

APPENDIX A: SUMMARY OF EXISTING AMBIENT SOUND LEVELS MEASURED AT 2 LOCATIONS NEAR EACH OF THE 2 PROPOSED RANGE SITES

Table A-1. Summary table of LAeq and LDN sound levels measured at 2 locations near each of the 2 proposed range sites.

Rion #	Location	Day	LDN (dBA)	LAeq Range (dBA)
1	Rion 1	1	45	25-58
1	Rion 1	2	NA	25-55
1	Rion 1	3	48	22-58
1	Rion 1	4	48	22-66
1	Rion 1	5	50	23-70
1	Rion 1	6	55	20-77
1	Rion 1	7	46	23-58
2	Rion 2	1	43	21-53
2	Rion 2	2	NA	18-54
2	Rion 2	3	39	9-44
2	Rion 2	4	39	8-44
2	Rion 2	5	39	11-60
2	Rion 2	6	36	10-47
2	Rion 2	7	38	8-46
3	Rion 3	1	43	20-62
3	Rion 3	2	NA	20-62
3	Rion 3	3	46	18-57
3	Rion 3	4	44	18-56
3	Rion 3	5	48	23-73
3	Rion 3	6	44	20-53
3	Rion 3	7	49	20-79
4	Rion 4	1	43	18-63
4	Rion 4	2	NA	17-66
4	Rion 4	3	46	18-63
4	Rion 4	4	45	19-64
4	Rion 4	5	46	18-73
4	Rion 4	6	41	18-61
4	Rion 4	7	60	18-81



Figure A-1. Aerial photograph showing LA eq and LDN existing ambient sound levels measured at 2 locations near proposed range Site 1: MCRC.

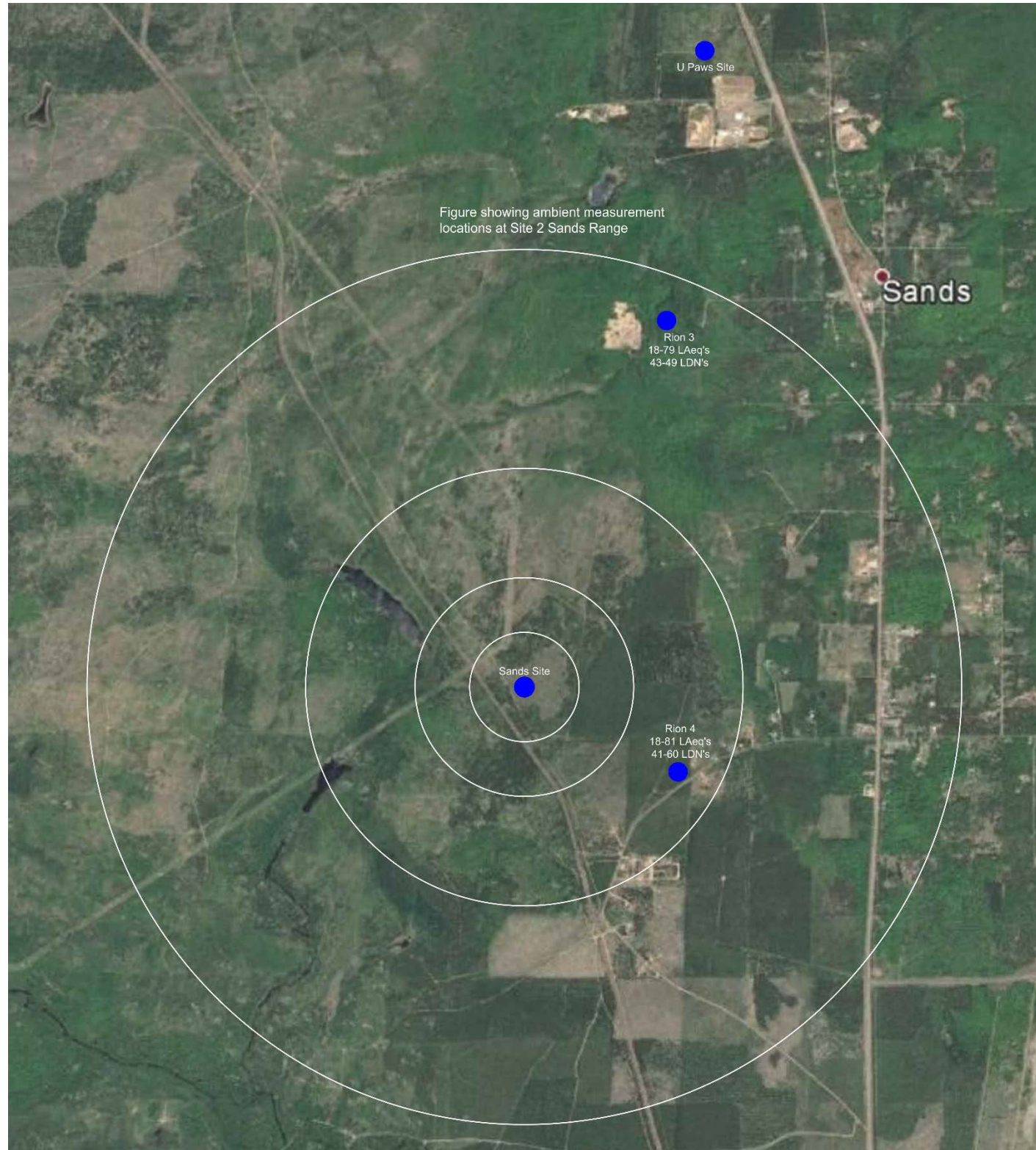


Figure A-2. Aerial photograph showing LA eq and LDN existing ambient sound levels measured at 2 locations near proposed range Site 2: Sands West.

APPENDIX B: SUMMARY OF SOUND LEVELS MEASURED AT 10 FEET FROM THE SOURCE DURING THE EXPERIMENT AT THE PROPOSED RANGE SITES WITH LIVE FIREARMS DISCHARGES

Table B-1. Summary table of LAeq sound levels made at 10 feet from the person shooting during the live fire experiments conducted at the 2 proposed range sites, Site 1: Marquette County Road Commission and Site 2: Sands West.

SUMMARY TABLE LAeq															
Site	Receiver	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
MCRC	M1	FRONT	Series	108	115	121	124	124	130	16	9	8	121	120	126
			Single Shot	116	115	122	116	115	122	0	0	0	116	115	122
			Overall	108	115	121	124	124	130	16	9	8	121	120	126
			Series vs. Single				8	8	8						
	M3	NEAR SIDE	Series	110	106	114	118	113	123	8	8	8	115	110	119
			Single Shot	111	105	115	111	107	115	0	2	0	111	106	115
			Overall	110	105	114	118	113	123	8	8	8	115	110	119
			Series vs. Single				7	7	8						
M5	REAR	Series	105	102	108	112	110	114	7	8	6	110	107	111	
		Single Shot	106	102	107	106	103	108	0	1	0	106	102	108	
		Overall	105	102	107	112	110	114	7	8	7	110	107	111	
		Series vs. Single				6	7	6							
M7	BACK SIDE	Series	107	107	112	117	114	120	10	7	8	114	111	116	
		Single Shot	113	107	113	113	109	113	0	3	0	113	108	113	
		Overall	107	107	112	117	114	120	10	7	8	114	111	116	
		Series vs. Single				4	4	7							
SANDS	M1	FRONT	Series	108	104	121	124	124	128	16	19	7	121	121	125
			Single Shot	116	115	122	116	116	122	0	1	0	116	116	122
			Overall	108	104	121	124	124	128	16	19	7	121	120	125
			Series vs. Single				7	7	6						
	M3	NEAR SIDE	Series	104	106	114	117	115	120	13	9	7	115	112	118
			Single Shot	111	105	114	111	107	114	0	3	0	111	106	114
			Overall	104	105	114	117	115	120	13	10	7	115	112	118
			Series vs. Single				6	8	6						
M5	REAR	Series	106	103	107	113	111	114	6	8	7	110	108	111	
		Single Shot	106	103	106	106	104	106	1	2	0	106	104	106	
		Overall	106	103	106	113	111	114	7	8	8	110	108	111	
		Series vs. Single				6	7	8							
M7	BACK SIDE	Series	109	106	112	117	113	119	9	8	7	113	110	116	
		Single Shot	112	110	113	112	110	114	0	0	1	112	110	114	
		Overall	109	106	112	117	113	119	9	8	7	113	110	116	
		Series vs. Single				5	4	5							

Table B-2. Summary table of LApeak sound levels made at 10 feet from the person shooting during the live fire experiments conducted at the 2 proposed range sites, Site 1: Marquette County Road Commission and Site 2: Sands West.

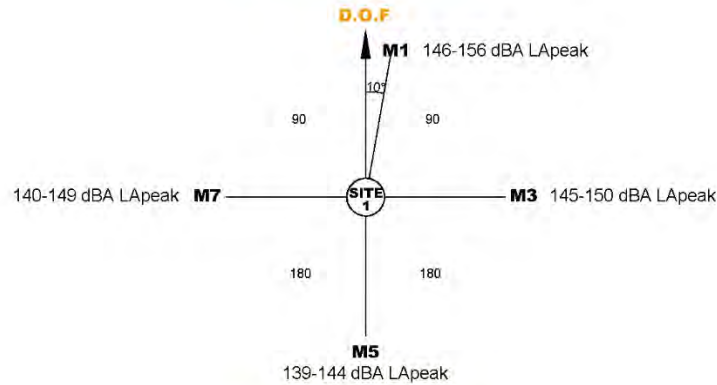
SUMMARY TABLE															
LApeak															
Site	Receiver	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
MCRC	M1	FRONT	Series	146	148	157	156	156	162	9	8	5	153	154	160
			Single Shot	150	151	157	150	152	157	1	0	0	150	152	157
			Overall	146	148	157	156	156	162	9	8	5	153	154	160
			Series vs. Single				5	4	4						
	M3	NEAR SIDE	Series	145	142	150	150	146	154	5	4	5	148	145	153
			Single Shot	146	139	150	146	142	150	0	3	0	146	141	150
			Overall	145	139	150	150	146	154	5	7	5	148	144	153
			Series vs. Single				4	4	4						
M5	REAR	Series	139	135	139	144	143	145	6	8	6	142	140	143	
		Single Shot	141	135	143	142	136	144	0	1	1	141	135	144	
		Overall	139	135	139	144	143	145	6	9	6	142	140	143	
		Series vs. Single				3	7	1							
M7	BACK SIDE	Series	140	142	146	149	147	150	9	6	4	147	144	149	
		Single Shot	147	144	148	148	144	148	1	0	0	148	144	148	
		Overall	140	142	146	149	147	150	9	6	4	147	144	149	
		Series vs. Single				1	3	2							
SANDS	M1	FRONT	Series	146	144	157	155	159	161	9	15	3	153	155	159
			Single Shot	150	152	157	151	152	158	1	0	0	151	152	158
			Overall	146	144	157	155	159	161	9	15	3	153	155	159
			Series vs. Single				4	6	3						
	M3	NEAR SIDE	Series	143	142	149	150	149	153	7	7	4	148	147	153
			Single Shot	146	141	150	146	144	150	0	3	0	146	142	150
			Overall	143	141	149	150	149	153	7	8	4	148	147	152
			Series vs. Single				4	5	3						
M5	REAR	Series	138	138	139	145	146	147	7	7	8	143	143	144	
		Single Shot	141	139	139	142	142	140	1	3	1	142	141	139	
		Overall	138	138	139	145	146	147	7	7	8	143	143	144	
		Series vs. Single				3	4	7							
M7	BACK SIDE	Series	144	142	148	149	147	151	5	5	3	147	145	150	
		Single Shot	148	147	150	148	147	150	0	0	1	148	147	150	
		Overall	144	142	148	149	147	151	5	5	3	147	145	150	
		Series vs. Single				1	1	1							

Table B-3. Summary of differences in LApeak sound levels vs. direction for the 3 types of weapons used in the live fire experiments conducted at the proposed range sites measured at 10 feet from the person shooting.

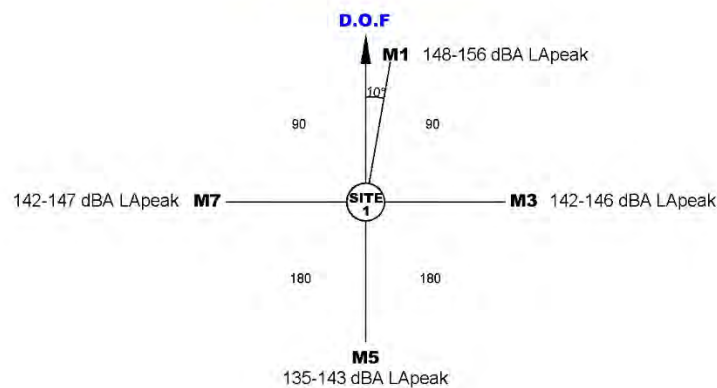
Direction	Site	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
Front to side	1	5	9	7
	2	5	8	7
AVERAGE		5	9	7
Front to rear	1	11	14	16
	2	10	12	15
AVERAGE		11	13	16
Front to back side	1	6	10	11
	2	6	10	9
AVERAGE		6	10	10

Site 1: Marquette County Road Commission

0.40 caliber Pistol



12 gauge Shotgun



0.223 Rifle

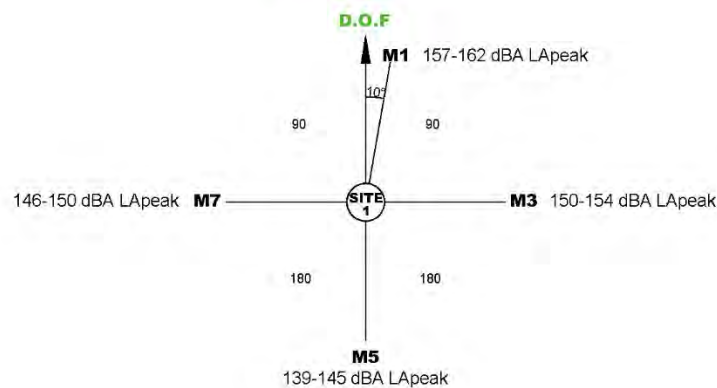
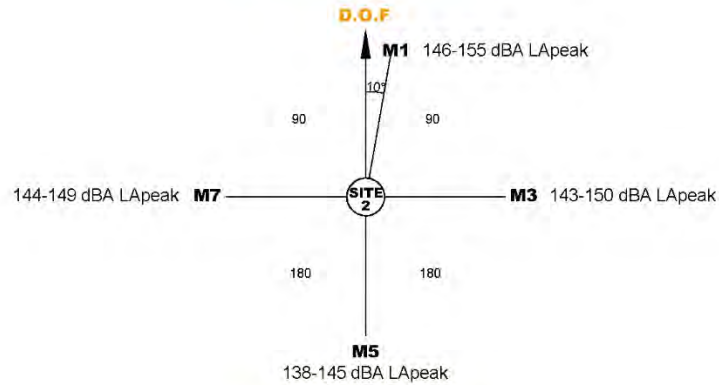


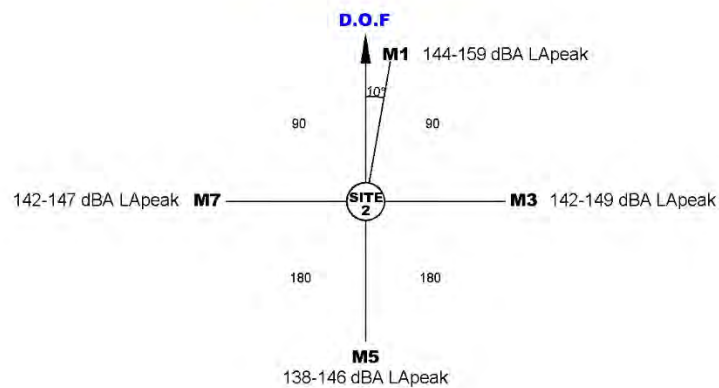
Figure B-1. Diagrams of measured LA peak sound levels (dBA) measured at 10 feet from the person shooting at the proposed shooting range at Site 1: Marquette County Road Commission.

Site 2: Sands West

0.40 caliber Pistol



12 gauge Shotgun



0.223 Rifle

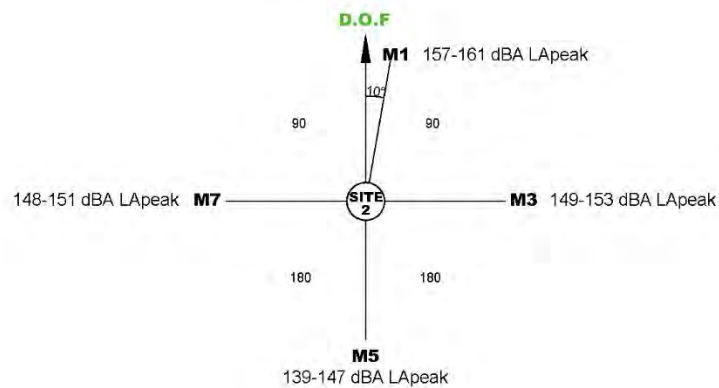


Figure B-2. Diagrams of measured LA peak sound levels (dBA) measured at 10 feet from the person shooting at the proposed shooting range at Site 2: Sands West.

APPENDIX C: SUMMARY OF SOUND LEVELS MEASURED AT DISTANCES OF APPROXIMATELY ¼ MILE, ½ MILE, 1 MILE AND 2 MILES FROM THE PROPOSED RANGE PROPOSED RANGE SITE 1: MCRC, DURING THE EXPERIMENTS WITH LIVE FIREARMS DISCHARGES

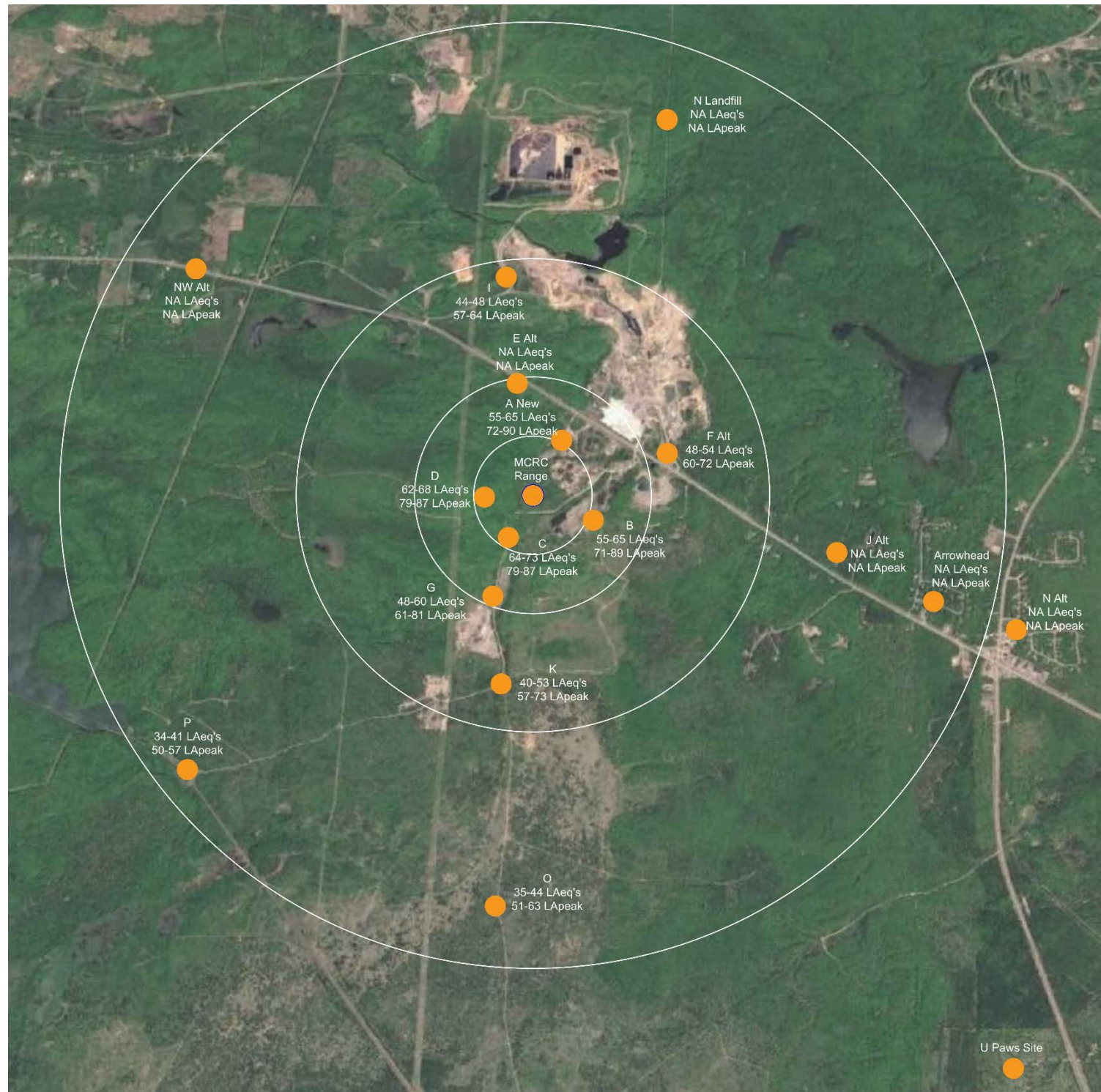


Figure C-1. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 0.40 caliber handgun measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 1: MCRC, with the shooter firing towards the north.

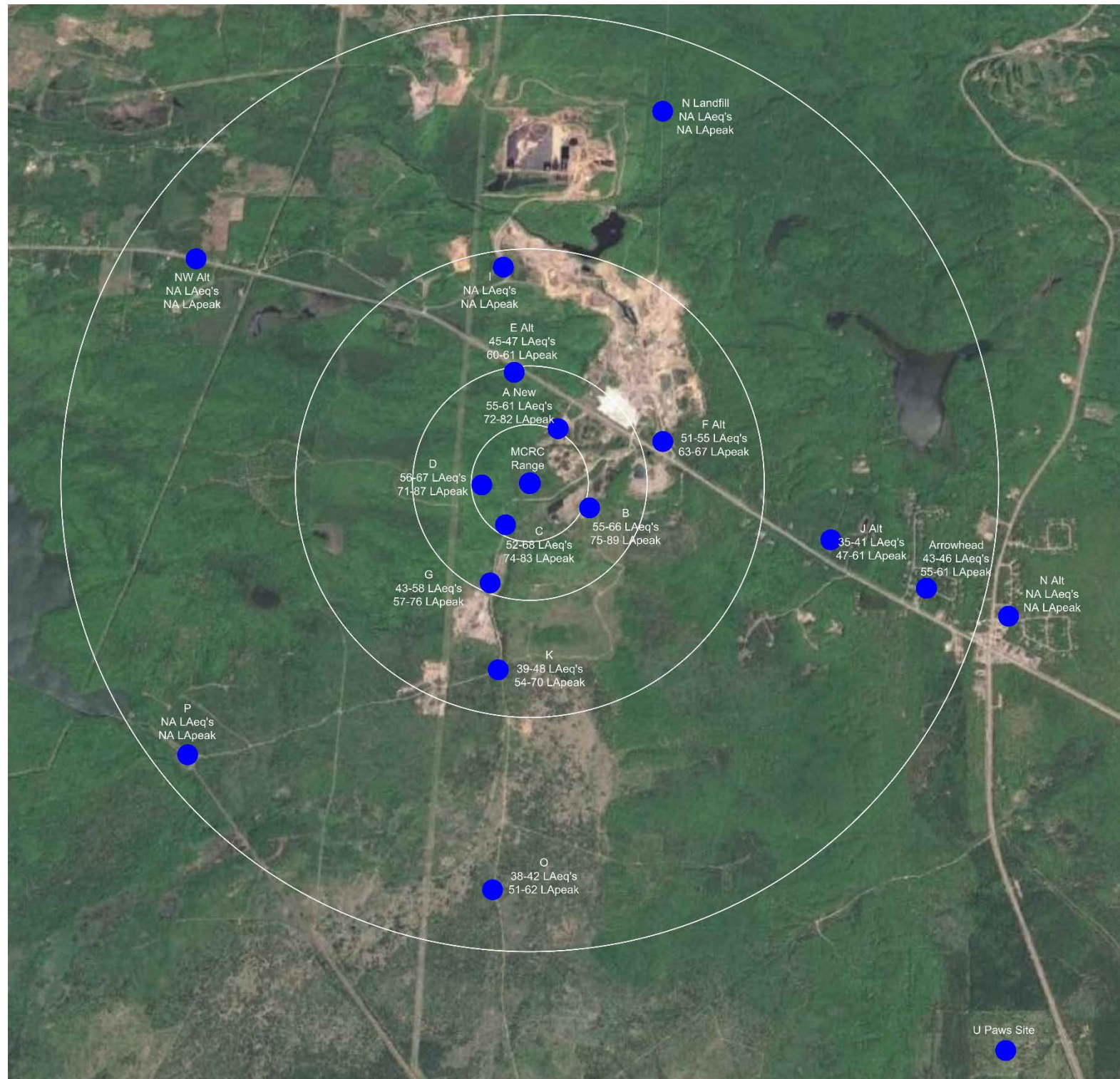


Figure C-2. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 12 gauge shotgun measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 1: MCRC, with the shooter firing towards the north.

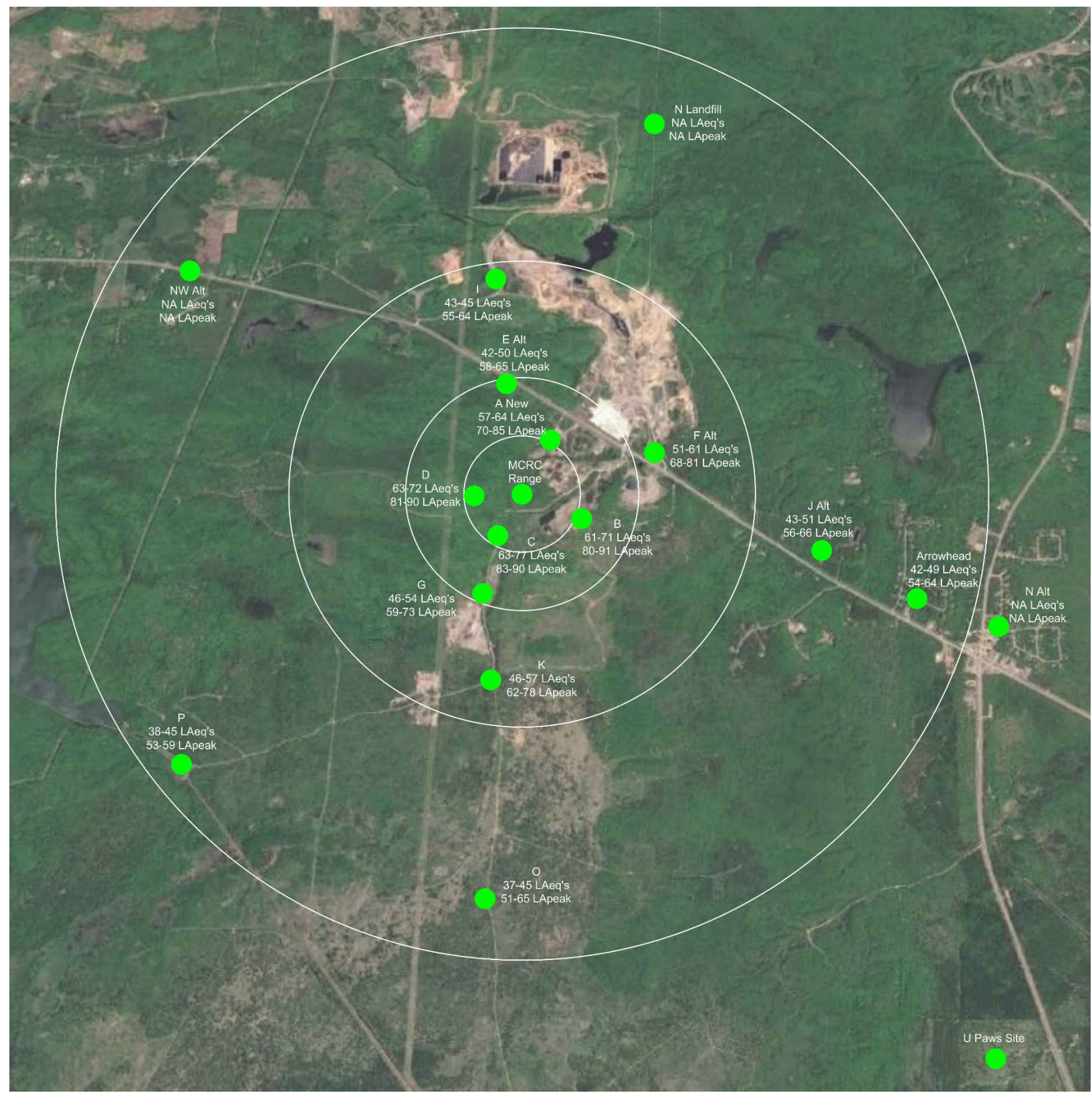


Figure C-3. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 0.223 rifle measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 1: MCRC, with the shooter firing towards the north.

Table C-1. Summary table of LAeq sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from the proposed Site 1: MCRC during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: MCRC															
Location	Distance	Direction	Difference Using	LAeq											
				MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A new	1/4 mile	N	Series	55	55	57	65	61	64	10	6	6	60	58	61
			Single Shot	57	52	59	57	53	59	0	1	0	57	52	59
			Overall	55	52	57	65	61	64	10	9	6	60	57	61
			Series vs. Single				8	8	5						
B	1/4 mile	SE	Series	55	55	61	65	66	71	10	11	9	62	60	66
			Single Shot	58	56	65	60	59	66	2	3	1	59	58	66
			Overall	55	55	61	65	66	71	10	11	9	62	60	66
			Series vs. Single				5	7	5						
C	1/4 mile	SW	Series	64	52	63	73	68	77	9	16	14	70	65	73
			Single Shot	64	62	67	66	63	67	1	0	0	65	62	67
			Overall	64	52	63	73	68	77	9	16	14	70	65	72
			Series vs. Single				7	5	9						
D	1/4 mile	W	Series	62	56	63	68	67	72	7	11	9	66	64	69
			Single Shot	62	57	66	63	59	66	1	2	0	63	58	66
			Overall	62	56	63	68	67	72	7	11	9	66	64	69
			Series vs. Single				5	8	6						
E alt	1/2 mile	N nw	Series	--	45	42	--	47	50	--	2	8	--	46	48
			Single Shot	49	--	45	51	--	49	2	--	4	50	--	47
			Overall	49	45	42	51	47	50	2	2	8	50	46	48
			Series vs. Single				--	--	2						
F alt	1/2 mile	N ne	Series	48	51	51	54	55	61	6	4	10	51	52	58
			Single Shot	52	51	52	56	51	55	3	1	3	54	51	53
			Overall	48	51	51	56	55	61	8	4	10	51	52	57
			Series vs. Single				-1	3	7						
G	1/2 mile	SW	Series	48	43	46	60	58	54	12	15	9	56	51	52
			Single Shot	49	43	50	51	43	52	2	0	1	50	43	51
			Overall	48	43	46	60	58	54	12	15	9	56	51	52
			Series vs. Single				9	14	3						
I	1 mile	N	Series	44	--	43	48	--	45	4	--	2	46	--	44
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	44	--	43	48	--	45	4	--	2	46	--	44
			Series vs. Single				--	--	--						
J alt	1 mile	E se	Series	--	35	43	--	41	51	--	6	8	--	39	49
			Single Shot	--	--	44	--	--	44	--	--	0	--	--	44
			Overall	--	35	43	--	41	51	--	6	8	--	39	48
			Series vs. Single				--	--	7						
K	1 mile	SW	Series	40	39	46	53	48	57	13	9	11	49	43	54
			Single Shot	42	39	47	43	41	49	1	2	2	42	40	48
			Overall	40	39	46	53	48	57	13	9	11	49	43	53
			Series vs. Single				11	6	8						

SUMMARY TABLE: MCRC															
LAeq															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
N landfill	2 miles	N	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--
Arrowhead	2 miles	SE	Series	--	43	42	--	46	49	--	4	6	--	45	45
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	43	42	--	46	49	--	4	6	--	45	45
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--
N Alt	2 miles	SE	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--
O	2 miles	S	Series	35	38	37	44	42	45	9	4	7	41	40	41
			Single Shot	38	38	39	39	39	39	2	1	0	39	38	39
			Overall	35	38	37	44	42	45	9	5	7	41	40	41
			Series vs. Single	--	--	--	5	3	6	--	--	--	--	--	--
P	2 miles	W	Series	34	--	38	41	--	45	7	--	8	38	--	43
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	34	--	38	41	--	45	7	--	8	38	--	43
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--
NW alt	2 miles	NW	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--

Table C-2. Summary table of LA peak sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from the proposed Site 1: MCRC during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: MCRC															
LA peak															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A new	1/4 mile	N	Series	72	72	70	90	82	85	18	11	15	83	77	81
			Single Shot	75	74	82	77	75	82	2	1	0	76	74	82
			Overall	72	72	70	90	82	85	18	11	15	83	76	81
			Series vs. Single				13	7	3						
B	1/4 mile	SE	Series	71	75	80	89	89	91	18	14	11	82	82	85
			Single Shot	80	72	85	84	81	88	5	9	4	82	79	87
			Overall	71	72	80	89	89	91	18	17	11	82	82	85
			Series vs. Single				5	8	2						
C	1/4 mile	SW	Series	79	74	83	87	83	90	7	9	8	84	80	87
			Single Shot	80	79	82	81	80	85	1	1	3	81	79	84
			Overall	79	74	82	87	83	90	7	9	8	84	80	87
			Series vs. Single				5	3	5						
D	1/4 mile	W	Series	79	71	81	87	87	90	9	16	9	83	81	86
			Single Shot	79	77	86	80	78	86	1	0	0	79	77	86
			Overall	79	71	81	87	87	90	9	16	9	83	81	86
			Series vs. Single				7	9	4						
E alt	1/2 mile	N nw	Series	--	60	58	--	61	65	--	2	6	--	61	62
			Single Shot	63	--	62	65	--	63	1	--	1	64	--	62
			Overall	63	60	58	65	61	65	1	2	6	64	61	62
			Series vs. Single				--	--	1						
F alt	1/2 mile	N ne	Series	60	63	68	72	67	81	12	5	14	66	65	76
			Single Shot	68	65	69	72	67	79	4	2	10	71	67	76
			Overall	60	63	68	72	67	81	12	5	14	67	65	76
			Series vs. Single				-1	0	2						
G	1/2 mile	SW	Series	61	57	59	81	76	73	20	19	14	75	69	66
			Single Shot	65	59	64	72	60	68	7	2	3	69	59	66
			Overall	61	57	59	81	76	73	20	19	14	75	69	66
			Series vs. Single				10	16	5						
I	1 mile	N	Series	57	--	55	64	--	64	8	--	9	60	--	61
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	57	--	55	64	--	64	8	--	9	60	--	61
			Series vs. Single				--	--	--						
J alt	1 mile	E se	Series	--	47	56	--	61	66	--	14	10	--	55	63
			Single Shot	--	--	58	--	--	58	--	--	0	--	--	58
			Overall	--	47	56	--	61	66	--	14	10	--	55	63
			Series vs. Single				--	--	8						
K	1 mile	SW	Series	57	54	62	73	70	78	16	16	16	66	62	71
			Single Shot	58	59	64	67	62	66	9	3	2	64	61	65
			Overall	57	54	62	73	70	78	16	16	16	66	62	70
			Series vs. Single				7	7	12						

SUMMARY TABLE: MCRC															
LA peak															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
N landfill	2 miles	N	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			<i>Series vs. Single</i>	--	--	--	--	--	--	--	--	--	--	--	--
Arrowhead	2 miles	SE	Series	--	55	54	--	61	64	--	6	9	--	59	59
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	55	54	--	61	64	--	6	9	--	59	59
			<i>Series vs. Single</i>	--	--	--	--	--	--	--	--	--	--	--	--
N Alt	2 miles	SE	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			<i>Series vs. Single</i>	--	--	--	--	--	--	--	--	--	--	--	--
O	2 miles	S	Series	51	51	51	63	62	65	12	11	14	58	56	58
			Single Shot	55	56	53	59	60	56	4	4	3	58	59	55
			Overall	51	51	51	63	62	65	12	11	14	58	57	58
			<i>Series vs. Single</i>				4	1	9						
P	2 miles	W	Series	50	--	53	57	--	59	7	--	6	53	--	57
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	50	--	53	57	--	59	7	--	6	53	--	57
			<i>Series vs. Single</i>	--	--	--	--	--	--	--	--	--	--	--	--
NW alt	2 miles	NW	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
			<i>Series vs. Single</i>	--	--	--	--	--	--	--	--	--	--	--	--

Table C-3. Summary table of LA max sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from the proposed Site 1: MCRC during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: MCRC															
LA max															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A new	1/4 mile	N	Series	61	58	62	69	64	67	9	5	5	65	61	65
			Single Shot	60	57	65	60	58	67	0	0	3	60	58	65
			Overall	60	57	62	69	64	67	10	6	5	65	61	65
			Series vs. Single				9	--	0						
B	1/4 mile	SE	Series	61	60	65	68	70	75	7	10	11	65	64	70
			Single Shot	64	62	70	65	63	70	1	1	0	64	63	70
			Overall	61	60	65	68	70	75	7	10	11	65	64	70
			Series vs. Single				4	--	5						
C	1/4 mile	SW	Series	69	60	69	75	71	78	6	12	9	73	68	75
			Single Shot	69	66	71	69	66	71	0	0	0	69	66	71
			Overall	69	60	69	75	71	78	7	12	9	73	68	75
			Series vs. Single				6	--	7						
D	1/4 mile	W	Series	65	62	68	71	69	74	7	7	5	69	67	72
			Single Shot	66	61	70	67	61	70	1	1	0	67	61	70
			Overall	65	61	68	71	69	74	7	8	5	69	67	71
			Series vs. Single				4	--	4						
E alt	1/2 mile	N nw	Series	--	47	43	--	48	52	--	1	8	--	48	49
			Single Shot	52	--	49	52	--	50	0	--	1	52	--	50
			Overall	52	47	43	52	48	52	0	1	8	52	48	49
			Series vs. Single				--	--	2						
F alt	1/2 mile	N ne	Series	50	52	54	57	57	64	7	5	10	53	54	60
			Single Shot	56	52	55	56	54	59	0	2	4	56	53	58
			Overall	50	52	54	57	57	64	7	5	10	53	54	60
			Series vs. Single				0		5						
G	1/2 mile	SW	Series	54	48	50	62	63	57	8	15	7	59	56	54
			Single Shot	52	46	52	54	47	56	2	2	3	53	47	54
			Overall	52	46	50	62	63	57	10	18	7	59	56	54
			Series vs. Single				8	--	2						
I	1 mile	N	Series	45	--	44	49	--	47	5	--	4	47	--	46
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	45	--	44	49	--	47	5	--	4	47	--	46
			Series vs. Single				--	--	--						
J alt	1 mile	E se	Series	--	37	46	--	44	54	--	7	8	--	41	50
			Single Shot	--	--	47	--	--	47	--	--	0	--	--	47
			Overall	--	37	46	--	44	54	--	7	8	--	41	50
			Series vs. Single				--		7						
K	1 mile	SW	Series	44	42	51	56	51	60	12	9	9	51	47	57
			Single Shot	45	44	52	47	44	53	2	0	1	46	44	53
			Overall	44	42	51	56	51	60	12	9	9	51	47	57
			Series vs. Single				9	--	7						

SUMMARY TABLE: MCRC															
LA max															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
N landfill	2 miles	N	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
<i>Series vs. Single</i>															
Arrowhead	2 miles	SE	Series	--	45	44	--	48	50	--	3	7	--	46	47
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	45	44	--	48	50	--	3	7	--	46	47
<i>Series vs. Single</i>															
N Alt	2 miles	SE	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
<i>Series vs. Single</i>															
O	2 miles	S	Series	38	39	40	48	45	48	10	6	8	43	42	44
			Single Shot	41	40	40	43	43	42	2	3	2	42	42	41
			Overall	38	39	40	48	45	48	10	6	8	43	42	44
<i>Series vs. Single</i>						5	--	6							
P	2 miles	W	Series	36	--	42	43	--	47	7	--	5	41	--	45
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	36	--	42	43	--	47	7	--	5	41	--	45
<i>Series vs. Single</i>															
NW alt	2 miles	NW	Series	--	--	--	--	--	--	--	--	--	--	--	--
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	--	--	--	--	--	--	--	--	--	--
<i>Series vs. Single</i>															

APPENDIX D: SUMMARY OF SOUND LEVELS MEASURED AT DISTANCES OF APPROXIMATELY ¼ MILE, ½ MILE, 1 MILE AND 2 MILES FROM THE PROPOSED RANGE SITE 2: SANDS WEST, DURING THE EXPERIMENTS WITH LIVE FIREARMS DISCHARGES

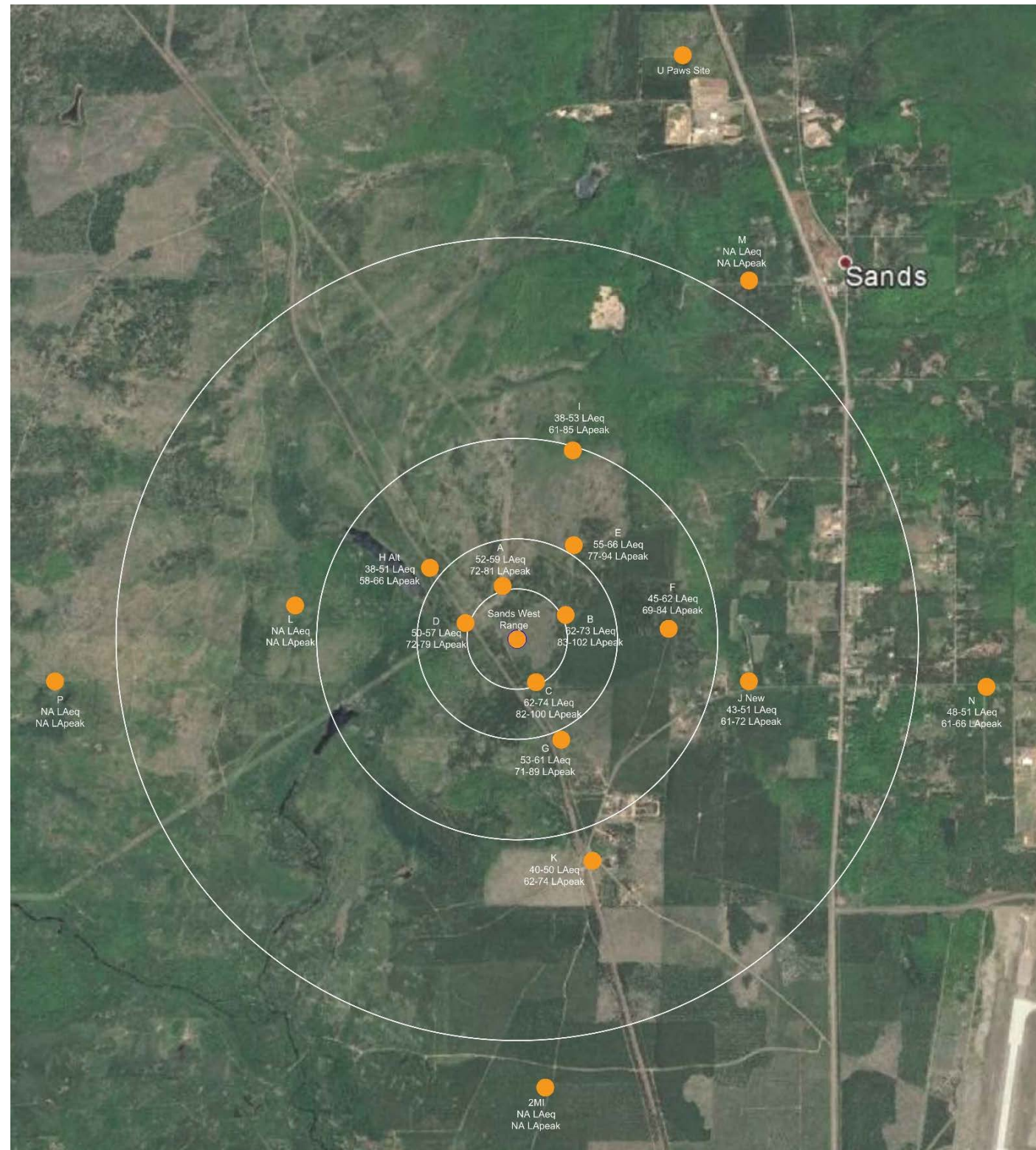


Figure D-1. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 0.40 caliber handgun measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 2: Sands West, with the shooter firing towards the north.

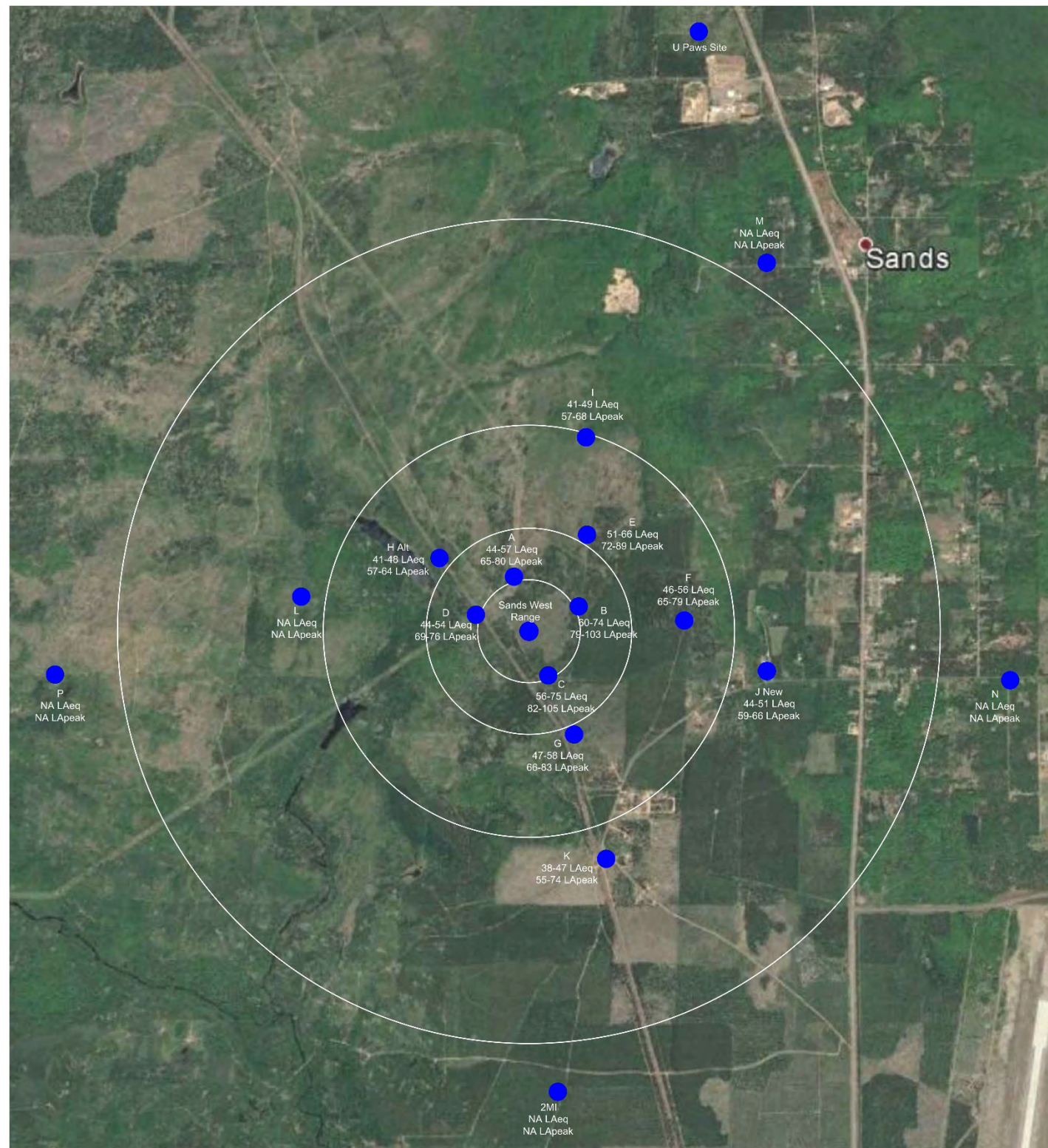


Figure D-2. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 12 gauge shotgun measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 2: Sands West, with the shooter firing towards the north.

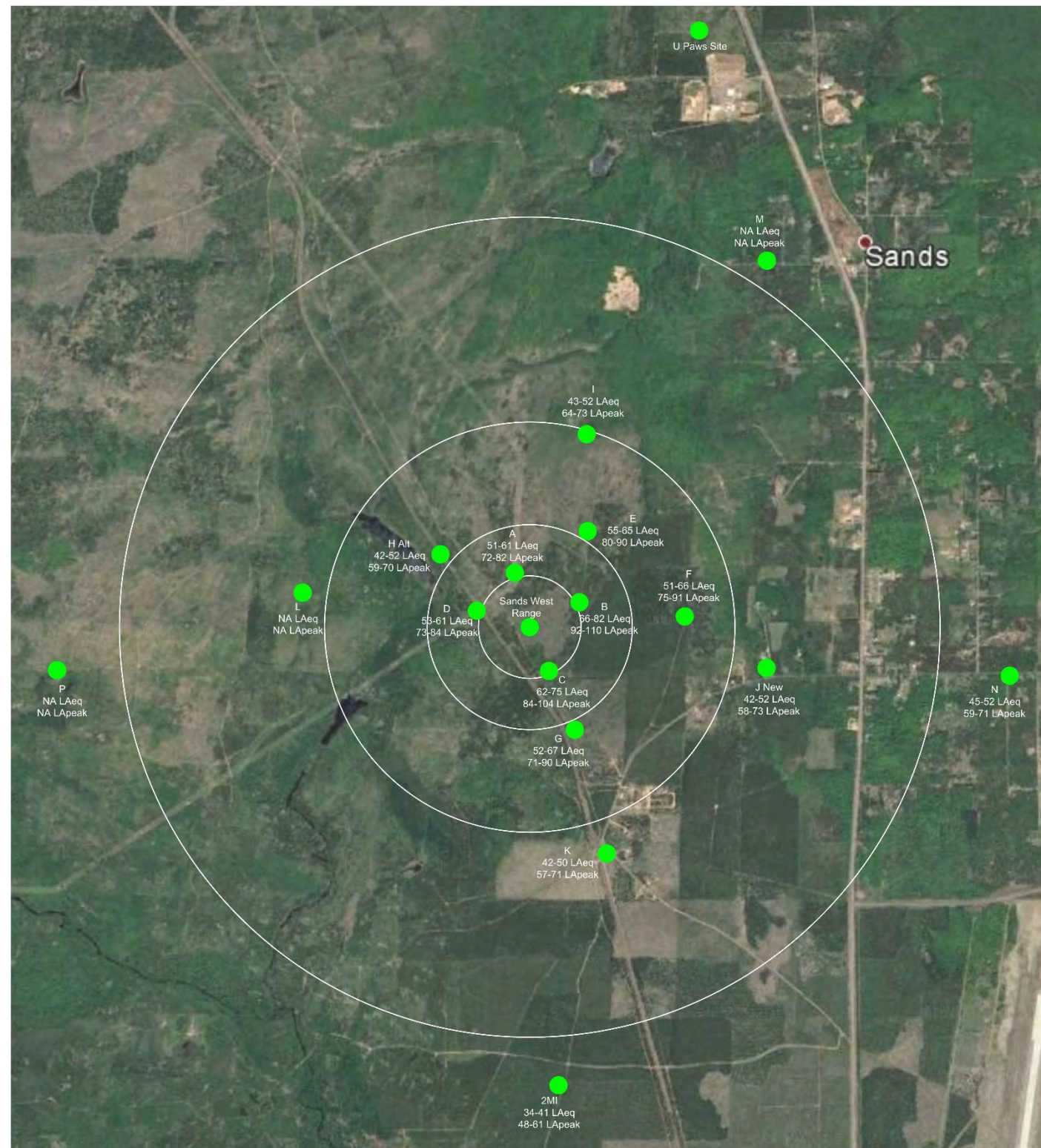


Figure D-3. Aerial photograph showing measured LAeq and LA peak sound levels produced by a 0.223 rifle measured at distances of approximately 1/4 mile, 1/2 mile, 1 mile and 2 miles from proposed range Site 2: Sands West, with the shooter firing towards the north.

Table D-1. Summary table of LAeq sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from proposed range Site 2: Sands West during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: SANDS															
LAeq															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A	1/4 mile	NW	Series	52	44	51	59	57	61	6	13	9	56	53	57
			Single Shot	48	47	52	49	48	53	1	1	1	48	47	53
			Overall	48	44	51	59	57	61	11	13	9	56	52	57
			Series vs. Single				10	9	8						
B	1/4 mile	NE	Series	62	60	66	73	74	82	10	14	16	68	68	75
			Single Shot	63	65	64	65	68	66	2	3	2	64	67	65
			Overall	62	60	64	73	74	82	10	14	18	68	68	75
			Series vs. Single				8	5	16						
C	1/4 mile	SE	Series	62	56	62	74	75	75	12	19	13	69	67	70
			Single Shot	61	59	63	67	59	65	7	1	2	65	59	64
			Overall	61	56	62	74	75	75	13	19	13	69	67	70
			Series vs. Single				6	15	9						
D	1/4 mile	W nw	Series	50	44	53	57	54	61	7	10	7	55	52	57
			Single Shot	49	45	54	49	47	55	0	2	0	49	46	54
			Overall	49	44	53	57	54	61	8	10	7	54	52	57
			Series vs. Single				8	7	6						
E	1/2 mile	N ne	Series	55	51	55	66	66	65	11	15	10	60	59	62
			Single Shot	54	51	61	55	52	64	1	1	2	54	52	63
			Overall	54	51	55	66	66	65	12	15	10	60	59	62
			Series vs. Single				11	13	1						
F	1/2 mile	E	Series	45	46	51	62	56	66	16	10	15	56	52	60
			Single Shot	51	44	56	55	50	57	4	6	1	53	48	56
			Overall	45	44	51	62	56	66	16	13	15	56	52	59
			Series vs. Single				7	6	9						
G	1/2 mile	SE	Series	53	47	52	61	58	67	8	10	14	57	53	60
			Single Shot	52	48	48	53	53	48	1	6	0	53	51	48
			Overall	52	47	48	61	58	67	9	10	18	57	53	60
			Series vs. Single				8	5	18						
HALT	1/2 mile	NW	Series	38	41	42	51	48	52	13	7	10	47	45	48
			Single Shot	42	--	47	42	--	48	0	--	1	42	--	47
			Overall	38	41	42	51	48	52	13	7	10	46	45	48
			Series vs. Single				9	--	4						
I	1 mile	N	Series	38	41	43	53	49	52	15	9	9	48	45	49
			Single Shot	47	41	47	48	44	51	0	3	3	47	43	49
			Overall	38	41	43	53	49	52	15	9	9	48	45	49
			Series vs. Single				5	5	2						
J NEW	1 mile	E se	Series	43	44	42	51	51	52	9	7	10	47	47	49
			Single Shot	42	41	45	46	42	47	5	1	2	45	42	46
			Overall	42	41	42	51	51	52	9	9	10	47	47	49
			Series vs. Single				5	8	6						

SUMMARY TABLE: SANDS															
LAeq															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
K	1 mile	S se	Series	40	38	42	50	47	50	10	9	8	46	43	47
			Single Shot	--	41	44	--	42	44	--	0	0	--	42	44
			Overall	40	38	42	50	47	50	10	9	8	46	43	47
			Series vs. Single	--			--	5	6						
L	1 mile	W nw	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single	--			--			--			--		
M	2 miles	N ne	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single	--			--			--			--		
N	2 miles	E	Series	48	--	45	51	--	52	4	--	7	50	--	49
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	48	--	45	51	--	52	4	--	7	50	--	49
			Series vs. Single	--			--			--			--		
2 MI	2 miles	S	Series	--	--	34	--	--	41	--	--	7	--	--	37
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	34	--	--	41	--	--	7	--	--	37
			Series vs. Single	--			--		41			7			
P	2 miles	W	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single	--			--			--			--		

Table D-2. Summary table of LA peak sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from proposed range Site 2: Sands West during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: SANDS															
LA peak															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A	1/4 mile	NW	Series	72	65	72	81	80	82	9	15	10	77	75	77
			Single Shot	66	67	74	71	70	75	5	3	2	70	69	75
			Overall	66	65	72	81	80	82	14	15	10	77	75	77
			Series vs. Single				9	10	6						
B	1/4 mile	NE	Series	83	79	92	102	103	110	18	24	17	94	95	101
			Single Shot	87	92	89	93	98	95	6	6	5	91	96	93
			Overall	83	79	89	102	103	110	18	24	20	94	95	101
			Series vs. Single				9	5	15						
C	1/4 mile	SE	Series	82	82	84	100	105	104	18	23	20	94	96	96
			Single Shot	85	81	90	97	83	94	13	2	4	94	82	93
			Overall	82	81	84	100	105	104	18	24	20	94	96	96
			Series vs. Single				3	22	9						
D	1/4 mile	W nw	Series	72	69	73	79	76	84	7	7	11	76	73	79
			Single Shot	70	72	77	73	74	81	3	2	4	72	73	80
			Overall	70	69	73	79	76	84	10	7	11	76	73	79
			Series vs. Single				6	3	3						
E	1/2 mile	N ne	Series	77	72	80	94	89	90	17	18	10	85	84	85
			Single Shot	75	71	88	81	74	88	6	3	0	79	73	88
			Overall	75	71	80	94	89	90	19	18	10	84	84	86
			Series vs. Single				13	15	2						
F	1/2 mile	E	Series	69	65	75	84	79	91	15	14	16	79	74	84
			Single Shot	72	65	81	81	72	84	9	8	3	78	70	83
			Overall	69	65	75	84	79	91	15	15	16	79	74	84
			Series vs. Single				4	7	7						
G	1/2 mile	SE	Series	71	66	71	89	83	90	18	17	19	80	76	82
			Single Shot	76	68	77	82	84	77	6	16	0	80	81	77
			Overall	71	66	71	89	84	90	18	17	19	80	77	82
			Series vs. Single				6	-1	14						
HALT	1/2 mile	NW	Series	58	57	59	66	64	70	8	7	11	62	61	66
			Single Shot	60	--	66	62	--	67	1	--	1	61	--	67
			Overall	58	57	59	66	64	70	8	7	11	62	61	66
			Series vs. Single				4	--	3						
I	1 mile	N	Series	61	57	64	85	68	73	24	11	9	71	64	68
			Single Shot	65	55	68	69	65	69	4	10	1	68	63	69
			Overall	61	55	64	85	68	73	24	13	9	71	64	68
			Series vs. Single				16	3	4						
J NEW	1 mile	E se	Series	61	59	58	72	66	73	11	7	15	67	62	67
			Single Shot	63	58	67	68	60	70	5	3	3	67	59	69
			Overall	61	58	58	72	66	73	11	8	15	67	62	67
			Series vs. Single				4	5	3						

SUMMARY TABLE: SANDS															
LA peak															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
K	1 mile	S se	Series	62	55	57	74	74	71	12	19	15	67	64	66
			Single Shot	--	58	63	--	62	64	--	3	1	--	60	63
			Overall	62	55	57	74	74	71	12	19	15	67	63	65
			Series vs. Single				--	12	7						
L	1 mile	W nw	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single				--	--	--						
M	2 miles	N ne	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single				--	--	--						
N	2 miles	E	Series	61	--	59	66	--	71	5	--	12	64	--	65
			Single Shot	--	--	61	--	--	64	--	--	3	--	--	63
			Overall	61	--	59	66	--	71	5	--	12	64	--	65
			Series vs. Single				--	--	7						
2 MI	2 miles	S	Series	--	--	48	--	--	61	--	--	13	--	--	55
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--
			Overall	--	--	48	--	--	61	--	--	13	--	--	55
			Series vs. Single				--	--	--						
P	2 miles	W	Series	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single				--	--	--						

Table D-3. Summary table of LA max sound levels made at distances of approximately ¼ mile, ½ mile, 1 mile and 2 miles from proposed range Site 2: Sands West during the live fire experiments with the shooter firing towards the north.

SUMMARY TABLE: SANDS															
LA max															
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA		
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle
A	1/4 mile	NW	Series	72	65	72	81	80	82	9	15	10	77	75	77
			Single Shot	66	67	74	71	70	75	5	3	2	70	69	75
			Overall	66	65	72	81	80	82	14	15	10	77	75	77
			Series vs. Single				9	10	6						
B	1/4 mile	NE	Series	83	79	92	102	103	110	18	24	17	94	95	101
			Single Shot	87	92	89	93	98	95	6	6	5	91	96	93
			Overall	83	79	89	102	103	110	18	24	20	94	95	101
			Series vs. Single				9	5	15						
C	1/4 mile	SE	Series	82	82	84	100	105	104	18	23	20	94	96	96
			Single Shot	85	81	90	97	83	94	13	2	4	94	82	93
			Overall	82	81	84	100	105	104	18	24	20	94	96	96
			Series vs. Single				3	22	9						
D	1/4 mile	W nw	Series	72	69	73	79	76	84	7	7	11	76	73	79
			Single Shot	70	72	77	73	74	81	3	2	4	72	73	80
			Overall	70	69	73	79	76	84	10	7	11	76	73	79
			Series vs. Single				6	3	3						
E	1/2 mile	N ne	Series	77	72	80	94	89	90	17	18	10	85	84	85
			Single Shot	75	71	88	81	74	88	6	3	0	79	73	88
			Overall	75	71	80	94	89	90	19	18	10	84	84	86
			Series vs. Single				13	15	2						
F	1/2 mile	E	Series	69	65	75	84	79	91	15	14	16	79	74	84
			Single Shot	72	65	81	81	72	84	9	8	3	78	70	83
			Overall	69	65	75	84	79	91	15	15	16	79	74	84
			Series vs. Single				4	7	7						
G	1/2 mile	SE	Series	71	66	71	89	83	90	18	17	19	80	76	82
			Single Shot	76	68	77	82	84	77	6	16	0	80	81	77
			Overall	71	66	71	89	84	90	18	17	19	80	77	82
			Series vs. Single				6	-1	14						
HALT	1/2 mile	NW	Series	58	57	59	66	64	70	8	7	11	62	61	66
			Single Shot	60	--	66	62	--	67	1	--	1	61	--	67
			Overall	58	57	59	66	64	70	8	7	11	62	61	66
			Series vs. Single				4	--	3						
I	1 mile	N	Series	61	57	64	85	68	73	24	11	9	71	64	68
			Single Shot	65	55	68	69	65	69	4	10	1	68	63	69
			Overall	61	55	64	85	68	73	24	13	9	71	64	68
			Series vs. Single				16	3	4						
J NEW	1 mile	E se	Series	61	59	58	72	66	73	11	7	15	67	62	67
			Single Shot	63	58	67	68	60	70	5	3	3	67	59	69
			Overall	61	58	58	72	66	73	11	8	15	67	62	67
			Series vs. Single				4	5	3						

SUMMARY TABLE: SANDS																
LA max																
Location	Distance	Direction	Difference Using	MIN dBA			MAX dBA			dBA RANGE			AVERAGE dBA			
				.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	.40 cal Handgun	12 ga Shotgun	0.223 Rifle	
K	1 mile	S se	Series	44	39	44	53	54	55	10	15	10	50	47	50	
			Single Shot	--	45	45	--	46	49	--	1	4	--	45	47	
			Overall	44	39	44	53	54	55	10	15	10	50	47	50	
			Series vs. Single	--	--	--	--	8	6	--	--	--	--	--	--	--
L	1 mile	W nw	Series	--	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	--	--
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--	--
M	2 miles	N ne	Series	--	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	--	--
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--	--
N	2 miles	E	Series	49	--	46	52	--	55	3	--	8	51	--	51	
			Single Shot	--	--	49	--	--	54	--	--	5	--	--	52	
			Overall	49	--	46	52	--	55	3	--	8	51	--	51	
			Series vs. Single	--	--	--	--	--	1	--	--	--	--	--	--	--
2 MI	2 miles	S	Series	--	--	37	--	--	46	--	--	9	--	--	40	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	37	--	--	46	--	--	9	--	--	40	
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--	--
P	2 miles	W	Series	--	--	--	--	--	--	--	--	--	--	--	--	
			Single Shot	--	--	--	--	--	--	--	--	--	--	--	--	
			Overall	--	--	--	--	--	--	--	--	--	--	--	--	
			Series vs. Single	--	--	--	--	--	--	--	--	--	--	--	--	--

APPENDIX E: SUMMARY OF WEAPONS DATA USED IN THE COMPUTER MODEL STUDIES

Weapons used on proposed 25-yard, 40-yard, 50-yard, 100-yard, 200-yard and 300-yard Ranges

.223 Rifle
 12-gauge Shotgun
 .44 Handgun

Octave Band Sound Exposure Level Data for M-16 with .223 Rem. 55gr. power-locked hollow point rounds at a distance of 13 ft (4 meters)

Receiver Direction Relative to Direction of Gunfire	Octave Band Sound Exposure Level in dB					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Front	109	118	121	121	118	115
Front/Side ¹	106	114	117	117	115	112
Side	103	109	112	113	112	109
Rear/Side ²	100	106	109	110	110	107
Rear ⁴	96	102	105	107	108	104

Octave Band Sound Exposure Level Data for a 12-gauge shotgun at a distance of 13 ft (4 meters)

Receiver Direction Relative to Direction of Gunfire	Octave Band Sound Exposure Level in dB					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Front	111	118	119	119	116	112
Front/Side ²	106	113	114	114	112	110
Side	101	108	109	109	109	107

Octave Band Sound Exposure Level Data for a .44 Remington Magnum with a 200 gr. hollow point hunting load ammunition at a distance of 13 ft (4 meters)

Receiver Direction Relative to Direction of Gunfire	Octave Band Sound Exposure Level in dB					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Front	111	118	118	119	117	114
Front/Side ¹	108	114	116	117	115	112
Side	104	111	114	115	113	109
Rear/Side ²	104	109	112	113	112	109
Rear ⁴	104	107	110	111	111	108

Notes:

1. Sound levels were interpolated between the Front and Side conditions.
2. Sound levels were interpolated between the Rear and Side conditions.