800,000</b>
<b>Piping</b>				
Fill/Drain Piping	300	LF	\$ 288	\$ 86,400
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 186,400</b>
<b>Site Improvements</b>				
Gravel Access Road	360	LF	\$ 20	\$ 7,200
Paved Access Road	2,000	LF	\$ 65	\$ 130,000
Site Fencing	5,580	LF	\$ 34	\$ 189,720
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 426,920</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 9,895,282</b>
Construction Contingency	1	LS	30%	\$ 2,968,584
Engineering, Administration and Legal	1	LS	23%	\$ 2,958,689
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 5,927,274</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	48	AC	\$ 300,000	\$ 14,400,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 7,200,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 21,600,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 37,422,555</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 49,476	\$ 49,476
Maintenance	1	LS	\$ 49,476	\$ 49,476
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 98,953</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	60	HP	\$ 50	\$ 3,000
Power	208,096	KW-Hrs	\$ 0.12	\$ 24,971
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 47,971</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 146,924</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 39,419,304</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 7**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
Brown Farm Pond 2 (BF2) - Storage Volume = 105.4 MG  
IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 31,000	\$ 31,000
Clearing and Grubbing	66	AC	\$ 2,000	\$ 132,680
Topsoil Stripping & Stockpiling	41	AC	\$ 3,000	\$ 123,150
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	33	AC	\$ 6,000	\$ 196,080
Spread Excess Topsoil	13,504	CY	\$ 4	\$ 47,263
Reclamation of Disturbed Areas	33	AC	\$ 3,000	\$ 98,040
<b>Subtotal, General</b>				<b>\$ 1,215,713</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	32,430	CY	n/a	
Subexcavation for Pond Liner	215,535	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	18,537	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	1,019	CY	\$ 19	\$ 18,858
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	35,477	SY	\$ 3	\$ 106,432
Liner Subgrade Preparation	119,742	SY	\$ 3	\$ 359,225
Clay Liner (mix-in-place)	119,742	SY	\$ 6	\$ 718,450
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	79,828	CY	\$ 5	\$ 399,139
Fine Grading Pond Bottom	119,742	SY	\$ 2	\$ 239,483
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 1,841,586</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	297,495	CY	\$ 5	\$ 1,487,475
Embankment Fill (imported)	265,065	CY	\$ 25	\$ 6,626,625
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	1,019	CY	\$ 15	\$ 15,290
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	7,264	CY	\$ 57	\$ 414,048
Finger Drains	828	CY	\$ 57	\$ 47,196
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	11,585	CY	\$ 80	\$ 926,800
Gravel Surfacing on Crest	2,724	CY	\$ 50	\$ 136,200
Toe Drains and Outfalls	5,520	LF	\$ 50	\$ 276,000
<b>Subtotal, Embankment</b>				<b>\$ 9,929,634</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>

**TABLE 7**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Brown Farm Pond 2 (BF2) - Storage Volume = 105.4 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 60 hp	1	LS	\$ 800,000	\$ 800,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 800,000</b>
<b>Piping</b>				
Fill/Drain Piping	500	LF	\$ 288	\$ 144,000
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 244,000</b>
<b>Site Improvements</b>				
Gravel Access Road	2,180	LF	\$ 20	\$ 43,600
Paved Access Road	2,000	LF	\$ 65	\$ 130,000
Site Fencing	5,520	LF	\$ 34	\$ 187,680
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 461,280</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 14,822,212</b>
Construction Contingency	1	LS	30%	\$ 4,446,664
Engineering, Administration and Legal	1	LS	23%	\$ 4,431,841
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 8,878,505</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	41	AC	\$ 300,000	\$ 12,300,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 6,150,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 18,450,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 42,150,718</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 74,111	\$ 74,111
Maintenance	1	LS	\$ 74,111	\$ 74,111
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 148,222</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	60	HP	\$ 50	\$ 3,000
Power	96,682	KW-Hrs	\$ 0.12	\$ 11,602
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 34,602</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 182,824</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 44,635,354</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 8**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
Brown Farm Pond 1 & 2 (BF1&2) - Storage Volume = 331.1 MG  
IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 66,500	\$ 66,500
Clearing and Grubbing	102	AC	\$ 2,000	\$ 204,900
Topsoil Stripping & Stockpiling	88	AC	\$ 3,000	\$ 264,060
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	1	LS	\$ 30,000	\$ 30,000
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	29	AC	\$ 6,000	\$ 176,580
Spread Excess Topsoil	94,525	CY	\$ 4	\$ 330,838
Reclamation of Disturbed Areas	29	AC	\$ 3,000	\$ 88,290
<b>Subtotal, General</b>				<b>\$ 1,748,668</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	487,484	CY	n/a	
Subexcavation for Pond Liner	364,099	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	36,696	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	10,484	CY	\$ 19	\$ 193,947
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	143,893	SY	\$ 3	\$ 431,680
Liner Subgrade Preparation	247,082	SY	\$ 3	\$ 741,246
Clay Liner (mix-in-place)	247,082	SY	\$ 6	\$ 1,482,492
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	164,721	CY	\$ 5	\$ 823,607
Fine Grading Pond Bottom	247,082	SY	\$ 2	\$ 494,164
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 4,167,135</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	715,613	CY	\$ 5	\$ 3,578,065
Embankment Fill (imported)	228,129	CY	\$ 25	\$ 5,703,225
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	10,484	CY	\$ 15	\$ 157,254
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	14,679	CY	\$ 57	\$ 836,703
Finger Drains	1,865	CY	\$ 57	\$ 106,305
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	22,935	CY	\$ 80	\$ 1,834,800
Gravel Surfacing on Crest	5,505	CY	\$ 50	\$ 275,250
Toe Drains and Outfalls	11,100	LF	\$ 50	\$ 555,000
<b>Subtotal, Embankment</b>				<b>\$ 13,046,602</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 200,000</b>

**TABLE 8**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Brown Farm Pond 1 & 2 (BF1&2) - Storage Volume = 331.1 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	2	LS	\$ 230,000	\$ 460,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 460,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 60 hp each pond	2	LS	\$ 800,000	\$ 1,600,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 1,600,000</b>
<b>Piping</b>				
Fill/Drain Piping	800	LF	\$ 288	\$ 230,400
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 330,400</b>
<b>Site Improvements</b>				
Gravel Access Road	2,900	LF	\$ 20	\$ 58,000
Paved Access Road	2,000	LF	\$ 65	\$ 130,000
Site Fencing	11,100	LF	\$ 34	\$ 377,400
Monitoring Wells	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Site Improvements</b>				<b>\$ 765,400</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 22,318,205</b>
Construction Contingency	1	LS	30%	\$ 6,695,462
Engineering, Administration and Legal	1	LS	23%	\$ 6,673,143
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 13,368,605</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	88	AC	\$ 300,000	\$ 26,400,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 13,200,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 39,600,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 75,286,810</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 111,591	\$ 111,591
Maintenance	1	LS	\$ 111,591	\$ 111,591
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 223,182</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	120	HP	\$ 50	\$ 6,000
Power	304,777	KW-Hrs	\$ 0.12	\$ 36,573
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 62,573</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 285,755</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 79,170,318</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 9**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
Alpha Farm Pond 1 (AF1) - Storage Volume = 146.4 MG  
IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ 45,000	\$ 45,000
Temporary Pump Station for Irrigation System	1	LS	\$ 50,000	\$ 50,000
Clearing and Grubbing	77	AC	\$ 2,000	\$ 154,000
Topsoil Stripping & Stockpiling	74	AC	\$ 3,000	\$ 221,520
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 88,500
Diversion and Water Control	0	LS	\$ 75,000	\$ -
Drain Existing Ponds	1	LS	\$ 30,000	\$ 30,000
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	11	AC	\$ 6,000	\$ 63,000
Spread Excess Topsoil	102,189	CY	\$ 4	\$ 357,660
Reclamation of Disturbed Areas	11	AC	\$ 3,000	\$ 33,000
<b>Subtotal, General</b>				<b>\$ 1,492,680</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	176,074	CY	n/a	
Subexcavation for Pond Liner	229,311	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	21,319	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	3,948	CY	\$ 19	\$ 73,035
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	72,600	SY	\$ 3	\$ 217,800
Liner Subgrade Preparation	198,440	SY	\$ 3	\$ 595,320
Clay Liner (mix-in-place)	198,440	SY	\$ 6	\$ 1,190,640
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Select Liner Subgrade Material	0	CY	\$ 10	\$ -
Liner Cover Material	132,293	CY	\$ 5	\$ 661,465
Fine Grading Pond Bottom	198,440	SY	\$ 2	\$ 396,880
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 3,135,140</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	172,379	CY	\$ 5	\$ 861,895
Embankment Fill (imported)	0	CY	\$ 25	\$ -
Excess Excavation for Disposal	3,691	CY	\$ 15	\$ 55,365
Unsuitable Excavation for Disposal	3,948	CY	\$ 15	\$ 59,218
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	8,527	CY	\$ 57	\$ 486,039
Finger Drains	687	CY	\$ 57	\$ 39,159
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	13,324	CY	\$ 80	\$ 1,065,920
Gravel Surfacing on Crest	3,204	CY	\$ 50	\$ 160,200
Toe Drains and Outfalls	6,220	LF	\$ 50	\$ 311,000
<b>Subtotal, Embankment</b>				<b>\$ 3,038,796</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	0	LF	\$ 100	\$ -
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 100,000</b>

**TABLE 9**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
Alpha Farm Pond 1 (AF1) - Storage Volume = 146.4 MG  
IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>
<b>Pump Stations/Treatment</b>				
Remove and Relocate Existing Irrigation Pump Station	2	ea	\$ 50,000	\$ 100,000
Inboard Pump Station, 60 hp	1	LS	\$ 800,000	\$ 800,000
Offsite Pump Station Upgrades	0	HP	\$ 3,000	\$ -
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 900,000</b>
<b>Piping</b>				
Fill/Drain Piping, 16"	1,560	LF	\$ 192	\$ 299,520
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	0	LF	\$ 288	\$ -
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 399,520</b>
<b>Site Improvements</b>				
Gravel Access Road	6,100	LF	\$ 20	\$ 122,000
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing	6,220	LF	\$ 34	\$ 211,480
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 433,480</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 9,729,616</b>
Construction Contingency	1	LS	30%	\$ 2,918,885
Engineering, Administration and Legal	1	LS	23%	\$ 2,909,155
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 5,828,040</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	46	AC	\$ 300,000	\$ 13,890,000
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	0	AC	\$ 75,000	\$ -
Land Contingency	1	LS	50%	\$ 6,945,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 20,835,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 36,392,656</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 48,648	\$ 48,648
Maintenance	1	LS	\$ 48,648	\$ 48,648
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 97,296</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	60	HP	\$ 50	\$ 3,000
Power	348,591	KW-Hrs	\$ 0.12	\$ 41,831
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 64,831</b>
<b>Treatment</b>				
Labor, Maintenance and Power	0	LS	\$ -	\$ -
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ -</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 162,127</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 38,596,016</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 10**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 1 (PHR1) - Storage Volume = 32 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ -	\$ -
Clearing and Grubbing	35	AC	\$ 2,000	\$ 70,520
Topsoil Stripping & Stockpiling	20	AC	\$ 3,000	\$ 61,410
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	22	AC	\$ 6,000	\$ 129,060
Spread Excess Topsoil	1,678	CY	\$ 4	\$ 5,873
Reclamation of Disturbed Areas	22	AC	\$ 3,000	\$ 64,530
<b>Subtotal, General</b>				<b>\$ 918,893</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	38,300	CY	n/a	
Subexcavation for Pond Liner	5,421	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	11,800	CY	n/a	
Allowance for Rock Excavation	1	LS	\$ 500,000	\$ 500,000
Foundation Overexc/Replacement	1,002	CY	\$ 19	\$ 18,537
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	43,028	SY	\$ 3	\$ 129,084
Liner Subgrade Preparation	19,360	SY	\$ 3	\$ 58,080
Clay Liner (mix-in-place)	0	SY	\$ 3	\$ -
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Double Flexible Membrane Liner (FML) - Bottom	19,360	SY	\$ 30	\$ 580,800
Double Flexible Membrane Liner (FML) - Slope	15,972	SY	\$ 30	\$ 479,160
Select Liner Subgrade Material	23,555	CY	\$ 10	\$ 235,550
Liner Cover Material	34,203	CY	\$ 10	\$ 342,030
Fine Grading Pond Bottom	0	SY	\$ 2	\$ -
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 2,343,241</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	50,100	CY	\$ 5	\$ 250,500
Embankment Fill (imported)	143,766	CY	\$ 25	\$ 3,594,150
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	1,002	CY	\$ 15	\$ 15,030
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	4,720	CY	\$ 57	\$ 269,040
Finger Drains	759	CY	\$ 57	\$ 43,263
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	7,375	CY	\$ 80	\$ 590,000
Gravel Surfacing on Crest	1,770	CY	\$ 50	\$ 88,500
Toe Drains and Outfalls	3,186	LF	\$ 50	\$ 159,300
<b>Subtotal, Embankment</b>				<b>\$ 5,009,783</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	3,186	LF	\$ 100	\$ 318,600
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Uplift Protection Sytem Interceptor Drain (Main)	1,000	LF	\$ 100	\$ 100,000
Uplift Protection Sytem Interceptor Drain (Main)	2,000	LF	\$ 50	\$ 100,000
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	1	LS	\$ 1,000,000	\$ 1,000,000
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 1,618,600</b>

**TABLE 10**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 1 (PHR1) - Storage Volume = 32 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	1	LS	\$ 75,000	\$ 75,000
<b>Subtotal, Drainage and Containment</b>				<b>\$ 305,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 110 hp	1	LS	\$ 800,000	\$ 800,000
Treatment Facility	1	LS	\$ 8,260,000	\$ 8,260,000
Offsite Pump Station Upgrades	1	LS	\$ 565,000	\$ 565,000
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 9,625,000</b>
<b>Piping</b>				
Fill/Drain Piping, 24 in.	9,520	LF	\$ 288	\$ 2,741,760
Miscellaneous Yard Piping, Drain Line from pond, 24 in.	0	LF	\$ 288	\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	7,000	LF	\$ 288	\$ 2,016,000
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 4,857,760</b>
<b>Site Improvements</b>				
Gravel Access Road	5,000	LF	\$ 20	\$ 100,000
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing, assume at treatment facility only due to location of pond	1,200	LF	\$ 34	\$ 40,800
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 240,800</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 24,919,077</b>
Construction Contingency	1	LS	30%	\$ 7,475,723
Engineering, Administration and Legal	1	LS	25%	\$ 8,098,700
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 15,574,423</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	0	AC	\$ 300,000	\$ -
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	35	AC	\$ 75,000	\$ 2,625,000
Land Contingency	1	LS	50%	\$ 1,312,500
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 3,937,500</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 44,430,999</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 124,595	\$ 124,595
Maintenance	1	LS	\$ 124,595	\$ 124,595
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 249,191</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	110	HP	\$ 50	\$ 5,500
Power	118,358	KW-Hrs	\$ 0.12	\$ 14,203
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 39,703</b>
<b>Treatment</b>				
Labor, Maintenance and Power	1	LS	\$ 206,500	\$ 206,500
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ 206,500</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 495,394</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 51,163,562</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 11**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 2 (PHR2) - Storage Volume = 48.7 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ -	\$ -
Clearing and Grubbing	31	AC	\$ 2,000	\$ 62,000
Topsoil Stripping & Stockpiling	24	AC	\$ 3,000	\$ 72,960
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	0	LS	\$ 30,000	\$ -
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	13	AC	\$ 6,000	\$ 76,200
Spread Excess Topsoil	18,747	CY	\$ 4	\$ 65,614
Reclamation of Disturbed Areas	13	AC	\$ 3,000	\$ 38,100
<b>Subtotal, General</b>				<b>\$ 902,374</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	3,006	CY	n/a	
Subexcavation for Pond Liner	57,693	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	12,697	CY	n/a	
Allowance for Rock Excavation	0	LS	\$ 500,000	\$ -
Foundation Overexc/Replacement	314	CY	\$ 19	\$ 5,809
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	55,757	SY	\$ 3	\$ 167,271
Liner Subgrade Preparation	43,270	SY	\$ 3	\$ 129,810
Clay Liner (mix-in-place)	0	SY	\$ 3	\$ -
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Double Flexible Membrane Liner (FML) - Bottom	0	SY	\$ 30	\$ -
Double Flexible Membrane Liner (FML) - Slope	18,053	SY	\$ 30	\$ 541,590
Select Liner Subgrade Material	40,881	CY	\$ 10	\$ 408,810
Liner Cover Material	52,916	CY	\$ 10	\$ 529,160
Fine Grading Pond Bottom	43,270	SY	\$ 2	\$ 86,540
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 1,868,990</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	15,389	CY	\$ 5	\$ 76,945
Embankment Fill (imported)	184,959	CY	\$ 25	\$ 4,623,975
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	314	CY	\$ 15	\$ 4,710
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	5,185	CY	\$ 57	\$ 295,545
Finger Drains	695	CY	\$ 57	\$ 39,615
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	7,935	CY	\$ 80	\$ 634,800
Gravel Surfacing on Crest	1,950	CY	\$ 50	\$ 97,500
Toe Drains and Outfalls	3,500	LF	\$ 50	\$ 175,000
<b>Subtotal, Embankment</b>				<b>\$ 5,948,090</b>
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	3,500	LF	\$ 100	\$ 350,000
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Uplift Protection Sytem Interceptor Drain (Main)	1,100	LF	\$ 100	\$ 110,000
Uplift Protection Sytem Interceptor Drain (Main)	7,000	LF	\$ 50	\$ 350,000
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	0	LS	\$ 1,000,000	\$ -
Dam Instrumentation Allowance	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 910,000</b>

**TABLE 11**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 2 (PHR2) - Storage Volume = 48.7 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	1	LS	\$ 230,000	\$ 230,000
Outlet Structure & Piping	0	LS	\$ 75,000	\$ -
<b>Subtotal, Drainage and Containment</b>				<b>\$ 230,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Outboard Pump Station, 400hp	1	LS	\$ 500,000	\$ 500,000
Treatment Facility	1	LS	\$ 8,260,000	\$ 8,260,000
Offsite Pump Station Upgrades	1	LS	\$ 565,000	\$ 565,000
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 9,325,000</b>
<b>Piping</b>				
Fill/Drain Piping	2,000	LF	\$ 288	\$ 576,000
Miscellaneous Yard Piping	0	LF	\$ 288	\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	7,000	LF	\$ 288	\$ 2,016,000
Valves and Appurtenances	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Piping</b>				<b>\$ 2,692,000</b>
<b>Site Improvements</b>				
Gravel Access Road	2,400	LF	\$ 20	\$ 48,000
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing, assume embankment of pond and treatment area	4,700	LF	\$ 34	\$ 159,800
Monitoring Wells	1	LS	\$ 100,000	\$ 100,000
<b>Subtotal, Site Improvements</b>				<b>\$ 307,800</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 22,184,254</b>
Construction Contingency	1	LS	30%	\$ 6,655,276
Engineering, Administration and Legal	1	LS	25%	\$ 7,209,883
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 13,865,159</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	0	AC	\$ 300,000	\$ -
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	31	AC	\$ 75,000	\$ 2,345,250
Land Contingency	1	LS	50%	\$ 1,172,625
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 3,517,875</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 39,567,288</b>
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 110,921	\$ 110,921
Maintenance	1	LS	\$ 110,921	\$ 110,921
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 221,843</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	400	HP	\$ 50	\$ 20,000
Power	254,207	KW-Hrs	\$ 0.12	\$ 30,505
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 70,505</b>
<b>Treatment</b>				
Labor, Maintenance and Power	1	LS	\$ 206,500	\$ 206,500
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ 206,500</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 498,847</b>
<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>				<b>\$ 46,346,787</b>

\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.

**TABLE 12**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 1&2 (PHR1&2) - Storage Volume = 80.7 MG  
 IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Site Preparation</b>				
Demolition	1	LS	\$ -	\$ -
Clearing and Grubbing	56	AC	\$ 2,000	\$ 112,060
Topsoil Stripping & Stockpiling	39	AC	\$ 3,000	\$ 116,910
Temporary Erosion Controls	1	LS	\$ 62,500	\$ 62,500
Diversion and Water Control	1	LS	\$ 75,000	\$ 75,000
Drain Existing Ponds	1	LS	\$ 30,000	\$ 30,000
Dewatering	1	LS	\$ 150,000	\$ 150,000
Allowance for Construction Water	1	LS	\$ 300,000	\$ 300,000
Replace Topsoil	34	AC	\$ 6,000	\$ 205,260
Spread Excess Topsoil	7,679	CY	\$ 4	\$ 26,878
Reclamation of Disturbed Areas	34	AC	\$ 3,000	\$ 102,630
<b>Subtotal, General</b>				<b>\$ 1,181,238</b>
<b>Excavation/Foundation &amp; Lining</b>				
Pond Excavation to Pond Bottom	41,306	CY	n/a	
Subexcavation for Pond Liner	63,114	CY	n/a	
Foundation Excavation	0	CY	n/a	
Inspection/Key Trench Excavation	24,497	CY	n/a	
Allowance for Rock Excavation	1	LS	\$ 500,000	\$ 500,000
Foundation Overexc/Replacement	1,316	CY	\$ 19	\$ 24,346
Grouting	0	LF	\$ 100	\$ -
Embankment Foundation Preparation	98,785	SY	\$ 3	\$ 296,355
Liner Subgrade Preparation	62,630	SY	\$ 3	\$ 187,890
Clay Liner (mix-in-place)	0	SY	\$ 3	\$ -
Geosynthetic Clay Liner (GCL) - Bottom	0	SY	\$ 9	\$ -
Geosynthetic Clay Liner (GCL) - Slope	0	SY	\$ 10	\$ -
Double Flexible Membrane Liner (FML) - Bottom	177,096	SY	\$ 30	\$ 5,312,868
Double Flexible Membrane Liner (FML) - Slope	41,866	SY	\$ 30	\$ 1,255,980
Select Liner Subgrade Material	64,436	CY	\$ 10	\$ 644,360
Liner Cover Material	87,119	CY	\$ 10	\$ 871,190
Fine Grading Pond Bottom	43,270	SY	\$ 2	\$ 86,540
<b>Subtotal, Excavation/Foundation &amp; Lining</b>				<b>\$ 9,179,529</b>
<b>Embankment</b>				
Embankment Fill (onsite excavation)	65,489	CY	\$ 5	\$ 327,445
Embankment Fill (imported)	328,725	CY	\$ 25	\$ 8,218,125
Excess Excavation for Disposal	0	CY	\$ 15	\$ -
Unsuitable Excavation for Disposal	1,316	CY	\$ 15	\$ 19,740
Core (onsite)	0	CY	\$ 10	\$ -
Core (imported)	0	CY	\$ 27	\$ -
Shell	0	CY	\$ 11	\$ -
Chimney Drain	9,905	CY	\$ 57	\$ 564,585
Finger Drains	1,454	CY	\$ 57	\$ 82,878
Blanket Drains	0	CY	\$ 70	\$ -
Riprap Erosion Protection	15,310	CY	\$ 80	\$ 1,224,800
Gravel Surfacing on Crest	3,720	CY	\$ 50	\$ 186,000
Toe Drains and Outfalls	6,686	LF	\$ 50	\$ 334,300
<b>Subtotal, Embankment</b>				<b>\$ 10,957,873</b>

**TABLE 12**

**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**

Petaluma Hill Road Pond 1&2 (PHR1&2) - Storage Volume = 80.7 MG

IRWP Seasonal Storage Project - Basis for Cost

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>Drainage/Stabilization</b>				
Interceptor Drain (Main)	6,686	LF	\$ 100	\$ 668,600
Interceptor Drain (Laterals)	0	LF	\$ 50	\$ -
Reservoir Leakage Mitigation Allowance	0	LS	\$ 500,000	\$ -
Landslide Stabilization Allowance	1	LS	\$ 1,000,000	\$ 1,000,000
Dam Instrumentation Allowance	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Drainage/Stabilization</b>				<b>\$ 1,868,600</b>
<b>Drainage and Containment</b>				
Open Channel Spillway	0	LS	\$ 785,000	\$ -
Standpipe Spillway & Piping	2	LS	\$ 230,000	\$ 460,000
Outlet Structure & Piping	2	LS	\$ 75,000	\$ 150,000
<b>Subtotal, Drainage and Containment</b>				<b>\$ 610,000</b>
<b>Pump Stations/Treatment</b>				
Relocate Existing Irrigation Pump Station	0	HP	\$ 3,000	\$ -
Inboard Pump Station, 110 hp	1	LS	\$ 800,000	\$ 800,000
Outboard Pump Station, 400hp	1	LS	\$ 500,000	\$ 500,000
Treatment Facility	1	LS	\$ 8,260,000	\$ 8,260,000
Offsite Pump Station Upgrades	1	LS	\$ 565,000	\$ 565,000
<b>Subtotal, Pump Stations/Treatment</b>				<b>\$ 10,125,000</b>
<b>Piping</b>				
Fill/Drain Piping	11,520	LF		\$ -
Miscellaneous Yard Piping	0	LF		\$ -
Protection of Existing Pipelines	0	LF		\$ -
Offsite Conveyance Pipeline (24")	7,000	LF	\$ 288	\$ 2,016,000
Valves and Appurtenances	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Piping</b>				<b>\$ 2,216,000</b>
<b>Site Improvements</b>				
Gravel Access Road	5,000	LF	\$ 20	\$ 100,000
Paved Access Road	0	LF	\$ 65	\$ -
Site Fencing	4,700	LF	\$ 34	\$ 159,800
Monitoring Wells	2	LS	\$ 100,000	\$ 200,000
<b>Subtotal, Site Improvements</b>				<b>\$ 459,800</b>
<b>Subtotal, Construction Costs</b>				<b>\$ 36,598,040</b>
Construction Contingency	1	LS	30%	\$ 10,979,412
Engineering, Administration and Legal	1	LS	25%	\$ 11,894,363
<b>Subtotal, Admin and Contingency Costs</b>				<b>\$ 22,873,775</b>
CTS Mitigation (1:1)	0	AC	\$ 150,000	\$ -
CTS Mitigation (2:1)	0	AC	\$ 300,000	\$ -
CTS Mitigation (3:1)	0	AC	\$ 450,000	\$ -
Land Acquisition	56	AC	\$ 75,000	\$ 4,200,000
Land Contingency	1	LS	50%	\$ 2,100,000
<b>Subtotal, CTS Mitigation and Land Acquisition Costs</b>				<b>\$ 6,300,000</b>
<b>TOTAL CAPITAL COSTS WITH CONTINGENCIES</b>				<b>\$ 65,771,815</b>

**TABLE 12**  
**ENGINEER'S ESTIMATE OF PROBABLE COST(CONCEPTUAL DESIGN)**  
 Petaluma Hill Road Pond 1&2 (PHR1&2) - Storage Volume = 80.7 MG  
*IRWP Seasonal Storage Project - Basis for Cost*

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
<b>ANNUAL O&amp;M COSTS</b>				
<b>Pond(s)</b>				
Labor	1	LS	\$ 182,990	\$ 182,990
Maintenance	1	LS	\$ 182,990	\$ 182,990
<b>Subtotal, Pond O&amp;M Costs</b>				<b>\$ 365,980</b>
<b>Pump Station(s)</b>				
Labor	1	LS	\$ 20,000	\$ 20,000
Maintenance	510	HP	\$ 50	\$ 25,500
Power	372,565	KW-Hrs	\$ 0.12	\$ 44,708
<b>Subtotal, Pump Station O&amp;M Costs</b>				<b>\$ 90,208</b>
<b>Treatment</b>				
Labor, Maintenance and Power	1	LS	\$ 206,500	\$ 206,500
<b>Subtotal, Treatment O&amp;M Costs</b>				<b>\$ 206,500</b>
<b>TOTAL ANNUAL O&amp;M COSTS</b>				<b>\$ 662,688</b>

<b>PRESENT WORTH VALUE (20 yrs @ 4%)</b>	<b>\$ 74,777,964</b>
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\*Because of the length of time required to build a storage pond the City should be able to wait on the market to get the most favorable price for the project. The market value fluctuated from \$135k-\$400k in the past year.