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

Appendix E2: Construction Noise Calculations

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Operational Noise Levels
Lower San Felipe Intake Alternative

Table 1. Air Compressor Noise Levels

Equipment	Compressor (air)
Usage Factor	100%
Equipment Lmax @ 3'	75
Equipment Leq(h) @ 3'	75
Distance from the Center of Operational Activity to a Receptor (ft)	800
Distance Divergence (dBA)	48.5
Atmospheric Attenuation (dBA)	0.66
8-Hour Operational Noise Level at the Receptor (dBA)	26
Daytime Unmitigated Leq (Operational Noise + Existing) (dBA)	40
Daytime Increase Over Existing (dBA)	0.16
Significant?	No

Equipment Specifications: Mattei Air Compressor, Model No. MAXIMA 160 X, 200 hp
http://cdn2.hubspot.net/hub/377802/file-703884676-pdf/docs/maxima_160kw_usa.pdf?t=1404151772000

County
Merced

Existing Noise Levels
Land Use Type Rural Residential
Background Noise (dBA) 40

Significance Level
10 dBA
(daytime increase over existing noise levels)

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

Table 2. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Mobilization	Bulldozer	Dozer	40%	82	78	2	3	85	81
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	2	3	82	78
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	2	3	79	75
							Mobilization Total	**92**	**89**
Site Improvements	Bulldozer	Dozer	40%	82	78	2	3	85	81
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	1	0	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	2	3	88	84
	Loaders	Front End Loader	40%	79	75	2	3	82	78
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	1	0	84	80
	Water Truck	Dump Truck	40%	76	72	2	3	79	75
							Site Improvements Total	**94**	**91**
Construct Vertical Shaft	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	2	3	84	77
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	15	12	91	87
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	1	0	84	77
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	1	0	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Construct Vertical Shaft Total	**95**	**91**
Set up TBM	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	-	-	-	-
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Set up TBM Total	**92**	**87**

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

Table 2. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Tunneling and Spreading of Soils	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	2	3	88	84
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	1	0	84	80
	Water Truck	Dump Truck	40%	76	72	2	3	79	75
							Tunneling and Spreading of Soils Total	**93**	**90**
Cofferdam and TBM Out	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	-	-	-	-
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Cofferdam and TBM Out Total	**92**	**87**
Connect to Existing Intake	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	2	3	84	77
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	15	12	91	87
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Connect to Existing Intake Total	**94**	**90**
Fabricate Inlet	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	2	3	84	77
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	15	12	91	87
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Fabricate Inlet Total	**95**	**91**

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

Table 2. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Set Inlet and Flood Tunnel	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	-	-	-	-
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Set Inlet and Flood Tunnel Total	**92**	**87**
Construct Aeration Facility	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	2	3	84	77
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	15	12	91	87
	Cranes	Crane	16%	81	73	4	6	87	79
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	1	0	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	2	3	88	84
	Loaders	Front End Loader	40%	79	75	2	3	82	78
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	1	0	84	80
	Water Truck	Dump Truck	40%	76	72	2	3	79	75
							Construct Aeration Facility Total	**96**	**92**
Fab and Set Air Tubing	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Fab and Set Air Tubing Total	**91**	**88**
Final Work and Testing	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	-	-	-	-
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	-	-	-	-
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	-	-	-	-
							Final Work and Testing Total	**90**	**87**

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

Table 2. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Demobilization	Bulldozer	Dozer	40%	82	78	-	-	-	-
	Concrete Pumpers	Concrete Pump Truck	20%	81	74	-	-	-	-
	Concrete Trucks	Concrete Mixer Truck	40%	79	75	-	-	-	-
	Cranes	Crane	16%	81	73	-	-	-	-
	Drill Rig	Auger Drill Rig	20%	84	77	-	-	-	-
	Dump Truck	Dump Truck	40%	76	72	6	8	84	80
	Excavator	Excavator	40%	81	77	-	-	-	-
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70	3	5	79	75
	Grader	Grader	40%	85	81	2	3	88	84
	Loaders	Front End Loader	40%	79	75	-	-	-	-
	Portable Diesel Generators	Generator	50%	81	78	7	8	89	86
	Scraper	Scraper	40%	84	80	-	-	-	-
	Water Truck	Dump Truck	40%	76	72	2	3	79	75
							Demobilization Total	**93**	**89**

Table 3. 1-Hour Construction Noise Level at the Receptor (dBA) - Residence on Harper Lane

Phase Type	Mobilization	Site Improvements	Construct Vertical Shaft	Set up TBM	Tunneling and Spreading of Soils	Cofferdam and TBM Out	Connect to Existing Intake	Fabricate Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	16,400	16,400	16,400	16,400	16,400	16,400	16,400	16,400
1-Hour Construction Noise Level at 50 ft (dBA)	89	91	91	87	90	87	90	91
Distance Divergence (dBA)	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3
Atmospheric Attenuation (dBA)	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50
1-Hour Construction Noise Level at the Receptor (dBA)	25	27	27	24	26	24	27	27
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	40	40	40	40	40	40	40	40
Daytime Increase Over Existing (dBA)	0	0	0	0	0	0	0	0
Significant?	No	No	No	No	No	No	No	No

Table 4. 1-Hour Construction Noise Level at the Receptor (dBA) - San Luis Creek Use Area

Phase Type	Mobilization	Site Improvements	Construct Vertical Shaft	Set up TBM	Tunneling and Spreading of Soils	Cofferdam and TBM Out	Connect to Existing Intake	Fabricate Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	9,500	9,500	9,500	9,500	9,500	9,500	9,500	9,500
1-Hour Construction Noise Level at 50 ft (dBA)	89	91	91	87	90	87	90	91
Distance Divergence (dBA)	45.6	45.6	45.6	45.6	45.6	45.6	45.6	45.6
Atmospheric Attenuation (dBA)	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
1-Hour Construction Noise Level at the Receptor (dBA)	36	37	38	34	36	34	37	37
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	41	42	42	41	42	41	42	42
Daytime Increase Over Existing (dBA)	1	2	2	1	2	1	2	2
Significant?	No	No	No	No	No	No	No	No

Table 5. 1-Hour Construction Noise Level at the Receptor (dBA) - Subdivision off Dinosaur Point Road

Phase Type	Mobilization	Site Improvements	Construct Vertical Shaft	Set up TBM	Tunneling and Spreading of Soils	Cofferdam and TBM Out	Connect to Existing Intake	Fabricate Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
1-Hour Construction Noise Level at 50 ft (dBA)	89	91	91	87	90	87	90	91
Distance Divergence (dBA)	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0
Atmospheric Attenuation (dBA)	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29
1-Hour Construction Noise Level at the Receptor (dBA)	31	33	33	29	32	29	32	32
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	40	41	41	40	41	40	41	41
Daytime Increase Over Existing (dBA)	0	1	1	0	1	0	1	1
Significant?	No	No	No	No	No	No	No	No

Set Inlet and Flood Tunnel	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
16,400	16,400	16,400	16,400	16,400
87	92	88	87	89
50.3	50.3	50.3	50.3	50.3
13.50	13.50	13.50	13.50	13.50
24	28	24	23	25
40	40	40	40	40
0	0	0	0	0
No	No	No	No	No

Set Inlet and Flood Tunnel	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
9,500	9,500	9,500	9,500	9,500
87	92	88	87	89
45.6	45.6	45.6	45.6	45.6
7.82	7.82	7.82	7.82	7.82
34	39	34	33	36
41	42	41	41	41
1	2	1	1	1
No	No	No	No	No

Set Inlet and Flood Tunnel	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
12,500	12,500	12,500	12,500	12,500
87	92	88	87	89
48.0	48.0	48.0	48.0	48.0
10.29	10.29	10.29	10.29	10.29
29	34	29	28	31
40	41	40	40	41
0	1	0	0	1
No	No	No	No	No

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

County		Significance Level
Merced		10 dBA
		(daytime increase over existing noise levels)

Existing Noise Levels

Land Use Type	Rural Residential
Background Noise (dBA)	40

Sensitive Receptor Locations:

Residence on Harper Lane	16,400	feet
San Luis Creek Use Area	9,500	feet
Residence off Dinosaur Point Road	12,500	feet

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

Table 6. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'
Mobilization	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72
Site Improvements	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72

Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
2	3	85	81
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
3	5	79	75
2	3	88	84
2	3	82	78
4	6	87	84
-	-	-	-
2	3	79	75
	Mobilization Total	**92**	**89**
2	3	85	81
1	0	81	74
2	3	82	78
-	-	-	-
6	8	84	80
1	0	81	77
3	5	79	75
2	3	88	84
2	3	82	78
4	6	87	84
1	0	84	80
2	3	79	75
	Site Improvements Total	**94**	**90**

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

Fabricate Inlet	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72
Build Cofferdam and Set Lower Inlet	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72

-	-	-	-
-	-	-	-
-	-	-	-
3	5	86	78
-	-	-	-
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
	Fabricate Inlet Total	**90**	**85**
-	-	-	-
-	-	-	-
-	-	-	-
3	5	86	78
-	-	-	-
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
Build Cofferdam and Set Lower Inlet Total		**90**	**85**

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

Table 6. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'
Lay Pipe	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72
Connect to Existing Intake	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72
Construct Aeration Facility	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72

Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
-	-	-	-
-	-	-	-
-	-	-	-
3	5	86	78
6	8	84	80
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
Lay Pipe Total		**91**	**86**
-	-	-	-
-	-	-	-
-	-	-	-
3	5	86	78
-	-	-	-
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
Connect to Existing Intake Total		**90**	**85**
-	-	-	-
1	0	81	74
2	3	82	78
3	5	86	78
6	8	84	80
1	0	81	77
3	5	79	75
2	3	88	84
2	3	82	78
4	6	87	84
1	0	84	80
2	3	79	75
Construct Aeration Facility Total		**94**	**90**

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

Fab and Set Air Tubing	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72

-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
Fab and Set Air Tubing Total		**88**	**85**

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

Table 6. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'
Final Work and Testing	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72
Demobilization	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Grader	Grader	40%	85	81
	Loaders	Front End Loader	40%	79	75
	Portable Diesel Generators	Generator	50%	81	78
	Scraper	Scraper	40%	84	80
	Water Truck	Dump Truck	40%	76	72

Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
3	5	79	75
-	-	-	-
-	-	-	-
4	6	87	84
-	-	-	-
-	-	-	-
Final Work and Testing Total		**88**	**85**
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
6	8	84	80
-	-	-	-
3	5	79	75
2	3	88	84
-	-	-	-
4	6	87	84
-	-	-	-
2	3	79	75
Demobilization Total		**92**	**88**

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

Table 7. 1-Hour Construction Noise Level at the Receptor (dBA) - Residence on Harper Lane

Phase Type	Mobilization	Site Improvements	Fabricate Inlet	Build Cofferdam and Set Lower Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	16,400	16,400	16,400	16,400
1-Hour Construction Noise Level at 50 ft (dBA)	89	90	85	85
Distance Divergence (dBA)	50.3	50.3	50.3	50.3
Atmospheric Attenuation (dBA)	13.50	13.50	13.50	13.50
1-Hour Construction Noise Level at the Receptor (dBA)	25	27	22	22
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	40	40	40	40
Daytime Increase Over Existing (dBA)	0	0	0	0
Significant?	No	No	No	No

Table 8. 1-Hour Construction Noise Level at the Receptor (dBA) - San Luis Creek Use Area

Phase Type	Mobilization	Site Improvements	Fabricate Inlet	Build Cofferdam and Set Lower Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	9,500	9,500	9,500	9,500
1-Hour Construction Noise Level at 50 ft (dBA)	89	90	85	85
Distance Divergence (dBA)	45.6	45.6	45.6	45.6
Atmospheric Attenuation (dBA)	7.82	7.82	7.82	7.82
1-Hour Construction Noise Level at the Receptor (dBA)	35	37	32	32
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	41	42	41	41
Daytime Increase Over Existing (dBA)	1	2	1	1
Significant?	No	No	No	No

Table 9. 1-Hour Construction Noise Level at the Receptor (dBA) - Residence off Dinosaur Point Road

Phase Type	Mobilization	Site Improvements	Fabricate Inlet	Build Cofferdam and Set Lower Inlet
Distance from the Center of Construction Activity to a Receptor (ft)	12,500	12,500	12,500	12,500
1-Hour Construction Noise Level at 50 ft (dBA)	89	90	85	85
Distance Divergence (dBA)	48.0	48.0	48.0	48.0
Atmospheric Attenuation (dBA)	10.29	10.29	10.29	10.29
1-Hour Construction Noise Level at the Receptor (dBA)	31	32	27	27
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	40	41	40	40
Daytime Increase Over Existing (dBA)	0	1	0	0
Significant?	No	No	No	No

Lay Pipe	Connect to Existing Intake	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
16,400	16,400	16,400	16,400	16,400	16,400
86	85	90	85	85	88
50.3	50.3	50.3	50.3	50.3	50.3
13.50	13.50	13.50	13.50	13.50	13.50
23	22	26	21	21	24
40	40	40	40	40	40
0	0	0	0	0	0
No	No	No	No	No	No

Lay Pipe	Connect to Existing Intake	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
9,500	9,500	9,500	9,500	9,500	9,500
86	85	90	85	85	88
45.6	45.6	45.6	45.6	45.6	45.6
7.82	7.82	7.82	7.82	7.82	7.82
33	32	37	31	31	35
41	41	42	41	41	41
1	1	2	1	1	1
No	No	No	No	No	No

Lay Pipe	Connect to Existing Intake	Construct Aeration Facility	Fab and Set Air Tubing	Final Work and Testing	Demobilization
12,500	12,500	12,500	12,500	12,500	12,500
86	85	90	85	85	88
48.0	48.0	48.0	48.0	48.0	48.0
10.29	10.29	10.29	10.29	10.29	10.29
28	27	32	26	26	30
40	40	41	40	40	40
0	0	1	0	0	0
No	No	No	No	No	No

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

County	Significance Level
Merced	10 dBA
	(daytime increase over existing noise levels)

Existing Noise Levels

Land Use Type	Rural Residential
Background Noise (dBA)	40

Sensitive Receptor Locations:

Residence on Harper Lane	16,400	feet
San Luis Creek Use Area	9,500	feet
Residence off Dinosaur Point Road	12,500	feet

Construction Noise - Traffic
Lower San Felipe Intake Alternative

Table 10. Construction Vehicles - Equivalent Noise Levels (Tunneling Option)

Type	Roadway	Existing 2016 AADT	Maximum Daily Truck Hauling Trips	Maximum Daily Worker Trips	Speed (mph)	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total With Project	Increase Ratio
Interstate	I-5 at junction with SR-152	32,000	138	150	55	10.4	1,585	33,585	1.05
State Route	SR-152 at junction with I-5	27,000	138	150	55	10.4	1,585	28,585	1.06
State Route	SR-152 at junction with SR-33	28,600	138	150	55	10.4	1,585	30,185	1.06
State Route	SR-33 at junction with I-5	12,900	138	150	55	10.4	1,585	14,485	1.12
Local	Fifield Rd/ Dinosaur Point Rd	137	138	200	35	19.1	2,836	2,973	**21.70**
Local	Basalt Rd	191	138	200	35	19.1	2,836	3,027	**15.85**
Note:								**Maximum**	**21.70**
Impacts would be significant if equivalent traffic volume increases by nine times (10 dBA increase).								**Significant?**	**Yes**

Table 11. Construction Vehicles - Equivalent Noise Levels (Pipeline Option)

Type	Roadway	Existing 2016 AADT	Maximum Daily Truck Hauling Trips	Maximum Daily Worker Trips	Speed (mph)	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total With Project	Increase Ratio
Interstate	I-5 at junction with SR-152	32,000	36	46	55	10.4	420	32,420	1.01
State Route	SR-152 at junction with I-5	27,000	36	46	55	10.4	420	27,420	1.02
State Route	SR-152 at junction with SR-33	28,600	36	46	55	10.4	420	29,020	1.01
State Route	SR-33 at junction with I-5	12,900	36	46	55	10.4	420	13,320	1.03
Local	Fifield Rd/ Dinosaur Point Rd	137	36	60	35	19.1	748	885	6.46
Local	Basalt Rd	191	36	60	35	19.1	748	939	4.91
Note:								**Maximum**	**6.46**
Impacts would be significant if equivalent traffic volume increases by nine times (10 dBA increase).								**Significant?**	**No**

Doubling of the noise source produces only a 3 dB increase, which is a barely perceptible change; therefore, there would be no audible change in traffic noise.
FHWA. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Construction Noise - Equipment
Treatment Alternative - Santa Teresa WTP

Table 12. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'
Mobilization and Site Improvements	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Saw Cutters	Concrete Saw	20%	90	83
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Loaders	Front End Loader	40%	79	75
	Vibrating Plate	Compactor (ground)	20%	83	76
	Water Truck	Dump Truck	40%	76	72
	Wheel Trencher	Slurry Trenching Machine	50%	80	77
Retrofit Existing Facilities	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Saw Cutters	Concrete Saw	20%	90	83
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Loaders	Front End Loader	40%	79	75
	Vibrating Plate	Compactor (ground)	20%	83	76
	Water Truck	Dump Truck	40%	76	72
	Wheel Trencher	Slurry Trenching Machine	50%	80	77
Starting and Testing	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Saw Cutters	Concrete Saw	20%	90	83
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Loaders	Front End Loader	40%	79	75
	Vibrating Plate	Compactor (ground)	20%	83	76
	Water Truck	Dump Truck	40%	76	72
	Wheel Trencher	Slurry Trenching Machine	50%	80	77
Demobilization	Bulldozer	Dozer	40%	82	78
	Concrete Pumpers	Concrete Pump Truck	20%	81	74
	Concrete Saw Cutters	Concrete Saw	20%	90	83
	Concrete Trucks	Concrete Mixer Truck	40%	79	75
	Cranes	Crane	16%	81	73
	Dump Truck	Dump Truck	40%	76	72
	Excavator	Excavator	40%	81	77
	Flatbed Trucks (on site)	Flat Bed Truck	40%	74	70
	Loaders	Front End Loader	40%	79	75
	Vibrating Plate	Compactor (ground)	20%	83	76
	Water Truck	Dump Truck	40%	76	72
	Wheel Trencher	Slurry Trenching Machine	50%	80	77

Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
1	0	82	78
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
2	3	79	75
-	-	-	-
4	6	80	76
1	0	79	75
-	-	-	-
2	3	79	75
-	-	-	-
Mobilization and Site Improvements Total		**87**	**83**
-	-	-	-
2	3	84	77
2	3	93	86
2	3	82	78
2	3	84	76
2	3	79	75
1	0	81	77
4	6	80	76
1	0	79	75
2	3	86	79
2	3	79	75
2	3	83	80
Retrofit Existing Facilities Total		**96**	**90**
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
Starting and Testing Total		**n/a**	**n/a**
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
2	3	79	75
-	-	-	-
4	6	80	76
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
Demobilization Total		**83**	**79**

Construction Noise - Equipment
Treatment Alternative - Santa Teresa WTP

Table 13. 1-Hour Construction Noise Level at the Receptor (dBA)

Phase Type	Mobilization and Site Improvements	Retrofit Existing Facilities	Starting and Testing	Demobilization
Distance from the Center of Construction Activity to a Receptor (ft)	520	520	520	520
1-Hour Construction Noise Level at 50 ft (dBA)	83	90	n/a	79
Distance Divergence (dBA)	20.3	20.3	20.3	20.3
Atmospheric Attenuation (dBA)	0.43	0.43	0.43	0.43
1-Hour Construction Noise Level at the Receptor (dBA)	62	69	n/a	58
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	63	69	n/a	60
Daytime Increase Over Existing (dBA)	8	14	n/a	5
Significant?	No	Yes	n/a	No

County
Santa Clara

Significance Level
10 dBA
(daytime increase over existing noise levels)

Existing Noise Levels
Land Use Type Normal Suburban Residential
Background Noise (dBA) 55

Sensitive Receptor:
Residence located at 19500 Graystone Ln, San Jose, CA
The Santa Teresa WTP is surrounded by residences on all sides

Construction Noise - Traffic
Treatment Alternative

Table 14. Construction Vehicles - Equivalent Noise Levels

Type	Roadway	Existing 2016 AADT	Maximum Daily Truck Hauling Trips	Maximum Daily Worker Trips	Average Speed	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total With Project	Increase Ratio
Interstate	I-880 at junction with US-101	182,000	160	183	35	19.1	3,246	185,246	1.02
Interstate	I-680 at junction with Berryessa Road	177,000	160	183	65	7.9	1,450	178,450	1.01
State Route	SR-237 at junction with I-880	141,000	160	183	35	19.1	3,246	144,246	1.02
State Route	SR-87 at junction with I-280	169,000	160	183	35	19.1	3,246	172,246	1.02
State Route	SR-85 at junction with US-101	55,000	160	183	35	19.1	3,246	58,246	1.06
State Route	US-101 at junction with SR-85	150,000	160	183	40	15.1	2,605	152,605	1.02
Note:								**Maximum**	**1.06**
Impacts would be significant if equivalent traffic volume increases by nine times (10 dBA increase).								**Significant?**	**No**

Doubling of the noise source produces only a 3 dB increase, which is a barely perceptible change; therefore, there would be no audible change in traffic noise.
FHWA. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Construction Noise - Equipment
Enlarged Reservoir Alternative

Table 15. 1-Hour Daytime Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'
Peak Day	Excavator	Excavator	40%	81
	Bulldozer	Dozer	40%	82
	Crane/ Lift	Crane	16%	81
	Compactor	Compactor (ground)	20%	83
	Grader	Grader	40%	85
	Scraper	Scraper	40%	84
	Loader	Dozer	40%	82
	Dump Truck	Dump Truck	40%	76
	Water Truck	Tractor	40%	84
	Blasting	Blasting	1%	94

Table 16. 1-Hour Nighttime Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'
Peak Day	Excavator	Excavator	40%	81
	Bulldozer	Dozer	40%	82
	Crane/ Lift	Crane	16%	81
	Compactor	Compactor (ground)	20%	83
	Grader	Grader	40%	85
	Scraper	Scraper	40%	84
	Loader	Dozer	40%	82
	Dump Truck	Dump Truck	40%	76
	Water Truck	Tractor	40%	84

Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
77	3	5	86	82
78	4	6	88	84
73	5	7	88	80
76	5	7	90	83
81	2	3	88	84
80	2	3	87	83
78	5	7	89	85
72	13	11	87	83
80	5	7	91	87
74	4	6	100	80
		Peak Day Total	**98**	**94**

Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
77	3	5	86	82
78	4	6	88	84
73	5	7	88	80
76	5	7	90	83
81	2	3	88	84
80	2	3	87	83
78	5	7	89	85
72	13	11	87	83
80	5	7	91	87
		Peak Day Total	**98**	**93**

Table 17. 1-Hour Daytime Construction Noise Level at the Receptor (dBA)

Location	Residence on Harper Lane	San Luis Creek Use Area	Subdivision off SR 152
Distance from the Center of Construction Activity to a Receptor (ft)	16,400	5,600	8,250
1-Hour Construction Noise Level at 50 ft (dBA)	94	94	94
Distance Divergence (dBA)	50.3	41.0	44.3
Atmospheric Attenuation (dBA)	13.50	4.61	6.79
1-Hour Construction Noise Level at the Receptor (dBA)	30	48	42
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	40	49	44
Daytime Increase Over Existing (dBA)	0	9	4
Significant?	No	No	No

Table 18. 1-Hour Nighttime Construction Noise Level at the Receptor (dBA)

Location	Residence on Harper Lane	San Luis Creek Use Area	Subdivision off SR 152
Distance from the Center of Construction Activity to a Receptor (ft)	16,400	5,600	8,250
1-Hour Construction Noise Level at 50 ft (dBA)	93	93	93
Distance Divergence (dBA)	50.3	41.0	44.3
Atmospheric Attenuation (dBA)	13.50	4.61	6.79
1-Hour Construction Noise Level at the Receptor (dBA)	30	48	42
Nighttime Unmitigated Leq (Construction Noise + Existing) (dBA)	33	48	43
Nighttime Increase Over Existing (dBA)	3	18	13
Significant?	No	Yes	Yes

County		Significance Level	
Merced	Daytime	10	dBA
	Nighttime	5	dBA

Existing Noise Levels

Land Use Type	Rural Residential
Daytime Background Noise (dBA)	40
Nightime Background Noise (dBA)	30

Sensitive Receptor Locations:

San Luis Creek Use Area	5,600	feet
Residence on Harper Lane	16,400	feet
Subdivision off SR 152	8,250	feet

Construction Noise - Traffic
Enlarged Reservoir Alternative

Table 19. Construction Vehicles - Equivalent Noise Levels

Type	Roadway	Existing 2016 AADT	Maximum Daily Truck Hauling Trips	Maximum Daily Worker Trips	Speed (mph)	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total With Project	Increase Ratio
Interstate	I-5 at junction with SR-152	32,000	160	108	55	10.4	1,772	33,772	1.06
US	SR-152 at junction with I-5	27,000	160	108	55	10.4	1,772	28,772	1.07
State Route	SR-152 at junction with SR-33	28,600	320	217	55	10.4	3,545	32,145	1.12
State Route	SR-33 at junction with I-5	12,900	160	108	55	10.4	1,772	14,672	1.14
Local	Fifield Rd/ Dinosaur Point Rd	137	480	434	35	19.1	9,602	9,739	**71.09**
Local	Basalt Rd	191	480	434	35	19.1	9,602	9,793	**51.27**
Note:								**Maximum**	**71.09**
Impacts would be significant if equivalent traffic volume increases by nine times (10 dBA increase).								**Significant?**	**Yes**

Doubling of the noise source produces only a 3 dB increase, which is a barely perceptible change; therefore, there would be no audible change in traffic noise.
FHWA. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Construction Noise - Equipment
Pacheco Reservoir Expansion Alternative

Table 20. 1-Hour Construction Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'
Peak Day	Bulldozer	Dozer	40%	82
	Loader	Front End Loader	40%	79
	Grader	Grader	40%	85
	Backhoe	Backhoe	40%	78
	Excavator	Excavator	40%	81
	On Highway Truck	Flat Bed Truck	40%	74
	Off Highway Truck	Dump Truck	40%	76
	Scraper	Scraper	40%	84
	Smooth Drum Compactor	Compactor (ground)	20%	83
	Large Compactor	Roller	20%	80
	Grapple	Grapple (on backhoe)	40%	87
	Conveyor	Conveyor	100%	90
	Grout Mixer	Drum Mixer	50%	80
	Trailer Mounted Concrete Pump	Concrete Pump Truck	20%	81
	Concrete Vibrator	Vibrating Hopper	50%	87
	Pumps	Pumps	50%	81
	Grout/Shotcrete Plants	Concrete Batch Plant	15%	83
	Generator	Generator	50%	81
	Diesel Compressor	Compressor (air)	40%	78
	Diesel Welder	Welder/Torch	40%	74
	Sand Blasting Pot	Sand Blasting (Single Nozzl	20%	96
	Pressure Washer	Pneumatic Tools	50%	85
	Crane	Crane	16%	81
	Man Lift	Man Lift	20%	75
	Auger Drill Rig	Auger Drill Rig	20%	84
	Jackhammer	Jackhammer	20%	89
	Hydraulic Hoe Ram	Mounted Impact Hammer (h	20%	90
	Drill Rig Truck	Drill Rig Truck	20%	79
	Ventilation Fan	Ventilation Fan	100%	79
	Pickup Trucks	Pickup Truck	40%	75
	Blasting	Blasting	1%	94

Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
78	6	8	90	86
75	9	10	89	85
81	2	3	88	84
74	6	8	86	82
77	1	0	81	77
70	6	8	82	78
72	17	12	88	84
80	1	0	84	80
76	1	0	83	76
73	6	8	88	81
83	1	0	87	83
90	1	0	90	90
77	1	0	80	77
74	2	3	84	77
84	1	0	87	84
78	3	5	86	83
75	2	3	86	78
78	4	6	87	84
74	4	6	84	80
70	5	7	81	77
89	2	3	99	92
82	2		85	82
73	7	8	89	81
68	2	3	78	71
77	4	6	90	83
82	1	0	89	82
83	1	0	90	83
72	5	7	86	79
79	1	0	79	79
71	23	14	89	85
74	1	0	94	74
		Peak Day Total	**104**	**98**

Table 21. 1-Hour Construction Noise Level at the Receptor (dBA)

Location	Residence on El Toro Road	Residence on unnamed access road	Residence off SR 152
Distance from the Center of Construction Activity to a Receptor (ft)	1,250	11,750	7,000
1-Hour Construction Noise Level at 50 ft (dBA)	98	98	98
Distance Divergence (dBA)	28.0	47.4	42.9
Atmospheric Attenuation (dBA)	1.03	9.67	5.76
1-Hour Construction Noise Level at the Receptor (dBA)	69	41	50
Unmitigated Leq (Construction Noise + Existing) (dBA)	69	44	50
Increase Over Existing (dBA)	29	4	10
Significant?	Yes	No	Yes

County		Significance Level	
Santa Clara	Daytime	10	dBA
	Nighttime	5	dBA

Existing Noise Levels

Land Use Type	Rural Residential
Daytime Background Noise (dBA)	40
Nighttime Background Noise (dBA)	30

Sensitive Receptor Locations:

Residence on El Toro Road	1,250	feet
Residence on unnamed access road	11,750	feet
Residence off SR 152	7,000	feet

Operational Noise
Pacheco Reservoir Expansion Alternative

Table 22. 1-Hour Operational Noise Level at 50 Feet (dBA)

Phase	Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Peak Day	Pump station	Pumps	50%	81	78	11	10	91	88
							Peak Day Total	**91**	**88**

Table 23. 1-Hour Operational Noise Level at the Receptor (dBA)

Location	Residence on El Toro Road	Residence on unnamed access road	Residence off SR 152
Distance from the Center of Proposed Pump station to a Receptor (ft)	2,130	14,600	9,120
1-Hour Operational Noise Level at 50 ft (dBA)	88	88	88
Distance Divergence (dBA)	32.6	49.3	45.2
Atmospheric Attenuation (dBA)	1.75	12.02	7.51
1-Hour Operational Noise Level at the Receptor (dBA)	54	27	36
Unmitigated Leq (Construction Noise + Existing) (dBA)	54	40	41
Increase Over Existing (dBA)	14	0	1
Significant?	Yes	No	No

County
Merced

Significance Level
10 dBA *(daytime increase over existing noise levels)*
5 dBA *(nighttime increase over existing noise levels)*

Existing Noise Levels
Land Use Type Rural Residential
Daytime Background Noise (dBA) 40
Nighttime Background Noise (dBA) 30
Sensitive Receptor Locations:

Residence on El Toro Road 2,130 feet
Residence on unnamed access road 14,600 feet
Residence off SR 152 9,120 feet

Construction Noise - Traffic
Pacheco Reservoir Expansion Alternative

Table 24. Construction Vehicles - Equivalent Noise Levels

Type	Roadway	Existing 2016 AADT	Maximum Daily Truck Hauling Trips	Maximum Daily Worker Trips	Speed (mph)	Equivalency Factor for Heavy-Duty Vehicles	Equivalent Vehicles	Total With Project	Increase Ratio
Interstate	I-5 at junction with SR-152	32,000	430	950	55	10.4	5,422	37,422	1.17
State Route	SR-152 at junction with I-5	27,000	430	950	55	10.4	5,422	32,422	1.20
State Route	SR-152 at junction with SR-33	28,600	430	950	55	10.4	5,422	34,022	1.19
State Route	SR-33 at junction with I-5	12,900	430	950	55	10.4	5,422	18,322	1.42
Note:								**Maximum**	**1.42**
Impacts would be significant if equivalent traffic volume increases by nine times (10 dBA increase).								**Significant?**	**No**

Doubling of the noise source produces only a 3 dB increase, which is a barely perceptible change; therefore, there would be no audible change in traffic noise.
FHWA. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Table 25. Atmospheric Attenuation

Assumptions	Merced	Santa Clara
Ambient pressure (kPa)	101.3	101.3
Temperature (F)	68	68
Relative humidity (%)	90	90
Frequency of noise source (Hz)	500	500
Air Attenuation Coefficient (α, dB/km)	2.7	2.7
(dB/ft)	0.0008	0.0008

Conversion:
0.3048 m/ft
1000 m/km

$A_{air} = \alpha d$

Weather in Merced County
Average temperature 62.9 °F
Average relative humidity 79.48 %

Weather in Santa Clara County
Average temperature 59.7 °F
Average relative humidity 81.51 %

Reference:
Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control. 3rd ed. - Chapter 3 Calculation of Attenuation
http://www.usa.com/santa-clara-county-ca-weather.htm; http://www.usa.com/merced-county-ca-weather.htm

Table 26. Equipment noise emissions and acoustical usage factors database

Equipment Description	Impact Device?	Acoustical Use Factor	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50 ft (dBA, slow)
All Other Equipment > 5 hp	No	50%	85	N/A
Auger Drill Rig	No	20%	85	84
Backhoe	No	40%	80	78
Bar Bender	No	20%	80	N/A
Blasting	Yes	1%	94	N/A
Boring Jack Power Unit	No	50%	80	83
Chain Saw	No	20%	85	84
Clam Shovel (dropping)	Yes	20%	93	87
Compactor (ground)	No	20%	80	83
Compressor (air)	No	40%	80	78
Concrete Batch Plant	No	15%	83	N/A
Concrete Mixer Truck	No	40%	85	79
Concrete Pump Truck	No	20%	82	81
Concrete Saw	No	20%	90	90
Conveyor	No	100%	90	90
Crane	No	16%	85	81
Dozer	No	40%	85	82
Drill Rig Truck	No	20%	84	79
Drum Mixer	No	50%	80	80
Dump Truck	No	40%	84	76
Excavator	No	40%	85	81
Flat Bed Truck	No	40%	84	74
Front End Loader	No	40%	80	79
Generator	No	50%	82	81
Generator (<25KVA, VMS signs)	No	50%	70	73
Gradall	No	40%	85	83
Grader	No	40%	85	N/A
Grapple (on backhoe)	No	40%	85	87
Horizontal Boring Hydr. Jack	No	25%	80	82
Hydra Break Ram	Yes	10%	90	N/A
Impact Pile Driver	Yes	20%	95	101
Jackhammer	Yes	20%	85	89
Man Lift	No	20%	85	75
Mounted Impact Hammer (hoe ram)	Yes	20%	90	90
Pavement Scarifier	No	20%	85	90
Paver	No	50%	85	77
Pickup Truck	No	40%	55	75
Pneumatic Tools	No	50%	85	85
Pumps	No	50%	77	81
Refrigerator Unit	No	100%	82	73
Rivit Buster/Chipping Gun	Yes	20%	85	79
Rock Drill	No	20%	85	81
Roller	No	20%	85	80
Sand Blasting (Single Nozzle)	No	20%	85	96
Scraper	No	40%	85	84
Shears (on backhoe)	No	40%	85	96
Slurry Plant	No	100%	78	78
Slurry Trenching Machine	No	50%	82	80
Soil Mix Drill Rig	No	50%	80	N/A
Tractor	No	40%	84	N/A
Vacuum Excavator (vac-truck)	No	40%	85	85
Vacuum Street Sweeper	No	10%	80	82
Ventilation Fan	No	100%	85	79
Vibrating Hopper	No	50%	85	87
Vibratory Concrete Mixer	No	20%	80	80
Vibratory Pile Driver	No	20%	95	101
Warning Horn	No	5%	85	83
Welder/Torch	No	40%	73	74

Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power. In case of construction blasting, the equipment gives a very short duration blast and can be quantified by using a 1% usage factor in the RCNM to allow for some prediction.

FHWA. RCNM User's Guide - Table 1. CA/T equipment noise emissions and acoustical usage factors database.

Table 27. Average Ambient Noise Levels for Various Land Uses

Land Use Description	Average Ldn (dBA)	Daytime Leq (dBA)	Nighttime Leq (dBA)
Wilderness	35	35	25
Rural Residential	40	40	30
Quiet Suburban Residential	50	50	40
Normal Suburban Residential	55	55	45
Urban Residential	60	60	50
Noisy Urban Residential	65	65	55
Very Noisy Urban Residential	70	70	60

Source: U.S. EPA, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974.

Table 28. Noise Reductions from Mitigation Measures

Mitigation Type	Reduction (dBA)
Noise barrier or other obstruction just barely breaks the line-of-sight between the noise source and the receptor	3
Noise source completely enclosed or completely shielded with solid barrier located close to the source	8
Enclosure and/or barrier with some gaps	5
Noise source completely enclosed and completely shielded with a solid barrier located close to the source	10
Noise source enclosed or shielded with heavy vinyl noise curtain material	5

Source: FHWA. RCNM User's Guide Appendix A Best Practices for Calculating Estimated Shielding for Use in the RCNM