Appendix M Noise Support Information

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/20/2014
Case Description: Encina MOT Offshore Segment

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Beach & Residence	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Barge w generator	No	100		80	1200	0
Barge w crane 67%	No	67		85	1200	0
Barge anchor winch	No	17		79	1200	0
Barge anchor winch	No	17		79	1200	0
Barge pull winch	No	67		79	1200	0
Tug 33%	No	33		82.1	1200	0
Tugboat generator	No	100		83	1200	0
Tug 33%	No	33		82.1	1200	0
Tugboat generator	No	100		83	1200	0
Crew boat 17%	No	17		88	1200	0
Crew boat generator	No	100		83	1200	0
Welding machine	No	33	74		1200	0
Jet pump	No	33		81	1200	0
Industrial air compressor	No	8		78	1200	0
Divers air compressor	No	83		63.6	1200	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Noise Limits (dBA) Evening Lmax	Evening Leq
Barge w generator	52.4	52.4	N/A	N/A	N/A	N/A
Barge w crane 67%	57.4	55.7	N/A	N/A	N/A	N/A
Barge anchor winch	51.4	43.7	N/A	N/A	N/A	N/A
Barge anchor winch	51.4	43.7	N/A	N/A	N/A	N/A
Barge pull winch	51.4	49.7	N/A	N/A	N/A	N/A
Tug 33%	54.5	49.7	N/A	N/A	N/A	N/A
Tugboat generator	55.4	55.4	N/A	N/A	N/A	N/A
Tug 33%	54.5	49.7	N/A	N/A	N/A	N/A
Tugboat generator	55.4	55.4	N/A	N/A	N/A	N/A
Crew boat 17%	60.4	52.7	N/A	N/A	N/A	N/A
Crew boat generator	55.4	55.4	N/A	N/A	N/A	N/A
Welding machine	46.4	41.6	N/A	N/A	N/A	N/A
Jet pump	53.4	48.6	N/A	N/A	N/A	N/A
Industrial air compressor	50.4	39.4	N/A	N/A	N/A	N/A
Divers air compressor	36	35.2	N/A	N/A	N/A	N/A
Total	60.4	63.4	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 63.4 - 62.8 (beach ambient) = 0.6. Therefore, add 2.8 to highest = 66.2 dBA
63.4 – 60.6 (res. ambient) = 2.8. Therefore add 1.8 to highest = 65.2 dBA

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Description: Encina MOT Onshore Segment w/side of Carlsbad Blvd

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Residential	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 67%	No	67		80.7	1400	0
Excavator 67%	No	67		80.7	1400	0
Dozer 67%	No	67		81.7	1400	0
Loader 67%	No	67		79	1400	0
Generator 83%	No	83		80.6	1400	0
Industrial air compressor 50 %	No	50		77.7	1400	0
Concrete breaker 33%	Yes	33		90	1400	0

	Calculated (dBA)		Results Day	Noise Limits (dBA)	Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator 67%	51.8	50	N/A	N/A	N/A	N/A
Excavator 67%	51.8	50	N/A	N/A	N/A	N/A
Dozer 67%	52.8	51	N/A	N/A	N/A	N/A
Loader 67%	50.1	48.3	N/A	N/A	N/A	N/A
Generator 83%	51.7	50.8	N/A	N/A	N/A	N/A
Industrial air compressor 50 %	48.8	45.7	N/A	N/A	N/A	N/A
Concrete breaker 33%	61.1	56.2	N/A	N/A	N/A	N/A
Total	61.1	59.9	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 60.6-59.9 = 0.7 Therefore, add 2.8 to highest = 63.4 dBA
63.4 -60.6 = 2.8 dBA increase over ambient

Combine with offshore: 63.4 (offshore segment noise level) – 63.4=0. Therefore, add 3.0 to highest = 63.4 =3 = 66.4 dBA
66.4-60.6 = 5.8 dBA increase over ambient

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Description: Encina MOT Onshore Segment w/side of Carlsbad Blvd

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Beach	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 67%	No	67		80.7	100	0
Excavator 67%	No	67		80.7	100	0
Dozer 67%	No	67		81.7	100	0
Loader 67%	No	67		79	100	0
Generator 83%	No	83		80.6	100	0
Industrial air compressor 50 %	No	50		77.7	100	0
Concrete breaker 33%	Yes	33		90	100	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq
Excavator 67%	74.7	72.9	N/A	N/A	N/A	N/A
Excavator 67%	74.7	72.9	N/A	N/A	N/A	N/A
Dozer 67%	75.7	73.9	N/A	N/A	N/A	N/A
Loader 67%	73	71.2	N/A	N/A	N/A	N/A
Generator 83%	74.6	73.8	N/A	N/A	N/A	N/A
Industrial air compressor 50 %	71.7	68.7	N/A	N/A	N/A	N/A
Concrete breaker 33%	84	79.2	N/A	N/A	N/A	N/A
Total	84	82.8	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 82.8-62.8 = 20. Therefore, add 0 to highest.

Combine noise including offshore: 82.8-63.5 (offshore segment noise) = 19.3 dBA. Therefore, add 0 to highest.

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Description: Encina MOT Surf Zone Segment - onshore

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Beach	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 67%	No	67		80.7	100	0
Excavator 67%	No	67		80.7	100	0
Dozer 67%	No	67		81.7	100	0
Crane 33%	No	33		60.6	100	0
Divers air compressor 67%	No	67		63.6	100	0
Light plant 33%	No	33		50	100	0
Light plant 33%	No	33		50	100	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq
			Noise Limits (dBA)			
Excavator 67%	74.7	72.9	N/A	N/A	N/A	N/A
Excavator 67%	74.7	72.9	N/A	N/A	N/A	N/A
Dozer 67%	75.7	73.9	N/A	N/A	N/A	N/A
Crane 33%	54.6	49.8	N/A	N/A	N/A	N/A
Divers air compressor 67%	57.6	55.8	N/A	N/A	N/A	N/A
Light plant 33%	44	39.2	N/A	N/A	N/A	N/A
Light plant 33%	44	39.2	N/A	N/A	N/A	N/A
Total	75.7	78.1	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 78.1-62.8 = 15.3. Therefore, add 0.2 to highest = 78.3

Onshore 78.1, offshore 62.7, ambient 62.8
78.1 - 62.7=15.4. Therefore, add 0.2 to highest = 78.3 dBA
78.3 - 62.8 = 15.5. Therefore, add 0.2 to highest = 78.5 dBA

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/20/2014
Case Description Encina MOT Surf Zone Segment offshore work

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Beach	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Barge w generator	No	100		80	1200	0
Barge w crane 83%	No	83		83	1200	0
Barge w anchor winch 8%	No	8		79	1200	0
Barge w anchor winch 8%	No	8		79	1200	0
Barge w pull winch 33 %	No	33		79	1200	0
Tug 33%	No	33		82.1	1200	0
Tugboat generator	No	100		83	1200	0
Crew boat 33%	No	33		88	1200	0
Crew boat generator	No	100		83	1200	0
Welding machine 50%	No	50		74	1200	0
Jet pump 50%	No	50		81	1200	0
Industrial air compressor 33%	No	33		78	1200	0
Divers air compressor 33%	No	33		63.3	1200	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq
Barge w generator	52.4	52.4	N/A	N/A	N/A	N/A
Barge w crane 83%	55.4	54.6	N/A	N/A	N/A	N/A
Barge w anchor winch 8%	51.4	40.4	N/A	N/A	N/A	N/A
Barge w anchor winch 8%	51.4	40.4	N/A	N/A	N/A	N/A
Barge w pull winch 33 %	51.4	46.6	N/A	N/A	N/A	N/A
Tug 33%	54.5	49.7	N/A	N/A	N/A	N/A
Tugboat generator	55.4	55.4	N/A	N/A	N/A	N/A
Crew boat 33%	60.4	55.6	N/A	N/A	N/A	N/A
Crew boat generator	55.4	55.4	N/A	N/A	N/A	N/A
Welding machine 50%	46.4	43.4	N/A	N/A	N/A	N/A
Jet pump 50%	53.4	50.4	N/A	N/A	N/A	N/A
Industrial air compressor 33%	50.4	45.6	N/A	N/A	N/A	N/A
Divers air compressor 33%	35.7	30.9	N/A	N/A	N/A	N/A
Total	60.4	62.7	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/20/2014
Case Description: Encina MOT Surf Zone Segment offshore work

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residence	Residential	60.6	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Barge w generator	No	100		80	1800	0
Barge w crane 83%	No	83		83	1800	0
Barge w anchor winch 8%	No	8		79	1800	0
Barge w anchor winch 8%	No	8		79	1800	0
Barge w pull winch 33 %	No	33		79	1800	0
Tug 33%	No	33		82.1	1800	0
Tugboat generator	No	100		83	1800	0
Crew boat 33%	No	33		88	1800	0
Crew boat generator	No	100		83	1800	0
Welding machine 50%	No	50		74	1800	0
Jet pump 50%	No	50		81	1800	0
Industrial air compressor 33%	No	33		78	1800	0
Divers air compressor 33%	No	33		63.3	1800	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Barge w generator	48.9	48.9	N/A	N/A	N/A	N/A
Barge w crane 83%	51.9	51.1	N/A	N/A	N/A	N/A
Barge w anchor winch 8%	47.9	36.9	N/A	N/A	N/A	N/A
Barge w anchor winch 8%	47.9	36.9	N/A	N/A	N/A	N/A
Barge w pull winch 33 %	47.9	43.1	N/A	N/A	N/A	N/A
Tug 33%	51	46.2	N/A	N/A	N/A	N/A
Tugboat generator	51.9	51.9	N/A	N/A	N/A	N/A
Crew boat 33%	56.9	52.1	N/A	N/A	N/A	N/A
Crew boat generator	51.9	51.9	N/A	N/A	N/A	N/A
Welding machine 50%	42.9	39.9	N/A	N/A	N/A	N/A
Jet pump 50%	49.9	46.9	N/A	N/A	N/A	N/A
Industrial air compressor 33%	46.9	42.1	N/A	N/A	N/A	N/A
Divers air compressor 33%	32.2	27.4	N/A	N/A	N/A	N/A
Total	56.9	59.1	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 60.6 (ambient at res) – 59.1 = 1.5. Therefore, add 2.3 to highest = 62.9 dBA
62.9-55.2 (noise level onshore work) = 7.7. Therefore add 0.7 to highest = 63.0 dBA

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Descripti Encina MOT Surf Zone Segment Onshore

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residences	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 67%	No	67		80.7	1400	0
Excavator 67%	No	67		80.7	1400	0
Dozer 67%	No	67		81.7	1400	0
Crane 33%	No	33		60.6	1400	0
Divers air compressor 67%	No	76		63.6	1400	0
Light plant 33%	No	33		50	1400	0
Light plant 33%	No	33		50	1400	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator 67%	51.8	50	N/A	N/A	N/A	N/A	N/A
Excavator 67%	51.8	50	N/A	N/A	N/A	N/A	N/A
Dozer 67%	52.8	51	N/A	N/A	N/A	N/A	N/A
Crane 33%	31.7	26.8	N/A	N/A	N/A	N/A	N/A
Divers air compressor 67%	34.7	33.5	N/A	N/A	N/A	N/A	N/A
Light plant 33%	21.1	16.2	N/A	N/A	N/A	N/A	N/A
Light plant 33%	21.1	16.2	N/A	N/A	N/A	N/A	N/A
Total	52.8	55.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

DYNAMIC PIPE RAMMING

TO DETERMINE NOISE CONTOURS FOR A GIVEN NOISE LEVEL

ATTENUATION RATE: 6 dBA/DOUBLING OF DISTANCE
(choice: 3, 4.5, or 6)
NOISE LEVEL: 95 dBA
REFERENCE DISTANCE: 50 FEET

NOISE CONTOUR	DISTANCE FROM SOURCE	SPECIFIC DISTANCE	NOISE LEVEL	
75	500	50	95.0	
70	889	100	89.0	
65	1581	150	85.5	
63	1991	200	83.0	
60	2812	300	79.4	
55	5000	1200	67.4	Beach
50	8891	1800	63.9	Res.

Combine noise (beach): 67.4 rammer – 62.7 (other onshore noise) = 4.7. Therefore, add 1.3 to highest = 68.7 dBA.
68.7 - 62.7 = 6 dBA increase

Combine noise (res): 63.9 (rammer) – 63.0 (other construction noise at res.) = 0.9. Therefore, add 2.6 to highest = 66.5 dBA
66.5 – 63.0 = 3.5 dBA increase

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Description: Encina MOT Beach Segment - residences

REMOVE RIP RAP GROIN

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residences	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 42%	No	42		80.7	1400	0
Excavator 42%	No	42		80.7	1400	0
Dozer 67%	No	67		81.7	1400	0
Loader 67%	No	67		79	1400	0
Crane 67%	No	67		80.6	1400	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq
Excavator 42%	51.8	48	N/A	N/A	N/A	N/A
Excavator 42%	51.8	48	N/A	N/A	N/A	N/A
Dozer 67%	52.8	51	N/A	N/A	N/A	N/A
Loader 67%	50.1	48.3	N/A	N/A	N/A	N/A
Crane 67%	51.7	49.9	N/A	N/A	N/A	N/A
Total	52.8	56.2	N/A	N/A	N/A	N/A

Noise Limits (dBA)

*Calculated Lmax is the Loudest value.

Combine noise: 60.6 (ambient at res) – 56.2 = 4.4. Therefore, add 1.3 to highest = 61.9 dBA
61.9 – 60.6 = 1.3 dBA change from ambient

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 6/19/2014
Case Description: Encina MOT Beach Segment

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Beach	Residential	62.8	59	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator 42%	No	42		80.7	100	0
Excavator 42%	No	42		80.7	100	0
Dozer 67%	No	67		81.7	100	0
Loader 67%	No	67		79	100	0
Crane 67%	No	67		80.6	100	0

	Results					
	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator 42%	74.7	70.9	N/A	N/A	N/A	N/A
Excavator 42%	74.7	70.9	N/A	N/A	N/A	N/A
Dozer 67%	75.7	73.9	N/A	N/A	N/A	N/A
Loader 67%	73	71.2	N/A	N/A	N/A	N/A
Crane 67%	74.6	72.8	N/A	N/A	N/A	N/A
Total	75.7	79.1	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Combine noise: 79.1 – 62.8 = 16.3. Therefore, add 0 to highest = 79.1

Combining Sound Levels in Decibels — Worksheet A

The noise environment at a site is determined by combining the contributions of different noise sources. In these Guidelines, Workcharts are provided to estimate the contribution of aircraft, automobile, truck, and train noise to the total day-night average sound level (DNL) at a site. The DNL contributions from each source are expressed in decibels and entered on Worksheet A. The combined DNL from all the sources is the DNL for the site and is the value used to determine the acceptability of the noise environment.

Sound levels in decibels ARE NOT COMBINED BY SIMPLE ADDITION! The following table shows how to combine sound levels:

Table 1

Difference in Sound Level	Add to Larger Level
0	3.0
1	2.5
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
9	0.5
10	0.4
12	0.3
14	0.2
16	0.1
greater than 16	0

Use the table by first finding the numerical difference in sound level between two levels being combined. Entering the table with this value, find the value to be added to the larger of the two levels, add this value to the larger level to determine the total. Where more than two levels are to be combined use the same procedure to combine any two levels, then use this subtotal and combine it with any other level, and so on. Fractional numerical values may be interpolated from the table; however, the final result should be rounded to the nearest whole number.

Example 1: In performing a site evaluation, the separate DNL values for airports, road traffic, and railroads have been listed on Worksheet A as 56, 63, and 61 decibels. In order to complete the final evaluation of the site, these separate DNL values must be combined. The difference between 63 and 56 is 7; from the table you find that 0.8 should be added to 63, for a subtotal of 63.8. The difference between 63.8 and 61 is 2.8; from the table you interpolate that approximately 1.9 should be added to 63.8 for a total of 65.7 or 66 dB when rounded to whole numbers. This example shows how noise from different sources may be Acceptable, individually, at a site, but when combined, the total noise environment may exceed the Acceptable DNL limit of 65 decibels.