Appendix H: Noise Calculations

Construction Calculations:

Variable		A	B	C	D	E	F
Project Element	**Construction Equipment**	**Noise Level at 50 ft, dBA L_{max}[1]**	**Usage Factor (%)[1]**	**Distance to Closest NSA**	**L_{max} at NSA[2]**	**L_{eq} at NSA[3]**	**Total Noise Level at Closest NSA, dBA $L_{eq,1\text{-}hour}$[4]**
Pump Stations	Crane	85	16	175 ft	74	66	75
	Backhoe	80	40		69	65	
	Excavator	85	40		74	70	
	Concrete Truck	85	40		74	70	
	Compactor	80	20		69	62	
Road Crossings	Crane	85	16	100 ft	79	71	81
	Excavator	85	40		79	75	
	Compactor	80	20		74	67	
	Dump Truck	84	40		78	74	
	Loader	80	40		74	70	
	Bulldozer	85	40		79	75	
Main Conveyance Canal	Excavator	85	40	50 ft	85	81	86
	Grader	85	40		85	81	
	Scraper	85	40		85	81	
	Compactor	80	40		80	78	
Recharge Elements	Backhoe	80	40	50 ft	80	76	88
	Grader	85	40		85	81	
	Scraper	85	40		85	81	
	Compactor	80	20		80	73	
	Dump Truck	84	40		84	80	
	Loader	80	40		80	76	
	Bulldozer	85	40		85	81	
Recovery Well Elements	Crane	85	16	125 ft	77	69	80
	Drill Rig	84	20		76	69	
	Grader	85	40		77	73	
	Concrete Truck	85	40		77	73	
	Dump Truck	84	40		76	72	
	Loader	80	40		72	68	
	Bulldozer	85	40		77	73	

Note:

[1] Source: FHWA 2006

[2] D=A-20log(C/50)

[3] E=D+10log(B/100)

[4] F=Logrithmic total of Leq values for Project element of interest

Operation Calculations:

Variable		A	B	C	D
Equipment	Sound Power, dBA	Sound Pressure at 3 feet, dBA[1]	Distance to 45 dBA (feet)[2]	Mitigated Sound Pressure at 10 feet, dBA[3]	Mitigated Sound Pressure at 175 feet, dBA[4]
Pump	95	86	350	52	27

Note:

[1]A=Calculated using pump as a point source within CadnaA

[2]B=3*10^(|A-45|/20)

[3]C=Assumes 10 feet away from the pump is just outside the STC 45 enclosure

[4]D=52-|20*log(10/175)|

Vibration Calculations:

Equipment	[1]PPV at 25 ft	Distance to PPV of 0.12 in/sec[2]	Vibration Level at 25 ft	Distance to 80 VdB[3]
Large Bulldozer	0.089	20 ft	87 VdB	42 ft
Caisson Drilling	0.089	20 ft	87 VdB	42 ft

Note:

[1] PPV is Peak Particle Velocity: The peak signal value of an oscillating vibration velocity waveform. Usually expressed in inches/second in the United States.

[2]0.12=0.089*((25/20)^1.5)

[3]42=87-30*log(42/25)