

**CARLSBAD SEAWATER DESALINATION PROJECT**

**SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD**

**REGION 9, SAN DIEGO REGION**

**ORDER NO. R-9-2006-0065**

**NPDES NO. CA0109223**

**FLOW, ENTRAINMENT AND IMPINGEMENT MINIMIZATION PLAN**

**ATTACHMENT 2 - COST ESTIMATE OF SUBSURFACE INTAKE ALTERNATIVES**

**March 9, 2009**

## 304 MDG Intake Cost Estimates - October 2007

### VERTICAL BEACH WELLS

Total Capacity =		304 MGD
Individual Intake Well Capacity =		1.5 MGD
Duty Number of Intake Wells Needed =		203
Additional Standby Intakes Needed @ 25 % =		51
Total Intake Wells Needed =		253
Minimum Distance Between Wells (Best Case)=		150 ft
Length of Beach Occupied by Wells =		7.2 miles
Land Needed to Install Wells & Support Facilities		8.6 acres
Cost of Installation of Individual Well =	\$	1,200,000 per well
Total Costs of Well Installation =	\$	304,000,000
Cost of Seawater Conveyance Pipelines @US\$500/ft =	\$	18,925,000
Cost of Intake Booster Pump Stations - =	\$	30,400,000
Cost of Electrical Power Supply for Well Pumps =	\$	50,160,000
<b>Total Construction (Direct) Costs =</b>	<b>\$</b>	<b>403,485,000</b>
<b>Indirect Costs</b>		
Acquisition of Land to Install Wells & Support Struct. =	\$	4,304,408
Engineering, Design and Procurement @ 25 % =	\$	100,871,250
Environmental Mitigation Costs @ 15 % =	\$	60,522,750
Contingency @ 20 % =	\$	80,697,000
<b>TOTAL INDIRECT COSTS</b>	<b>\$</b>	<b>246,395,407.71</b>
<b>TOTAL PROJECT EPC COSTS =</b>	<b>\$</b>	<b>649,880,408</b>

**SLANT WELLS - Similar to Dana Point Desal Plant**

Total Capacity =		304 MGD
Individual Intake Well Capacity =		5 MGD
Duty Number of Intake Wells Needed =		61
Additional Standby Intakes Needed @ 25 % =		15
Total Intake Wells Needed =		76
Minimum Distance Between Wells (Best Case)=		300 ft
Length of Beach Occupied by Wells =		4.3 miles
Land Needed to Install Wells & Support Facilities		17.4 acres
Cost of Installation of Individual Well =	\$	2,400,000 per well
Total Costs of Well Installation =	\$	182,400,000
Cost of Seawater Conveyance Pipelines @US\$500/ft =	\$	11,250,000
Cost of Intake Booster Pump Stations - =	\$	30,400,000
Cost of Electrical Power Supply for Well Pumps =	\$	31,920,000
<b>Total Construction (Direct) Costs =</b>	<b>\$</b>	<b>255,970,000</b>
<b>Indirect Costs</b>		
Acquisition of Land to Install Wells & Support Struct. =	\$	8,723,600
Engineering, Design and Procurement @ 25 % =	\$	63,992,500
Environmental Mitigation Costs @ 15 % =	\$	38,395,500
Contingency @ 20 % =	\$	51,194,000
<b>TOTAL INDIRECT COSTS</b>	<b>\$</b>	<b>162,305,600</b>
<b>TOTAL PROJECT EPC COSTS =</b>	<b>\$</b>	<b>418,275,600</b>

**HORIZONTAL RANNEY WELLS**

Total Capacity =		304 MGD
Individual Intake Well Capacity =		5 MGD
Duty Number of Intake Wells Needed =		61
Additional Standby Intakes Needed @ 25 % =		15
Total Intake Wells Needed =		76
Minimum Distance Between Wells (Best Case)=		400 ft
Length of Beach Occupied by Wells =		5.7 miles
Land Needed to Install Wells & Support Facilities		17.4 acres
Cost of Installation of Individual Well =	\$	2,500,000 per well
Total Costs of Well Installation =	\$	190,000,000
Cost of Seawater Conveyance Pipelines @US\$500/ft =	\$	15,000,000
Cost of Intake Booster Pump Stations - =	\$	30,400,000
Cost of Electrical Power Supply for Well Pumps =	\$	33,060,000
<b>Total Construction (Direct) Costs =</b>	<b>\$</b>	<b>268,460,000</b>
<b>Indirect Costs</b>		
Acquisition of Land to Install Wells & Support Struct. =	\$	8,723,600
Engineering, Design and Procurement @ 25 % =	\$	67,115,000
Environmental Mitigation Costs @ 15 % =	\$	40,269,000
Contingency @ 20 % =	\$	53,692,000
<b>TOTAL INDIRECT COSTS</b>	<b>\$</b>	<b>169,799,600</b>
<b>TOTAL PROJECT EPC COSTS =</b>	<b>\$</b>	<b>438,259,600</b>

**SUBSURFACE INFILTRATION GALLERY (FUKUOKA TYPE INTAKE)**

Total Capacity =		304 MGD
Capacity of Individual Intake Galleries =		101.3 MGD
Duty Intake Galleries Needed =		3
Additional Standby Intakes Needed @ 0 % =		0
Total Intake Galleries Needed =		3
Length x Width x Depth Each Gallery =		5280x400x15 ft
Total Length of Intake System =		3.0 miles
Land Needed to Install Wells & Support Facilities		17.9 acres
Cost of Installation of Individual Gallery =	\$	120,000,000 per 100 MGD gallery
Total Costs of Gallery Installation =	\$	360,000,000
Cost of Seawater Conv. Pipelines @US\$500/ft =	\$	7,922,606
Cost of Intake Booster Pump Stations - =	\$	12,160,000
Cost of Electrical Power Supply for Well Pumps =	\$	18,608,000
<b>Total Construction (Direct) Costs =</b>	<b>\$</b>	<b>398,690,606</b>
<b>Indirect Costs</b>		
Acquisition of Land to Install Intake & Support Struct. =	\$	8,956,114
Engineering, Design and Procurement @ 25 % =	\$	99,672,652
Environmental Mitigation Costs @ 15 % =	\$	59,803,591
Contingency @ 20 % =	\$	79,738,121
<b>TOTAL INDIRECT COSTS</b>	<b>\$</b>	<b>248,170,478</b>
<b>TOTAL PROJECT EPC COSTS =</b>	<b>\$</b>	<b>646,861,084</b>

**NEW OPEN INTAKE - 1,000 FT INTAKE LINE W/ LOW-VELOCITY INTAKE STRUCTURE**

Total Capacity =		304 MGD
Length of Intake Pipe =		1000 ft
Land Needed to Install Wells & Support Facilities		2.3 acres
Cost of Installation of Intake Pipe @ US\$45,000/ft =	\$	45,000,000
Cost of Construction of Ocean Intake Structure =	\$	10,500,000
Cost of New Intake Screens =	\$	8,000,000
Cost of New Intake Pump Station =	\$	24,320,000
Cost of Power Supply for New Pump Station =	\$	5,223,000
<b>Total Construction (Direct) Costs =</b>	<b>\$</b>	<b>93,043,000</b>
<b>Indirect Costs</b>		
Acquisition of Land to Install Intake & Support Struct. =	\$	1,147,842
Engineering, Design and Procurement @ 25 % =	\$	23,260,750
Environmental Mitigation @ 15 % =	\$	13,956,450
Contingency @ 20 % =	\$	18,608,600
<b>TOTAL INDIRECT COSTS</b>	<b>\$</b>	<b>56,973,642.06</b>
<b>TOTAL PROJECT EPC COSTS =</b>	<b>\$</b>	<b>150,016,642</b>