

## Material Quantities

This sheet contains project data provided by the client on total aggregate/material quantities and is used to calculate fugitive dust emissions from truck loading/movement during construction as well as batch plant throughput

Phase 1	Alt 1		Alt 2		Alt 3		Alt 4	
	cy	tons	cy	tons	cy	tons	cy	tons
Excavation	15,478,174	20,121,626	15,478,174	20,121,626	15,478,174	20,121,626	15,478,174	20,121,626
Embankment/Fill	2,162,550	2,811,315	2,162,550	2,811,315	2,162,550	2,811,315	2,162,550	2,811,315
Aggregate*	2,118,655	2,754,252	2,118,655	2,754,252	2,118,655	2,754,252	2,118,655	2,754,252
<b>Phase total</b>	<b>19,759,379</b>	<b>25,687,193</b>	<b>19,759,379</b>	<b>25,687,193</b>	<b>19,759,379</b>	<b>25,687,193</b>	<b>19,759,379</b>	<b>25,687,193</b>
<b>Phase 2</b>								
Excavation	898,848	1,168,502	898,848	1,168,502	898,848	1,168,502	946,848	1,230,902
Embankment/Fill	626,500	814,450	626,500	814,450	626,500	814,450	626,500	814,450
Aggregate*	125,206	162,768	125,206	162,768	125,206	162,768	176,901	229,971
<b>Phase total</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,750,249</b>	<b>2,275,324</b>
<b>Phase 3</b>								
Excavation	1,547,158	2,011,305	1,547,158	2,011,305	1,547,158	2,011,305	1,547,158	2,011,305
Embankment/Fill	45,050	58,565	45,050	58,565	45,050	58,565	45,050	58,565
Aggregate*	6,008,556	7,811,123	6,008,556	7,811,123	6,008,556	7,811,123	6,008,556	7,811,123
<b>Phase total</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>
<b>Alternative total</b>	<b>29,010,697</b>	<b>37,713,906</b>	<b>29,010,697</b>	<b>37,713,906</b>	<b>29,010,697</b>	<b>37,713,906</b>	<b>29,110,392</b>	<b>37,843,510</b>

\*aggregate would come from onsite batch plants and therefore aggregate quantities were used to estimate daily throughput of the batch plant to calculate fugitive dust emissions

**Temperance Flat Transmission Line Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,177	3,265	-
3/4 Ton Crew Cab Truck 4x4	2,177	3,265	-
40 Ton Hydraulic Crane (Grove700)	2,177	-	5,224
Drill Rig Truck Mount	2,177	-	4,354
170 Hsp Bulldozer (Cat D6)	2,177	-	10,884
Subtotal:	10,884	6,530	20,462
<b>Total:</b>			
	<b>10,884</b>	<b>6,530</b>	<b>20,462</b>
Grading/Dozing/Scraper	2,177		

Haul Roads Area A: Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	9	39	0
1.5 CY Backhoe (Cat 325)	432	2,654	0
2.3 CY Backhoe (Cat 235)	2,385	17,202	0
3.5 CY Loader (Cat 950)	432	1,676	0
11.2 CY Loader (Cat 990)	1,237	16,881	0
140 Hsp Grader (Cat 140)	5,615	40,809	0
150 Hsp Grapple (Cat 527)	439	2,656	0
275 Hsp Grader (Cat 16G)	1,341	10,413	0
170 Hsp Bulldozer (Cat D6)	7,414	41,134	0
305 Hsp Bulldozer (Cat D8)	2,577	27,885	0
850 Hsp Bulldozer (Cat D11)	1,855	51,467	0
6 Ton Compactor 48"(Cat 323)	9	23	0
10 Ton Compactor 120 hsp (Dyn CA25)	1,333	5,333	0
23 Ton Compactor 220 hsp (Cat 815)	4,282	36,947	0
18 CY Tandem Scraper (Cat 627)	415	6,333	0
90 Kg Plate Tamper	432	0	145
Cat TK723 Feller Buncher	439	4,485	0
DT-320 Tree Mulcher	439	9,344	0
Tree Stumper	878	2,680	0
Subtotal:	31,964	277,961	145
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	2,117	17,027	0
Subtotal:	2,117	17,027	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	7,593	0	14,042
5 Ton Flat Bed Truck	706	2,153	0
16 Ton (8 CY) Tandem Truck	7,424	50,796	0
20 Ton (10 CY) Tandem Truck	1,997	13,667	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	4,947	54,898	0
3000 Gallon Watertruck	4,282	19,004	0
5000 Gallon Watertanker	1,237	6,176	0
10000 Gallon Cat 631 Waterwagon	104	685	0
Subtotal:	28,290	147,380	14,042
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	432	0	160
Subtotal:	432	0	160
<b>Total:</b>	<b>62,802</b>	<b>442,368</b>	<b>14,347</b>

Grading/Dozing/Scraper

7,370

Haul Roads Area D: Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	5	23	0
1.5 CY Backhoe (Cat 325)	144	885	0
2.3 CY Backhoe (Cat 235)	972	7,011	0
3.5 CY Loader (Cat 950)	144	559	0
11.2 CY Loader (Cat 990)	505	6,896	0
140 Hsp Grader (Cat 140)	2,408	17,500	0
150 Hsp Grapple (Cat 527)	154	929	0
275 Hsp Grader (Cat 16G)	542	4,210	0
170 Hsp Bulldozer (Cat D6)	3,403	18,883	0
305 Hsp Bulldozer (Cat D8)	1,047	11,330	0
850 Hsp Bulldozer (Cat D11)	758	21,025	0
6 Ton Compactor 48"(Cat 323)	5	13	0
10 Ton Compactor 120 hsp (Dyn CA25)	329	1,317	0
23 Ton Compactor 220 hsp (Cat 815)	2,079	17,937	0
18 CY Tandem Scraper (Cat 627)	147	2,240	0
90 Kg Plate Tamper	144	0	48
Cat TK723 Feller Buncher	154	1,568	0
DT-320 Tree Mulcher	154	3,268	0
Tree Stumper	307	937	0
Subtotal:	13,401	116,531	48
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	865	6,956	0
Subtotal:	865	6,956	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,988	0	5,525
5 Ton Flat Bed Truck	288	879	0
16 Ton (8 CY) Tandem Truck	2,982	20,406	0
20 Ton (10 CY) Tandem Truck	634	4,340	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	2,021	22,426	0
3000 Gallon Watertruck	2,079	9,226	0
5000 Gallon Watertanker	505	2,523	0
10000 Gallon Cat 631 Waterwagon	37	242	0
Subtotal:	11,534	60,044	5,525
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	144	0	53
Subtotal:	144	0	53
<b>Total:</b>	<b>25,944</b>	<b>183,531</b>	<b>5,627</b>
Grading/Dozing/Scraper	8,305		

**Haul Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	19	82	0
1.5 CY Backhoe (Cat 325)	144	885	0
2.3 CY Backhoe (Cat 235)	38	277	0
3.5 CY Loader (Cat 950)	144	559	0
140 Hsp Grader (Cat 140)	4,324	31,425	0
150 Hsp Grapple (Cat 527)	125	755	0
275 Hsp Grader (Cat 16G)	28	219	0
170 Hsp Bulldozer (Cat D6)	4,663	25,873	0
305 Hsp Bulldozer (Cat D8)	28	305	0
6 Ton Compactor 48"(Cat 323)	19	48	0
10 Ton Compactor 120 hsp (Dyn CA25)	285	1,141	0
23 Ton Compactor 220 hsp (Cat 815)	4,038	34,848	0
18 CY Tandem Scraper (Cat 627)	113	1,723	0
90 Kg Plate Tamper	144	0	48
Cat TK723 Feller Buncher	125	1,274	0
DT-320 Tree Mulcher	125	2,655	0
Tree Stumper	250	762	0
Subtotal:	14,613	102,831	48
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,640	0	4,882
16 Ton (8 CY) Tandem Truck	173	1,182	0
20 Ton (10 CY) Tandem Truck	622	4,258	0
3000 Gallon Watertruck	4,038	17,925	0
10000 Gallon Cat 631 Waterwagon	28	186	0
Subtotal:	7,502	23,551	4,882
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	144	0	53
Subtotal:	144	0	53
<b>Total:</b>			
	<b>22,259</b>	<b>126,382</b>	<b>4,984</b>

Grading/Dozing/Scraper 4,833

Table X-X. Permanent Roads Area A: Appraisal Level Equipment and Fuel Consumption Est

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	2	10	0
1.5 CY Backhoe (Cat 325)	120	737	0
2.3 CY Backhoe (Cat 235)	3,840	27,697	0
3.5 CY Loader (Cat 950)	120	466	0
11.2 CY Loader (Cat 990)	162	2,213	0
140 Hsp Grader (Cat 140)	4,662	33,888	0
150 Hsp Grapple (Cat 527)	230	1,393	0
275 Hsp Grader (Cat 16G)	216	1,676	0
170 Hsp Bulldozer (Cat D6)	9,006	49,966	0
305 Hsp Bulldozer (Cat D8)	378	4,088	0
850 Hsp Bulldozer (Cat D11)	243	6,745	0
6 Ton Compactor 48"(Cat 323)	2	6	0
10 Ton Compactor 120 hsp (Dyn CA25)	329	1,317	0
23 Ton Compactor 220 hsp (Cat 815)	4,333	37,393	0
18 CY Tandem Scraper (Cat 627)	215	3,274	0
90 Kg Plate Tamper	120	0	40
Cat TK723 Feller Buncher	230	2,353	0
DT-320 Tree Mulcher	230	4,902	0
Tree Stumper	461	1,406	0
Subtotal:	24,901	179,529	40
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	143	786	0
Asphalt Steel Roller (Ferguson)	143	286	0
Asphalt 7 Ton Roller (Cat CB434)	143	2,002	0
Asphalt Broom -Ride On (Ten215)	143	241	0
Subtotal:	572	3,315	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	277	2,232	0
Truck Mounted Post Hole Auger	696	772	0
Subtotal:	973	3,004	0

**Table X-X. Permanent Roads Area A: Appraisal Level Equipment and Fuel Consumption Est**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	5,220	0	9,653
5 Ton Flat Bed Truck	788	2,406	0
General Service Truck	143	0	143
16 Ton (8 CY) Tandem Truck	11,586	79,276	0
20 Ton (10 CY) Tandem Truck	1,645	11,257	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	648	7,195	0
3000 Gallon Watertruck	4,333	19,234	0
5000 Gallon Watertanker	162	809	0
10000 Gallon Cat 631 Waterwagon	54	354	0
Subtotal:	24,580	120,531	9,796
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	120	0	37
Subtotal:	120	0	37
<b>Total:</b>			
	<b>51,147</b>	<b>306,379</b>	<b>9,874</b>
Grading/Dozing/Scraper	14,950		

**Table X-X. Permanent Roads Area D: Appraisal Level Equipment and Fuel Consumption Estima**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	1	6	0
1.5 CY Backhoe (Cat 325)	23	140	0
2.3 CY Backhoe (Cat 235)	588	4,241	0
3.5 CY Loader (Cat 950)	23	88	0
11.2 CY Loader (Cat 990)	12	158	0
140 Hsp Grader (Cat 140)	936	6,804	0
150 Hsp Grapple (Cat 527)	42	255	0
275 Hsp Grader (Cat 16G)	21	167	0
170 Hsp Bulldozer (Cat D6)	1,628	9,034	0
305 Hsp Bulldozer (Cat D8)	33	357	0
850 Hsp Bulldozer (Cat D11)	17	482	0
6 Ton Compactor 48"(Cat 323)	1	4	0
10 Ton Compactor 120 hsp (Dyn CA25)	55	219	0
23 Ton Compactor 220 hsp (Cat 815)	881	7,605	0
18 CY Tandem Scraper (Cat 627)	40	603	0
90 Kg Plate Tamper	23	0	8
Cat TK723 Feller Buncher	42	431	0
DT-320 Tree Mulcher	42	899	0
Tree Stumper	84	258	0
Subtotal:	4,494	31,753	8
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	26	140	0
Asphalt Steel Roller (Ferguson)	26	51	0
Asphalt 7 Ton Roller (Cat CB434)	26	357	0
Asphalt Broom -Ride On (Ten215)	26	43	0
Subtotal:	102	592	0



**Table X-X. Permanent Roads Area D: Appraisal Level Equipment and Fuel Consumption Estima**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	20	159	0
Truck Mounted Post Hole Auger	120	133	0
Subtotal:	140	293	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	910	0	1,682
5 Ton Flat Bed Truck	127	386	0
General Service Truck	26	0	26
16 Ton (8 CY) Tandem Truck	1,775	12,145	0
20 Ton (10 CY) Tandem Truck	298	2,038	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	46	514	0
3000 Gallon Watertruck	881	3,912	0
5000 Gallon Watertanker	12	58	0
10000 Gallon Cat 631 Waterwagon	10	65	0
Subtotal:	4,084	19,119	1,708
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	23	0	8
Subtotal:	23	0	8
<b>Total:</b>			
	<b>8,843</b>	<b>51,756</b>	<b>1,724</b>
Grading/Dozing/Scraper	2,676		

**Table X-X. Permanent Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	5	21	0
1.5 CY Backhoe (Cat 325)	31	192	0
2.3 CY Backhoe (Cat 235)	384	2,770	0
3.5 CY Loader (Cat 950)	31	121	0
11.2 CY Loader (Cat 990)	4	49	0
140 Hsp Grader (Cat 140)	1,501	10,908	0
150 Hsp Grapple (Cat 527)	63	383	0
275 Hsp Grader (Cat 16G)	19	146	0
170 Hsp Bulldozer (Cat D6)	2,035	11,288	0
305 Hsp Bulldozer (Cat D8)	22	242	0
850 Hsp Bulldozer (Cat D11)	5	149	0
6 Ton Compactor 48"(Cat 323)	5	12	0
10 Ton Compactor 120 hsp (Dyn CA25)	77	307	0
23 Ton Compactor 220 hsp (Cat 815)	1,424	12,288	0
18 CY Tandem Scraper (Cat 627)	61	931	0
90 Kg Plate Tamper	31	0	10
Cat TK723 Feller Buncher	63	647	0
DT-320 Tree Mulcher	63	1,348	0
Tree Stumper	127	387	0
Subtotal:	5,952	42,190	10
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	36	197	0
Asphalt Steel Roller (Ferguson)	36	71	0
Asphalt 7 Ton Roller (Cat CB434)	36	500	0
Asphalt Broom -Ride On (Ten215)	36	60	0
Subtotal:	143	829	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	6	49	0
Truck Mounted Post Hole Auger	192	213	0
Subtotal:	198	262	0

**Table X-X. Permanent Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	1,137	0	2,103
5 Ton Flat Bed Truck	194	592	0
General Service Truck	36	0	36
16 Ton (8 CY) Tandem Truck	1,168	7,988	0
20 Ton (10 CY) Tandem Truck	414	2,835	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	14	159	0
3000 Gallon Watertruck	1,424	6,321	0
5000 Gallon Watertanker	4	18	0
10000 Gallon Cat 631 Waterwagon	15	101	0
Subtotal:	4,406	18,013	2,138
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	31	0	12
Subtotal:	31	0	12
<b>Total:</b>			
	<b>10,730</b>	<b>61,294</b>	<b>2,161</b>

Grading/Dozing/Scraper

2,142

**Table X-X. Contractor Use Areas Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
2.6 CY Backhoe (Cat 350)	725	7,641	0
3.5 CY Loader (Cat 950)	2,815	10,918	0
11.2 CY Loader (Cat 990)	27,410	374,115	0
18 CY Tandem Scraper (Cat 627)	1,389	21,195	0
125 Ton Towed Packer (SWMB125)	2,815	0	0
160 Hsp Wheel Skidder (Cat 525)	1,450	5,219	0
200 Hsp Grader (Cat 14G)	1,407	10,541	0
275 Hsp Grader (Cat 16G)	27,758	215,608	0
210 Hsp Harvester (Cat 580)	725	5,177	0
305 Hsp Bulldozer (Cat D8)	57,983	627,316	0
850 Hsp Bulldozer (Cat D11)	36,569	1,014,453	0
30 Ton Compactor 315 hsp (Cat 825)	5,629	75,596	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	109,642	1,216,634	0
Jumping Jack Handheld Packer	2,815	0	1,608
22" Smooth Drum Manual (Bomag 55)	2,815	2,413	0
Chipper - clearing	725	15,421	1,657
Subtotal:	282,669	3,602,246	3,265
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	41,718	335,621	0
Subtotal:	41,718	335,621	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	41,664	0	77,053
3/4 Ton Crew Cab Truck 4x4	725	0	1,628
5 Ton Flat Bed Truck	13,906	42,435	0
631 Water Wagon	4,222	60,173	0
5000 Gallon Watertanker	27,410	136,872	0
10000 Gallon Cat 631 Waterwagon	347	2,294	0
Chain Saw	1,450	0	383
Subtotal:	89,724	241,773	79,064
<b>Total:</b>			
	<b>414,111</b>	<b>4,179,640</b>	<b>82,329</b>

Grading/Dozing/Scraper

123,716

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	369	2,046	0
305 Hsp Bulldozer ( Cat D8 )	1,432	15,495	0
850 Hsp Bulldozer ( Cat D11 )	345	9,571	0
2.0 CY Loader (CAT IT28)	954	2,539	0
4.5 CY Loader (Cat 966)	36	165	0
200 Hsp Grader (Cat 14G)	1,074	8,043	0
275 Hsp Grader (Cat 16G)	292	2,264	0
Rome Plow	146	0	0
Farm Tractor	146	404	0
2.0 CY Backhoe ( Cat 330 )	108	899	0
2.6 CY Backhoe (Cat 350)	777	8,187	0
1.7 CY Backhoe Loader (Case680)	40	122	0
30 Ton Articulated Truck (Cat D300)	3,880	25,188	0
18 CY Tandem Scraper (Cat 627)	1,166	17,792	0
631 Water Wagon	755	10,756	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	738	3,794	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	72	967	0
Grid Roller	53	0	0
125 Ton Towed Packer (SWMB125)	72	0	0
160 Hsp Wheel Skidder (Cat 525)	154	1,014	0
210 Hsp Harvester (Cat 580)	77	549	0
Chipper - clearing	77	1,634	176
Subtotal:	12,914	112,242	176
<b>Concrete Equipment</b>			
90 YPH Trailer Mounted Concrete Pump	1,115	3,092	0
Truck Mounted Concrete Pump	2,061	17,152	0
3-CY Concrete Bucket (Gravity)	3,344	0	0
Concrete Vibrator-Normal	8,244	0	0
Concrete Vibrator-2.0 inch	2,229	0	0
Post-tensioning Jack	71	0	0
Grout Pump	71	40	0
Grout Plant	121	168	0

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
8 YPH Wet Shotcrete Pump (Swing 750)	404	337	0
Tunnel Concrete Form Gantry	2,230	0	0
Tunnel Concrete Placing Bridge	1,115	0	0
Tunnel Concrete Finishing Gantry	304	0	0
Subtotal:	21,310	20,788	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	3,435	0	2,287
500 KW Diesel Generator Set	1,858	45,459	0
500 KW Diesel Generator Set	2,249	55,034	0
185 CFM Diesel Compressor	2,500	8,322	0
250 CFM Diesel Compressor	401	1,467	0
375 CFM Diesel Compressor	574	3,440	0
750 CFM Diesel Compressor	4,107	42,386	0
250 Amp Diesel Welder	2,500	0	0
350 Amp Diesel Welder	2,500	0	0
2000 PSI Pressure Washer	2,500	834	0
Subtotal:	22,624	156,943	2,287
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	2,479	8,542	0
40 Ton Hydraulic Crane (Grove700)	29	81	0
Motorized Manlift 30 Ft	397	660	0
Subtotal:	2,904	9,283	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	246	328	0
Hydraulic Hoe Ram	44	0	0
Subtotal:	290	328	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 2" (AC1032)	41	343	0
Hydraulic Drill 3" (AC1238/Tam400)	733	7,079	0
Percussion Jumbo 3- Boom(GD-P123)	2,208	0	0
Tunnel 5 CY Scoop Tram	4,416	58,802	0
Tunnel Ventilation Fan 42"	2,249	0	0
Subtotal:	9,648	66,224	0

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	64	0	75
1/2 Ton Pickup Truck 2x2	32	0	51
1/2 Ton Pickup Truck 4x4	2,904	0	5,525
3/4 Ton Pickup Truck 2x2	76,554	0	169,894
3/4 Ton Pickup Truck 4x4	98	0	233
3/4 Ton Crew Cab Truck	2,112	0	5,357
3/4 Ton Crew Cab Truck 4x4	6,573	0	17,714
5 Ton Flat Bed Truck	3,714	14,836	0
2-Ton Mechanic Truck	7,500	39,947	0
Lube Truck	2,500	9,987	0
Fuel Truck (Tandem Axle 20000 litres)	2,500	13,316	0
3000 Gallon Watertruck	128	682	0
10000 Gallon Cat 631 Waterwagon	243	4,155	0
5 Ton Boomtruck	33	79	0
15 Ton Pitman Boom Truck	1,322	4,752	0
Storage Trailer 40 Ft	27,600	0	0
First Aid Trailer 10 x 40	7,200	0	0
Foreman Shack (8x12)	14,400	0	0
Lunch Trailer (8x20)	7,200	0	0
Office Trailer (12x50 )	3,000	0	0
Parts Storage 8x10	3,000	0	0
Chain Saw	128	0	41
Subtotal:	168,805	87,754	198,889
<b>Total:</b>			
	<b>238,495</b>	<b>453,562</b>	<b>201,351</b>
Grading/Dozing/Scraper	4,969		

**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	489	2,712	0
305 Hsp Bulldozer ( Cat D8 )	1,705	18,445	0
850 Hsp Bulldozer ( Cat D11 )	486	13,482	0
2.0 CY Loader (CAT IT28)	954	2,540	0
4.5 CY Loader (Cat 966)	36	165	0
200 Hsp Grader (Cat 14G)	1,287	9,636	0
275 Hsp Grader (Cat 16G)	292	2,264	0
Rome Plow	146	0	0
Farm Tractor	146	404	0
2.0 CY Backhoe ( Cat 330 )	108	899	0
2.6 CY Backhoe (Cat 350)	929	9,797	0
1.7 CY Backhoe Loader (Case680)	40	122	0
30 Ton Articulated Truck (Cat D300)	4,744	30,795	0
18 CY Tandem Scraper (Cat 627)	1,166	17,792	0
631 Water Wagon	899	0	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	978	5,028	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	72	967	0
Grid Roller	62	0	0
125 Ton Towed Packer (SWMB125)	72	0	0
160 Hsp Wheel Skidder (Cat 525)	154	1,015	0
210 Hsp Harvester (Cat 580)	77	549	0
Chipper - clearing	77	878	0
Subtotal:	15,069	118,301	0
<b>Concrete Equipment</b>			
90 YPH Trailer Mounted Concrete Pump	1,115	3,092	0
Truck Mounted Concrete Pump	7,369	61,327	0
3-CY Concrete Bucket (Gravity)	3,344	0	0
Concrete Vibrator-Normal	29,476	0	0
Concrete Vibrator-2.0 inch	2,229	0	0
Post-tensioning Jack	71	0	0
Grout Pump	71	40	0
Grout Plant	121	168	0



**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
8 YPH Wet Shotcrete Pump (Swing 750)	404	337	0
Tunnel Concrete Form Gantry	2,230	0	0
Tunnel Concrete Placing Bridge	1,115	0	0
Tunnel Concrete Finishing Gantry	304	0	0
Subtotal:	47,850	64,964	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	14,738	0	0
500 KW Diesel Generator Set	2,230	45,459	0
500 KW Diesel Generator Set	2,699	55,034	0
185 CFM Diesel Compressor	6,000	16,645	0
250 CFM Diesel Compressor	2,832	8,643	0
375 CFM Diesel Compressor	689	3,441	0
750 CFM Diesel Compressor	4,929	42,385	0
250 Amp Diesel Welder	6,000	0	0
350 Amp Diesel Welder	6,000	0	0
2000 PSI Pressure Washer	6,000	51,598	0
Subtotal:	52,117	223,204	0
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	6,786	19,485	0
40 Ton Hydraulic Crane (Grove700)	34	81	0
Motorized Manlift 30 Ft	476	660	0
Subtotal:	7,296	20,226	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	295	328	0
Hydraulic Hoe Ram	62	0	0
Subtotal:	357	328	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 2" (AC1032)	50	343	0
Hydraulic Drill 3" (AC1238/Tam400)	1,027	8,264	0
Percussion Jumbo 3- Boom(GD-P123)	2,650	0	0
Tunnel 5 CY Scoop Tram	5,299	58,802	0
Tunnel Ventilation Fan 42"	2,699	0	0
Subtotal:	11,725	67,410	0

**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	77	0	75
1/2 Ton Pickup Truck 2x2	38	0	51
1/2 Ton Pickup Truck 4x4	3,485	0	5,525
3/4 Ton Pickup Truck 2x2	132,353	0	244,773
3/4 Ton Pickup Truck 4x4	194	0	385
3/4 Ton Crew Cab Truck	5,069	0	10,713
3/4 Ton Crew Cab Truck 4x4	19,707	0	44,255
5 Ton Flat Bed Truck	9,834	30,009	0
2-Ton Mechanic Truck	18,000	79,894	0
Lube Truck	6,000	19,974	0
Fuel Truck (Tandem Axle 20000 litres)	6,000	26,631	0
3000 Gallon Watertruck	154	682	0
10000 Gallon Cat 631 Waterwagon	292	1,926	0
5 Ton Boomtruck	40	79	0
15 Ton Pitman Boom Truck	2,769	8,295	0
Storage Trailer 40 Ft	48,960	0	0
First Aid Trailer 10 x 40	11,520	0	0
Foreman Shack (8x12)	23,040	0	0
Lunch Trailer (8x20)	11,520	0	0
Office Trailer (12x50 )	7,200	0	0
Parts Storage 8x10	7,200	0	0
Chain Saw	154	0	41
Subtotal:	313,604	167,489	305,818
<b>Total:</b>			
	<b>448,018</b>	<b>661,922</b>	<b>305,818</b>
Grading/Dozing/Scraper	5,715		

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	120	666	0
305 Hsp Bulldozer ( Cat D8 )	6,050	65,456	0
850 Hsp Bulldozer ( Cat D11 )	2,203	61,103	0
3.5 CY Loader (Cat 950)	413	1,601	0
6.5 CY Loader (Cat 980)	288	1,924	0
11.2 CY Loader (Cat 990)	2,761	37,678	0
2.1 CY Track Loader (Cat 939)	444	1,848	0
200 Hsp Grader (Cat 14G)	826	6,188	0
275 Hsp Grader (Cat 16G)	3,015	23,416	0
Rome Plow	127	0	0
Farm Tractor	127	352	0
2.0 CY Backhoe ( Cat 330 )	72	599	0
2.6 CY Backhoe (Cat 350)	125	1,316	0
1.7 CY Backhoe Loader (Case680)	40	122	0
5 Ton Flatbed Truck	300	999	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	11,112	123,306	0
18 CY Tandem Scraper (Cat 627)	1,016	15,509	0
631 Water Wagon	1,857	26,468	0
Jumping Jack Handheld Packer	413	0	236
22" Smooth Drum Manual (Bomag 55)	1,493	1,280	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	240	1,234	0
15 Ton Compactor 84" (Cat 563)	192	1,097	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	2,003	26,896	0
Grid Roller	58	0	0
125 Ton Towed Packer (SWMB125)	1,110	0	0
160 Hsp Wheel Skidder (Cat 525)	134	0	0
210 Hsp Harvester (Cat 580)	67	480	0
Chipper - clearing	67	1,430	154
Subtotal:	36,826	401,780	390
<b>Paving Equipment</b>			
2 Deck 8x24 Screen	96	186	0
Plate Feeder 36inx6Ft	96	160	0
Radial Stacker 24"x100 15 Hsp	96	107	0
Subtotal:	288	453	0

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Pipeline Equipment</b>			
250 Amp Diesel Welder	564	0	0
400 Amp Diesel Welder	79,808	0	0
Acetylene Cutting Torch	564	0	0
Subtotal:	80,936	0	0
<b>Concrete Equipment</b>			
Concrete Pump	5,256	14,579	0
Truck Mounted Concrete Pump	11,221	93,388	0
Concrete Vibrator-Normal	22,443	0	0
Post-tensioning Jack	361	0	0
Grout Pump	661	367	0
Grout Plant	741	1,028	0
8 YPH Wet Shotcrete Pump (Swing 750)	206	171	0
Subtotal:	40,889	109,534	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	22,443	0	12,452
15 KW Generator Set (Gas)	592	0	493
150 KW Diesel Generator Set	9,845	49,159	0
500 KW Diesel Generator Set	1,170	23,856	0
125 CFM Diesel Compressor	965	2,143	0
185 CFM Diesel Compressor	6,030	16,728	0
250 CFM Diesel Compressor	787	2,400	0
750 CFM Diesel Compressor	1,170	10,062	0
250 Amp Diesel Welder	6,000	0	0
350 Amp Diesel Welder	6,000	0	0
2000 PSI Pressure Washer	6,000	51,598	0
Subtotal:	61,002	155,946	12,945
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	1,980	5,685	0
150 Ton Crawler Crane (American 9260)	6,085	23,547	0
40 Ton Hydraulic Crane (Grove700)	2,770	6,570	0
Motorized Manlift 30 Ft	206	286	0
Knuckleboom Manlift 36 Ft	373	622	0
Motorized Manlift 120FT ( JLG 120FXJ)	373	1,184	0
Subtotal:	11,787	37,893	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	308	342	0
Hydraulic Hoe Ram	58	0	0
Subtotal:	366	342	0

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	1,828	14,703	0
Diamond Core Drill (Hilti)	30	0	0
Tunnel 5 CY Scoop Tram	120	1,332	0
Tunnel Ventilation Fan 42"	10,075	0	0
Subtotal:	12,052	16,035	0
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	77	0	75
1/2 Ton Pickup Truck 2x2	38	0	51
1/2 Ton Pickup Truck 4x4	2,598	0	4,118
3/4 Ton Pickup Truck 2x2	195,072	0	360,766
3/4 Ton Pickup Truck 4x4	346	0	685
3/4 Ton Crew Cab Truck	5,069	0	10,713
3/4 Ton Crew Cab Truck 4x4	29,293	0	65,782
5 Ton Flat Bed Truck	15,023	45,842	0
2-Ton Mechanic Truck	18,000	79,894	0
Lube Truck	12,000	39,947	0
Fuel Truck (Tandem Axle 20000 litres)	6,000	26,631	0
3000 Gallon Watertruck	154	682	0
5000 Gallon Watertanker	2,761	13,785	0
10000 Gallon Cat 631 Waterwagon	254	1,678	0
5 Ton Boomtruck	40	79	0
15 Ton Pitman Boom Truck	3,639	10,902	0
Tractor & Hi-Trailer	2,177	13,889	0
Storage Trailer 40 Ft	48,960	0	0
First Aid Trailer 10 x 40	11,520	0	0
Foreman Shack (8x12)	46,080	0	0
Lunch Trailer (8x20)	23,040	0	0
Office Trailer (12x50 )	7,200	0	0
Parts Storage 8x10	7,200	0	0
Chain Saw	134	0	36
Subtotal:	436,672	233,330	442,226
<b>Total:</b>			
	<b>680,820</b>	<b>955,313</b>	<b>455,560</b>

Grading/Dozing/Scraper 13,484

**LeGrande-Sanger Transmission Line Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	1,642	2,462	-
3/4 Ton Crew Cab Truck 4x4	1,642	2,462	-
40 Ton Hydraulic Crane (Grove700)	1,642	-	3,940
Drill Rig Truck Mount	1,642	-	3,283
170 Hsp Bulldozer (Cat D6)	1,642	-	8,208
Subtotal:	8,208	4,925	15,431
<b>Total:</b>	<b>8,208</b>	<b>4,925</b>	<b>15,431</b>
Grading/Dozing/Scraper	1,642		

**Reservoir Area Recreation Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
1.4 CY Backhoe Loader (JD 410)	832	1,616	0
1.5 CY Backhoe (Cat 325)	4,190	11,431	0
1.7 CY Backhoe Loader (Case 680)	0	1	0
10 Ton Compactor 120 hsp (Dyn CA25)	179	718	0
110 Hsp Bulldozer (Cat D5)	13	53	0
125 Hsp Grader (Cat 120)	1,139	8,212	0
125 Ton Towed Packer (SWMB125)	6	0	0
13 Ton Compactor 72" (Cat 553)	939	4,829	0
1300LB Skid Steer Loader (Bobcat 743)	1	2	0
15 Ton Compactor 84" (Cat 563)	40	228	0
150 Hsp Grapple (Cat 527)	21	125	0
170 Hsp Bulldozer (Cat D6)	179	994	0
2.0 CY Backhoe (Cat 330)	103	859	0
2.3 CY Backhoe (Cat 235)	121	1,138	0
2.6 CY Backhoe (Cat 350)	171	1,804	0
2.7 CY Loader (JD 644)	1,383	5,266	0
200 Hsp Grader (Cat 14G)	237	1,772	0
22" Smooth Drum Manual (Bomag 55)	1,125	965	0
3.0 CY Track Loader (Cat 963)	121	487	0
6.5 CY Loader (Cat 980)	171	1,143	0
80 LB Jackhammer	342	0	0
Cat TK723 Feller Buncher	21	210	0
Farm Tractor-4 Wheel Drive	0	0	0
Hoe Hammer 4X	57	0	0
DT-320 Tree Mulcher	0	0	0
Tree Stumper	41	126	0
Subtotal:	11,433	41,979	0
<b>Pipeline Equipment</b>			
Acetylene Cutting Torch	121	0	0
Subtotal:	121	0	0
<b>Concrete Equipment</b>			
90 YPH Trailer-Mounted Concrete Pump	0	0	0
Subtotal:	0	0	0

**Reservoir Area Recreation Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	211	0	117
250 CFM Diesel Compressor	366	1,118	0
Subtotal:	577	1,118	117
<b>Hoisting Equipment</b>			
60 Ton Hydraulic Crane (Grove)	12	28	0
75 Ton Crawler Crane (Linkbelt 138)	9	25	0
Subtotal:	21	54	0
<b>Foundation &amp; Marine Equipment</b>			
125 Hsp Marina Workboat	1	0	14
700 Hsp Marine Inland Tugboat	79	3,065	0
Hydraulic Hoe Ram	101	0	0
Truck Mounted Post Hole Auger	54	60	0
Subtotal:	235	3,125	14
<b>Service &amp; Maintenance Equipment</b>			
1/2 Ton Pickup Truck 4x4	1,102	0	1,748
10 Ton Boomtruck	3	8	0
15 Ton Pitman Boom Truck	12	36	0
20 Ton (10 CY) Tandem Truck	2,984	20,420	0
24 Ton (12 CY) Tandem Truck	171	1,171	0
3/4 Ton Crew Cab Truck 4x4	13	0	30
3/4 Ton Pickup Truck 2x2	141	0	261
3000 Gallon Watertruck	196	870	0
32 Ton (16 CY) Triaxle Truck-Operated	275	1,943	0
5 Ton Flat Bed Truck	506	1,544	0
500 Ton Marine Barge	79	0	0
80 Ton Lowboy	9	72	0
8000 Gallon Watertanker	6	34	0
Dozer Winch (American)	79	0	0
Helicopter 5000lbs (Aviation Fuel)	19	0	1,632
Subtotal:	5,596	26,098	3,671
<b>Total:</b>	<b>17,983</b>	<b>72,374</b>	<b>3,802</b>

Grading/Dozing/Scraper 1,568



**Reservoir Area Utilities Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
1.0 CY Backhoe Loader (Case 580)	304	583	0
1.5 CY Backhoe (Cat 225)	226	615	0
1.5 CY Backhoe (Cat 325)	21	58	0
1.7 CY Backhoe Loader (Case 680)	1	3	0
10 Ton Compactor 12 hsp (Cyn CA25)	1	4	0
125 Hsp Grader (Cat 120)	7	49	0
150 Hsp Grapple (Cat 527)	0	0	0
2.0 CY Backhoe (Cat 330)	3	23	0
2.3 CY Backhoe (Cat 235)	114	1,074	0
2.6 CY Backhoe (Cat 350)	2	24	0
2.7 CY Loader (JD644)	9	33	0
22" Smooth Drum Manual (Bomag 55)	3	3	0
3.0 CY Track Loader (Cat 963)	3	14	0
3.5 CY Loader (Cat 950)	336	1,482	0
5 Ft Wheel Mounted Chain Trencher	44	153	0
6.5 CY Loader (Cat 980)	2	15	0
80 LB Jackhammer	5	0	0
90 Kg Plate Tamper	10	0	3
Cat TK723 Feller Buncher	0	0	0
DT-320 Tree Mulcher	0	1	0
Hoe Hammer 4X	2	0	0
Tree Stumper	0	0	0
Subtotal:	1,091	4,134	3
<b>Pipeline Equipment</b>			
Acetylene Cutting Torch	3	0	0
Subtotal:	3	0	0
<b>Concrete Equipment</b>			
Grout Pump	45	0	25
Subtotal:	45	0	25

**Reservoir Area Utilities Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	1	0	1
250 CFM Diesel Compressor	4	11	0
Subtotal:	5	11	1
<b>Foundation &amp; Marine Equipment</b>			
Hydraulic Hoe Ram	3	0	0
Truck-Mounted Direct Rotary Drill Rig	10	24	0
Subtotal:	12	24	0
<b>Service &amp; Maintenance Equipment</b>			
1/2 Ton Pickup Truck 4x4	6	0	10
10 Ton Boomtruck	275	823	0
20 Ton (10 CY) Tandem Truck	24	162	0
24 Ton (12 CY) Tandem Truck	2	16	0
3/4 Ton Pickup Truck 2x2	404	0	746
32 Ton (16 CY) Triaxle Truck-Operated	6	42	0
5 Ton Flatbed Truck	70	213	0
Electrical Service truck	375	0	594
Tractor & Trailer	255	708	0
Subtotal:	1,416	1,964	1,350
<b>Total:</b>			
	<b>2,573</b>	<b>6,133</b>	<b>1,379</b>

Grading/Dozing/Scraper

**Kerckhoff Project Decommissioning Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
110 Hsp Bulldozer (Cat D5)	10	40	0
170 Hsp Bulldozer ( Cat D6 )	115	639	0
3.5 CY Loader (Cat 950)	91	354	0
6.5 CY Loader (Cat 980)	10	64	0
3.0 CY Track Loader ( Cat 963 )	162	988	0
1300LB Skid Steer Loader (Bobcat 743)	10	13	0
125 Hsp Grader (Cat 120)	10	40	0
275 Hsp Grader (Cat 16G)	41	320	0
1.5 CY Backhoe ( Cat 225 )	26	146	0
1.5 CY Backhoe (Cat 325)	38	266	0
2.0 CY Backhoe ( Cat 330 )	48	403	0
2.6 CY Backhoe (Cat 350)	72	759	0
2.7 CY Backhoe ( Cat 345 BL )	368	3,676	0
20 Ton (10 CY) Tandem Truck	232	1,610	0
15 Ton Compactor 84" (Cat 563)	41	235	0
23 Ton Compactor 220 hsp (Cat 815)	19	214	0
Subtotal:	1,294	9,768	0
<b>Pipeline Equipment</b>			
300 Amp Gas Welder	29	21	0
350 Amp Diesel Welder	58	48	0
Subtotal:	86	69	0
<b>Concrete Equipment</b>			
124 YPH Trailer Mounted Concrete Pump	182	1,265	0
Concrete Saw 10"	29	0	8
Subtotal:	211	1,265	8
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	1,681	0	933
60 KW Diesel Generator Set	115	288	0
100 KW Diesel Generator Set	634	2,353	0
Tower 6-Lights 16 Hsp	304	202	0
2" Diesel Water Pump 8,000 gph	67	36	0
250 CFM Diesel Compressor	259	790	0
750 CFM Diesel Compressor	29	248	0
Subtotal:	3,088	3,916	933

**Kerckhoff Project Decommissioning Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Hoisting Equipment</b>			
20 Ton Truck Crane	10	30	0
40 Ton Truck Crane	130	453	0
100 Ton Truck Crane (Linkbelt 218)	624	2,037	0
125 Ton Truck Crane (Linkbelt 228)	19	91	0
150 Ton Crawler Crane (American 9260)	163	632	0
250 Ton Crawler Crane (American 9320)	622	2,949	0
30 Ton Hydraulic Crane (Grove500)	1,053	2,234	0
40 Ton Hydraulic Crane (Grove700)	106	250	0
50 Ton Hydraulic Crane (Grove)	134	336	0
60 Ton Hydraulic Crane (Grove)	38	120	0
2 Tonne Forklift (JCB-5500lb)	24	47	0
6 Tonne Forklift(12,000lb)	466	1,808	0
Motorized Manlift 30 Ft	58	80	0
Knuckleboom Manlift 36 Ft	173	288	0
Motorized Manlift 120FT ( JLG 120FXJ)	38	122	0
Swing Stage	302	503	0
Subtotal:	3,959	11,979	0
<b>Foundation &amp; Marine Equipment</b>			
Concrete Crusher	368	1,838	0
Subtotal:	368	1,838	0
<b>Service &amp; Maintenance Equipment</b>			
Sedan Car 4-Door	144	0	160
1/2 Ton Pickup Truck 4x4	285	0	451
3/4 Ton Pickup Truck 2x2	4,412	0	8,160
3/4 Ton Pickup Truck 4x4	29	0	57
1-Ton Crew Cab	60	0	143
5 Ton Flat Bed Truck	654	1,996	0
1- Ton Mechanic Truck	29	96	0
2-Ton Mechanic Truck	144	639	0
Electrical Service truck	749	3,324	0
Fuel Truck (Single Axle)	67	242	0
1000 Gallon Watertruck	144	439	0
5 Ton Boomtruck	19	38	0
15 Ton Pitman Boom Truck	19	58	0

**Kerckhoff Project Decommissioning Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
Tractor & Trailer	1,164	7,107	0
20 Ton Lowboy	158	439	0
40 Ton Lowboy	10	40	0
Chain Saw	38	0	10
Subtotal:	8,126	14,419	8,981
<b>Subcontract Equipment Est</b>			
Subcontract Equipment Est	0	38,987	0
Subtotal:	0	38,987	0
<b>Total:</b>			
	<b>17,133</b>	<b>82,240</b>	<b>9,922</b>

Grading/Dozing/Scraper

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**Reservoir Clearing Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
305 Hsp Bulldozer ( Cat D8 )	5,670	56,699	
2.0 CY Backhoe ( Cat 330 )	4,501	36,007	
140 Hsp Wheel Skidder (Cat 515)	31,000	180,185	
160 Hsp Wheel Skidder (Cat 525)	1,600	10,568	
200 Hsp Wheel Skidder (Cat 545)	1,169	9,352	
210 Hsp Harvester (Cat 580)	800	5,715	
Cat TK723 Feller Buncher	16,469	164,701	
Cat 330 LC Log Loader	16,469	143,587	
Chipper - clearing	16,500	188,584	
DT-320 Tree Mulcher	15,300	428,400	
Subtotal:	109,478	1,223,797	0
<b>Pipeline Equipment</b>			
250 Amp Diesel Welder	6,667	3,329	
350 Amp Diesel Welder	6,667	5,548	
Subtotal:	13,333	8,877	0
<b>Utility Equipment</b>			
Tower 6-Lights 16 Hsp	41,600	83,200	
185 CFM Diesel Compressor	6,667	18,494	
2000 PSI Pressure Washer	6,667	1,849	
Subtotal:	54,933	103,543	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 4x4	372		737
3/4 Ton Crew Cab Truck 4x4	22,761		45,522
2-Ton Mechanic Truck	13,333		37,054
Lube Truck	16,000	59,181	
Fuel Truck (Tandem Axle 20000 litres)	8,000	28,000	
5000 Gallon Watertanker	3,332	11,662	
Survey Total Station	1,760		
Chain Saw	49,900		24,950
Subtotal:	115,458	98,843	108,263
<b>Total:</b>			
	<b>293,203</b>	<b>1,435,060</b>	<b>108,263</b>
Grading/Dozing/Scraper	5,670		

## USJRBSI Construction Mass Emissions Calculations

<b>Green Tabs G1-G7</b>	<i>Green tabs include emissions calculations/summaries</i>
<b>Orange Tabs O1-O5</b>	<i>Orange tabs include emission factor calculations, conversion factors, and other pertinent information used to calculate emissions</i>
<b>Yellow Tabs Y1-Y8</b>	<i>Yellow tabs include construction equipment estimates for Phase 1 of construction</i>
<b>Red Tabs R1-R3</b>	<i>Red tabs include construction equipment estimates for Phase 2 of construction</i>
<b>Blue Tabs B1-B5</b>	<i>Blue tabs include construction equipment estimates for Phase 3 of construction</i>

## Emissions Summary

*this sheet summarizes total mass emissions for each alternative by construction phase*

	<b>Alternative 1-3, 5</b>				<b>Alternative 4</b>			
	<u>Average (TPY)</u>	<u>Phase 1 (TPY)</u>	<u>Phase 2 (TPY)</u>	<u>Phase 3 (TPY)</u>	<u>Average (TPY)</u>	<u>Phase 1 (TPY)</u>	<u>Phase 2 (TPY)</u>	<u>Phase 3 (TPY)</u>
<b>ROG</b>	23	23	4	29	23	23	5	29
<b>NOX</b>	187	211	37	262	190	211	43	262
<b>PM10 (exhaust)</b>	7	7	1	9	7	7	2	9
<b>PM10 (dust)</b>	170	142	8	233	170	142	8	233
<b>CO2 (MT)</b>	29,162	28,948	6,502	37,744	29,531	28,948	7,441	37,744



## Off-Road Emissions Summary Alternative 1-3, 5

this sheet summarizes exhaust and fugitive dust emissions from the use of off-road equipment for alternatives 1-3

		Fuel Consumption			Fugitive Dust Sources	
Phase 1 Activities	Phase 1 Equipment Use/Fuel Consumption	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
	Contractor Use Area	4,179,640	82,329	123,716		
	Transmission	6,530	20,462	2,177		
Site Access and Staging	Haul Roads	2,083,062	70,879	44,678		
	PermRoads	419,428	13,758	19,768		
	USJRB - RM274 - Subgrp A - Fine Gold Crk Brdge - 2013	0	0	0		
	USJRV - RM274 - Subgrp E - Pwrplt Acc Rd Brdge - 2013	50,694	19	0		
Cofferdam Material Processing	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt	798,930	159,777	5,277		
Marine Cofferdam Work*	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (marine vessels)	0	0	0		
Diversion Tunnel	USJRB - Subgrp B - Outlet Works Tunnel - March 2013	596,113	0	3,101		
<b>Phase Total</b>		<b>8,134,397</b>	<b>347,224</b>	<b>198,718</b>	<b>29,610,788</b>	<b>2,976,552</b>
Per Day		10,564	451	258	38,456	3,866
Per year		2,324,113	99,207	56,776	8,460,225	850,443
Phase 2 Activities	Phase 2 Equipment Use/Fuel Consumption	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
Powerhouse/Valve house	PH&Row	955,313	455,560	13,484		
Intake Structure	LLIS (Alt1-3)	226,781	100,676	2,485		
Tunnel Connection	LLIS (Alt1-3)	226,781	100,676	2,485		
<b>Phase Total</b>		<b>1,408,875</b>	<b>656,911</b>	<b>18,453</b>	<b>2,145,720</b>	<b>162,768</b>
Per Day		1,601	746	21	2,438	185
Per year		352,219	164,228	4,613	536,430	40,692
Phase 3 Activities	Phase 3 Equipment Use/Fuel Consumption	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
Dam Material Processing	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)	2,865,120	117,473	7,826		
Complete Cofferdams	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (PDF) + 1/2 marine vessels	798,930	159,777	5,277		
Foundation Preparation	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)	2,865,120	117,473	7,826		
RCC Arch Dam	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)	2,865,120	117,473	7,826		
	USJRB - RM274 - Subgrp C - Spillway Curved Arch Dam - 2013 - 1 (PDF)	741,605	48,910	1,408		
Reclamation and Demobilization	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)	2,865,120	117,473	7,826		
	Kerkhoff Decom (spreadsheet)	82,240	9,922	176		
Affected Existing Facilities	Recreation (spreadsheet)	72,374	3,802	1,568		
	Utilities (spreadsheet)	6,133	1,379	7		
	LeGrande Transmission Line (spreadsheet)	4,925	15,431	1,642		
Reservoir Clearing	Reservoir Clearing (spreadsheet)	1,435,060	108,263	5,670		
<b>Phase Total</b>		<b>14,601,746</b>	<b>817,377</b>	<b>47,051</b>	<b>9,880,993</b>	<b>7,811,123</b>
Per Day		13,274	743	43	8,983	7,101
Per year		2,920,349	163,475	9,410	1,976,199	1,562,225

Alternative 1-3 Totals	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
EMFAC Input Alt Total	24,145,018	1,821,512	264,222	41,637,501	10,950,442

<b>Emissions Summary</b>					
<b>Exhaust (Off-Road)</b>					
ROG (tons)	215				
NOX (tons)	1,711				
PM10 Exhaust (tons)	63				
CO2 (tons)	286,285				
CO2 (MT)	257,657				
<b>Exhaust (Marine Vessel)</b>					
ROG (tons)	6				
NOX (tons)	100				
PM10 Exhaust (tons)	3				
CO2 (tons)	7,311				
CO2 (MT)	6,580				
<b>Fugitive Dust Summary</b>					
pounds/activity			161,757	5,031	3,182,198
tons/activity			81	3	1,591
PM10 Dust Alt Total (tons)	1,674				
<b>Alternative Average</b>					
ROG (TPY)	22				
NOX (TPY)	181				
PM10 (TPY)	7				
PM10 Dust	167				
CO2 (MT/YR)	26,424				

\* See "Exhaust Emission Factors" sheet for marine vessel exhaust calculations

## On-Road Emissions Summary Alternative 1-3, 5

this sheet summarizes exhaust and dust emissions from the use of on-road vehicles (worker commute and haul trucks) for alternative 1-3

Phase 1 Activities	Exhaust		Fugitive Dust Sources		
	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road VMT	Heavy Duty Travel on Unpaved Road VMT	Worker Commute on Paved Roads VMT
	49,560	2,740,920	44,604	4,956	2,740,920
<i>Site Access and Staging</i>	1,400	5,949,020	1,260	140	5,949,020
	37,520	356,440	33,768	3,752	356,440
	55,840	0	50,256	5,584	0
<i>Cofferdam Material Processing</i>	0	1,340,640	0	0	1,340,640
<i>Marine Cofferdam Work</i>	0	1,340,640	0	0	1,340,640
	130,480	1,752,520	117,432	13,048	1,752,520
<i>Diversion Tunnel</i>	20,860	0	18,774	2,086	0
	52,824	0	47,542	5,282	0
<b>Phase Total</b>	<b>348,484</b>	<b>13,480,180</b>	<b>313,636</b>	<b>34,848</b>	<b>13,480,180</b>
<i>Per Day</i>	453	17,507	407	45	17,507
<i>Per year</i>	99,567	3,851,480	89,610	9,957	3,851,480
Phase 2 Activities	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road	Heavy Duty Travel on Unpaved Road	Worker Commute on Paved Roads
	170,660	5,246,220	153,594	17,066	5,246,220
<i>Powerhouse/Valve house</i>	96,320	0	86,688	9,632	0
	1,260,140	0	1,134,126	126,014	0
<i>Intake Structure</i>	122,640	937,860	110,376	12,264	937,860
<i>Tunnel Connection</i>	0	937,860	0	0	937,860
<b>Phase Total</b>	<b>1,649,760</b>	<b>7,121,940</b>	<b>1,484,784</b>	<b>164,976</b>	<b>7,121,940</b>
<i>Per Day</i>	1,875	8,093	1,687	187	8,093
<i>Per year</i>	412,440	1,780,485	371,196	41,244	1,780,485

<b>Phase 3 Activities</b>	<b>Haul Trip VMT</b>	<b>Worker VMT</b>	<b>Heavy Duty Travel on Paved Road</b>	<b>Heavy Duty Travel on Unpaved Road</b>	<b>Worker Commute on Paved Roads</b>
<i>Dam Material Processing</i>	0	2,340,380	0	0	2,340,380
<i>Complete Cofferdams</i>	0	932,680	0	0	932,680
<i>Foundation Preparation</i>	90,020	1,679,720	81,018	9,002	1,679,720
<i>RCC Arch Dam</i>	5,146,540	13,143,480	4,631,886	514,654	13,143,480
<i>Reclamation and Demobilization</i>	0	136,640	0	0	136,640
	82,600	810,000	74,340	8,260	810,000
	47,800	272,200	43,020	4,780	272,200
	0	7,980	0	0	7,980
<i>Affected Existing Facilities</i>	87,220	0	78,498	8,722	0
	342,800	0	308,520	34,280	0
	1,200	0	1,080	120	0
	7,520	0	6,768	752	0
<i>Reservoir Clearing</i>	411,800	3,518,600	370,620	41,180	3,518,600
<b>Phase Total</b>	<b>6,217,500</b>	<b>22,841,680</b>	<b>5,595,750</b>	<b>621,750</b>	<b>22,841,680</b>
<i>Per Day</i>	5,652	20,765	5,087	565	20,765
<i>Per year</i>	1,243,500	4,568,336	1,119,150	124,350	4,568,336

<b>Alternative 1-3 Totals</b>	<b>Haul Trip VMT</b>	<b>Worker VMT</b>	<b>Heavy Duty Travel on Paved Road</b>	<b>Heavy Duty Travel on Unpaved Road</b>	<b>Worker Commute on Paved Roads</b>
<i>EMFAC Input Alt Total</i>	8,215,744	43,443,800	7,394,170	821,574	43,443,800

**Emissions Summary**

**Alternative Total by Source**

ROG (tons)	3	2			
NOX (tons)	57	6			
PM10 Exhaust (tons)	1	0.09			
PM10 Dust (tons)			9	5	8
CO2 (tons)	15,753	18,048			
CO2 (MT)	14,178	16,243			

**Alternative Total**

ROG (tons)	4
NOX (tons)	63
PM10 Exhaust (tons)	1
PM10 Dust (tons)	21
CO2 (tons)	30,421
CO2 (MT)	27,379

**Alternative Average**

ROG (TPY)	0
NOX (TPY)	6
PM10 (TPY)	0
PM10 Dust	2
CO2 (MT/YR)	2,738

## Emissions Summary by Phase Alternative 1-3, 5

This sheet summarizes the total mass emissions on a per phase basis for alternatives 1-3

Phase 1	Off-Road Emissions							On-Road Emissions			
	off road diesel	off road gas	total fuel	grading hours	truck loading tons	batch plant (cy)	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road VMT	Heavy Duty Travel on Unpaved Road VMT	Worker Commute on Paved Roads VMT
	2,324,113	99,207	2,423,320	56,776	8,460,225	850,443	99,567	3,851,480	89,610	9,957	3,851,480

### Emissions Summary

<b>Exhaust</b>											
ROG (tons)			20					0.03	0.17		
NOX (tons)			160					0.69	0.55		
PM10 Exhaust (tons)			6					0.01	0.01		
CO2 (tons)			26,717					191	1,600		
CO2 (MT)			24,046					172	1,440		
<b>Exhaust (Marine Vessel)</b>											
ROG (tons)	3										
NOX (tons)	50										
PM10 Exhaust (tons)	1										
CO2 (tons)	3,656										
CO2 (MT)	3,290										
<b>Fugitive Dust</b>											
Batch Plant/Quarry (lbs)						247,139					
PM10 Dust (tons)				17	0.51	124			0.11	0.06	1

Phase 1 Total (TPY)	
ROG	23
NOX	211
PM10 Exhaust	7.3
PM2.5 Exhaust	
PM10 Dust	142
PM2.5 Dust	
CO2 (MT)	28,948







## Off-Road Emissions Summary Alternative 4

this sheet summarizes exhaust and fugitive dust emissions from the use of off-road equipment for alternatives 1-3

Phase 1 Activities		Phase 1 Equipment Use/Fuel Consumption	Fuel Consumption			Fugitive Dust Sources	
			Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
Site Access and Staging	Contractor Use Area		4,179,640	82,329	123,716		
	Transmission		6,530	20,462	2,177		
	Haul Roads		2,083,062	70,879	44,678		
	PermRoads		419,428	13,758	19,768		
	USJRB - RM274 - Subgrp A - Fine Gold Grk Brdg - 2013		0	0	0		
Cofferdam Material Processing	USJRV - RM274 - Subgrp E - Pwrplt Acc Rd Brdg - 2013		50,694	19	0		
	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt		798,930	159,777	5,277		
	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (marine vessels)		0	0	0		
Marine Cofferdam Work*							
USJRB - Subgrp B - Outlet Works Tunnel - March 2013			596,113	0	3,101		
Diversion Tunnel							
<b>Phase Total</b>			<b>8,134,397</b>	<b>347,224</b>	<b>198,718</b>	<b>29,610,788</b>	<b>2,976,552</b>
Per Day			10,564	451	258	38,456	3,866
Per year			2,324,113	99,207	56,776	8,460,225	850,443
Phase 2 Activities		Phase 2 Equipment Use/Fuel Consumption	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
Powerhouse/Valve house	PH&Row		955,313	455,560	13,484		
Intake Structure	SLIS (Alt 4)		330,961	152,909	2,485		
Tunnel Connection	SLIS (Alt 4)		330,961	152,909	2,485		
<b>Phase Total</b>			<b>1,617,235</b>	<b>761,378</b>	<b>18,453</b>	<b>2,145,720</b>	<b>162,768</b>
Per Day			1,838	865	21	2,438	185
Per year			404,309	190,344	4,613	536,430	40,692
Phase 3 Activities		Phase 3 Equipment Use/Fuel Consumption	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
Dam Material Processing	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)		2,865,120	117,473	7,826		
Complete Cofferdams	USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (PDF) + 1/2 marine vessels		798,930	159,777	5,277		
Foundation Preparation	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)		2,865,120	117,473	7,826		
RCC Arch Dam	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)		2,865,120	117,473	7,826		
	USJRB - RM274 - Subgrp C - Spillway Curved Arch Dam - 2013 -1 (PDF)		741,605	48,910	1,408		
Reclamation and Demobilization	USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)		2,865,120	117,473	7,826		
	Kerckhoff Decom (spreadsheet)		82,240	9,922	176		
Affected Existing Facilities	Recreation (spreadsheet)		72,374	3,802	1,568		
	Utilities (spreadsheet)		6,133	1,379	7		
Reservoir Clearing	LeGrande Transmission Line (spreadsheet)		4,925	15,431	1,642		
	Reservoir Clearing (spreadsheet)		1,435,060	108,263	5,670		
<b>Phase Total</b>			<b>14,601,746</b>	<b>817,377</b>	<b>47,051</b>	<b>9,880,993</b>	<b>7,811,123</b>
Per Day			13,274	743	43	8,983	7,101
Per year			2,920,349	163,475	9,410	1,976,199	1,562,225

Alternative 1-3 Totals	Diesel (gal)	Gasoline (gal)	Grading/Dozing (hours)	Truck Loading (tons)	Batch Plant (cy)
EMFAC Input Alt Total	24,353,378	1,925,979	264,222	41,637,501	10,950,442

**Emissions Summary**

**Exhaust (Off-Road)**

ROG (tons)	217
NOX (tons)	1,731
PM10 Exhaust (tons)	64
CO2 (tons)	289,734
CO2 (MT)	260,761

**Exhaust (Marine Vessel)**

ROG (tons)	6
NOX (tons)	100
PM10 Exhaust (tons)	3
CO2 (tons)	7,311
CO2 (MT)	6,580

**Fugitive Dust Summary**

pounds/activity		161,757	5,031	3,182,198
tons/activity		81	3	1,591
PM10 Dust Alt Total (tons)	1,674			

**Alternative Average**

ROG (TPY)	22
NOX (TPY)	183
PM10 (TPY)	7
PM10 Dust	167
CO2 (MT/YR)	26,734

\* See "Exhaust Emission Factors" sheet for marine vessel exhaust calculations

## On-Road Emissions Summary Alternative 4

this sheet summarizes exhaust and dust emissions from the use of on-road vehicles (worker commute and haul trucks) for alternative 4

Phase 1 Activities	Exhaust		Fugitive Dust Sources		
	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road VMT	Heavy Duty Travel on Unpaved Road VMT	Worker Commute on Paved Roads VMT
	49,560	2,740,920	44,604	4,956	2,740,920
<i>Site Access and Staging</i>	1,400	5,949,020	1,260	140	5,949,020
	37,520	356,440	33,768	3,752	356,440
<i>Cofferdam Material Processing</i>	55,840	0	50,256	5,584	0
<i>Marine Cofferdam Work</i>	0	1,340,640	0	0	1,340,640
	0	1,340,640	0	0	1,340,640
<i>Diversion Tunnel</i>	130,480	1,752,520	117,432	13,048	1,752,520
	20,860	0	18,774	2,086	0
	52,824	0	47,542	5,282	0
<b>Phase Total</b>	<b>348,484</b>	<b>13,480,180</b>	<b>313,636</b>	<b>34,848</b>	<b>13,480,180</b>
<i>Per Day</i>	453	17,507	407	45	17,507
<i>Per year</i>	99,567	3,851,480	89,610	9,957	3,851,480
Phase 2 Activities	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road	Heavy Duty Travel on Unpaved Road	Worker Commute on Paved Roads
	170,660	5,246,220	153,594	17,066	5,246,220
<i>Powerhouse/Valve house</i>	96,320	0	86,688	9,632	0
	1,260,140	0	1,134,126	126,014	0
<i>Intake Structure</i>	270,620	1,470,420	243,558	27,062	1,470,420
<i>Tunnel Connection</i>	0	1,470,420	0	0	1,470,420
<b>Phase Total</b>	<b>1,797,740</b>	<b>8,187,060</b>	<b>1,617,966</b>	<b>179,774</b>	<b>8,187,060</b>
<i>Per Day</i>	2,043	9,303	1,839	204	9,303
<i>Per year</i>	449,435	2,046,765	404,492	44,944	2,046,765

<b>Phase 3 Activities</b>	<b>Haul Trip VMT</b>	<b>Worker VMT</b>	<b>Heavy Duty Travel on Paved Road</b>	<b>Heavy Duty Travel on Unpaved Road</b>	<b>Worker Commute on Paved Roads</b>
<i>Dam Material Processing</i>	0	2,340,380	0	0	2,340,380
<i>Complete Cofferdams</i>	0	932,680	0	0	932,680
<i>Foundation Preparation</i>	90,020	1,679,720	81,018	9,002	1,679,720
<i>RCC Arch Dam</i>	5,146,540	13,143,480	4,631,886	514,654	13,143,480
<i>Reclamation and Demobilization</i>	0	136,640	0	0	136,640
	82,600	810,000	74,340	8,260	810,000
	47,800	272,200	43,020	4,780	272,200
	0	7,980	0	0	7,980
<i>Affected Existing Facilities</i>	87,220	0	78,498	8,722	0
	342,800	0	308,520	34,280	0
	1,200	0	1,080	120	0
	7,520	0	6,768	752	0
<i>Reservoir Clearing</i>	411,800	3,518,600	370,620	41,180	3,518,600
<b>Phase Total</b>	<b>6,217,500</b>	<b>22,841,680</b>	<b>5,595,750</b>	<b>621,750</b>	<b>22,841,680</b>
<i>Per Day</i>	5,652	20,765	5,087	565	20,765
<i>Per year</i>	1,243,500	4,568,336	1,119,150	124,350	4,568,336

<b>Alternative 1-3 Totals</b>	<b>Haul Trip VMT</b>	<b>Worker VMT</b>	<b>Heavy Duty Travel on Paved Road</b>	<b>Heavy Duty Travel on Unpaved Road</b>	<b>Worker Commute on Paved Roads</b>
<i>EMFAC Input Alt Total</i>	8,363,724	44,508,920	7,527,352	836,372	44,508,920

**Emissions Summary**

**Alternative Total by Source**

ROG (tons)	3	2			
NOX (tons)	58	6			
PM10 Exhaust (tons)	1	0.09			
PM10 Dust (tons)			9	5	8
CO2 (tons)	16,037	18,490			
CO2 (MT)	14,434	16,641			

**Alternative Total**

ROG (tons)	5
NOX (tons)	65
PM10 Exhaust (tons)	1
PM10 Dust (tons)	22
CO2 (tons)	31,075
CO2 (MT)	27,967

**Alternative Average**

ROG (TPY)	0
NOX (TPY)	6
PM10 (TPY)	0
PM10 Dust	2
CO2 (MT/YR)	2,797

### Emissions Summary by Phase Alternative 4

This sheet summarizes the total mass emissions on a per phase basis for alternatives 1-3

Phase 1	Off-Road Emissions						On-Road Emissions				
	off road diesel	off road gas	total fuel	grading hours	truck loading tons	batch plant (cy)	Haul Trip VMT	Worker VMT	Heavy Duty Travel on Paved Road VMT	Heavy Duty Travel on Unpaved Road VMT	Worker Commute on Paved Roads VMT
	2,324,113	99,207	2,423,320	56,776	8,460,225	850,443	99,567	3,851,480	89,610	9,957	3,851,480

#### Emissions Summary

##### Exhaust

ROG (tons)		20					0.03	0.17			
NOX (tons)		160					0.69	0.55			
PM10 Exhaust (tons)		6					0.01	0.01			
CO2 (tons)		26,717					191	1,600			
CO2 (MT)		24,046					172	1,440			

##### Exhaust (Marine Vessel)

ROG (tons)	3
NOX (tons)	50
PM10 Exhaust (tons)	1
CO2 (tons)	3,656
CO2 (MT)	3,290

##### Fugitive Dust

Batch Plant/Quarry (lbs)						247,139					
PM10 Dust (tons)				17	0.51	124			0.11	0.06	1

Phase 1 Total (TPY)	
ROG	23
NOX	211
PM10 Exhaust	7.3
PM2.5 Exhaust	
PM10 Dust	142
PM2.5 Dust	
CO2 (MT)	28,948







## Phasing Summary

*this sheet summarizes the activities within each phase and the associated sources of construction equipment estimates for each.*

### **Schedule**

#### **Phase 1**

Site Access and Staging

Cofferdam Material Processing

Marine Cofferdam Work

Diversion Tunnel

#### **Phase 2**

Powerhouse/Valve house

Intake Structure

Tunnel Connection

#### **Phase 3**

Dam Material Processing

Complete Cofferdams

Foundation Preparation

RCC Arch Dam

Reclamation and Demobilization

Affected Existing Facilities

Reservoir Clearing

### **Source for fuel consumption and equipment hours**

Contractor Use Area (spreadsheet)

Transmission (spreadsheet)

Haul Roads (spreadsheet)

PermRoads (spreadsheet)

USJRB - RM274 - Subgrp A - Fine Gold Crk Brdge - 2013 (PDF)

USJRV - RM274 - Subgrp E - Pwrplt Acc Rd Brdg - 2013 (PDF)

USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (PDF)

USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (PDF)

USJRB - Subgrp B - Outlet Works Tunnel - March 2013 (PDF)

PH&Row (spreadsheet)

LLIS (Alt1-3)/SLIS (Alt. 4) (spreadsheet)

LLIS (Alt1-3)/SLIS (Alt. 4) (spreadsheet)

USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)

USJRB-RM274 Subgrp B - Emb Coffdms - Arch Alt (PDF)

USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)

USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)

USJRB - RM274 - Subgrp C - Spillway Curved Arch Dam - 2013 - 1 (PDF)

USJRB - RM 274 - Subgrp A - RCC Dam - VE Prop 6 Curved (PDF)

Kerckhoff Decom (spreadsheet)

Recreation (spreadsheet)

Utilities (spreadsheet)

LeGrande Transmission Line (spreadsheet)

Reservoir Clearing (spreadsheet)

## Conversion Factors and Dust Emission Factors

this sheet contains common conversion factors and construction timing assumptions used throughout this entire spreadsheet as well as calculated emission factors for fugitive dust emissions based on EPA's AP-42

### Construction Timing

	Years	days
Phase 1	3.5	770
Phase 2	4	880
Phase 3	5	1100
Alternatives	10	

### Conversions

	Units	Source
220	days/yr	conversion
8	hours/day	conversion
2000	lbs/ton	conversion
0.9	ton/mt	conversion
1.3	tons/cubic yard	calEEMod v2013.2
2.3	mph= 1m/s	conversion
0.1	% unpaved roads	assumption
453.6	g/lb	conversion
1.34	hp/kW	conversion

### Fugitive Dust Emissions

This section provides calculated emission factors for the various sources of fugitive dust emissions using formulas from EPA's AP-42

#### 1 Bulldozing/Grading/Scraping

Equation is applied to dozers/scrapers, and graders to estimate fugitive dust from grading activity  
Emissions factors for P10 from bulldozing are scaled from those of PM15

$$E(\text{lbs/hr}) = C(\text{PM15}) * s^{1.5} / M^{1.5} \quad \text{Where} \quad E(\text{PM10}) = E(\text{PM15}) * F(\text{PM10})$$

Where:	Unit	Source
C= coefficient	1 constant	AP-42 Table 11.9-1, PM15, overburden
M= material moisture content	7.9 %	AP-42 Table 11.9-3, Overburden
s= material silt content	6.9 %	AP-42 Table 11.9-3, Overburden
F= scaling factor	0.75 constant	AP-42 Table 11.9-1, PM10 Bulldozing

Emission Factors	PM15	PM10	PM10	Unit
	0.82	0.61	0.00031	lbs/hr
				tons/hr

Source: EPA 1998. AP-42 Chapter 11.9 Mineral Products Industry, Western Surface Coal Mining, Equation 11.9-1 Bulldozing

**2 Batch Plant**

<u>Batching Operations</u>	<u>Emission Factor</u>	
	<u>PM10 (lbs/cy)</u>	<u>PM2.5 (lbs/cy)</u>
Aggregate Transfer	0.0031	0.00047
Sand Transfer	0.0007	0.00011
Cement unloading	0.113	0.0152
Cement supplement unloading	0.04	0.0054
weigh hopper loading	0.13	0.0175
Mixer loading (central mix)	0.0038	0.00058

*Source: SMAQMD 2010 (June 28). Concrete Batching Operations Policy Manual. Last updated March 31, 2011.*

**3 Truck Loading**

*Emissions result from several distinct processes within the stockpiling/loading cycle: 1. loading in of materials through batch or drop operations, 2. equipment traffic in storage areas, 3. wind erosion of piles, 4. loadout of material through batch or drop operations*

$E(\text{lb/ton}) = (k)(0.0032)(U/5)^{1.3}/(M/2)^{1.4}$

Where:	<u>PM10</u>	<u>Unit</u>	<u>Source</u>
k= Particle Size Multiplier:	0.35	lbs/ton	AP-42 Chapter 13.2.4-3, PM10 emissions
U=mean wind speed	2.7	m/s	CalEEMod wind speed for San Joaquin County
U=mean wind speed	6.2	mph	Calculation based on wind speed for San Joaquin County from CalEEMod
M=moisture content (%)	12.0	constant	AP-42 Chapter 13.2.4-3, Table 13.2.4-1, as used by CalEEMod
Emission Factor	0.000120827	lbs/ton	
	0.000000604	tons pm10/ton	

*Source: EPA 1998. AP-42 Chapter 13.2 Miscellaneous Sources, Aggregate Handling and Storage Piles*

**4 Travel on Unpaved Roads (Heavy Duty Trucks)**

$E(\text{lbs/VMT}) = (k)(s/12)^a (W/3)^b$

Where:	<u>PM10</u>	<u>Unit</u>	<u>Source</u>
k= Particle Size Multiplier:	1.5	lbs/VMT	AP-42 Chapter 13.2.2-2, PM10 emissions; industrial roads
s= Silt Content	0.043	constant	AP-42 Chapter 13.2.2-2, service roads
a= constant	0.9	constant	AP-42 Chapter 13.2.2-2, industrial roads
b= constant	0.45	constant	AP-42 Chapter 13.2.2-2, industrial roads
W=Vehicle Weight	14	tons	Average weight of loaded and unloaded truck: assumed empty truck weights 2 tons, 20 CY truck capacity and 1 CY of fill equals 1.3 tons $((2+(20\text{cy} \cdot 1.3 \text{ tons}))/2)$
	0.01	lbs/VMT	
	0.0000069	tons/VMT	

Correction for Natural Precipitation

$E(\text{ext}) = E[(365 - P)/365]$

Where:	<u>PM10</u>	<u>Unit</u>	<u>Source</u>
P=#days/yr with >=0.01 precip	51	inches	CalEEMod for San Joaquin County
Emission Factors	0.012	lbs/VMT	
	0.0000059	tons/VMT	

*Source: EPA 1998. AP-42 Chapter 13.2 Miscellaneous Sources, Unpaved Roads*

**5 Travel on Paved Roads (Heavy Duty Trucks and Worker Commute)**

$$E(\text{lbs/VMT}) = (k)(sL)^{.91} (W)^{1.02}$$

Where:	PM10	Unit	Source
k= Particle Size Multiplier:	0.0022	lbs/VMT	AP-42 Chapter 13.2.1, Table 13.2.1-1, PM10 emissions
sL= road surface silt loading	0.06	g/m <sup>2</sup>	AP-42 Chapter 13.2.1, Table 13.2.1-2
W=Vehicle Weight	2.1	tons	Worker Commute Vehicle Weight Calculation shown below
			Heavy Duty Average weight of loaded and unloaded truck: assumed empty truck weights 2 tons, 20 CY truck capacity and 1 CY of fill equals 1.3 tons
			$((2+(20\text{cy} \times 1.3 \text{ tons} + 2))/2)$
W=Vehicle Weight	14	tons	
	0.000362413	lbs/vmt	Worker Vehicle
	0.002509521	lbs/vmt	Heav Duty Vehicle

Correction for Natural Precipitation

$$E(\text{ext}) = E[(1-P/4N)]$$

Where:		Unit	Source
P=#days/yr with >=0.01 precip	51 days		CalEEMod for San Joaquin County
N=# days in averaging period	365 days		NA

Emission Factors	0.000349754 lbs/vmt	Worker Vehicle
	0.000000175 tons/vmt	Worker Vehicle
	0.002421860 lbs/vmt	Heavy Duty Vehicle
	0.000001211 tons/vmt	Heavy Duty Vehicle

Worker Commute Vehicle Weight Calculation

		Units	Source
Vehicle class for worker trips	LDA, LDT1, LDT2	NA	default value in CalEEMod's for Trips/VMT in the Construction module
Weight	4230	lb	average of vehicle category weight (LDA-3,190 lbs, LDT1-3,750 lbs, LDT2-5,750 lbs) from EMFAC2011
Mass conversion	2000	lb/ton	conversion
Weight	2.12	ton	calculation

Source: EPA 1998. AP-42 Chapter 13.2 Miscellaneous Sources, Paved Roads

### Exhaust Emissions (Off-Road and On-Road Vehicles)

this sheet provides calculation of emission factors from off-road fuel consumption based on OFFROAD 2007, on-road exhaust emissions from haul trucks and worker commute based on EMFAC 2011 and AP-42, and exhaust emissions from marine vessels, and is used to estimate exhaust emissions from construction activities.

Fuel Consumption/Emissions (off-road equipment)								
OFFROAD 2007: San Joaquin County, 2015								
Equipment	MaxHP	Population	Activity (hr/day)	Consumption (gal/day)	ROG Exhaust (tons/day)	NOX Exhaust (tons/day)	CO2 (tons/day)	PM Exhaust (tons/day)
Pavers	500	102	233	2470	0.02	0.21	27.18	0.01
Rollers	500	219	420	4172	0.03	0.29	46.02	0.01
Scrapers	500	1239	3773	55045	0.54	4.54	605.85	0.18
Surfacing Equipment	500	65	80	804	0.01	0.06	8.87	0.00
Trenchers	500	66	114	1610	0.02	0.14	17.71	0.01
Bore/Drill Rigs	500	230	531	7474	0.03	0.20	82.65	0.01
Excavators	500	2770	10786	114105	0.85	6.26	1259.39	0.22
Cranes	500	343	1203	9821	0.08	0.71	108.28	0.03
Graders	500	72	189	1962	0.02	0.13	21.63	0.00
Off-Highway Trucks	500	875	4763	58730	0.47	3.37	648.03	0.12
Crushing/Proc. Equipment	500	138	362	6129	0.04	0.39	67.66	0.01
Rough Terrain Forklifts	500	32	100	1165	0.01	0.07	12.86	0.00
Rubber Tired Loaders	500	2232	5963	64012	0.50	4.17	706.05	0.15
Rubber Tired Dozers	500	488	2172	26196	0.32	2.60	287.46	0.11
Tractors/Loaders/Backhoes	500	1136	3005	46887	0.31	2.41	517.70	0.08
Crawler Tractors	500	2048	5859	68924	0.67	5.56	758.75	0.21
Other Construction Equipment	500	589	1131	13007	0.07	0.67	143.69	0.02
Totals				482513	3.9930186	31.7854338	5319.7855180	1.1715923
Tons/gal					0.0000082755	0.0000658748	0.0110251616	0.0000024281
<b>Emission Factor</b>	<b>ROG</b>	<b>NOX</b>	<b>PM Exh</b>	<b>CO2</b>				
Tons/gal	0.0000083	0.0000659	0.0000024	0.0110252				
lbs/gal	0.016550921	0.131749502	0.004856209	22.05032328				

### On-Road (Commute and Haul Trip) Exhaust Emission Factors

EMFAC2011 Emission Rates    Region Type: County    Region: San Joaquin    Calendar Year: 2015    Season: Summer    Vehicle Classification: EMFAC2007 Categories

#### Raw Emission Factors from EMFAC2011

Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	VMT (miles/day)	Trips (trips/day)	ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)
LDA	GAS	Aggregated	Aggregated	221,452	8,373,837	1,395,737	0.035	0.104	374.205	0.002	0.002
LDA	DSL	Aggregated	Aggregated	711	24,969	4,237	0.034	0.589	386.822	0.024	0.022
LDT1	GAS	Aggregated	Aggregated	32,747	1,170,489	198,959	0.091	0.276	428.735	0.004	0.003
LDT1	DSL	Aggregated	Aggregated	43	1,417	230	0.055	0.642	391.012	0.045	0.041
LDT2	GAS	Aggregated	Aggregated	74,971	2,892,650	470,876	0.049	0.196	508.491	0.002	0.002
LDT2	DSL	Aggregated	Aggregated	39	1,453	227	0.039	0.653	387.562	0.030	0.028
T7	GAS	Aggregated	Aggregated	57	8,199	1,131	0.719	4.428	580.568	0.001	0.001
T7	DSL	Aggregated	Aggregated	6,429	1,104,570	0	0.279	6.306	1739.505	0.113	0.104
<b>Total</b>					<b>13,577,584</b>						

#### Ratio of Vehicle/Fuel Type to Total VMT

Veh	Fuel	Ratio
LDA	GAS	61.7%
LDA	DSL	0.2%
LDT1	GAS	8.6%
LDT1	DSL	0.0%
LDT2	GAS	21.3%
LDT2	DSL	0.0%

#### On-Road Emission Factor Calculations

Pollutant	g/mile	Worker (light duty) <sup>1</sup>		g/mile	Haul Truck (heavy duty) <sup>2</sup>	
		lbs/mile	tons/mile		lbs/mile	tons/mile
ROG	0.0400233	8.82364E-05	0.00000004	0.279	0.00061444	0.00000031
NOX	0.1305610	0.000287838	0.00000014	6.306	0.013902	0.00000695
PM10	0.0018070	3.98378E-06	0.00000000	0.113	0.0002495	0.00000012
PM2.5	0.0016487	3.63482E-06	0.00000000	0.104	0.00022954	0.00000011
CO2	376.87	0.830862056	0.00041543	1,740	3.83495297	0.00191748

1. Emission factors calculated based on the composite mix light duty vehicles (LDA, LDT1, LDT2) and the ratio of vehicle/fuel type to total VMT

2. CalEEMod assumes that Heavy-Heavy Diesel Trucks (HHDT) are used to haul materials and equipment during construction. Therefore, haul truck emissions are estimated using EMFAC2011 emission factors for a Heavy-Heavy Duty Diesel CA International Registration Plan Construction Truck (T7 CAIRP construction).

### Marine Vessels

#### Emission Factor Algorithm

$$E = a * (\text{fractional Load})^x + b$$

	a	Fractional Load	x	b
ROG	0.0667	20%	-1.5	0
NOx	0.1255	20%	-1.5	10.4496
PM	0.0059	20%	-1.5	0.2551
CO2	44.1	20%	-1	648.6

#### Emission Factors

	g/kWh	g/bhp-hr	Adjusted g/bhp-hr
ROG	0.75	1.0	0.20
NOx	11.85	15.9	3.18
PM	0.32	0.4	0.09
CO2	869.10	1165.5	233.10

Load Factor    0.2

Sources: EPA 2000, p. 5-2. Emission factors are calculated using the Emission Factor Algorithm and pollutant factors. 20% is the fractional load for many harborcraft when maneuvering. See Table 4-2 on p. 4-13. It is assumed that all of the PM emissions are PM10.

**Project Boat Emissions**

boats would be used during the marine cofferdam work during phase 1 and to complete the cofferdam in phase 3. Thus, boat hours and emissions are divided evenly between these two activities.

<u>Boats</u>	<u>HP</u>	<u>source</u>	<u>Total Work</u>	<u>phase 1 / 2 hrs</u>
Speed Boat	250	assumed	82	41
Tug Boat	900	applicant	31,593	15,797

**Speed Boat Emissions (Phase 1/ Phase 2)**

<u>pollutant</u>	<u>g/phase</u>	<u>lbs/phase</u>	<u>tons/phase</u>
ROG	2,050	5	0.0023
NOX	32,584	72	0.0359
PM10	883	2	0.0010
CO2	2,389,239	5,267	2.5

**Tug Boat Emissions (Phase 1/ Phase 2)**

<u>pollutant</u>	<u>g/phase</u>	<u>lbs/phase</u>	<u>tons/phase</u>
ROG	2,843,480	6,269	3
NOX	45,194,730	99,637	50
PM10	1,224,224	2,699	1
CO2	3,313,897,409	7,305,893	3,653

### On-Road Vehicle Miles Traveled

This sheet includes trip numbers provided by the project applicant for each phase/alternative as well as VMT calculation used to estimate exhaust dust emissions from material hauling and travel on paved/unpaved roads

#### Material Haul VMT

Construction Activity	Route Number	one way (miles)	round trip length (miles)	Alternative 1 Trips	Alternative 1 VMT	Alternative 2 Trips	Alternative 2 VMT	Alternative 3 Trips	Alternative 3 VMT	Alternative 4 Trips	Alternative 4 VMT
	1	35	70	708	49,560	708	49,560	708	49,560	708	49,560
<i>Site Access and Staging</i>	1	35	70	20	1,400	20	1,400	20	1,400	20	1,400
	3	35	70	536	37,520	536	37,520	536	37,520	536	37,520
	11	20	40	1,396	55,840	1,396	55,840	1,396	55,840	1,396	55,840
<i>Cofferdam Material Processing and Marine Cofferdam Work</i>	1	35	70	0	0	0	0	0	0	0	0
	1	35	70	0	0	0	0	0	0	0	0
<i>Diversion Tunnel</i>	1	35	70	1,864	130,480	1,864	130,480	1,864	130,480	1,864	130,480
	3	35	70	298	20,860	298	20,860	298	20,860	298	20,860
<i>Powerhouse/Valve House</i>	10	2	4	13,206	52,824	13,206	52,824	13,206	52,824	13,206	52,824
	1	35	70	2,438	170,660	2,438	170,660	2,438	170,660	2,438	170,660
	1	35	70	1,376	96,320	1,376	96,320	1,376	96,320	1,376	96,320
<i>Intake Structure and Tunnel Connection</i>	1	35	70	18,002	1,260,140	18,002	1,260,140	18,002	1,260,140	18,002	1,260,140
	1	35	70	1,752	122,640	1,752	122,640	1,752	122,640	1,752	122,640
<i>Dam Material Processing and Complete Cofferdams</i>	1	35	70	0	0	0	0	0	0	0	0
	1	35	70	0	0	0	0	0	0	0	0
<i>Foundation Preparation and RCC Arch Dam</i>	1	35	70	1,286	90,020	1,286	90,020	1,286	90,020	1,286	90,020
	1	35	70	73,522	5,146,540	73,522	5,146,540	73,522	5,146,540	73,522	5,146,540
<i>Reclamation and Demobilization</i>	1	35	70	0	0	0	0	0	0	0	0
	4	50	100	826	82,600	826	82,600	826	82,600	826	82,600
<i>Affected Existing Facilities</i>	5	50	100	478	47,800	478	47,800	478	47,800	478	47,800
	1	35	70	0	0	0	0	0	0	0	0
	6	35	70	1,246	87,220	1,246	87,220	1,246	87,220	1,246	87,220
	7	25	50	6,856	342,800	6,856	342,800	6,856	342,800	6,856	342,800
	11	20	40	30	1,200	30	1,200	30	1,200	30	1,200
<i>Reservoir Clearing</i>	9	20	40	188	7,520	188	7,520	188	7,520	188	7,520
	7	25	50	8,236	411,800	8,236	411,800	8,236	411,800	8,236	411,800

#### Worker Commute VMT

Construction Activity	Route Number	one way (miles)	round trip length (miles)	Alternative 1 Trips	Alternative 1 VMT	Alternative 2 Trips	Alternative 2 VMT	Alternative 3 Trips	Alternative 3 VMT	Alternative 4 Trips	Alternative 4 VMT
	1	35	70	39,156	2,740,920	39,156	2,740,920	39,156	2,740,920	39,156	2,740,920
<i>Site Access and Staging</i>	1	35	70	84,986	5,949,020	84,986	5,949,020	84,986	5,949,020	84,986	5,949,020
	3	35	70	5,092	356,440	5,092	356,440	5,092	356,440	5,092	356,440
	11	20	40	1,396	55,840	1,396	55,840	1,396	55,840	1,396	55,840
<i>Cofferdam Material Processing and Marine Cofferdam Work</i>	1	35	70	38,304	2,681,280	38,304	2,681,280	38,304	2,681,280	38,304	2,681,280
	3	35	70	25,036	1,752,520	25,036	1,752,520	25,036	1,752,520	25,036	1,752,520
<i>Diversion Tunnel</i>	1	35	70	74,946	5,246,220	74,946	5,246,220	74,946	5,246,220	74,946	5,246,220
	3	35	70	2,438	170,660	2,438	170,660	2,438	170,660	2,438	170,660
<i>Powerhouse/Valve House</i>	1	35	70	26,796	1,875,720	26,796	1,875,720	26,796	1,875,720	42,012	2,940,840
	1	35	70	33,434	2,340,380	33,434	2,340,380	33,434	2,340,380	33,434	2,340,380
<i>Intake Structure and Tunnel Connection</i>	1	35	70	13,324	932,680	13,324	932,680	13,324	932,680	13,324	932,680
	1	35	70	23,996	1,679,720	23,996	1,679,720	23,996	1,679,720	23,996	1,679,720
<i>Dam Material Processing and Complete Cofferdams</i>	1	35	70	187,764	13,143,480	187,764	13,143,480	187,764	13,143,480	187,764	13,143,480
	1	35	70	1,952	136,640	1,952	136,640	1,952	136,640	1,952	136,640
<i>Foundation Preparation and RCC Arch Dam</i>	4	50	100	8,100	810,000	8,100	810,000	8,100	810,000	8,100	810,000
	1	35	70	2,722	272,200	2,722	272,200	2,722	272,200	2,722	272,200
<i>Reclamation and Demobilization</i>	1	35	70	114	7,980	114	7,980	114	7,980	114	7,980
	5	50	100	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600
<i>Affected Existing Facilities</i>	1	35	70	114	7,980	114	7,980	114	7,980	114	7,980
	5	50	100	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600
<i>Reservoir Clearing</i>	1	35	70	114	7,980	114	7,980	114	7,980	114	7,980
	5	50	100	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600	35,186	3,518,600



## Material Quantities

This sheet contains project data provided by the client on total aggregate/material quantities and is used to calculate fugitive dust emissions from truck loading/movement during construction as well as batch plant throughput

	Alt 1		Alt 2		Alt 3		Alt 4	
Phase 1	cy	tons	cy	tons	cy	tons	cy	tons
Excavation	17,769,574	23,100,446	17,769,574	23,100,446	17,769,574	23,100,446	17,769,574	23,100,446
Embankment/Fill	2,718,300	3,533,790	2,718,300	3,533,790	2,718,300	3,533,790	2,718,300	3,533,790
Aggregate*	2,289,655	2,976,552	2,289,655	2,976,552	2,289,655	2,976,552	2,289,655	2,976,552
<b>Phase total</b>	<b>22,777,529</b>	<b>29,610,788</b>	<b>22,777,529</b>	<b>29,610,788</b>	<b>22,777,529</b>	<b>29,610,788</b>	<b>22,777,529</b>	<b>29,610,788</b>
<b>Phase 2</b>								
Excavation	898,848	1,168,502	898,848	1,168,502	898,848	1,168,502	946,848	1,230,902
Embankment/Fill	626,500	814,450	626,500	814,450	626,500	814,450	626,500	814,450
Aggregate*	125,206	162,768	125,206	162,768	125,206	162,768	176,901	229,971
<b>Phase total</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,650,554</b>	<b>2,145,720</b>	<b>1,750,249</b>	<b>2,275,324</b>
<b>Phase 3</b>								
Excavation	1,547,158	2,011,305	1,547,158	2,011,305	1,547,158	2,011,305	1,547,158	2,011,305
Embankment/Fill	45,050	58,565	45,050	58,565	45,050	58,565	45,050	58,565
Aggregate*	6,008,556	7,811,123	6,008,556	7,811,123	6,008,556	7,811,123	6,008,556	7,811,123
<b>Phase total</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>	<b>7,600,764</b>	<b>9,880,993</b>
<b>Alternative total</b>	<b>32,028,847</b>	<b>41,637,501</b>	<b>32,028,847</b>	<b>41,637,501</b>	<b>32,028,847</b>	<b>41,637,501</b>	<b>32,128,542</b>	<b>41,767,105</b>

\*aggregate would come from onsite batch plants and therefore aggregate quantities were used to estimate daily throughput of the batch plant to calculate fugitive dust emissions

Temperance Flat Transmission Line Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,177	3,265	-
3/4 Ton Crew Cab Truck 4x4	2,177	3,265	-
40 Ton Hydraulic Crane (Grove700)	2,177	-	5,224
Drill Rig Truck Mount	2,177	-	4,354
170 Hsp Bulldozer (Cat D6)	2,177	-	10,884
Subtotal:	10,884	6,530	20,462
<b>Total:</b>			
	<b>10,884</b>	<b>6,530</b>	<b>20,462</b>

Grading/Dozing/Scraper 2,177

**Haul Roads Area A: Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	45	191	0
1.5 CY Backhoe (Cat 325)	2,074	12,740	0
2.3 CY Backhoe (Cat 235)	8,849	63,824	0
3.5 CY Loader (Cat 950)	2,074	8,044	0
11.2 CY Loader (Cat 990)	4,657	63,560	0
140 Hsp Grader (Cat 140)	24,554	178,464	0
150 Hsp Grapple (Cat 527)	1,999	12,085	0
275 Hsp Grader (Cat 16G)	5,123	39,791	0
170 Hsp Bulldozer (Cat D6)	30,105	167,029	0
305 Hsp Bulldozer (Cat D8)	9,780	105,805	0
850 Hsp Bulldozer (Cat D11)	6,985	193,780	0
6 Ton Compactor 48"(Cat 323)	45	111	0
10 Ton Compactor 120 hsp (Dyn CA25)	6,399	25,597	0
23 Ton Compactor 220 hsp (Cat 815)	18,155	156,666	0
18 CY Tandem Scraper (Cat 627)	1,863	28,432	0
90 Kg Plate Tamper	2,074	0	696
Cat TK723 Feller Buncher	1,999	20,410	0
DT-320 Tree Mulcher	1,999	42,524	0
Tree Stumper	3,997	12,198	0
Subtotal:	132,774	1,131,250	696
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	7,969	64,110	0
Subtotal:	7,969	64,110	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	31,797	0	58,806
5 Ton Flat Bed Truck	2,656	8,106	0
16 Ton (8 CY) Tandem Truck	27,838	190,469	0
20 Ton (10 CY) Tandem Truck	9,588	65,601	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	18,627	206,698	0
3000 Gallon Watertruck	18,155	80,584	0
5000 Gallon Watertanker	4,657	23,253	0
10000 Gallon Cat 631 Waterwagon	466	3,077	0
Subtotal:	113,785	577,788	58,806
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	2,074	0	767
Subtotal:	2,074	0	767
<b>Total:</b>	<b>256,601</b>	<b>1,773,149</b>	<b>60,269</b>
Grading/Dozing/Scraper	31,540		

Haul Roads Area D: Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	5	23	0
1.5 CY Backhoe (Cat 325)	144	885	0
2.3 CY Backhoe (Cat 235)	972	7,011	0
3.5 CY Loader (Cat 950)	144	559	0
11.2 CY Loader (Cat 990)	505	6,896	0
140 Hsp Grader (Cat 140)	2,408	17,500	0
150 Hsp Grapple (Cat 527)	154	929	0
275 Hsp Grader (Cat 16G)	542	4,210	0
170 Hsp Bulldozer (Cat D6)	3,403	18,883	0
305 Hsp Bulldozer (Cat D8)	1,047	11,330	0
850 Hsp Bulldozer (Cat D11)	758	21,025	0
6 Ton Compactor 48"(Cat 323)	5	13	0
10 Ton Compactor 120 hsp (Dyn CA25)	329	1,317	0
23 Ton Compactor 220 hsp (Cat 815)	2,079	17,937	0
18 CY Tandem Scraper (Cat 627)	147	2,240	0
90 Kg Plate Tamper	144	0	48
Cat TK723 Feller Buncher	154	1,568	0
DT-320 Tree Mulcher	154	3,268	0
Tree Stumper	307	937	0
Subtotal:	13,401	116,531	48
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	865	6,956	0
Subtotal:	865	6,956	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,988	0	5,525
5 Ton Flat Bed Truck	288	879	0
16 Ton (8 CY) Tandem Truck	2,982	20,406	0
20 Ton (10 CY) Tandem Truck	634	4,340	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	2,021	22,426	0
3000 Gallon Watertruck	2,079	9,226	0
5000 Gallon Watertanker	505	2,523	0
10000 Gallon Cat 631 Waterwagon	37	242	0
Subtotal:	11,534	60,044	5,525
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	144	0	53
Subtotal:	144	0	53
<b>Total:</b>	<b>25,944</b>	<b>183,531</b>	<b>5,627</b>
Grading/Dozing/Scraper	8,305		

**Haul Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	19	82	0
1.5 CY Backhoe (Cat 325)	144	885	0
2.3 CY Backhoe (Cat 235)	38	277	0
3.5 CY Loader (Cat 950)	144	559	0
140 Hsp Grader (Cat 140)	4,324	31,425	0
150 Hsp Grapple (Cat 527)	125	755	0
275 Hsp Grader (Cat 16G)	28	219	0
170 Hsp Bulldozer (Cat D6)	4,663	25,873	0
305 Hsp Bulldozer (Cat D8)	28	305	0
6 Ton Compactor 48"(Cat 323)	19	48	0
10 Ton Compactor 120 hsp (Dyn CA25)	285	1,141	0
23 Ton Compactor 220 hsp (Cat 815)	4,038	34,848	0
18 CY Tandem Scraper (Cat 627)	113	1,723	0
90 Kg Plate Tamper	144	0	48
Cat TK723 Feller Buncher	125	1,274	0
DT-320 Tree Mulcher	125	2,655	0
Tree Stumper	250	762	0
Subtotal:	14,613	102,831	48
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	2,640	0	4,882
16 Ton (8 CY) Tandem Truck	173	1,182	0
20 Ton (10 CY) Tandem Truck	622	4,258	0
3000 Gallon Watertruck	4,038	17,925	0
10000 Gallon Cat 631 Waterwagon	28	186	0
Subtotal:	7,502	23,551	4,882
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	144	0	53
Subtotal:	144	0	53
<b>Total:</b>			
	<b>22,259</b>	<b>126,382</b>	<b>4,984</b>

Grading/Dozing/Scraper 4,833

Table X-X. Permanent Roads Area A: Appraisal Level Equipment and Fuel Consumption Est

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	2	10	0
1.5 CY Backhoe (Cat 325)	120	737	0
2.3 CY Backhoe (Cat 235)	3,840	27,697	0
3.5 CY Loader (Cat 950)	120	466	0
11.2 CY Loader (Cat 990)	162	2,213	0
140 Hsp Grader (Cat 140)	4,662	33,888	0
150 Hsp Grapple (Cat 527)	230	1,393	0
275 Hsp Grader (Cat 16G)	216	1,676	0
170 Hsp Bulldozer (Cat D6)	9,006	49,966	0
305 Hsp Bulldozer (Cat D8)	378	4,088	0
850 Hsp Bulldozer (Cat D11)	243	6,745	0
6 Ton Compactor 48"(Cat 323)	2	6	0
10 Ton Compactor 120 hsp (Dyn CA25)	329	1,317	0
23 Ton Compactor 220 hsp (Cat 815)	4,333	37,393	0
18 CY Tandem Scraper (Cat 627)	215	3,274	0
90 Kg Plate Tamper	120	0	40
Cat TK723 Feller Buncher	230	2,353	0
DT-320 Tree Mulcher	230	4,902	0
Tree Stumper	461	1,406	0
Subtotal:	24,901	179,529	40
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	143	786	0
Asphalt Steel Roller (Ferguson)	143	286	0
Asphalt 7 Ton Roller (Cat CB434)	143	2,002	0
Asphalt Broom -Ride On (Ten215)	143	241	0
Subtotal:	572	3,315	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	277	2,232	0
Truck Mounted Post Hole Auger	696	772	0
Subtotal:	973	3,004	0

**Table X-X. Permanent Roads Area A: Appraisal Level Equipment and Fuel Consumption Est**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	5,220	0	9,653
5 Ton Flat Bed Truck	788	2,406	0
General Service Truck	143	0	143
16 Ton (8 CY) Tandem Truck	11,586	79,276	0
20 Ton (10 CY) Tandem Truck	1,645	11,257	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	648	7,195	0
3000 Gallon Watertruck	4,333	19,234	0
5000 Gallon Watertanker	162	809	0
10000 Gallon Cat 631 Waterwagon	54	354	0
Subtotal:	24,580	120,531	9,796
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	120	0	37
Subtotal:	120	0	37
<b>Total:</b>			
	<b>51,147</b>	<b>306,379</b>	<b>9,874</b>
Grading/Dozing/Scraper	14,950		

Table X-X. Permanent Roads Area D: Appraisal Level Equipment and Fuel Consumption Estim

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	1	6	0
1.5 CY Backhoe (Cat 325)	23	140	0
2.3 CY Backhoe (Cat 235)	588	4,241	0
3.5 CY Loader (Cat 950)	23	88	0
11.2 CY Loader (Cat 990)	12	158	0
140 Hsp Grader (Cat 140)	936	6,804	0
150 Hsp Grapple (Cat 527)	42	255	0
275 Hsp Grader (Cat 16G)	21	167	0
170 Hsp Bulldozer (Cat D6)	1,628	9,034	0
305 Hsp Bulldozer (Cat D8)	33	357	0
850 Hsp Bulldozer (Cat D11)	17	482	0
6 Ton Compactor 48"(Cat 323)	1	4	0
10 Ton Compactor 120 hsp (Dyn CA25)	55	219	0
23 Ton Compactor 220 hsp (Cat 815)	881	7,605	0
18 CY Tandem Scraper (Cat 627)	40	603	0
90 Kg Plate Tamper	23	0	8
Cat TK723 Feller Buncher	42	431	0
DT-320 Tree Mulcher	42	899	0
Tree Stumper	84	258	0
Subtotal:	4,494	31,753	8
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	26	140	0
Asphalt Steel Roller (Ferguson)	26	51	0
Asphalt 7 Ton Roller (Cat CB434)	26	357	0
Asphalt Broom -Ride On (Ten215)	26	43	0
Subtotal:	102	592	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	20	159	0
Truck Mounted Post Hole Auger	120	133	0
Subtotal:	140	293	0



Table X-X. Permanent Roads Area D: Appraisal Level Equipment and Fuel Consumption Estim

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	910	0	1,682
5 Ton Flat Bed Truck	127	386	0
General Service Truck	26	0	26
16 Ton (8 CY) Tandem Truck	1,775	12,145	0
20 Ton (10 CY) Tandem Truck	298	2,038	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	46	514	0
3000 Gallon Watertruck	881	3,912	0
5000 Gallon Watertanker	12	58	0
10000 Gallon Cat 631 Waterwagon	10	65	0
Subtotal:	4,084	19,119	1,708
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	23	0	8
Subtotal:	23	0	8
<b>Total:</b>			
	<b>8,843</b>	<b>51,756</b>	<b>1,724</b>

Grading/Dozing/Scraper 2,676

Table X-X. Permanent Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthwork Equipment</b>			
1.5 CY Backhoe (Cat 225)	5	21	0
1.5 CY Backhoe (Cat 325)	31	192	0
2.3 CY Backhoe (Cat 235)	384	2,770	0
3.5 CY Loader (Cat 950)	31	121	0
11.2 CY Loader (Cat 990)	4	49	0
140 Hsp Grader (Cat 140)	1,501	10,908	0
150 Hsp Grapple (Cat 527)	63	383	0
275 Hsp Grader (Cat 16G)	19	146	0
170 Hsp Bulldozer (Cat D6)	2,035	11,288	0
305 Hsp Bulldozer (Cat D8)	22	242	0
850 Hsp Bulldozer (Cat D11)	5	149	0
6 Ton Compactor 48"(Cat 323)	5	12	0
10 Ton Compactor 120 hsp (Dyn CA25)	77	307	0
23 Ton Compactor 220 hsp (Cat 815)	1,424	12,288	0
18 CY Tandem Scraper (Cat 627)	61	931	0
90 Kg Plate Tamper	31	0	10
Cat TK723 Feller Buncher	63	647	0
DT-320 Tree Mulcher	63	1,348	0
Tree Stumper	127	387	0
Subtotal:	5,952	42,190	10
<b>Pavement Equipment</b>			
Asphalt Spreader Rubber (AP 1000)	36	197	0
Asphalt Steel Roller (Ferguson)	36	71	0
Asphalt 7 Ton Roller (Cat CB434)	36	500	0
Asphalt Broom -Ride On (Ten215)	36	60	0
Subtotal:	143	829	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	6	49	0
Truck Mounted Post Hole Auger	192	213	0
Subtotal:	198	262	0

Table X-X. Permanent Roads Area E: Appraisal Level Equipment and Fuel Consumption Estimates

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	1,137	0	2,103
5 Ton Flat Bed Truck	194	592	0
General Service Truck	36	0	36
16 Ton (8 CY) Tandem Truck	1,168	7,988	0
20 Ton (10 CY) Tandem Truck	414	2,835	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	14	159	0
3000 Gallon Watertruck	1,424	6,321	0
5000 Gallon Watertanker	4	18	0
10000 Gallon Cat 631 Waterwagon	15	101	0
Subtotal:	4,406	18,013	2,138
<b>Utilities</b>			
2" Gas Water Pump 8,000 gph	31	0	12
Subtotal:	31	0	12
<b>Total:</b>			
	<b>10,730</b>	<b>61,294</b>	<b>2,161</b>

Grading/Dozing/Scraper 2,142

**Table X-X. Contractor Use Areas Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
2.6 CY Backhoe (Cat 350)	725	7,641	0
3.5 CY Loader (Cat 950)	2,815	10,918	0
11.2 CY Loader (Cat 990)	27,410	374,115	0
18 CY Tandem Scraper (Cat 627)	1,389	21,195	0
125 Ton Towed Packer (SWMB125)	2,815	0	0
160 Hsp Wheel Skidder (Cat 525)	1,450	5,219	0
200 Hsp Grader (Cat 14G)	1,407	10,541	0
275 Hsp Grader (Cat 16G)	27,758	215,608	0
210 Hsp Harvester (Cat 580)	725	5,177	0
305 Hsp Bulldozer (Cat D8)	57,983	627,316	0
850 Hsp Bulldozer (Cat D11)	36,569	1,014,453	0
30 Ton Compactor 315 hsp (Cat 825)	5,629	75,596	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	109,642	1,216,634	0
Jumping Jack Handheld Packer	2,815	0	1,608
22" Smooth Drum Manual (Bomag 55)	2,815	2,413	0
Chipper - clearing	725	15,421	1,657
Subtotal:	282,669	3,602,246	3,265
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	41,718	335,621	0
Subtotal:	41,718	335,621	0
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	41,664	0	77,053
3/4 Ton Crew Cab Truck 4x4	725	0	1,628
5 Ton Flat Bed Truck	13,906	42,435	0
631 Water Wagon	4,222	60,173	0
5000 Gallon Watertanker	27,410	136,872	0
10000 Gallon Cat 631 Waterwagon	347	2,294	0
Chain Saw	1,450	0	383
Subtotal:	89,724	241,773	79,064
<b>Total:</b>			
	<b>414,111</b>	<b>4,179,640</b>	<b>82,329</b>
Grading/Dozing/Scraper	123,716		

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	369	2,046	0
305 Hsp Bulldozer ( Cat D8 )	1,432	15,495	0
850 Hsp Bulldozer ( Cat D11 )	345	9,571	0
2.0 CY Loader (CAT IT28)	954	2,539	0
4.5 CY Loader (Cat 966)	36	165	0
200 Hsp Grader (Cat 14G)	1,074	8,043	0
275 Hsp Grader (Cat 16G)	292	2,264	0
Rome Plow	146	0	0
Farm Tractor	146	404	0
2.0 CY Backhoe ( Cat 330 )	108	899	0
2.6 CY Backhoe (Cat 350)	777	8,187	0
1.7 CY Backhoe Loader (Case680)	40	122	0
30 Ton Articulated Truck (Cat D300)	3,880	25,188	0
18 CY Tandem Scraper (Cat 627)	1,166	17,792	0
631 Water Wagon	755	10,756	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	738	3,794	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	72	967	0
Grid Roller	53	0	0
125 Ton Towed Packer (SWMB125)	72	0	0
160 Hsp Wheel Skidder (Cat 525)	154	1,014	0
210 Hsp Harvester (Cat 580)	77	549	0
Chipper - clearing	77	1,634	176
Subtotal:	12,914	112,242	176
<b>Concrete Equipment</b>			
90 YPH Trailer Mounted Concrete Pump	1,115	3,092	0
Truck Mounted Concrete Pump	2,061	17,152	0
3-CY Concrete Bucket (Gravity)	3,344	0	0
Concrete Vibrator-Normal	8,244	0	0
Concrete Vibrator-2.0 inch	2,229	0	0
Post-tensioning Jack	71	0	0
Grout Pump	71	40	0
Grout Plant	121	168	0

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
8 YPH Wet Shotcrete Pump (Swing 750)	404	337	0
Tunnel Concrete Form Gantry	2,230	0	0
Tunnel Concrete Placing Bridge	1,115	0	0
Tunnel Concrete Finishing Gantry	304	0	0
Subtotal:	21,310	20,788	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	3,435	0	2,287
500 KW Diesel Generator Set	1,858	45,459	0
500 KW Diesel Generator Set	2,249	55,034	0
185 CFM Diesel Compressor	2,500	8,322	0
250 CFM Diesel Compressor	401	1,467	0
375 CFM Diesel Compressor	574	3,440	0
750 CFM Diesel Compressor	4,107	42,386	0
250 Amp Diesel Welder	2,500	0	0
350 Amp Diesel Welder	2,500	0	0
2000 PSI Pressure Washer	2,500	834	0
Subtotal:	22,624	156,943	2,287
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	2,479	8,542	0
40 Ton Hydraulic Crane (Grove700)	29	81	0
Motorized Manlift 30 Ft	397	660	0
Subtotal:	2,904	9,283	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	246	328	0
Hydraulic Hoe Ram	44	0	0
Subtotal:	290	328	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 2" (AC1032)	41	343	0
Hydraulic Drill 3" (AC1238/Tam400)	733	7,079	0
Percussion Jumbo 3- Boom(GD-P123)	2,208	0	0
Tunnel 5 CY Scoop Tram	4,416	58,802	0
Tunnel Ventilation Fan 42"	2,249	0	0
Subtotal:	9,648	66,224	0
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	64	0	75

**Alt 1-3 Low Level Intake Structure Appraisal Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
1/2 Ton Pickup Truck 2x2	32	0	51
1/2 Ton Pickup Truck 4x4	2,904	0	5,525
3/4 Ton Pickup Truck 2x2	76,554	0	169,894
3/4 Ton Pickup Truck 4x4	98	0	233
3/4 Ton Crew Cab Truck	2,112	0	5,357
3/4 Ton Crew Cab Truck 4x4	6,573	0	17,714
5 Ton Flat Bed Truck	3,714	14,836	0
2-Ton Mechanic Truck	7,500	39,947	0
Lube Truck	2,500	9,987	0
Fuel Truck (Tandem Axle 20000 litres)	2,500	13,316	0
3000 Gallon Watertruck	128	682	0
10000 Gallon Cat 631 Waterwagon	243	4,155	0
5 Ton Boomtruck	33	79	0
15 Ton Pitman Boom Truck	1,322	4,752	0
Storage Trailer 40 Ft	27,600	0	0
First Aid Trailer 10 x 40	7,200	0	0
Foreman Shack (8x12)	14,400	0	0
Lunch Trailer (8x20)	7,200	0	0
Office Trailer (12x50 )	3,000	0	0
Parts Storage 8x10	3,000	0	0
Chain Saw	128	0	41
Subtotal:	168,805	87,754	198,889
<b>Total:</b>	<b>238,495</b>	<b>453,562</b>	<b>201,351</b>

Grading/Dozing/Scraper 4,969

**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	489	2,712	0
305 Hsp Bulldozer ( Cat D8 )	1,705	18,445	0
850 Hsp Bulldozer ( Cat D11 )	486	13,482	0
2.0 CY Loader (CAT IT28)	954	2,540	0
4.5 CY Loader (Cat 966)	36	165	0
200 Hsp Grader (Cat 14G)	1,287	9,636	0
275 Hsp Grader (Cat 16G)	292	2,264	0
Rome Plow	146	0	0
Farm Tractor	146	404	0
2.0 CY Backhoe ( Cat 330 )	108	899	0
2.6 CY Backhoe (Cat 350)	929	9,797	0
1.7 CY Backhoe Loader (Case680)	40	122	0
30 Ton Articulated Truck (Cat D300)	4,744	30,795	0
18 CY Tandem Scraper (Cat 627)	1,166	17,792	0
631 Water Wagon	899	0	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	978	5,028	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	72	967	0
Grid Roller	62	0	0
125 Ton Towed Packer (SWMB125)	72	0	0
160 Hsp Wheel Skidder (Cat 525)	154	1,015	0
210 Hsp Harvester (Cat 580)	77	549	0
Chipper - clearing	77	878	0
Subtotal:	15,069	118,301	0
<b>Concrete Equipment</b>			
90 YPH Trailer Mounted Concrete Pump	1,115	3,092	0
Truck Mounted Concrete Pump	7,369	61,327	0
3-CY Concrete Bucket (Gravity)	3,344	0	0
Concrete Vibrator-Normal	29,476	0	0
Concrete Vibrator-2.0 inch	2,229	0	0
Post-tensioning Jack	71	0	0
Grout Pump	71	40	0
Grout Plant	121	168	0



**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
8 YPH Wet Shotcrete Pump (Swing 750)	404	337	0
Tunnel Concrete Form Gantry	2,230	0	0
Tunnel Concrete Placing Bridge	1,115	0	0
Tunnel Concrete Finishing Gantry	304	0	0
Subtotal:	47,850	64,964	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	14,738	0	0
500 KW Diesel Generator Set	2,230	45,459	0
500 KW Diesel Generator Set	2,699	55,034	0
185 CFM Diesel Compressor	6,000	16,645	0
250 CFM Diesel Compressor	2,832	8,643	0
375 CFM Diesel Compressor	689	3,441	0
750 CFM Diesel Compressor	4,929	42,385	0
250 Amp Diesel Welder	6,000	0	0
350 Amp Diesel Welder	6,000	0	0
2000 PSI Pressure Washer	6,000	51,598	0
Subtotal:	52,117	223,204	0
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	6,786	19,485	0
40 Ton Hydraulic Crane (Grove700)	34	81	0
Motorized Manlift 30 Ft	476	660	0
Subtotal:	7,296	20,226	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	295	328	0
Hydraulic Hoe Ram	62	0	0
Subtotal:	357	328	0
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 2" (AC1032)	50	343	0
Hydraulic Drill 3" (AC1238/Tam400)	1,027	8,264	0
Percussion Jumbo 3- Boom(GD-P123)	2,650	0	0
Tunnel 5 CY Scoop Tram	5,299	58,802	0
Tunnel Ventilation Fan 42"	2,699	0	0
Subtotal:	11,725	67,410	0
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	77	0	75

**Alt 4 Selective Level Intake Structure Feasibility Level Equipment and Fuel Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
1/2 Ton Pickup Truck 2x2	38	0	51
1/2 Ton Pickup Truck 4x4	3,485	0	5,525
3/4 Ton Pickup Truck 2x2	132,353	0	244,773
3/4 Ton Pickup Truck 4x4	194	0	385
3/4 Ton Crew Cab Truck	5,069	0	10,713
3/4 Ton Crew Cab Truck 4x4	19,707	0	44,255
5 Ton Flat Bed Truck	9,834	30,009	0
2-Ton Mechanic Truck	18,000	79,894	0
Lube Truck	6,000	19,974	0
Fuel Truck (Tandem Axle 20000 litres)	6,000	26,631	0
3000 Gallon Watertruck	154	682	0
10000 Gallon Cat 631 Waterwagon	292	1,926	0
5 Ton Boomtruck	40	79	0
15 Ton Pitman Boom Truck	2,769	8,295	0
Storage Trailer 40 Ft	48,960	0	0
First Aid Trailer 10 x 40	11,520	0	0
Foreman Shack (8x12)	23,040	0	0
Lunch Trailer (8x20)	11,520	0	0
Office Trailer (12x50 )	7,200	0	0
Parts Storage 8x10	7,200	0	0
Chain Saw	154	0	41
Subtotal:	313,604	167,489	305,818
<b>Total:</b>	<b>448,018</b>	<b>661,922</b>	<b>305,818</b>

Grading/Dozing/Scraper 5,715

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
170 Hsp Bulldozer ( Cat D6 )	120	666	0
305 Hsp Bulldozer ( Cat D8 )	6,050	65,456	0
850 Hsp Bulldozer ( Cat D11 )	2,203	61,103	0
3.5 CY Loader (Cat 950)	413	1,601	0
6.5 CY Loader (Cat 980)	288	1,924	0
11.2 CY Loader (Cat 990)	2,761	37,678	0
2.1 CY Track Loader (Cat 939)	444	1,848	0
200 Hsp Grader (Cat 14G)	826	6,188	0
275 Hsp Grader (Cat 16G)	3,015	23,416	0
Rome Plow	127	0	0
Farm Tractor	127	352	0
2.0 CY Backhoe ( Cat 330 )	72	599	0
2.6 CY Backhoe (Cat 350)	125	1,316	0
1.7 CY Backhoe Loader (Case680)	40	122	0
5 Ton Flatbed Truck	300	999	0
50 Ton Off Hwy Truck 680 Hsp (Cat 773)	11,112	123,306	0
18 CY Tandem Scraper (Cat 627)	1,016	15,509	0
631 Water Wagon	1,857	26,468	0
Jumping Jack Handheld Packer	413	0	236
22" Smooth Drum Manual (Bomag 55)	1,493	1,280	0
10 Ton Compactor 120 hsp ( Dyn CA25)	77	307	0
13 Ton Compactor 72" (Cat 553)	240	1,234	0
15 Ton Compactor 84" (Cat 563)	192	1,097	0
20 Ton Compactor 190 hsp ( Bomag 217)	77	505	0
30 Ton Compactor 315 hsp (Cat 825)	2,003	26,896	0
Grid Roller	58	0	0
125 Ton Towed Packer (SWMB125)	1,110	0	0
160 Hsp Wheel Skidder (Cat 525)	134	0	0
210 Hsp Harvester (Cat 580)	67	480	0
Chipper - clearing	67	1,430	154
Subtotal:	36,826	401,780	390
<b>Paving Equipment</b>			
2 Deck 8x24 Screen	96	186	0
Plate Feeder 36inx6Ft	96	160	0
Radial Stacker 24"x100 15 Hsp	96	107	0
Subtotal:	288	453	0

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Pipeline Equipment</b>			
250 Amp Diesel Welder	564	0	0
400 Amp Diesel Welder	79,808	0	0
Acetylene Cutting Torch	564	0	0
Subtotal:	80,936	0	0
<b>Concrete Equipment</b>			
Concrete Pump	5,256	14,579	0
Truck Mounted Concrete Pump	11,221	93,388	0
Concrete Vibrator-Normal	22,443	0	0
Post-tensioning Jack	361	0	0
Grout Pump	661	367	0
Grout Plant	741	1,028	0
8 YPH Wet Shotcrete Pump (Swing 750)	206	171	0
Subtotal:	40,889	109,534	0
<b>Utility Equipment</b>			
10 KW Generator Set (Gas)	22,443	0	12,452
15 KW Generator Set (Gas)	592	0	493
150 KW Diesel Generator Set	9,845	49,159	0
500 KW Diesel Generator Set	1,170	23,856	0
125 CFM Diesel Compressor	965	2,143	0
185 CFM Diesel Compressor	6,030	16,728	0
250 CFM Diesel Compressor	787	2,400	0
750 CFM Diesel Compressor	1,170	10,062	0
250 Amp Diesel Welder	6,000	0	0
350 Amp Diesel Welder	6,000	0	0
2000 PSI Pressure Washer	6,000	51,598	0
Subtotal:	61,002	155,946	12,945
<b>Hoisting Equipment</b>			
60 Ton Crawler Crane (Linkbelt118)	1,980	5,685	0
150 Ton Crawler Crane (American 9260)	6,085	23,547	0
40 Ton Hydraulic Crane (Grove700)	2,770	6,570	0
Motorized Manlift 30 Ft	206	286	0
Knuckleboom Manlift 36 Ft	373	622	0
Motorized Manlift 120FT ( JLG 120FXJ)	373	1,184	0
Subtotal:	11,787	37,893	0
<b>Foundation &amp; Marine Equipment</b>			
Truck Mounted Post Hole Auger	308	342	0
Hydraulic Hoe Ram	58	0	0
Subtotal:	366	342	0

**Powerhouse and Valve House Feasibility Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Drilling &amp; Tunneling Equipment</b>			
Hydraulic Drill 3" (AC1238/Tam400)	1,828	14,703	0
Diamond Core Drill (Hilti)	30	0	0
Tunnel 5 CY Scoop Tram	120	1,332	0
Tunnel Ventilation Fan 42"	10,075	0	0
Subtotal:	12,052	16,035	0
<b>Service &amp; Maintenance Equipment</b>			
Compact Pickup Truck 2x2	77	0	75
1/2 Ton Pickup Truck 2x2	38	0	51
1/2 Ton Pickup Truck 4x4	2,598	0	4,118
3/4 Ton Pickup Truck 2x2	195,072	0	360,766
3/4 Ton Pickup Truck 4x4	346	0	685
3/4 Ton Crew Cab Truck	5,069	0	10,713
3/4 Ton Crew Cab Truck 4x4	29,293	0	65,782
5 Ton Flat Bed Truck	15,023	45,842	0
2-Ton Mechanic Truck	18,000	79,894	0
Lube Truck	12,000	39,947	0
Fuel Truck (Tandem Axle 20000 litres)	6,000	26,631	0
3000 Gallon Watertruck	154	682	0
5000 Gallon Watertanker	2,761	13,785	0
10000 Gallon Cat 631 Waterwagon	254	1,678	0
5 Ton Boomtruck	40	79	0
15 Ton Pitman Boom Truck	3,639	10,902	0
Tractor & Hi-Trailer	2,177	13,889	0
Storage Trailer 40 Ft	48,960	0	0
First Aid Trailer 10 x 40	11,520	0	0
Foreman Shack (8x12)	46,080	0	0
Lunch Trailer (8x20)	23,040	0	0
Office Trailer (12x50 )	7,200	0	0
Parts Storage 8x10	7,200	0	0
Chain Saw	134	0	36
Subtotal:	436,672	233,330	442,226
<b>Total:</b>			
	<b>680,820</b>	<b>955,313</b>	<b>455,560</b>

Grading/Dozing/Scraper 13,484

**LeGrande-Sanger Transmission Line Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Service &amp; Maintenance Equipment</b>			
3/4 Ton Pickup Truck 2x2	1,642	2,462	-
3/4 Ton Crew Cab Truck 4x4	1,642	2,462	-
40 Ton Hydraulic Crane (Grove700)	1,642	-	3,940
Drill Rig Truck Mount	1,642	-	3,283
170 Hsp Bulldozer (Cat D6)	1,642	-	8,208
Subtotal:	8,208	4,925	15,431
<b>Total:</b>			
	<b>8,208</b>	<b>4,925</b>	<b>15,431</b>
Grading/Dozing/Scraper	1,642		

**Reservoir Area Recreation Appraisal Level Equipment and Fuel Consumption Estimates**

Description	Equipment Hours	Total Diesel Consumption (gal)	Total Gas Consumption (gal)
<b>Earthmoving Equipment</b>			
1.4 CY Backhoe Loader (JD 410)	832	1,616	0
1.5 CY Backhoe (Cat 325)	4,190	11,431	0
1.7 CY Backhoe Loader (Case 680)	0	1	0
10 Ton Compactor 120 hsp (Dyn CA25)	179	718	0
110 Hsp Bulldozer (Cat D5)	13	53	0
125 Hsp Grader (Cat 120)	1,139	8,212	0
125 Ton Towed Packer (SWMB125)	6	0	0
13 Ton Compactor 72" (Cat 553)	939	4,829	0
1300LB Skid Steer Loader (Bobcat 743)	1	2	0
15 Ton Compactor 84" (Cat 563)	40	228	0
150 Hsp Grapple (Cat 527)	21	125	0
170 Hsp Bulldozer (Cat D6)	179	994	0
2.0 CY Backhoe (Cat 330)	103	859	0
2.3 CY Backhoe (Cat 235)	121	1,138	0
2.6 CY Backhoe (Cat 350)	171	1,804	0
2.7 CY Loader (JD 644)	1,383	5,266	0
200 Hsp Grader (Cat 14G)	237	1,772	0
22" Smooth Drum Manual (Bomag 55)	1,125	965	0
3.0 CY Track Loader (Cat 963)	121	487	0
6.5 CY Loader (Cat 980)	171	1,143	0
80 LB Jackhammer	342	0	0
Cat TK723 Feller Buncher	21	210	0
Farm Tractor-4 Wheel Drive	0	0	0
Hoe Hammer 4X	57	0	0
DT-320 Tree Mulcher	0	0	0
Tree Stumper	41	126	0
Subtotal:	11,433	41,979	0
<b>Pipeline Equipment</b>			
Acetylene Cutting Torch	121	0	0
Subtotal:	121	0	0
<b>Concrete Equipment</b>			
90 YPH Trailer-Mounted Concrete Pump	0	0	0
Subtotal:	0	0	0
<b>Utility Equipment</b>			