Yuba County IRWMP | 2015 UPDATE

APPENDIX 14-4
Completed Greenhouse Gas Inventories

Note: Not all projects were sufficiently developed to complete Greenhouse Gas Inventories.

BYLT-02: Yuba Watershed Forest and Fuels Project
Component 1 - CWPP Implementation
Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Masticator (equivalent to D 120 Excavator)*	1	100	800	3.38	2,704	0.010	28
3				0		-	0.010	-
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**2,704**		**28**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
32	13	300	7.95	31005	23.8	**1302.7**	0.009	**11.74**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery				4.25	0	0.010	0
Spoils				4.25	0	0.010	0
TOTAL							**0**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 39.8 (from lines 25, 32, 39, and 43)

Total Years of Construction 1

Expected Start Date of Construction n/a

Estimated Project Useful life 10 Years

Average Annual Total GHG Emissions[7] 3.9835888 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

CAMPTONVILLE WATER SYSTEM IMPROVEMENT PROJECT
Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	Chainsaw			12	0.27	3	0.010	0
3	Chipper			4	5.49	22	0.010	0
4	Crane			8	8.18	65	0.010	1
5	Dump Truck			12	11.51	138	0.010	1
6	Equip Haul			6	7.55	45	0.010	0
7	Excavator			8	10.6	85	0.010	1
8	Loader			10	6.76	68	0.010	1
9	Material Haul			0	7.55	-	0.010	-
10	Spoils Haul			4	7.55	30	0.010	0
11	Skidder			6	10.76	65	0.010	1
12	Self Loader			6	7.55	45	0.010	0
13	Transit Mixer			12	11.51	138	0.010	1
14	Trencher			8	10.14	81	0.010	1
15	Well Drill			20	9.04	181	0.010	2
16	Well Pump			504	0.46	232	0.010	2
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**1,198**		**12**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	3	28	50	4200	23.8	**176.5**	0.009	**1.59**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	4	50	200	4.25	47	0.010	0.49
Spoils	2	50	100	4.25	24	0.010	0.24
TOTAL							**0.73**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	1	0.310	0.31

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	15.1	(from lines 25, 32, 39, and 43)
Total Years of Construction	0.25	
Expected Start Date of Construction	June-16	
Estimated Project Useful life	35	Years
Average Annual Total GHG Emissions[7]	0.43	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Well System Monitoring Rehabilitation Project - Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Drill Rig*	1	50	400	6.42	2,568	0.010	27
3	*Backhoe*	1	50	400	2.37	948	0.010	10
4	*Trencher*	1	20	160	6.58	1,053	0.010	11
5	*Excavator*	1	20	160	3.38	541	0.010	6
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**5,110**		**53**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	4	50	100	20000	23.8	**840.3**	0.009	**7.57**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	15	100	1500	4.25	352.94	0.010	3.67
Spoils	5	50	250	4.25	58.82	0.010	0.61
TOTAL							**4.28**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	64.9	(from lines 25, 32, 39, and 43)
Total Years of Construction	1	
Expected Start Date of Construction	TBD	
Estimated Project Useful life	40	Years
Average Annual Total GHG Emissions[7]	1.6	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Forbestown Ditch Improvement Project - Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
1								
	Trackhoe - Excavator	1	240	1920	5.12	9,830	0.010	102
3	*Front End Loader*	1	240	1920	4.85	9,312	0.010	97
4	Pick-up Truck	1	240	1920	1.5	2,880	0.010	30
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**22,022**		**229**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
10	10	250	70	175000	23.8	**7352.9**	0.009	**66.25**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	90	150	13500	4.25	3176.470588	0.010	33.01
Spoils	0	0	0	4.25	0	0.010	0
TOTAL							**33.01**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed (portable generator)	4.5	0.310	1.395

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	329.5	(from lines 25, 32, 39, and 43)
Total Years of Construction	0.5	
Expected Start Date of Construction	April-15	
Estimated Project Useful life	100	Years
Average Annual Total GHG Emissions[7]	3.2949594	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Acquisition of Landside Urban Levee Maintenance Corridor- Inventory and Calculation of Greenhouse Gas Emissions

Line	Emissions from Construction Equipment							
1	**Type of Equipment**	**Maximum Number per Day**	**Total Operation Days**	**Total Operation Hours[1]**	**Fuel Consumption Per Hour[2]**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal diesel [3]**	**Total CO_2 Equivalent Emissions (metric tons)**
2	*Cranes*	1	5	40	1.94	78	0.010	1
3	*Rough Terrain Forklifts*	2	120	1920	3.3	6,336	0.010	66
4	Rubber Tired Loaders	3	120	2880	2.44	7,027	0.010	73
5	Concrete Industrial Saws	1	10	80	0.75	60	0.010	1
6	Cement and Mortar Mixers	2	10	160	0.8	128	0.010	1
7	Other Construction Equipment	5	120	4800	0.6	2,880	0.010	30
8	Misc Portable Equipment	10	60	4800	3.15	3	0.010	0
9	Tampers / Rammers	2	30	480	0.49	235	0.010	2
10	Rollers	2	5	80	0.55	44	0.010	0
11	Paving Equipment	1	2	16	0.2	3	0.010	0
12	Excavators	3	60	1440	3.38	4,867	0.010	51
13	Graders	3	20	480	5.66	2,717	0.010	28
14	Crawler Tractors	3	20	480	5.54	2,659	0.010	28
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**27,038**		**281**
26	[1] An 8-hour work day is assumed.							
27	[2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors							
28	[3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2							
29								

Emissions from Transportation of Construction Workforce

Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
5	150	120	90000	23.8	**3781.5**	0.009	**34.07**

[4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	30	120	3600	4.25	847.0588235	0.010	8.802106729
Spoils	30	120	3600	4.25	847.0588235	0.010	8.802106729
TOTAL							**17.60421346**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	2	0.310	0.62

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	333.3	(from lines 25, 32, 39, and 43)
Total Years of Construction	0.5	
Expected Start Date of Construction	TBD	
Estimated Project Useful life	40	
Average Annual Total GHG Emissions[7]	8.3313248	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Chestnut Pump Station Reconstruction- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Cranes*	1	25	200	1.94	388	0.010	4
3	*Rough Terrain Forklifts*	1	120	960	3.3	3,168	0.010	33
4	Rubber Tired Loaders	1	120	960	2.44	2,342	0.010	24
5	Concrete Industrial Saws	1	10	80	0.75	60	0.010	1
6	Cement and Mortar Mixers	1	10	80	0.8	64	0.010	1
7	Other Construction Equipment	1	60	480	0.6	288	0.010	3
8	Misc Portable Equipment	10	40	3200	3.15	3	0.010	0
9	Tampers / Rammers	2	20	320	0.49	157	0.010	2
10	Rollers	1	5	40	0.55	22	0.010	0
11	Paving Equipment	1	2	16	0.2	3	0.010	0
12	Excavators	1	30	240	3.38	811	0.010	8
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**7,307**		**76**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
32	4	150	120	72000	23.8	**3025.2**	0.009	**27.26**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	30	120	3600	4.25	847.0588235	0.010	8.802106729
Spoils	30	120	3600	4.25	847.0588235	0.010	8.802106729
TOTAL							**17.60421346**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	4	0.310	1.24

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	122.0	(from lines 25, 32, 39, and 43)
Total Years of Construction	0.5	
Expected Start Date of Construction	TBD	
Estimated Project Useful life	40	
Average Annual Total GHG Emissions[7]	3.0507136	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Pump Station 5 (Avondale) Improvements- Inventory and Calculation of Greenhouse Gas Emissions

Line	**Emissions from Construction Equipment**							
1	**Type of Equipment**	**Maximum Number per Day**	**Total Operation Days**	**Total Operation Hours[1]**	**Fuel Consumption Per Hour[2]**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal diesel [3]**	**Total CO_2 Equivalent Emissions (metric tons)**
2	*Cranes*	1	25	200	1.94	388	0.010	4
3	*Rough Terrain Forklifts*	1	120	960	3.3	3,168	0.010	33
4	Rubber Tired Loaders	1	120	960	2.44	2,342	0.010	24
5	Concrete Industrial Saws	1	10	80	0.75	60	0.010	1
6	Cement and Mortar Mixers	1	10	80	0.8	64	0.010	1
7	Other Construction Equipment	1	60	480	0.6	288	0.010	3
8	Misc Portable Equipment	10	40	3200	3.15	3	0.010	0
9	Tampers / Rammers	2	20	320	0.49	157	0.010	2
10	Rollers	1	5	40	0.55	22	0.010	0
11	Paving Equipment	1	2	16	0.2	3	0.010	0
12	Excavators	1	30	240	3.38	811	0.010	8
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**7,307**		**76**
26	[1] An 8-hour work day is assumed.							
27	[2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors							
28	[3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2							
29								
30	**Emissions from Transportation of Construction Workforce**							

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
32	4	150	120	72000	23.8	**3025.2**	0.009	**27.26**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel ⟦Efficiency⟧^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	30	120	3600	4.25	847.0588235	0.010	8.802106729
Spoils	30	120	3600	4.25	847.0588235	0.010	8.802106729
TOTAL							**17.60421346**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/⟦MWh⟧^6	CO_2 e emissions
Electricity Needed	4	0.310	1.24

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions		122.0	(from lines 25, 32, 39, and 43)
Total Years of Construction		0.5	
Expected Start Date of Construction	TBD		
Estimated Project Useful life	40	40	
Average Annual Total GHG Emissions[7]	3.0507136	**MT CO_2 equivalents**	

[7] short-term construction emissions amortized over life of project

Pump Station 1 Reconstruction- Inventory and Calculation of Greenhouse Gas Emissions

Line	**Emissions from Construction Equipment**							
1	**Type of Equipment**	**Maximum Number per Day**	**Total Operation Days**	**Total Operation Hours[1]**	**Fuel Consumption Per Hour[2]**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal diesel [3]**	**Total CO_2 Equivalent Emissions (metric tons)**
2	*Cranes*	1	5	40	1.94	78	0.010	1
3	*Rough Terrain Forklifts*	1	10	80	3.3	264	0.010	3
4	Rubber Tired Loaders	1	5	40	2.44	98	0.010	1
5	Concrete Industrial Saws	1	2	16	0.75	12	0.010	0
6	Cement and Mortar Mixers	1	1	8	0.8	6	0.010	0
7	Other Construction Equipment	1	5	40	0.6	24	0.010	0
8	Misc Portable Equipment	10	30	2400	3.15	3	0.010	0
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**485**		**5**
26	[1] An 8-hour work day is assumed.							
27	[2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors							
28	[3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2							
29								
30	**Emissions from Transportation of Construction Workforce**							

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
32	2	30	120	7200	23.8	**302.5**	0.009	**2.73**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	5	120	600	4.25	141.1764706	0.010	1.467017788
Spoils	2	120	240	4.25	56.47058824	0.010	0.586807115
TOTAL							**2.053824904**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	3	0.310	0.93

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 10.7 (from lines 25, 32, 39, and 43)

Total Years of Construction 0.1

Expected Start Date of Construction TBD

Estimated Project Useful life 40

Average Annual Total GHG Emissions[7] 0.268669 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Pump Station 2 Improvements- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Cranes*	1	5	40	1.94	78	0.010	1
3	*Rough Terrain Forklifts*	1	10	80	3.3	264	0.010	3
4	Rubber Tired Loaders	1	5	40	2.44	98	0.010	1
5	Concrete Industrial Saws	1	2	16	0.75	12	0.010	0
6	Cement and Mortar Mixers	1	1	8	0.8	6	0.010	0
7	Other Construction Equipment	1	5	40	0.6	24	0.010	0
8	Misc Portable Equipment	10	30	2400	3.15	3	0.010	0
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**485**		**5**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 **Emissions from Transportation of Construction Workforce**

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
32	2	30	120	7200	23.8	**302.5**	0.009	**2.73**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	5	120	600	4.25	141.1764706	0.010	1.467017788
Spoils	2	120	240	4.25	56.47058824	0.010	0.586807115
TOTAL							**2.053824904**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	3	0.310	0.93

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 10.7 (from lines 25, 32, 39, and 43)

Total Years of Construction 0.1

Expected Start Date of Construction TBD

Estimated Project Useful life 40

Average Annual Total GHG Emissions[7] 0.268669 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Pump Station 10 Improvements- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Cranes*	2	20	320	1.94	621	0.010	6
3	*Rough Terrain Forklifts*	2	120	1920	3.3	6,336	0.010	66
4	Rubber Tired Loaders	3	120	2880	2.44	7,027	0.010	73
5	Concrete Industrial Saws	2	10	160	0.75	120	0.010	1
6	Cement and Mortar Mixers	1	10	80	0.8	64	0.010	1
7	Other Construction Equipment	5	120	4800	0.6	2,880	0.010	30
8	Misc Portable Equipment	10	60	4800	3.15	3	0.010	0
9	Tampers / Rammers	2	30	480	0.49	235	0.010	2
10	Rollers	2	5	80	0.55	44	0.010	0
11	Paving Equipment	2	4	64	0.2	13	0.010	0
12	Excavators	2	60	960	3.38	3,245	0.010	34
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**20,588**		**214**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
32	5	150	120	90000	23.8	**3781.5**	0.009	**34.07**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel ⟦Efficiency⟧^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	30	120	3600	4.25	847.0588235	0.010	8.802106729
Spoils	30	120	3600	4.25	847.0588235	0.010	8.802106729
TOTAL							**17.60421346**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/⟦MWh⟧^6	CO_2 e emissions
Electricity Needed	4	0.310	1.24

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 266.9 (from lines 25, 32, 39, and 43)

Total Years of Construction 0.5

Expected Start Date of Construction TBD

Estimated Project Useful life 40

Average Annual Total GHG Emissions[7] 6.6713193 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Daguerre Point Dam Fish Passage Improvement- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Excavator*	2	60	960	3.38	3,245	0.010	34
3	*Cranes*	1	30	240	2.3	552	0.010	6
4	Rubber Tired Dozers	1	30	240	5.93	1,423	0.010	15
5	Tractors/Loader	2	100	1600	1.41	2,256	0.010	23
6	Other Construct	2	100	1600	1.3	2,080	0.010	22
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**9,556**		**99**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	3	120	100	36000	23.8	**1512.6**	0.009	**13.63**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	20	100	2000	4.25	470.5882353	0.010	4.890059294
Spoils	30	100	3000	4.25	705.8823529	0.010	7.335088941
TOTAL							**12.22514824**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	100	0.310	31

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 156.2 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 100 Years

Average Annual Total GHG Emissions[7] 1.5615371 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Water Conservation Education- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2				0		-	0.010	-
3				0		-	0.010	-
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					-		-

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	1	30	50	1500	23.8	**63.0**	0.009	**0.57**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery				4.25	0	0.010	0
Spoils				4.25	0	0.010	0
TOTAL							**0**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	10	0.310	3.1

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 3.7 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 100 Years

Average Annual Total GHG Emissions[7] 0.0366786 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Yuba River Recreation Projects- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	Tampers/Rammers	1	30	240	0.2	48	0.010	0
3	Paving Equipment	1	30	240	0.2	48	0.010	0
4	Surfacing Equipmen	1	30	240	0.2	48	0.010	0
5	Scrapers	1	10	80	4.32	346	0.010	4
6	Off-Highway Trucks	3	30	720	5.71	4,111	0.010	43
7	Other Construction E	5	30	1200	0.6	720	0.010	7
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**5,321**		**55**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

30 Emissions from Transportation of Construction Workforce

31	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
32	4	60	100	24000	23.8	**1008.4**	0.009	**9.09**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	10	100	1000	4.25	235.2941176	0.010	2.4450296
Spoils				4.25	0	0.010	0
TOTAL							**2.4450296**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 66.8 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 100 Years

Average Annual Total GHG Emissions[7] 0.67 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Yuba Salmon Education- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2				0		-	0.010	-
3				0		-	0.010	-
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					-		-

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	1	90	50	4500	23.8	**189.1**	0.009	**1.70**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery				4.25	0	0.010	0
Spoils				4.25	0	0.010	0
TOTAL							**0**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 1.7 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 3 Years

Average Annual Total GHG Emissions[7] 0.5678571 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Yuba Salmon Habitat Restoration- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Tractors/Loaders/Backhoes*	2	30	480	1.41	677	0.010	7
3	Other Construction Equipment	4	30	960	0.46	442	0.010	5
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**1,118**		**12**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	5	60	50	15000	23.8	**630.3**	0.009	**5.68**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	5	50	250	4.25	58.82352941	0.010	0.61125741
Spoils				4.25	0	0.010	0
TOTAL							**0.61125741**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	2	0.310	0.62

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 18.5 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 200 Years

Average Annual Total GHG Emissions[7] 0.0926577 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Lower Yuba Environmental Flows- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2				0		-	0.010	-
3				0		-	0.010	-
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					-		-

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	2	10	50	1000	23.8	**42.0**	0.009	**0.38**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	0	0	0	4.25	0	0.010	0
Spoils				4.25	0	0.010	0
TOTAL							**0**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 0.4 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction

Estimated Project Useful life 200 Years

Average Annual Total GHG Emissions[7] 0.0018929 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Hydrilla Eradication and Canal Lining- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Cement Mixer*	1	12	96	0.8	58	0.010	1
3	*Backhoe*	1	12	96	4.63	444	0.010	5
4	*Skid Steer*	1	12	96	1.95	187	0.010	2
5	*Dump Truck*	1	12	96	0.35	34	0.010	0
6	*Misc. Portable Equipment*	1	12	96	3.15	302	0.010	3
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0			0.010	
25	TOTAL					**1,025**		**11**

[1] An 8-hour work day is assumed.

[2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

[3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	10	12	156	3744	23.8	**157.3**	0.009	**1.42**

[4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	5	55	275	4.25	64.70588235	0.010	0.672383153
Spoils				4.25	0	0.010	0
TOTAL							**0.672383153**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 13.1 (from lines 25, 32, 39, and 43)

Total Years of Construction

Expected Start Date of Construction Winter 2015

Estimated Project Useful life 20 Years

Average Annual Total GHG Emissions[7] 0.6572641 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Yuba County Airport Drainage Improvements - Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	Pavers	1	15	120	8.84	1,061	0.010	11
3	Plate compactors	2	80	1280	0.2	256	0.010	3
4	Rollers	2	80	1280	2.64	3,379	0.010	35
5	Rollers	2	60	960	4.94	4,742	0.010	49
6	Tractor/Backhoes	2	90	1440	2.97	4,277	0.010	44
7	Tractor/Backhoes	2	50	800	7.78	6,224	0.010	65
8	Excavators	1	25	200	5.12	1,024	0.010	11
9	Paving Equipment	1	15	120	4.62	554	0.010	6
10	Trenchers	1	75	600	2.98	1,788	0.010	19
11	Other consturction equipment	5	90	3600	3.7	13,320	0.010	138
12						-	0.010	-
13						-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**36,626**		**381**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	8	90	100	72000	23.8	**3025.2**	0.009	**27.26**

[4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

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Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	200	30	6000	4.25	1411.764706	0.010	14.67017788
Spoils	300	20	6000	4.25	1411.764706	0.010	14.67017788
TOTAL							**29.34035576**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 437.2 (from lines 25, 32, 39, and 43)

Total Years of Construction 1

Expected Start Date of Construction

Estimated Project Useful life 50 Years

Average Annual Total GHG Emissions[7] 8.74 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Linda Drainage Improvements- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	Pavers	1	10	80	8.84	707	0.010	7
3	Plate compactors	2	30	480	0.2	96	0.010	1
4	Rollers	2	30	480	2.64	1,267	0.010	13
5	Rollers	4	60	1920	4.94	9,485	0.010	99
6	Tractor/Backhoes	2	60	960	2.97	2,851	0.010	30
7	Scrapers	3	30	720	9.52	6,854	0.010	71
8	Excavators	2	60	960	5.12	4,915	0.010	51
9	Graders	2	30	480	7.81	3,749	0.010	39
10	Tractor/Backhoes	2	100	1600	7.78	12,448	0.010	129
11	Paving Equipment	1	20	160	4.62	739	0.010	8
12	Trenchers	1	40	320	2.98	954	0.010	10
13	Other consturction equipment	5	90	3600	3.7	13,320	0.010	138
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**57,386**		**596**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	10	180	100	180000	23.8	**7563.0**	0.009	**68.14**

[4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

33

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	300	30	9000	4.25	2117.647059	0.010	22.00526682
Spoils	500	20	10000	4.25	2352.941176	0.010	24.45029647
TOTAL							**46.45556329**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions	710.9	(from lines 25, 32, 39, and 43)
Total Years of Construction	1	
Expected Start Date of Construction		
Estimated Project Useful life	50	Years
Average Annual Total GHG Emissions[7]	14.218275	**MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Olivehurst Drainage Improvements- Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	Pavers	1	100	800	8.84	7,072	0.010	73
3	Plate compactors	2	300	4800	0.2	960	0.010	10
4	Rollers	2	300	4800	2.64	12,672	0.010	132
5	Rollers	4	100	3200	4.94	15,808	0.010	164
6	Tractor/Backhoes	2	200	3200	2.97	9,504	0.010	99
7	Tractor/Backhoes	2	200	3200	7.78	24,896	0.010	259
8	Excavators	2	150	2400	5.12	12,288	0.010	128
9	Paving Equipment	1	100	800	4.62	3,696	0.010	38
10	Trenchers	1	250	2000	2.98	5,960	0.010	62
11	Other consturction equipment	5	400	16000	3.7	59,200	0.010	615
12						-	0.010	-
13						-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**152,056**		**1,580**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	10	500	100	500000	23.8	**21008.4**	0.009	**189.29**

[4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

33

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	600	30	18000	4.25	4235.294118	0.010	44.01053365
Spoils	1000	20	20000	4.25	4705.882353	0.010	48.90059294
TOTAL							**92.91112659**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	0	0.310	0

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 1,862.3 (from lines 25, 32, 39, and 43)

Total Years of Construction 6

Expected Start Date of Construction

Estimated Project Useful life 50 Years

Average Annual Total GHG Emissions[7] 37.25 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project

Olivehurst Pump Station Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Total Operation Hours[1]	Fuel Consumption Per Hour[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
1								
2	*Other Construction Equipment*	2	2	32	5.49	176	0.010	2
3	*Misc. Portable Equipment*	5	3	120	3.15	378	0.010	4
4				0		-	0.010	-
5				0		-	0.010	-
6				0		-	0.010	-
7				0		-	0.010	-
8				0		-	0.010	-
9				0		-	0.010	-
10				0		-	0.010	-
11				0		-	0.010	-
12				0		-	0.010	-
13				0		-	0.010	-
14				0		-	0.010	-
15				0		-	0.010	-
16				0		-	0.010	-
17				0		-	0.010	-
18				0		-	0.010	-
19				0		-	0.010	-
20				0		-	0.010	-
21				0		-	0.010	-
22				0		-	0.010	-
23				0		-	0.010	-
24				0		-	0.010	-
25	TOTAL					**554**		**6**

26 [1] An 8-hour work day is assumed.

27 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors

28 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

29

Emissions from Transportation of Construction Workforce

	Average Number of Workers per Day	Total Number of Workdays	Average Distance Traveled (round trip)	Total Miles Traveled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline [3]	Total CO_2 Equivalent Emissions (metric tons)
31								
32	1	4	120	480	23.8	**20.2**	0.009	**0.18**

33 [4] United States Environmental Protection Agency. 2013. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2012. [EPA-420-R-13-001]

Emissions from Transportation of Construction Materials

Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Traveled	Average Semi-Truck Fuel [Efficiency]^5	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
Delivery	2	120	240	4.25	56.47058824	0.010	0.586807115
Spoils	0	0	0	4.25	0	0.010	0
TOTAL							**0.586807115**

[5] The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles, 2010.

Construction Electricity Emissions

	MWh of electricity	mtCO2_e/[MWh]^6	CO_2 e emissions
Electricity Needed	1	0.310	0.31

[6] eGRID2010 Version 1.0, February 2011 (Year 2007 data) *CAMX-WECC sub-region* .

Total Construction Activity Emissions 6.8 (from lines 25, 32, 39, and 43)

Total Years of Construction 0.01

Expected Start Date of Construction TBD

Estimated Project Useful life 50 Years

Average Annual Total GHG Emissions[7] 0.1366404 **MT CO_2 equivalents**

[7] short-term construction emissions amortized over life of project