

San Luis Low Point Improvement Project Environmental Impact Statement / Environmental Impact Report

Appendix E3: Construction Vibration Calculations

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Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Tunneling Option

Table 29. Summary of Results

Phase	PPV (in/sec)		
	Residence on Harper Lane	San Luis Creek Use Area	Residence off Dinosaur Point Road
Mobilization	0.000060	0.000137	0.000091
Site Improvements	0.000060	0.000137	0.000091
Construct Vertical Shaft	0.000123	0.000279	0.000185
Set up TBM	0.000014	0.000031	0.000020
Tunneling and Spreading of Soils	0.000050	0.000113	0.000075
Cofferdam and TBM Out	0.000014	0.000031	0.000020
Connect to Existing Intake	0.000118	0.000267	0.000177
Fabricate Inlet	0.000118	0.000267	0.000177
Set Inlet and Flood Tunnel	0.000014	0.000031	0.000020
Construct Aeration Facility	0.000127	0.000287	0.000190
Fab and Set Air Tubing	0.000041	0.000092	0.000061
Final Work and Testing	0.000014	0.000031	0.000020
Demobilization	0.000050	0.000113	0.000075
Maximum	0.000127	0.000287	0.000190
Significant?	No	No	No

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Tunneling Option

Table 30. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Mobilization	Bulldozer	Large Bulldozer	2	0.178	0.000011	0.000024	0.000016
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Mobilization Total			N/A	0.000060	0.000137	0.000091
Site Improvements	Bulldozer	Large Bulldozer	2	0.178	0.000011	0.000024	0.000016
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	1	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	1	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Site Improvements Total			N/A	0.000060	0.000137	0.000091

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Tunneling Option

Table 30. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Construct Vertical Shaft	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Concrete Trucks	Loaded Trucks	15	1.140	0.000068	0.000154	0.000102
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	1	0.089	0.000005	0.000012	0.000008
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	1	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Construct Vertical Shaft Total				N/A	0.000123	0.000279
Set up TBM	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Set up TBM Total				N/A	0.000014	0.000031
Tunneling and Spreading of Soils	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	1	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Tunneling and Spreading of Soils Total				N/A	0.000050	0.000113
Cofferdam and TBM Out	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Cofferdam and TBM Out Total				N/A	0.000014	0.000031

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Tunneling Option

Table 30. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Connect to Existing Intake	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumps	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Concrete Trucks	Loaded Trucks	15	1.140	0.000068	0.000154	0.000102
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Connect to Existing Intake Total				N/A	0.000118	0.000267
Fabricate Inlet	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumps	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Concrete Trucks	Loaded Trucks	15	1.140	0.000068	0.000154	0.000102
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Fabricate Inlet Total				N/A	0.000118	0.000267
Set Inlet and Flood Tunnel	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumps	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
	Set Inlet and Flood Tunnel Total				N/A	0.000014	0.000031
Construct Aeration Facility	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumps	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Concrete Trucks	Loaded Trucks	15	1.140	0.000068	0.000154	0.000102
	Cranes	n/a	4	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	1	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	1	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Construct Aeration Facility Total				N/A	0.000127	0.000287

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Tunneling Option

Table 30. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on Harper Lane	Creek Use Area	Subdivision off SR 152
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Fab and Set Air Tubing	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Fab and Set Air Tubing Total				N/A	0.000041	0.000092	0.000061
Final Work and Testing	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Final Work and Testing Total				N/A	0.000014	0.000031	0.000020
Demobilization	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Drill Rig	Caisson Drilling	-	-	-	-	-
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	7	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
Demobilization Total				N/A	0.000050	0.000113	0.000075

Significance Threshold

0.3 in/sec

**Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Pipeline Option**

Table 31. Summary of Results

Phase	PPV (in/sec)		
	Residence on Harper Lane	San Luis Creek Use Area	Residence off Dinosaur Point Road
Mobilization	0.000033	0.000075	0.000050
Site Improvements	0.000074	0.000168	0.000111
Fabricate Inlet	0.000014	0.000031	0.000020
Build Cofferdam and Set Lower Inlet	0.000014	0.000031	0.000020
Lay Pipe	0.000041	0.000092	0.000061
Connect to Existing Intake	0.000014	0.000031	0.000020
Construct Aeration Facility	0.000063	0.000144	0.000095
Fab and Set Air Tubing	0.000014	0.000031	0.000020
Final Work and Testing	0.000014	0.000031	0.000020
Demobilization	0.000050	0.000113	0.000075
Maximum	0.000074	0.000168	0.000111
Significant?	No	No	No

Table 32. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Mobilization	Bulldozer	Large Bulldozer	2	0.178	0.000011	0.000024	0.000016
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
Mobilization Total				N/A	0.000033	0.000075	0.000050
Site Improvements	Bulldozer	Large Bulldozer	2	0.178	0.000011	0.000024	0.000016
	Concrete Pumpers	Loaded Trucks	1	0.076	0.000005	0.000010	0.000007
	Concrete Trucks	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	1	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	1	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
Site Improvements Total				N/A	0.000074	0.000168	0.000111

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Pipeline Option

Table 32. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Fabricate Inlet	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	3	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Fabricate Inlet Total				N/A	0.000014	0.000031	0.000020
Build Cofferdam and Set Lower Inlet	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	3	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Build Cofferdam and Set Lower Inlet Total				N/A	0.000014	0.000031	0.000020
Lay Pipe	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	3	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Lay Pipe Total				N/A	0.000041	0.000092	0.000061

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Pipeline Option

Table 32. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Connect to Existing Intake	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	3	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Connect to Existing Intake Total				N/A	0.000014	0.000031	0.000020
Construct Aeration Facility	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	1	0.076	0.000005	0.000010	0.000007
	Concrete Trucks	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
	Cranes	n/a	3	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	1	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	2	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	1	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
Construct Aeration Facility Total				N/A	0.000063	0.000144	0.000095
Fab and Set Air Tubing	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Fab and Set Air Tubing Total				N/A	0.000014	0.000031	0.000020

Construction Vibration - Equipment
Lower San Felipe Intake Alternative - Pipeline Option

Table 32. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	on Harper Lane	Creek Use Area	Dinosaur Point Road
				25	16,400	9,500	12,500
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)
Final Work and Testing	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	-	-	-	-	-
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	-	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	-	-	-	-	-
Final Work and Testing Total				N/A	0.000014	0.000031	0.000020
Demobilization	Bulldozer	Large Bulldozer	-	-	-	-	-
	Concrete Pumpers	Loaded Trucks	-	-	-	-	-
	Concrete Trucks	Loaded Trucks	-	-	-	-	-
	Cranes	n/a	-	n/a	n/a	n/a	n/a
	Dump Truck	Loaded Trucks	6	0.456	0.000027	0.000062	0.000041
	Excavator	n/a	-	n/a	n/a	n/a	n/a
	Flatbed Trucks (on site)	Loaded Trucks	3	0.228	0.000014	0.000031	0.000020
	Grader	n/a	2	n/a	n/a	n/a	n/a
	Loaders	n/a	-	n/a	n/a	n/a	n/a
	Portable Diesel Generators	n/a	4	n/a	n/a	n/a	n/a
	Scraper	n/a	-	n/a	n/a	n/a	n/a
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014
Demobilization Total				N/A	0.000050	0.000113	0.000075

Significance Threshold

0.3 in/sec

**Construction Vibration - Equipment
Treatment Alternative - Santa Teresa WTP**

Table 33. Summary of Results

Phase	PPV (in/sec)		
	Dinosaur Point	Basalt Area	Gianelli Pumping Plant
Mobilization and Site Improvements	0.000041	0.000094	0.000062
Retrofit Existing Facilities	0.000090	0.000204	0.000135
Starting and Testing	-	-	-
Demobilization	0.000027	0.000062	0.000041
Maximum	0.000090	0.000204	0.000135
Significant?	No	No	No

Table 34. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Dinosaur Point	Basalt Area	Gianelli Pumping Plant	
				25	16,400	9,500	12,500	
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	
Mobilization and Site Improvements	Bulldozer	Large Bulldozer	1	0.089	0.000005	0.000012	0.000008	
	Concrete Pumps	Loaded Trucks	-	-	-	-	-	
	Concrete Saw Cutters	n/a	-	-	-	-	-	
	Concrete Trucks	Loaded Trucks	-	-	-	-	-	
	Cranes	n/a	-	n/a	n/a	n/a	n/a	
	Dump Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
	Excavator	n/a	-	n/a	n/a	n/a	n/a	
	Flatbed Trucks (on site)	Loaded Trucks	4	0.304	0.000018	0.000041	0.000027	
	Loaders	n/a	1	n/a	n/a	n/a	n/a	
	Vibrating Plate	Vibratory Roller	-	-	-	-	-	
	Water Truck	Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
	Wheel Trencher	Large Bulldozer	-	n/a	n/a	n/a	n/a	
	Mobilization and Site Improvements Total				N/A	0.000041	0.000094	0.000062
	Retrofit Existing Facilities	Bulldozer	Large Bulldozer	-	n/a	n/a	n/a	n/a
Concrete Pumps		Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
Concrete Saw Cutters		n/a	2	n/a	n/a	n/a	n/a	
Concrete Trucks		Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
Cranes		n/a	2	n/a	n/a	n/a	n/a	
Dump Truck		Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
Excavator		n/a	1	n/a	n/a	n/a	n/a	
Flatbed Trucks (on site)		Loaded Trucks	4	0.304	0.000018	0.000041	0.000027	
Loaders		n/a	1	n/a	n/a	n/a	n/a	
Vibrating Plate		Vibratory Roller	2	0.420	0.000025	0.000057	0.000038	
Water Truck		Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
Wheel Trencher		Large Bulldozer	2	0.178	0.000011	0.000024	0.000016	
Retrofit Existing Facilities Total				N/A	0.000090	0.000204	0.000135	

Table 34. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Dinosaur Point	Basalt Area	Gianelli Pumping Plant	
				25	16,400	9,500	12,500	
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	
Starting and Testing	Bulldozer	Large Bulldozer	-	-	-	-	-	
	Concrete Pumps	Loaded Trucks	-	n/a	n/a	n/a	n/a	
	Concrete Saw Cutters	n/a	-	n/a	n/a	n/a	n/a	
	Concrete Trucks	Loaded Trucks	-	n/a	n/a	n/a	n/a	
	Cranes	n/a	-	n/a	n/a	n/a	n/a	
	Dump Truck	Loaded Trucks	-	n/a	n/a	n/a	n/a	
	Excavator	n/a	-	n/a	n/a	n/a	n/a	
	Flatbed Trucks (on site)	Loaded Trucks	-	n/a	n/a	n/a	n/a	
	Loaders	n/a	-	n/a	n/a	n/a	n/a	
	Vibrating Plate	Vibratory Roller	-	-	-	-	-	
	Water Truck	Loaded Trucks	-	n/a	n/a	n/a	n/a	
	Wheel Trencher	Large Bulldozer	-	-	-	-	-	
	Starting and Testing Total				N/A	-	-	-
	Demobilization	Bulldozer	Large Bulldozer	-	-	-	-	-
Concrete Pumps		Loaded Trucks	-	-	-	-	-	
Concrete Saw Cutters		n/a	-	n/a	n/a	n/a	n/a	
Concrete Trucks		Loaded Trucks	-	n/a	n/a	n/a	n/a	
Cranes		n/a	-	n/a	n/a	n/a	n/a	
Dump Truck		Loaded Trucks	2	0.152	0.000009	0.000021	0.000014	
Excavator		n/a	-	n/a	n/a	n/a	n/a	
Flatbed Trucks (on site)		Loaded Trucks	4	0.304	0.000018	0.000041	0.000027	
Loaders		n/a	-	n/a	n/a	n/a	n/a	
Vibrating Plate		Vibratory Roller	-	-	-	-	-	
Water Truck		Loaded Trucks	-	n/a	n/a	n/a	n/a	
Wheel Trencher		Large Bulldozer	-	-	-	-	-	
Demobilization Total				N/A	0.000027	0.000062	0.000041	

Significance Threshold

0.3 in/sec

**Construction Vibration - Equipment
Enlarged Reservoir Alternative**

Table 35. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on Harper Lane	Creek Use Area	Subdivision off SR 152	
				25	16,400	5,600	8,250	
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	
Peak Day	Excavator	n/a	2	n/a	n/a	n/a	n/a	
	Dozer	Large Bulldozer	3	0.267	0.000016	0.000080	0.000045	
	Crane/Lift	n/a	5	n/a	n/a	n/a	n/a	
	Compactor	Small bulldozer	5	0.015	0.000001	0.000004	0.000003	
	Grader	Large Bulldozer	2	0.178	0.000011	0.000053	0.000030	
	Scraper	Large Bulldozer	2	0.178	0.000011	0.000053	0.000030	
	Loader	Loaded Trucks	5	0.380	0.000023	0.000113	0.000063	
	Dump Truck	Loaded Trucks	13	0.988	0.000059	0.000295	0.000185	
	Water Truck	Loaded Trucks	5	0.380	0.000023	0.000113	0.000063	
	Blasting	n/a	4	0.050	0.000003	0.000015	0.000008	
	Peak Day Total				N/A	0.000142	0.000712	0.000398

Note: Reference distance for blasting is 2,500 feet
Significance Threshold

0.3 in/sec

Construction Vibration - Equipment
Pacheco Reservoir Expansion Alternative

Table 36. Construction Vibration

Phase	Equipment Description	Equivalent Equipment Types	Distance (ft): Number of Equipment	At Source	Residence on El Toro Road	unnamed access road	Residence off SR 152	
				25	1,250	11,750	7,000	
				PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	PPV (in/sec)	
Peak Day	Bulldozer	Large Bulldozer	6	0.534	0.001510	0.000052	0.000114	
	Loader	Large Bulldozer	9	0.801	0.002266	0.000079	0.000171	
	Grader	Large Bulldozer	2	0.178	0.000503	0.000017	0.000038	
	Backhoe	Small bulldozer	6	0.018	0.000051	0.000002	0.000004	
	Excavator	Large Bulldozer	1	0.089	0.000252	0.000009	0.000019	
	On Highway Truck	Loaded Trucks	6	0.456	0.001290	0.000045	0.000097	
	Off Highway Truck	Loaded Trucks	17	1.292	0.003654	0.000127	0.000276	
	Scraper	Large Bulldozer	1	0.089	0.000252	0.000009	0.000019	
	Smooth Drum Compactor	Vibratory Roller	1	0.210	0.000594	0.000021	0.000045	
	Large Compactor	Vibratory Roller	6	0.050	0.141421	0.004907	0.010672	
	Grapple	Large Bulldozer	1	0.089	0.000252	0.000009	0.000019	
	Conveyor	n/a	1	n/a	n/a	n/a	n/a	
	Grout Mixer	n/a	1	n/a	n/a	n/a	n/a	
	Trailer Mounted Concrete Pump	n/a	2	n/a	n/a	n/a	n/a	
	Concrete Vibrator	n/a	1	n/a	n/a	n/a	n/a	
	Pumps	n/a	3	n/a	n/a	n/a	n/a	
	Grout/Shotcrete Plants	n/a	2	n/a	n/a	n/a	n/a	
	Generator	n/a	4	n/a	n/a	n/a	n/a	
	Diesel Compressor	n/a	4	n/a	n/a	n/a	n/a	
	Diesel Welder	n/a	5	n/a	n/a	n/a	n/a	
	Sand Blasting Pot	n/a	2	n/a	n/a	n/a	n/a	
	Pressure Washer	n/a	2	n/a	n/a	n/a	n/a	
	Crane	Large Bulldozer	7	0.623	0.001762	0.000061	0.000133	
	Man Lift	Small bulldozer	2	0.006	0.000017	0.000001	0.000001	
	Auger Drill Rig	Caisson Drilling	4	0.356	0.001007	0.000035	0.000076	
	Jackhammer	Jackhammer	1	0.035	0.000099	0.000003	0.000007	
	Hydraulic Hoe Ram	Hoe Ram	1	0.089	0.000252	0.000009	0.000019	
	Drill Rig Truck	Caisson Drilling	5	0.445	0.001259	0.000044	0.000095	
	Ventilation Fan	n/a	1	n/a	n/a	n/a	n/a	
	Pickup Trucks	n/a	23	n/a	n/a	n/a	n/a	
	Blasting	n/a	1	0.050	0.141421	0.004907	0.010672	
	Peak Day Total				N/A	0.156440	0.005428	0.011805

Note: Reference distance for blasting is 2,500 feet
 Significance Threshold

0.3 in/sec