4.2 TAILING AREA/CARIBOU CROSSING (NM-4)

Hourly L_{eq} and L_{90} results recorded at monitoring location NM-4 for both summer and autumn seasons are presented in Tables 4.3 and 4.4, respectively. Field observations and the review of sound recordings indicated that construction activity was not audible.

The lowest hourly L_{eq} value recorded during summer was 27 dBA, which occurred between 1:00 PM and 2:00 PM. The L_{90} value for this hourly period is 24 dBA. During the autumn noise measurement study, the lowest hourly L_{eq} value recorded was 24 dBA, which occurred from 2:00 AM to 3:00 AM. The L_{90} value for this hourly period is 23 dBA. Peak noise sources observed at this location were predominantly helicopter fly-overs in addition to one blast event, wind, technician activity, and wildlife.

Figures 4.3 and 4.4 represent one minute interval L_{eq} noise levels at NM-4 during the summer and autumn season, respectively. The figures include sources of identified peaks.

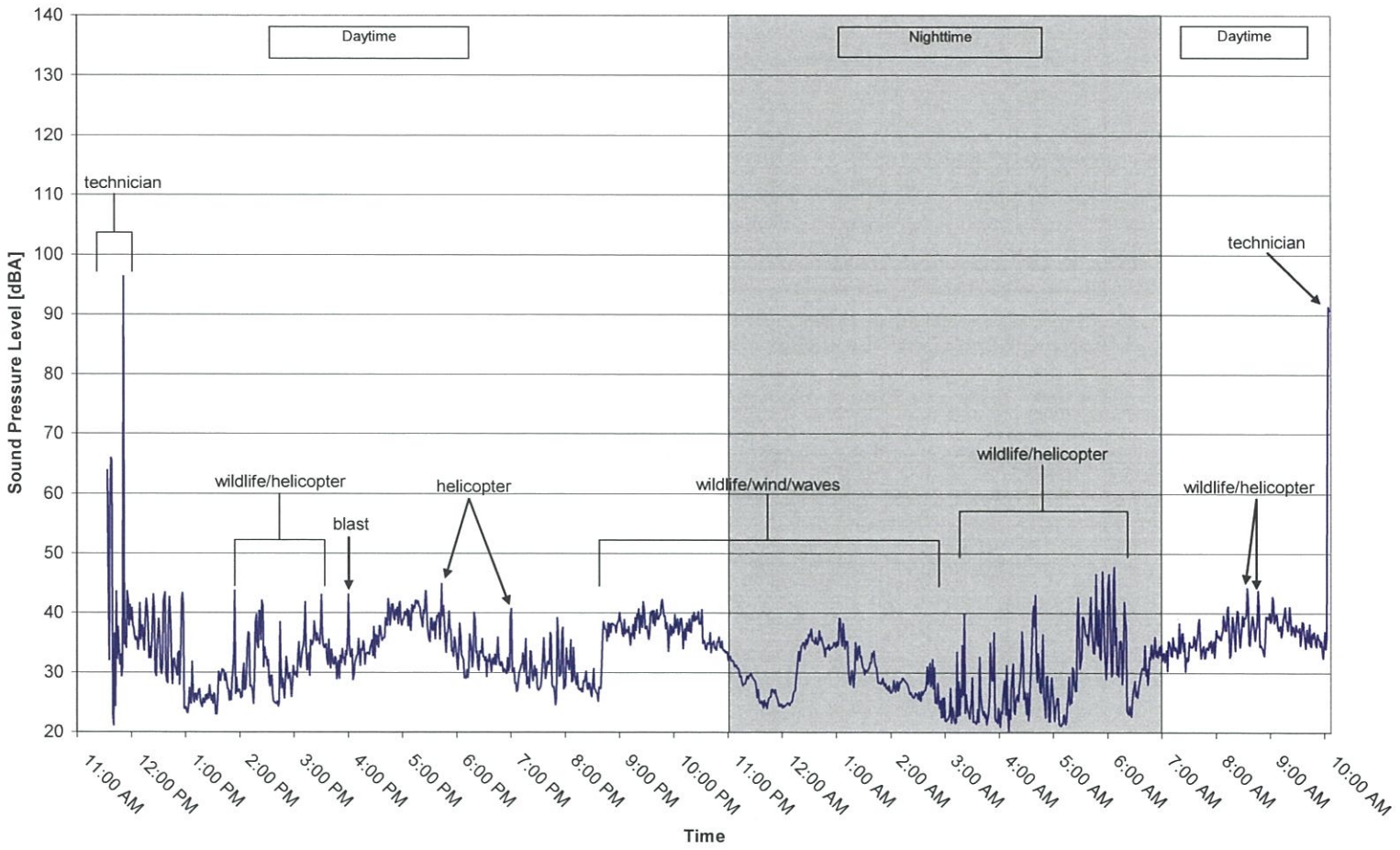
Table 4.3 Filtered Hourly Sound Levels, Monitoring Location NM-4, 13 to 14 July 2008

Date	Hour[a]	L_{eq} [dBA]	L_{90} [dBA]
13 July 2008	12:00 PM	38	33
13 July 2008	1:00 PM	27 [b]	24 [b]
13 July 2008	2:00 PM	33	28
13 July 2008	3:00 PM	35	30
13 July 2008	4:00 PM	37	33
13 July 2008	5:00 PM	39	36
13 July 2008	6:00 PM	33	29
13 July 2008	7:00 PM	32	28
13 July 2008	8:00 PM	34	31
13 July 2008	9:00 PM	39	35
13 July 2008	10:00 PM	37	34
13 July 2008	11:00 PM	29	27
14 July 2008	12:00 AM	34	32
14 July 2008	1:00 AM	33	30
14 July 2008	2:00 AM	28	26
14 July 2008	3:00 AM	28	21
14 July 2008	4:00 AM	32	22
14 July 2008	5:00 AM	37	33
14 July 2008	6:00 AM	37	30
14 July 2008	7:00 AM	35	31
14 July 2008	8:00 AM	38	35

[a] Measurement start hour.

[b] Measurement has noise due to technician activity excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

Note: Shaded area represents nighttime period



PROJECT

NEWMONT. The Gold Company

NEWMONT MINING CORPORATION
HOPE BAY MINING PROJECT

TITLE

ONE MINUTE INTERVAL NOISE LEVELS, MONITORING LOCATION NM-4, 13 TO 14 JULY 2008

Golder Associates

PROJECT	08.1373.0026		FILE No.	4.5
DESIGN	RB	17/12/08	NOT TO SCALE	REV. 0
NOISE	HSL	14/01/09		
CHECK	JC	14/01/09		
REVIEW	TD	14/01/09		

FIGURE: 4.3

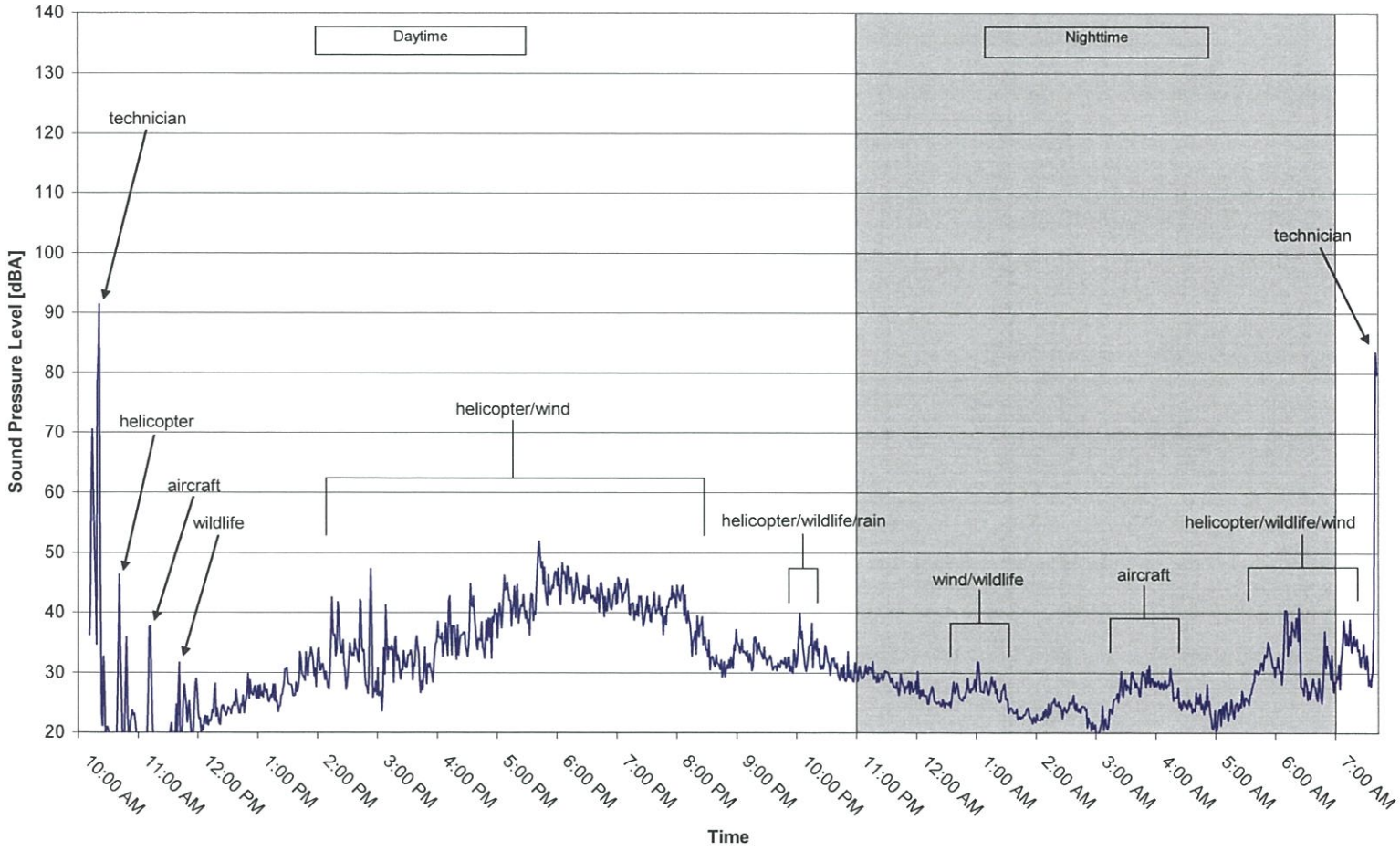
Table 4.4 Filtered Hourly Sound Levels, Monitoring Location NM-4, 9 to 10 September 2008

Date	Hour[a]	L_{eq} [dBA]	L_{90} [dBA]
09 September 2008	10:00 AM	32 [b]	25 [b]
09 September 2008	11:00 AM	26	22
09 September 2008	12:00 PM	25	23
09 September 2008	1:00 PM	29	27
09 September 2008	2:00 PM	36	31
09 September 2008	3:00 PM	33	28
09 September 2008	4:00 PM	38	34
09 September 2008	5:00 PM	44	40
09 September 2008	6:00 PM	44	40
09 September 2008	7:00 PM	42	38
09 September 2008	8:00 PM	38	34
09 September 2008	9:00 PM	33	31
09 September 2008	10:00 PM	33	30
09 September 2008	11:00 PM	29	27
10 September 2008	12:00 AM	26	25
10 September 2008	1:00 AM	26	25
10 September 2008	2:00 AM	24	23
10 September 2008	3:00 AM	27	25
10 September 2008	4:00 AM	26	24
10 September 2008	5:00 AM	29	27
10 September 2008	6:00 AM	34	29
10 September 2008	7:00 AM	34	30

[a] Measurement start hour.

[b] Measurement has noise due to technician activity excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

Note: Shaded area represents nighttime period



PROJECT

NEWMONT
The Gold Company

NEWMONT MINING CORPORATION
HOPE BAY MINING PROJECT

TITLE

ONE MINUTE INTERVAL NOISE LEVELS, MONITORING LOCATION NM-4, 9 TO 10 SEPTEMBER 2008

Golder Associates

PROJECT	08.1373.0026		FILE No.	4.6
DESIGN	RB	17/12/08	NOT TO SCALE	REV. 0
NOISE	HSL	14/01/09		
CHECK	JC	14/01/09		
REVIEW	TD	14/01/09		

FIGURE: 4.4

4.3 CAMP AND PLANT AREA AND QUARRY #2 (NM-5)

The NM-5 location was chosen to be representative for the Camp and Plant Area, and Quarry #2, due to the close proximity of the two locations. Hourly L_{eq} and L_{90} results recorded at monitoring location NM-5 for both summer and autumn seasons are presented in Tables 4.5 and 4.6, respectively. Construction activity was noted throughout the monitoring periods.

Table 4.5 Filtered Hourly Sound Levels, Monitoring Location NM-5, 13 to 14 July 2008

Date	Hour[a]	L_{eq} [dBA]	L_{90} [dBA]
13 July 2008	11:00 AM	59 [b]	42 [b]
13 July 2008	12:00 PM	52	40
13 July 2008	1:00 PM	32	28
13 July 2008	2:00 PM	49	36
13 July 2008	3:00 PM	47	33
13 July 2008	4:00 PM	45	33
13 July 2008	5:00 PM	57	45
13 July 2008	6:00 PM	47	34
13 July 2008	7:00 PM	50	37
13 July 2008	8:00 PM	36	31
13 July 2008	9:00 PM	38	34
13 July 2008	10:00 PM	38	35
13 July 2008	11:00 PM	39	37
14 July 2008	12:00 AM	38	33
14 July 2008	1:00 AM	43	40
14 July 2008	2:00 AM	42	39
14 July 2008	3:00 AM	37	33
14 July 2008	4:00 AM	34	29
14 July 2008	5:00 AM	51	34
14 July 2008	6:00 AM	51	39
14 July 2008	7:00 AM	51	36
14 July 2008	8:00 AM	50	40
14 July 2008	9:00 AM	50	36

[a] Measurement start hour.

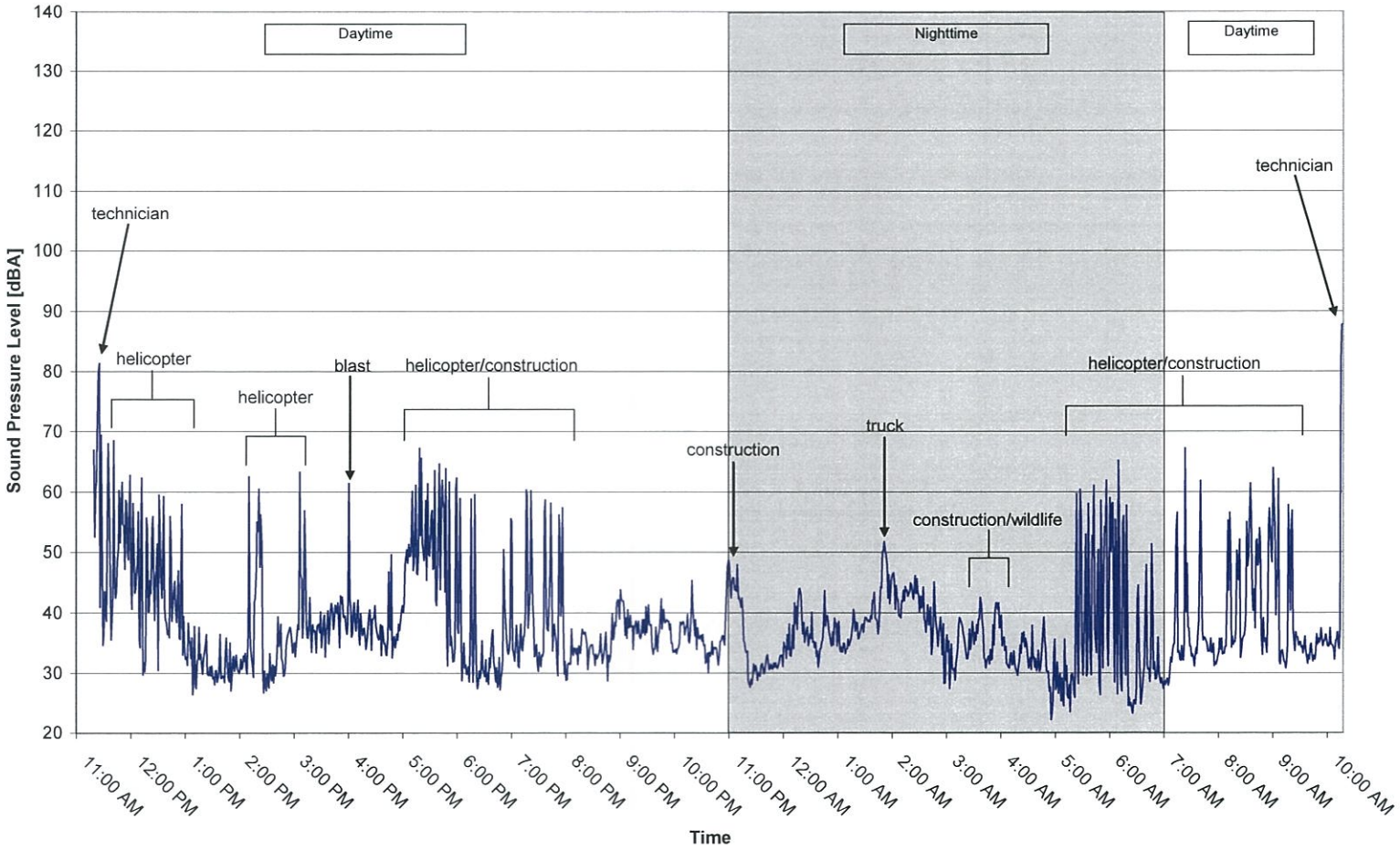
[b] Measurement has noise due to technician activity excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

Note: Shaded area represents nighttime period

The lowest hourly L_{eq} value recorded during summer was 34 dBA, which occurred between 4:00 AM and 5:00 AM. The L_{90} value for this hourly period was 29 dBA. During the autumn noise measurement study, the lowest hourly L_{eq} value recorded was 23 dBA, which occurred from 4:00 AM to 5:00 AM. The L_{90} value for this hour was 21 dBA. Peak noise sources observed at this location were predominantly helicopter fly-overs in addition to technician activity, one

blast event, periodic rain, and wind induced interference with the microphone of the noise meter (autumn season only). The period of precipitation recorded during autumn was not filtered from the measured data since these are typical weather conditions in autumn.

Figures 4.5 and 4.6 represents one-minute interval L_{eq} noise levels at NM-5 during the summer and autumn season respectively. The figures include sources of identified peaks.



PROJECT

NEWMONT

NEWMONT MINING CORPORATION
HOPE BAY MINING PROJECT

TITLE

ONE MINUTE INTERVAL NOISE LEVELS, MONITORING LOCATION NM-5, 13 TO 14 JULY 2008

Golder Associates

PROJECT	08.1373.0026		FILE No.	4.5
DESIGN	RB	17/12/08	NOT TO SCALE	REV. 0
NOISE	HSL	14/01/09		
CHECK	JC	14/01/09	**FIGURE: 4.5**	
REVIEW	TD	14/01/09		

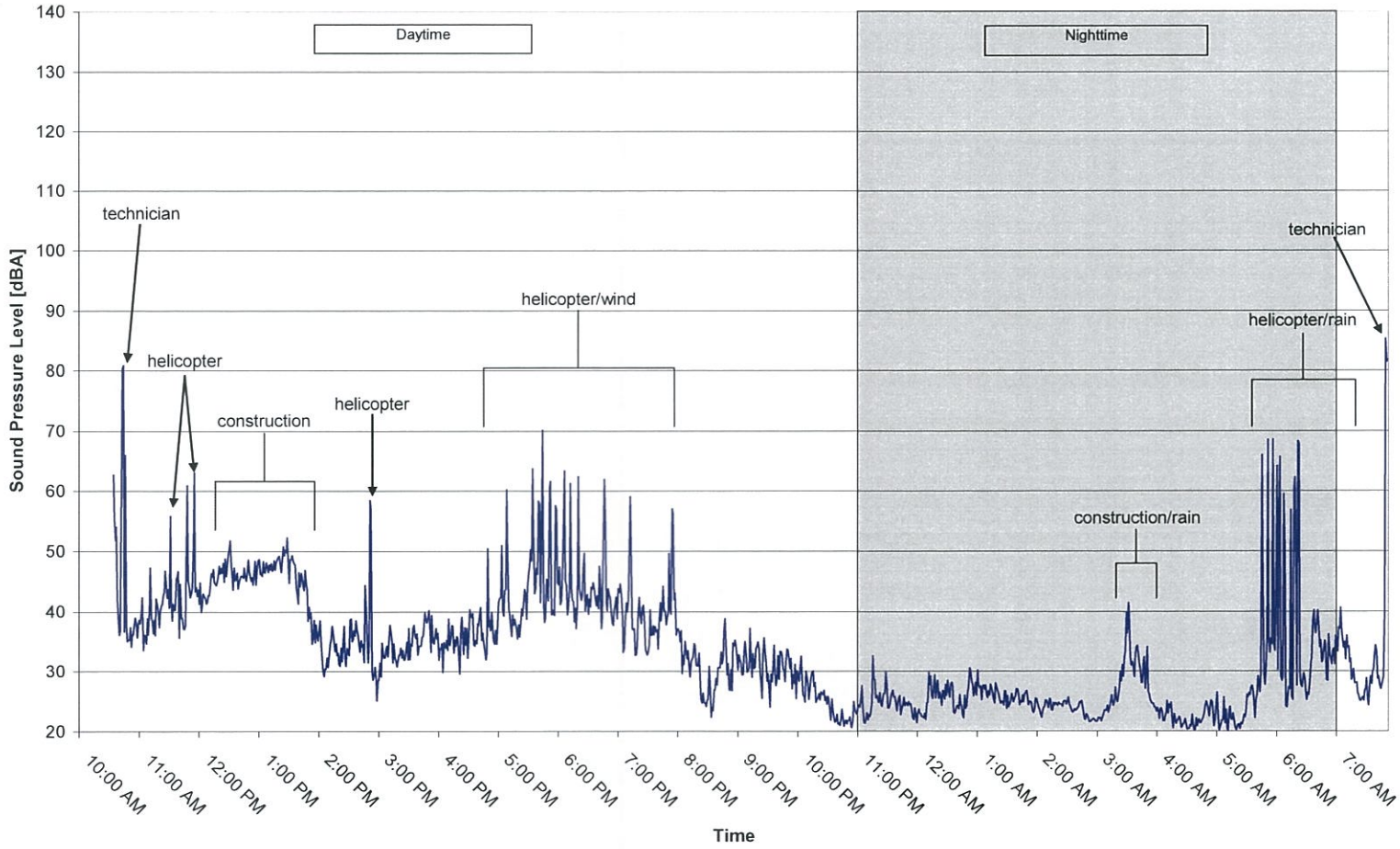
Table 4.6 Filtered Hourly Sound Levels, Monitoring Location NM-5, 9 to 10 September 2008

Date	Hour[a]	L_{eq} [dBA]	L_{90} [dBA]
09 September 2008	11:00 AM	49	41
09 September 2008	12:00 PM	46	43
09 September 2008	1:00 PM	47	44
09 September 2008	2:00 PM	44	32
09 September 2008	3:00 PM	35	32
09 September 2008	4:00 PM	38	31
09 September 2008	5:00 PM	55	40
09 September 2008	6:00 PM	51	42
09 September 2008	7:00 PM	46	39
09 September 2008	8:00 PM	32	27
09 September 2008	9:00 PM	32	26
09 September 2008	10:00 PM	26	23
09 September 2008	11:00 PM	25	23
10 September 2008	12:00 AM	26	23
10 September 2008	1:00 AM	26	24
10 September 2008	2:00 AM	24	23
10 September 2008	3:00 AM	31	27
10 September 2008	4:00 AM	23	21
10 September 2008	5:00 AM	55	28
10 September 2008	6:00 AM	56	30
10 September 2008	7:00 AM	33[b]	29[b]

[a] Measurement start hour.

[b] Measurement has noise due to technician activity excluded, thereby creating a value based on less than 60 minutes but more than 30 minutes of recorded data.

Note: Shaded area represents nighttime period



PROJECT

NEWMONT

NEWMONT MINING CORPORATION
HOPE BAY MINING PROJECT

TITLE

ONE MINUTE INTERVAL NOISE LEVELS, MONITORING LOCATION NM-5, 9 TO 10 SEPTEMBER 2008

Golder Associates

PROJECT	08,1373,0026		FILE No.	4.6
DESIGN	RB	17/12/08	NOT TO SCALE	REV. 0
NOISE	HSL	14/01/09		
CHECK	JC	14/01/09		
REVIEW	TD	14/01/09		

FIGURE: 4.6

5 WEATHER CONDITIONS

Weather information for the 24-hour surveys conducted at NM-1, NM-4, and NM-5 are presented in Tables 5.1 and 5.2. Air temperature, wind speed, wind direction, and humidity data were collect hourly from the Doris North weather station onsite. Periodic strong winds were common in the vicinity of the project site throughout the summer and autumn seasons. Higher humidity and precipitation were more frequent during the monitoring period conducted during the autumn season.

Table 5.1 Weather Information for 13 to 15 July 2008

Date	Hour[a]	Weather Information			
		Average Air Temperature (° Celsius)	Humidity (%)	Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction[b] (degrees)
13 July 2008	11:00 AM	7	90	17.4	292
13 July 2008	12:00 PM	7	88	13.8	295
13 July 2008	1:00 PM	8	83	13.8	295
13 July 2008	2:00 PM	10	76	20.9	278
13 July 2008	3:00 PM	11	72	23.4	275
13 July 2008	4:00 PM	11	72	21.4	283
13 July 2008	5:00 PM	10	72	19.6	303
13 July 2008	6:00 PM	10	72	16.5	285
13 July 2008	7:00 PM	11	70	11.6	280
13 July 2008	8:00 PM	12	67	16.6	342
13 July 2008	9:00 PM	11	70	17.4	357
13 July 2008	10:00 PM	9	76	16.6	351
13 July 2008	11:00 PM	7	83	24.0	345
14 July 2008	12:00 AM	6	88	21.7	6
14 July 2008	1:00 AM	5	90	15.3	4
14 July 2008	2:00 AM	5	91	13.9	328
14 July 2008	3:00 AM	5	91	11.2	308
14 July 2008	4:00 AM	5	92	13.0	312
14 July 2008	5:00 AM	6	90	12.8	323
14 July 2008	6:00 AM	6	88	19.4	297
14 July 2008	7:00 AM	7	85	23.1	297
14 July 2008	8:00 AM	8	84	24.8	292
14 July 2008	9:00 AM	10	80	24.7	285
14 July 2008	10:00 AM	10	77	24.6	280
14 July 2008	11:00 AM	11	75	24.5	278
14 July 2008	12:00 PM	10	74	28.6	277
14 July 2008	1:00 PM	9	76	31.7	278
14 July 2008	2:00 PM	9	79	29.7	277
14 July 2008	3:00 PM	7	83	29.4	276
14 July 2008	4:00 PM	7	85	25.4	281

Table 5.1 Weather Information for 13 to 15 July 2008 (continued)

Date	Hour[a]	Weather Information			
		Average Air Temperature (° Celsius)	Humidity (%)	Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction[b] (degrees)
14 July 2008	5:00 PM	8	84	26.1	271
14 July 2008	6:00 PM	7	84	25.7	277
14 July 2008	7:00 PM	8	81	27.4	283
14 July 2008	8:00 PM	7	82	24.5	285
14 July 2008	9:00 PM	7	83	18.7	281
14 July 2008	10:00 PM	7	82	17.1	283
14 July 2008	11:00 PM	5	87	25.6	274
15 July 2008	12:00 AM	5	90	27.4	301
15 July 2008	1:00 AM	5	90	26.9	349
15 July 2008	2:00 AM	4	90	25.5	11
15 July 2008	3:00 AM	4	91	18.2	23
15 July 2008	4:00 AM	4	91	16.6	2
15 July 2008	5:00 AM	4	90	10.4	347
15 July 2008	6:00 AM	5	90	5.6	334
15 July 2008	7:00 AM	5	86	9.7	301
15 July 2008	8:00 AM	6	86	18.3	285

[a] Measurement start hour

[b] 0 and 360 degrees represent true north

Table 5.2 Weather Information for 9 to 11 September, 2008

Date	Hour[a]	Weather Information			
		Average Air Temperature (° Celsius)	Humidity (%)	Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction[b] (degrees)
09 September 2008	10:00 AM	1	86	10.5	294
09 September 2008	11:00 AM	1	89	8.5	262
09 September 2008	12:00 PM	1	87	8.6	202
09 September 2008	1:00 PM	2	91	11.6	163
09 September 2008	2:00 PM	2	93	13.5	178
09 September 2008	3:00 PM	3	93	15.7	277
09 September 2008	4:00 PM	3	91	21.1	262
09 September 2008	5:00 PM	3	92	22.4	271
09 September 2008	6:00 PM	3	91	26.2	285
09 September 2008	7:00 PM	3	89	25.1	290
09 September 2008	8:00 PM	3	92	23.6	296
09 September 2008	9:00 PM	2	92	16.7	306
09 September 2008	10:00 PM	2	91	16.4	304
09 September 2008	11:00 PM	2	93	11.0	313

Table 5.2 Weather Information for September 9 to 11, 2008 (continued)

Date	Hour [a]	Weather Information			
		Average Air Temperature (° Celsius)	Humidity (%)	Mean Horizontal Wind Speed (km/h)	Unit Vector Mean Wind Direction [b] (degrees)
10 September 2008	12:00 AM	2	93	10.5	318
10 September 2008	1:00 AM	2	93	11.6	310
10 September 2008	2:00 AM	2	93	10.0	295
10 September 2008	3:00 AM	1	95	6.4	271
10 September 2008	4:00 AM	1	96	5.3	219
10 September 2008	5:00 AM	1	96	6.8	262
10 September 2008	6:00 AM	2	97	10.0	259
10 September 2008	7:00 AM	2	96	15.1	272
10 September 2008	8:00 AM	2	95	14.6	293
10 September 2008	9:00 AM	1	96	14.6	350
10 September 2008	10:00 AM	1	95	15.9	339
10 September 2008	11:00 AM	1	93	21.4	352
10 September 2008	12:00 PM	1	93	27.0	21
10 September 2008	1:00 PM	1	89	26.1	12
10 September 2008	2:00 PM	1	85	22.3	1
10 September 2008	3:00 PM	1	83	20.8	357
10 September 2008	4:00 PM	1	76	20.2	345
10 September 2008	5:00 PM	1	75	18.8	336
10 September 2008	6:00 PM	1	71	19.0	331
10 September 2008	7:00 PM	1	74	15.4	338
10 September 2008	8:00 PM	0	87	15.9	336
10 September 2008	9:00 PM	0	83	15.0	332
10 September 2008	10:00 PM	-1	83	12.8	326
10 September 2008	11:00 PM	-1	84	11.5	322
11 September 2008	12:00 AM	-2	84	10.5	319
11 September 2008	1:00 AM	-1	82	8.9	323
11 September 2008	2:00 AM	-1	82	11.5	336
11 September 2008	3:00 AM	-1	77	13.0	336
11 September 2008	4:00 AM	-2	79	11.6	320
11 September 2008	5:00 AM	-2	80	9.3	327
11 September 2008	6:00 AM	-1	79	8.3	332
11 September 2008	7:00 AM	-1	85	11.2	343

[a] Measurement start hour

[b] 0 and 360 degrees represent true north

6 DISCUSSION AND SUMMARY

Tables 6.1 and 6.2 summarize the L_{eq} results for the following Health Canada time period guidelines: daytime (7:00 AM to 11:00 PM), nighttime (11:00 PM to 7:00 AM), 24-hour and 1-hour (10:00 PM to 11:00 PM) time-average for the three monitoring locations identified for the Project. Table 6.3 provides a refresher of the L_{eq} results for the summer 2007 measurements.

Table 6.1 Summary of Ambient Sound Levels During the Summer Season, 2008

Monitoring Location	Ambient Noise Measurements (dBA)			
	Daytime, L_{eq} 7:00 AM to 11:00 PM	Nighttime, L_{eq} 11:00 PM to 7:00 AM	Daily, L_{eq}	1-hour, L_{eq} 10:00 PM to 11:00 PM
NM-1	68 [a]	70 [a]	69 [a]	38
NM-4	36 [a]	33 [a]	35 [a]	37
NM-5	51 [a]	46 [a]	50 [a]	38

[a] less than time indicated of noise measurements due to filtering of invalid data.

Table 6.2 Summary of Ambient Sound Levels During the Autumn Season, 2008

Monitoring Location	Ambient Noise Measurements (dBA)			
	Daytime, L_{eq} 7:00 AM to 11:00 PM	Nighttime, L_{eq} 11:00 PM to 7:00 AM	Daily, L_{eq}	1-hour, L_{eq} 10:00 PM to 11:00 PM
NM-1	66 [a]	62 [a]	65 [a]	44
NM-4	38 [a]	29 [a]	37 [a]	33
NM-5	47 [a]	49 [a]	48 [a]	26

[a] less than time indicated of noise measurements due to filtering of invalid data.

Table 6.3 Summary of Ambient Sound Levels During the Summer Season, 2007

Monitoring Location	Ambient Noise Measurements (dBA)			
	Daytime, L_{eq} 7:00 AM to 11:00 PM	Nighttime, L_{eq} 11:00 PM to 7:00 AM	Daily, L_{eq}	1-hour, L_{eq} 10:00 PM to 11:00 PM
NM-1	46	44	46	44
NM-2/NM-3 (Period 1) [a]	31	29	30	21
NM-2/NM-3 (Period 2) [b]	39 [c]	33 [c]	37 [c]	30
NM-4	48 [c]	44 [c]	47 [c]	47

[a] Period 1 consisted of 27 hours between 6:00 AM (25 July 2007) and 9:00 AM (26 July 2007).

[b] Period 2 consisted of 22 hours between 9:00 AM (25 July 2007) and 7:00 AM (27 July 2007).

[c] less than time indicated of noise measurements due to filtering of invalid data.

The results show the potential variability in ambient noise levels depending on the type of activity or noise sources measured. The ambient levels at two of the three monitoring locations are influenced by common factors, such as helicopter fly-overs, construction activities, weather conditions, and wildlife. However, these factors have different extents of influence at each monitoring location.

The daytime and daily L_{eq} values for NM-1 and NM-5 monitoring locations were lower during the autumn season because of less frequent helicopter activity during the shorter daylight hours. In addition, the new access road completed in autumn provides ground transportation for workers, reducing the helicopter requirement.

The nighttime L_{eq} values for NM-1 decreased in the autumn season for the same reasons discussed above; however, the nighttime L_{eq} values for NM-5 increased in the autumn season. The audio recording shows that an increase of nighttime construction activity near NM-5 contributed to the increase in noise level during the autumn season.

The ambient levels at NM-4 were primarily influenced by helicopter fly-overs, wind, and wildlife, with no anticipated influence from the construction noise. These results were lower than the values measured at NM-1 and NM-5. Daytime and daily L_{eq} noise levels were higher in the autumn season because of higher humidity, and precipitation was more frequent. The lower nighttime L_{eq} noise level during the autumn season was due to the less frequent helicopter activities, similar to NM-1 and NM-5.

The ambient levels at NM-1 and NM-5 (representing NM-2/NM-3) were higher in summer 2008 compared to summer 2007 due to increased construction activities. At NM-4, where construction noise was not audible, weather conditions were the dominant influence of the ambient level. The weather conditions during the summer 2008 study period were more calm than during the summer 2007 study period (e.g., less precipitation and gusty wind); thus, the ambient levels were lower in summer 2008 compared to summer 2007.

7 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

GOLDER ASSOCIATES LTD.

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Acoustic Scientist

Report reviewed by:

Teresa Drew, B.Sc.
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8 REFERENCE

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APPENDIX A

NOISE TERMINOLOGY

NOISE TERMINOLOGY

Since the concepts and theories used in the assessment of outdoor acoustics are not intuitive, the following descriptions of key concepts and definitions used in this evaluation are provided to guide the reader:

"Sound" or "sound emissions" refers to the acoustic energy generated by natural or man-made sources, including the Project activities.

"Noise" or "noise levels" refers to the levels that can be heard or measured at a receiver.

A noise "receiver" is a location where measurements or predictions of noise levels are made.

The "volume" of a sound or noise is expressed on a logarithmic scale, in units called decibels (dB). Since the scale is logarithmic, a sound or noise that is twice as loud as another will only be three decibels (3 dB) higher. A sound or noise with double the number of decibels is much more than twice as loud. A change of three decibels is also the general theshold at which a person can notice a change in sound volume.

Sound emissions and noise levels also have a "frequency". The human ear does not respond to all frequencies in the same way. Mid-range frequencies are most readily detected by the human ear, while low and high frequencies are harder to hear. Environmental noise levels are usually presented as "A weighted" decibels (or dBA), which incorporates the frequency response of the human ear. While low frequency noise may not be "heard", it can often be felt.

"Sound power" is the rate of acoustic energy flow across a specified surface, or emitted by a specified sound source. The sound power in a frequency band is the energy flow rate associated with sound frequencies lying within the band.

"Sound power level" is the level of sound power, expressed in decibel (dB) relative to a stated reference value of 1 pW (dB re 10^{-12} W).

"Sound pressure" is the difference between the instantaneous pressure at a fixed point in a sound field, and the pressure at the same point with the sound absent.

"Sound pressure level" is the sound pressure at a given point quantified by:

$$Lp = 10 \log_{10}(p_{rms}/p_{ref})^2$$

Where p_{rms} is the root mean square, sound pressure and p_{ref} is the reference root mean square, sound pressure (dB re 20μPa).

"Equivalent noise level" (L_{eq}) is the continuous equivalent sound level, defined as the sound pressure level that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period. This type of average takes into account the natural variability of sound. L_{eq} is a common descriptor used in outdoor noise measurement (Cowan 1994).

APPENDIX B

FIELD PHOTOGRAPHS