B.6 Construction Equipment Utilization and Workforce

To support environmental impact assessments, a preliminary estimate was prepared for construction equipment utilization and construction workforce. This appendix summarizes equipment and staffing for each of the major project features; it also provides this information in tabular format in Table B.6-1 through Table B.6-11.

Equipment numbers and utilization hours are based on the earthwork and material quantities developed for the project features to support cost estimating. Conservative hourly equipment production rates were used to estimate the number of pieces of construction equipment and the number of operating hours required to complete major tasks within schedule limits. Support equipment was also included in the evaluation. For example, this evaluation would include excavators and loaders to fill haul vehicles and water trucks, bulldozers, and compactors to spread and compact fills. Estimates were also included for the support equipment (e.g., cranes and hoists) needed for pipelines, buildings, and other facilities.

Haul equipment was also included for each facility where appropriate for an item such as filter and drain material, concrete aggregates, aggregate base and other material. The equipment numbers are based on the need to import such materials from an off-site quarry approximately 30 to 35 miles from the project.

A reasonable estimate was also included to haul major equipment components to the facilities, including pumps, motors, generators, mechanical equipment, and embedded items, and other items. Haul equipment for construction material (e.g., reinforcing steel, structural steel, readymix concrete, and on-site fabricated pipe) was also estimated.

Typically, equipment numbers and hours were based on 10-hour, single-shift work, 6 days per week. The only exception to this scheduling would be the tunneling work at Sites Dam; that effort was assumed to be double-shift work (22 hours per day, 6 days per week).

Staff numbers shown for each facility include equipment operators and other construction personnel needed to complete construction. Staff estimates do not include owner or engineer staff that would be supervising construction.

The equipment utilization and staff estimated represent construction of Alternative C, which would require the most equipment and staff.

Table B.6-1. Tunnel – Inlet and Outlet, Including Sites Pumping/Generating Plant

		Tunnel			Lake Outlet			Inlet area		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bulldozer			-	5	86	430	5	266	1,330	1,760
Compactor			-			-			-	
Concrete Pump	1	194	194	1	29	29	1	83	83	306
Concrete Trucks	3	194	582	4	29	116	4	83	332	1,030
Crane			-	1	200	200	1	150	150	350
Dump Truck Tunnel	3	200	600			-			-	600
Excavator			-			-			-	-
Fork Lift	1	248	248	1	72	72	1	190	190	510
Fuel Truck	1	200	200	1	86	86	1	266	266	552
Generator	1	200	200			-			-	200
Grader			-	1	40	40	2	266	532	572
Highway Trucks	5	54	270	3	34	102	10	80	800	1,172
Loader – Tunnel	2	200	400			-			-	400
Material Trucks - Concrete	8	194	1,552	8	38	304	8	110	880	2,736
Off-Road Truck										
Roller										
Scissor Lift	1	100	100			-			-	100
Scraper	-	-	-	5	86	430	10	266	2,660	3,090
Tunnel Boring Machine	1	200	200			-			-	200
Water Trucks			-	1	86	86	1	266	266	352
Welding Truck	1	194	194	1	50	50	1	50	50	294
			-			-			-	-
Staff	42		-	46		-	59		-	-

All equipment other than tunnels assumed 10 hr. day. Tunnels assumed 22 hours/day.

Table B.6-2. Pipelines – Delevan and TRR

		Excavation	1		Backfill			Pipe & Manhole Installation		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Backfill Loader				2	467	934			-	934
Bulldozer	4	538	2,152	2	467	934			-	3,086
Compactor	-		-	2	467	934			-	934
Conc. Material Trucks							8	28	224	224
Concrete Trucks			-	-	-	-	1	83	83	83
Crane Fabrication							1	1,000	1,000	1,000
Crane Installation							1	500	500	500
Dump Truck 20% Exc.	10	400	4,000	-		-			-	4,000
Dump Truck Comp. BF	-			10	467	4,670			-	4,670
Excavation Loader	1	400	400	-		-			-	400
Excavator	1	400	400	-		-			-	400
Fork Lift - Installation							1	500	500	500
Fork Lift – Yard							1	1,000	1,000	1,000
Fuel Truck	1	500	500	1	467	467			-	967
Generator	1	500	500	1	83	83			-	583
Grader			-	1	467	467			-	467
Highway Trucks	10	20	200			-	10	499	4,990	5,190
Jacking Equipment	-	-	-	-	-	-	1	600	600	600
Pipe Fabrication Equip.							1	1,000	1,000	1,000
Pipe Transport Truck							2	550	1,100	1,100
Scraper 80% Exc.	22	485	10,670	-		-			-	10,670
Scraper Common Bf	-			8	383	3,064			-	3,064
Water Trucks	1	500	500	1	467	467			-	967
Staff	61			43			37			

Appendix B.6 Construction Equipment Utilization and Workforce

Table B.6-3. Dams and Sites Reservoir Inundation

		Excavation & Fill			Drilling & Grouting			Concrete		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bulldozer	10	1,774	17,740							17,740
Compactor	10	1,535	15,350							15,350
Conc. Material Trucks							8	215	1,720	1,720
Concrete Pump			-				1	81		-
Concrete Trucks							8	81	648	648
Crane			-							-
Drilling Machine				4	488	1,952				1,952
Dump Truck	10	83	830							830
Filter Material Loader	3	1,160	3,480							3,480
Excavator			-							-
Fork Lift – Yard			-	1	89	89				89
Fuel Truck	2	1,774	3,548							3,548
Generator			-				1	81	81	81
Grader	5	1,535	7,675							7,675
Grout Pump				4	488	1,952				1,952
Highway Trucks	120	375	45,000	2	164	328				45,328
Off-Road Trucks	24	1,160	27,840							27,840
Scraper - Excavation	20	340	6,800							6,800
Waste/Tree Loader	1	83	83							83
Water Trucks	4	1,774	7,096							7,096
			-							-
Staff	219		-	12			10			-

Table B.6-4. Gravel Roads

		Tunnel			Lake Outlet				Total	
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bulldozer	3	64	192	3	29	87			-	279
Compactor	3	23	69	3	29	87			-	156
Concrete Trucks			-			-			-	-
Crane			-			-			-	-
Drilling Machine			-			-			-	-
Dump Truck			-	3	36	108	3	5	15	123
Excavator			-			-				-
Fork Lift - Yard			-			-				-
Fuel Truck	1	64	64	1	29	29				93
Generator			-			-				-
Grader	2	23	46	2	29	58				104
Grout Pump			-			-				-
Highway Trucks			-			-				-
Loader			-	1	36	36	1	5	5	41
Off-Road Trucks			-			-			-	-
Paving Machine			-			-	1	5	5	5
Roller			-			-	2	5	10	10
Scraper - Excavation	3	49	147			-			-	147
Water Trucks	2	64	128	2	29	58	1	5	5	191
			-			-	18		-	-
Staff Max	24		-	25		-			-	-

Table B.6-5. TRR Pumping/Generating Plant

		Excavation & Backfill			Concrete & Rock			Other Activities		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Batch Plant Equipment			-	1	104	104			-	104
Bulldozer	5	233	1,165			-			-	1,165
Compactor	2	100	200			-			-	200
Concrete Pump			-	1	104	104			-	104
Concrete Trucks			-	4	104	416			-	416
Crane	-		-	-		-	1	200	200	200
Drilling Machine			-			-			-	-
Dump Truck	10	125	1,250			-			-	1,250
Excavator			-			-			-	-
Fork Lift			-			-	1	400	400	400
Fuel Truck	1	233	233			-	1	100	100	333
Generator			-	1	104	104			-	104
Grader	2	100	200			-			-	200
Highway Trucks			-	8	147	1,176	8	73	584	1,760
Loader	1	125	125			-			-	125
Off-Road Trucks			-			-			-	-
Paving Machine			-			-			-	-
Roller			-			-			-	-
Scraper – Excavation & Bf	5	233	1,165			-			-	1,165
Water Trucks	2	233	466			-			-	466
Staff Max	38		-	25		-	101		-	-

Peak staff for other activities is set at 80 for building construction. Duration for buildings should be about two years.

Table B.6-6. TRR Reservoir and Connections

		Clear & Excavation	1		Backfill			AC Lining & Structures		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Backfill Loader			-			-			-	-
Bulldozer	4	180	720	4	33	132			-	852
Compactor			-	2	33	66			-	66
Concrete Trucks			-			-			-	-
Crane			-			-			-	-
Drilling Machine			-			-			-	-
Dump Truck			-			-			-	-
Excavation Loader	1	152	152			-			-	152
Excavator			-			-			-	-
Fork Lift – Yard			-			-	1	140	140	140
Fuel Truck	1	152	152	1	33	33			-	185
Generator			-			-			-	-
Grader			-	1	33	33			-	33
Grout Pump			-			-			-	-
Highway Trucks			-			-	5	140	700	700
Off-Road Trucks	10	152	1,520			-			-	1,520
Paving Machine			-			-	1	20	20	20
Scraper - Excavation	4	130	520	4	33	132			-	652
Water Trucks			-			-			-	-
			-			-			-	-
Staff Max	30			22			57			-

Appendix B.6 Construction Equipment Utilization and Workforce

Staff allowed for structures is 40 for a period of 16 months

Table B.6-7. Holthouse Reservoir (Enlarged Funks Reservoir)

		Excavation & Fill			Drilling & Grouting			Concrete		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bulldozer - Dam	10	285	2,850			-			-	2,850
Dozers For Clear/Grub	5	40	200			-			-	200
Dozers For Channel	20	530	10,600			-			-	10,600
Compactor	4	199	796			-			-	796
Conc. Material Trucks			-			-	8	59	472	472
Concrete Pump			-			-	1	22	22	22
Concrete Trucks			-			-	8	22	176	176
Crane			-			-			-	-
Drilling Machine			-	1	85	85			-	85
Dump Truck	2	4	8			-			-	8
Backfill Loader	1	149	149			-			-	149
Excavator			-			-			-	-
Fork Lift – Yard			-			-	1	59	59	59
Fuel Truck	1	570	570			-				570
Generator			-			-	1	22	22	22
Grader	2	199	398			-			-	398
Grout Pump			-	2	85	170			-	170
Highway Trucks	80	50	4,000	2	18	36			-	4,036
Off-Road Trucks	10	149	1,490			-			-	1,490
Scraper – For Dam	10	86	860			-			-	860
Scraper – For Dam	20	530	10,600			-			-	10,600
Waste/Tree Loader	1	4	4			-			-	4
Water Trucks	4	570	2,280			-			-	2,280
			-			-			-	-
Staff	180		-	11		-	51		-	-

Appendix B.6 Construction Equipment Utilization and Workforce

Table B.6-8. Delevan Intake Pumping/Generating Plant on Sacramento River (Including Fish Screening Facilities)

		Excavation & Backfill			Concrete & Rock			Other Activities		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Batch Plant Equipment			-	1	104	104			-	104
Bulldozer	5	233	1,165			-			-	1,165
Compactor	2	100	200			-			-	200
Concrete Pump			-	1	104	104			-	104
Concrete Trucks			-	4	104	416			-	416
Crane	-		-	-		-	1	200	200	200
Drilling Machine			-			-			-	-
Dump Truck	10	125	1,250			-			-	1,250
Excavator			-			-			-	-
Fork Lift			-			-	1	400	400	400
Fuel Truck	1	233	233			-	1	100	100	333
Generator			-	1	104	104			-	104
Grader	2	100	200			-			-	200
Highway Trucks			-	8	147	1,176	8	73	584	1,760
Loader	1	125	125			-			-	125
Off-Road Trucks			-			-			-	-
Paving Machine			-			-			-	-
Roller			-			-			-	-
Scraper-Excavation & Bf	5	233	1,165			-			-	1,165
Water Trucks	2	233	466			-				466
Staff	38		-	25		-	101		-	-

Peak staff for other activities is set at 80 for building construction. Duration for buildings should be about two years.

Table B.6-9. Paved Roads and Bridges

		Grading			Agg Base & Paving			Bridges		Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Backhoe/Drill				6	245	1,470	0	0	-	
Caisson Drill Rig							1	105	105	
Bulldozer	12	811	9,732			-	2	19	38	9,770
Compactor			-			-			-	-
Concrete Trucks			-	4	211	846	10	140	1,400	2,246
Concrete Material Trucks							12	310	3720	
Concrete Pump							2	140	280	
Crane			-			-	2	500	1,000	1,000
Drilling Machine			-			-			-	-
Dump Truck	10	30	300	20	315	6,300	5	35	175	6,775
Excavator			-			-	2	13	26	26
Fork Lift – Yard			-			-			-	-
Fuel Truck	1	811	811	1	315	315			-	1,126
Generator			-			-	1	500	500	500
Grader	4	211	844	4	315	1,260			-	2,104
Grout Pump			-			-			-	-
Highway Trucks			-	1	235	235	12	88	1,056	1,291
Loader	2	285	570	2	315	630	1	35	35	1,235
Off-Road Trucks	20	228	4,560			-			-	4,560
Paving Machine			-	2	40	80			-	80
Roller	4	211	844	2	40	81			-	925
Scraper	16	546	8,736			-			-	8,736
Water Trucks	2	811	1,622	2	315	630			-	2,252
			-			-			-	-
Staff Max	81		-	48		-	59		-	-

Table B.6-10. GCID Canal and Headworks Modifications

		Grading & Paving			Concrete Work			Miscellaneous	3	Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bulldozer	1	32	32			-			-	32
Compactor	1	159	159			-			-	159
Concrete Trucks			-	6	26	156			-	156
Crane			-			-			-	-
Drilling Machine			-			-			-	-
Dump Truck	4	192	768			-			-	768
Excavator			-			-			-	-
Fork Lift - Yard			-			-			-	-
Fuel Truck	1	205	205			-	1	130	130	335
Generator			-	1	26	26	1	130	130	156
Grader			-			-			-	-
Grout Pump			-			-			-	-
Highway Trucks			-	12	35	420	2	130	260	680
Loader	1	192	192			-			-	192
Off-Road Trucks			-			-			-	-
Paving Machine	1	33	33			-			-	33
Roller	2	33	66			-			-	66
Scraper - Excavation	3	46	138			-			-	138
Water Trucks	1	205	205			-			-	205
			-			-			-	-
Staff Max	25		-	29		-	14		-	-

Table B.6-11. Recreational Facilities

		Grading & Paving			Concrete Work			Miscellaneous	1	Total
Equipment	Count	Days	Equip Days	Count	Days	Equip Days	Count	Days	Equip Days	Equip Days
Bobcat	2	158								
Bulldozer	1	116	116			-			-	116
Compactor			-			-			-	-
Concrete Trucks			-	2	33	66			-	66
Concrete Material Trucks				4	44					
Crane			-			-			-	-
Drilling Machine			-			-			-	-
Dump Truck	3	158	474			-			-	474
Excavator			-			-			-	-
Fork Lift - Yard			-			-	1	121	121	121
Fuel Truck	1	158	158	1	33	33	1	121	121	312
Generator			-	1	33	33			-	33
Grader	1	28	28			-			-	28
Grout Pump			-			-			-	-
Highway Trucks	4	10	40			-	2	121	242	282
Loader	1	158	158			-			-	158
Off-Road Trucks			-			-			-	-
Paving Machine	1	22	22			-			-	22
Roller	1	50	50			-			-	50
Scraper - Excavation			-			-			-	-
Water Trucks	1	144	144			-			-	144
			-			-			-	-
Staff Max	24		-	18		-	14		-	-