

August 10, 2021

Mr. Ken Stoeber
TMC, Inc.
PO Box 69
Belgrade, MT 59714

**Re: Amendment #2 Morgan Family LLC Site
Noise Monitoring Report #8 – July 27, 2021
BSA Project #20174A**

Dear Ken:

Attached is Noise Monitoring Report #8 for the July 27, 2021 compliance monitoring for the Morgan Family LLC Site Amendment #2 operations. No noise level exceedances were measured during these Year 1 Phase 2, All Operations, including mining, stockpiling, crushing and processing (using conveyors and a stacker), as well as loading, hauling and maintenance activities.

If you have any questions or comments, please do not hesitate to call (406) 457-0407 or email me at sean@bigskyacoustics.com.

Sincerely,

Sean Connolly, INCE Bd. Cert.
BIG SKY ACOUSTICS

cc: Pat Eller/Morrison-Maierle

Noise Monitoring Report #8
Field Date: Tuesday, July 27, 2021

1.0 Noise Level Monitoring Methodology

Sean Connolly (INCE Bd. Cert.) of Big Sky Acoustics (BSA) conducted the measurements and field observations. The monitoring was conducted per the requirements listed in *Amendment #2 Morgan Family LLC Site, Environmental Noise Study – Revision 3, Appendix C-Noise Monitoring Plan* (BSA 2020). Measurements were completed according to the American National Standards Institute (ANSI) Standard S12.9-2013/Part 3 (R2018), *Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-term Measurements with an Observer Present* (ANSI 2018).

Equipment and Measurement Locations Property access was arranged by TMC. Noise level measurements were completed at the worst-case residential locations shown on the attached **Figure 1**, which represent the closest east and south residences to the current Amendment activities (excluding Receptor R5 occupied by a part-owner of TMC).

1. Measurement Location M1: (Receptor R8)

- GPS coordinates: 45° 36' 45" N, 111° 11' 29" W
- BSA Larson Davis Type 1 Sound Level Meter (BSA LD#1)
- Roland R-07#1 to record continuous audio
- In yard 52 feet west of residence R8, 105 feet south of Zachariah Lane, at the same location as previous 2021 measurements (**Figure 1**).
- Representing closest south residence to Year 1, Phase 2 – All Operations
- Mic on tripod approximately 8 feet above ground surface (ags), 7-inch windscreen, case locked and left unattended. Equipment checked by BSA at 1519 hours on 07/27/21, all OK.
- Measurement period – 1900 hours on 07/26/21 to 1900 hours on 07/27/21
- Calibration – Prior to measurement: 114.0. After measurement: 114.0

2. Measurement Location M2_{Yr1-2}: (between Receptors R2)

- GPS coordinates: 45° 37' 0" N, 111° 10' 58" W
- BSA Larson Davis Type 1 Sound Level Meter (BSA LD#2)
- Roland R-07#2 to record continuous audio
- In yard, 23 feet west of Receptor R2, west of Grey Wolf Trail, east of Amendment Area Year 1 east berm, and at the same location as June 2021 measurement.
- Closest east residences to Year 1, Phase 2 – All Operations
- Mic on tripod approximately 8 feet ags, 7-inch windscreen, case locked and left unattended. Equipment checked by BSA at 1530 hours on 07/27/21, all OK.
- Measurement period – 1900 hours on 07/26/21 to 1900 hours on 07/27/21
- Calibration – Prior to measurement: 114.0, After measurement: 113.8

3. Weather Station:

- BSA Kestrel 5500 Weather Station
- Approximately 33 feet south of Measurement Location M2_{Yr1-2} sound level meter.
- Mounted on tripod approximately 7 feet ags.

Weather See the weather station graph in **Attachment 1**. Ambient conditions were smokey and hot, with temperatures ranging from 57.6 to 92.7 degrees Fahrenheit, no precipitation, and wind ranging from 0 to 8.4 mph.

Frequency Per the Noise Monitoring Plan (BSA 2020), worst-case 24-hour noise measurements during the Amendment activities are required **biweekly** (10 working days) during the first four weeks of Year 1 Phase 2 – All Operations (i.e., mining, stockpiling, crushing, processing, loading, hauling and/or maintenance activities) and then **monthly**.

Background Per Section 7.3.3(c) of ANSI S12.9-2013/Part 3 (ANSI 2018), BSA is to measure the background L_{eq} between 0600-0700 hours (before activities), during one 30-minute (minimum) mid-day break, and between 1800-1900 hours (after activities), to determine the ambient sound environment without the influence of TMC's equipment and operations. If required, the measured $L_{eq}(h)$ data is corrected for background sound representative of the time of day, including traffic. The corrected $L_{eq}(h)$ data for each hour during Amendment activities are used to calculate the overall L_{eq} and L_{dn} values due to the Amendment activities for comparison to the appropriate Permissible Noise Levels (**Section 3**).

Adjustments If required, measurement intervals corrupted by transient noises not associated with Amendment activities, such as aircraft flyovers, excessively barking dogs, residential activities, wind in excess of 11 mph, heavy precipitation, BSA checking the equipment, and natural sounds (i.e., birds, insects, leaves rustling, etc., within 1,600 to 10,000 Hertz) are removed by BSA, and the $L_{eq}(h)$ of the corrupted hour recalculated according to ANSI S12.9-2013/Part 3 (ANSI 2018) (**Section 3**).

If applicable, the background $L_{eq}(h)$ data is adjusted by BSA by subtracting a 3 dBA uncertainty factor from the measured values according to Section 7.3.3(c) of ANSI S12.9-2013/Part 3 (ANSI 2018). If the $L_{eq}(h)$ minus the background value is less than 3 dBA, then a 99 dBA correction is applied (**Section 3**). This uncertainty factor is required since the measurements are intended to determine compliance.

If tonal noises are detected due to the Amendment activities (i.e., heard during the fieldwork and/or on the recorded data), BSA will add a 5 dB penalty to the measured L_{eq} according to Table 2 of ANSI S12.9/Part 4 (ANSI 2020). If applicable, the penalty is applied to the measured $L_{eq}(h)$ value before correcting for background, according to Annex B of ANSI S12.9/Part 3 (ANSI 2018) (**Section 3**).

2.0 Field Observations

Onsite During the field measurements on July 27th, TMC was conducting Year 1 Phase 2 conveying, crushing, processing, stockpiling, loading, offsite hauling and maintenance activities in the existing Morgan Pit, and mining and conveying activities in the Year 1 Amendment area (**Figure 1**). Conveyors moved the mined material from the Year 1 Amendment area to the crusher in the existing Morgan Pit. The processed gravel was moved by conveyors to the stacker and stockpiled. Oversized gravel was moved by a loader from the crusher to a secondary stockpile.

On July 27th, TMC's operations began at 0700 hours and the equipment in the existing Morgan Pit included the crusher, conveyors, stacker, one loader, and haul trucks for offsite transport. The crusher was not operating between 1215 and 1245 hours for the midday break. BSA noted that the stacker alarms (i.e., "beeps") when moving back and forth over the stockpile. In the Year 1 Amendment Area, the mining equipment included one loader moving mined material into the hopper/conveyor circuit. The crusher was equipped with a noise-reducing rubber screen, and the mobile equipment had broadband backup alarms. The onsite operations ended at 1800 hours, and are documented in the following photos.

Onsite Operations – July 27, 2021



Looking south at the loader filling the hopper and conveyor in the Year 1 Amendment Area.



Looking east at the mining activities in the Year 1 Amendment Area.



Looking north at the crushing/processing circuit in the existing Morgan Pit.



Looking northeast at the gravel stockpile and stacker in the Morgan Pit.

Monitoring Locations

1. **Measurement Location M1:** BSA's sound level meter was located in the yard 52 feet west of residential Receptor R8, 105 feet south of Zachariah Lane and east of Receptor R9, at the same location as the previous 2021 measurements (**Figure 1**). During the July 27th measurement, the dominant noise source was traffic on Zachariah Lane. Other noise sources included US 191 traffic, TMC's crusher (faint), sprinklers, aircraft and birds. From Measurement Location M1, TMC's vegetated south berm blocked the viewshed into the Amendment Area and TMC's equipment was not visible. The following photos document Measurement Location M1 during the measurements.

Measurement Location M1 – July 27, 2021



Looking east at Measurement Location M1 and residential Receptor R8.



From Measurement Location M1, looking north at Zachariah Lane and TMC's south berm and trees.

2. **Measurement Location M2_{Yr1-2}:** BSA's sound level and weather meters were located in the yard 23 feet west of residential Receptors R2, located west of Grey Wolf Trail and east of the Amendment Area east berm (**Figure 1**), at the same location as the June 2021 measurement. During the July 27th measurement, the dominant noise source was birds. Other noise sources included aircraft, US 191 traffic, sprinklers, a tractor, and TMC's equipment including the crusher, loader and stacker alarm (all faint). Measurement Location M2_{Yr1-2} is documented on July 27, 2021 in the following photos.

Measurement Location M2_{Yr1-2} – July 27, 2021



From Measurement Location M2_{Yr1-2}, looking east at residential Receptor R2.



From Measurement Location M2_{Yr1-2}, looking west at Receptor R2's horse barn and TMC's Amendment east berm in distance.

3.0 Measurement Results

Permissible Noise Levels that shall not be exceeded by the current Amendment activities at the 12 nearby Receptors (i.e., 11 residences and the cemetery) are shown on **Figure 1**, which excludes the owner/operator residences (Receptors R5 and R14). The Amendment activities that were occurring on July 27, 2021 are highlighted in **Table 1**, and included the Year 1 Phase 2 – All Operations (i.e., mining, stockpiling, crushing, processing, loading, hauling and/or maintenance activities) using diesel-powered equipment and conveyors.

Table 1: Permissible Noise Levels

Amendment Year	Amendment Activity	Hours	Permissible Noise Level at Receptor	Guideline or Standard Notes	Reference
Years 1 – 4	Loading and Offsite Hauling only	0600 – 0700 Weekdays (acoustical nighttime hour)	$L_{eq}(1h)$ 45 dBA	Nighttime, outside at open bedroom window, to avoid sleep disturbance at residence	WHO 1999
Year 1 only	Year 1 Berm Construction and Concurrent Stripping	0700 – 1800 Weekdays	$L_{eq}(8h)$ 80 dBA	At adjacent residential land use	FTA 2018
			L_{dn} 60 dBA	Marginally compatible occurrence during construction of noise attenuation berms at residential outdoor living area	ANSI 2017
Years 2 – 4	Stripping	0700 – 1800 Weekdays	$L_{eq}(11h)$ 50 dBA	At residential outdoor living area, to avoid moderate annoyance	WHO 1999
Year 1 Phase 1	Mining (without Crushing/Processing)				
Year 1 Phase 2 & Years 2 – 4	All Operations ¹				
Years 1 – 4	All Operations ¹	0700 – 1800 Weekdays	L_{dn} 55 dBA	Compatible occurrence to protect public health and welfare in residential areas and other places where quiet is a basis for use	ANSI 2017
Years 1 – 4	Loading, Hauling and/or Maintenance only	0700 to 1700 Saturdays	$L_{eq}(10h)$ 50 dBA	At residential outdoor living area, to avoid moderate annoyance	WHO 1999

Note:

¹ All Operations = Mining + Crushing + Processing + Loading + Hauling + Maintenance with all equipment operating (worst-case conditions).

Measurement Location M1: BSA evaluated and adjusted the data per TMC’s Noise Monitoring Plan (BSA 2020), summarized in **Section 1**. Transient sounds removed from the data set included vehicle pass-bys on Zachariah Lane, BSA checking the sound level meter and locking the case, aircraft flyovers, and birds.

The Measurement Location M1 data results are summarized in **Table 2**. The $L_{eq}(h)$ data was corrected for background sound (based on time of day), resulting in the Amendment activity noise levels. BSA used the corrected $L_{eq}(h)$ data to calculate the overall L_{eq} and L_{dn} data due to the Amendment activities during the operating hours (0700 to 1215 hours and 1245 to 1800 hours). The resulting overall L_{eq} 40.3 dBA and L_{dn} 36.7 dBA data results are less than the permissible noise levels of $L_{eq}(h)$ 50 dBA and L_{dn} 55 dBA, listed in **Table 1**.

**Table 2: Measurement Location M1
Data Summary – July 27, 2021**

Start Time (hours)	Measured $L_{eq}(h)$	$L_{eq}(h)$ after Transient Data Deleted	Adjustments	Adjusted $L_{eq}(h)$	Adjusted $L_{eq}(h)$ minus Background	Background Correction per ANSI 2018	Background Corrected $L_{eq}(h)$
0600 ^a	52.4	51.8	-3	48.8 ^b			
0700	51.8	51.2	0	51.2	2.4	99.0	-47.8 ^c
0800	52.2	48.9	0	48.9	0.0	99.0	-50.1 ^c
0900	49.3	44.1	0	44.1	10.5	0.0	44.1
1000	42.9	39.4	0	39.4	5.8	1.7	37.7
1100	43.4	38.9	0	38.9	5.2	1.7	37.2
½ hour of 1200 ^a	47.5	36.7	-3	33.7 ^b			
½ hour of 1200	47.5	38.1	0	38.1	4.4	2.2	35.9
1300	48.0	39.4	0	39.4	5.7	1.7	37.7
1400	47.5	39.7	0	39.7	6.1	1.3	38.4
1500	47.2	41.4	0	41.4	7.7	1.0	40.4
1600	48.6	47.1	0	47.1	13.4	0.0	47.1
1700	50.3	49.2	0	49.2	1.0	99.0	-49.8 ^c
1800 ^a	52.0	51.2	-3	48.2 ^b			
Overall L_{eq}:	48.8 (10.5 hrs)	46.1 (10.5 hrs)					40.3 (10.5 hrs)
Calculated L_{dn}:	53.5 (24-hrs)	42.5 (10.5 hrs)					36.7 (10.5 hrs)

Notes:

- ^a Background periods
- ^b 3 dBA uncertainty factor subtracted from background $L_{eq}(h)$ (**Section 1**)
- ^c 99 dBA correction applied (**Section 1**)

Measurement Location M2_{Yr1-2}: BSA evaluated and adjusted the data per TMC’s Noise Monitoring Plan (BSA 2020), summarized in **Section 1**. Transient sounds removed from the data set included BSA checking the sound level meter and locking the case, aircraft and birds.

The Measurement Location M2_{Yr1-2} data results are summarized in **Table 3**. The $L_{eq}(h)$ data was corrected for background sound (based on time of day), resulting in the Amendment activity noise levels. The tonal noise of the stacker “beep” was detected by the sound level meter, and BSA applied the 5 dBA penalty to the measured $L_{eq}(h)$ during 1700-hour period. To address the tonal noise, BSA notified TMC on July 28th and the equipment was modified.

BSA used the corrected $L_{eq}(h)$ data to calculate the overall L_{eq} and L_{dn} data due to the Amendment activities during the operating hours (0700 to 1215 hours and 1245 to 1800 hours). The resulting overall L_{eq} 41.1 dBA and L_{dn} 37.5 dBA data results are less than the permissible noise levels of $L_{eq}(h)$ 50 dBA and L_{dn} 55 dBA, listed in **Table 1**.

**Table 3: Measurement Location M2_{Yr1-2}
Data Summary – July 27, 2021**

Start Time (hours)	Measured $L_{eq}(h)$	$L_{eq}(h)$ after Transient Data Deleted	Adjustments	Adjusted $L_{eq}(h)$	Adjusted $L_{eq}(h)$ minus Background	Background Correction per ANSI 2018	Background Corrected $L_{eq}(h)$
0600 ^a	49.3	49.2	-3	46.2 ^b			
0700	49.3	47.9	0	47.9	1.7	99.0	-51.1 ^c
0800	47.9	45.0	0	45.0	18.4	0.0	45.0
0900	42.6	38.3	0	38.3	11.7	0.0	38.3
1000	38.7	33.9	0	33.9	7.3	1.0	32.9
1100	37.6	33.0	0	33.0	6.4	1.3	31.7
½ hour of 1200 ^a	33.9	29.6	-3	26.6 ^b			
½ hour of 1200	33.9	31.0	0	31.0	4.4	2.2	28.8
1300	36.6	32.8	0	32.8	6.2	1.3	31.5
1400	38.1	33.3	0	33.3	6.7	1.3	32.0
1500	40.9	35.6	0	35.6	9.0	0.6	35.0
1600	40.9	41.4	0	41.4	14.8	0.0	41.4
1700	45.3	44.2	5 ^d	49.2	9.1	0.6	48.6
1800 ^a	46.0	43.0	-3	40.0 ^b			
Overall L_{eq}:	43.7 (10.5 hrs)	41.7 (10.5 hrs)					41.1 (10.5 hrs)
Calculated L_{dn}:	53.3 (24-hrs)	38.1 (10.5 hrs)					37.5 (10.5 hrs)

Notes:

- ^a Background periods
- ^b 3 dBA uncertainty factor subtracted from background $L_{eq}(h)$ (**Section 1**)
- ^c 99 dBA correction applied (**Section 1**)
- ^d 5 dBA tonal correction applied (**Section 1**)

References

American National Standards Institute (ANSI). 2020. *Quantities and Procedures for Description and Measurement of Environmental Sound – Part 4: Noise Assessment and Prediction of Long-Term Community Response*. ANSI/ASA S12.9-2005/Part 4 (R2020).

American National Standards Institute (ANSI). 2018. *Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-term Measurements with an Observer Present*. ANSI/ASA S12.9-2013/Part 3 (R2018).

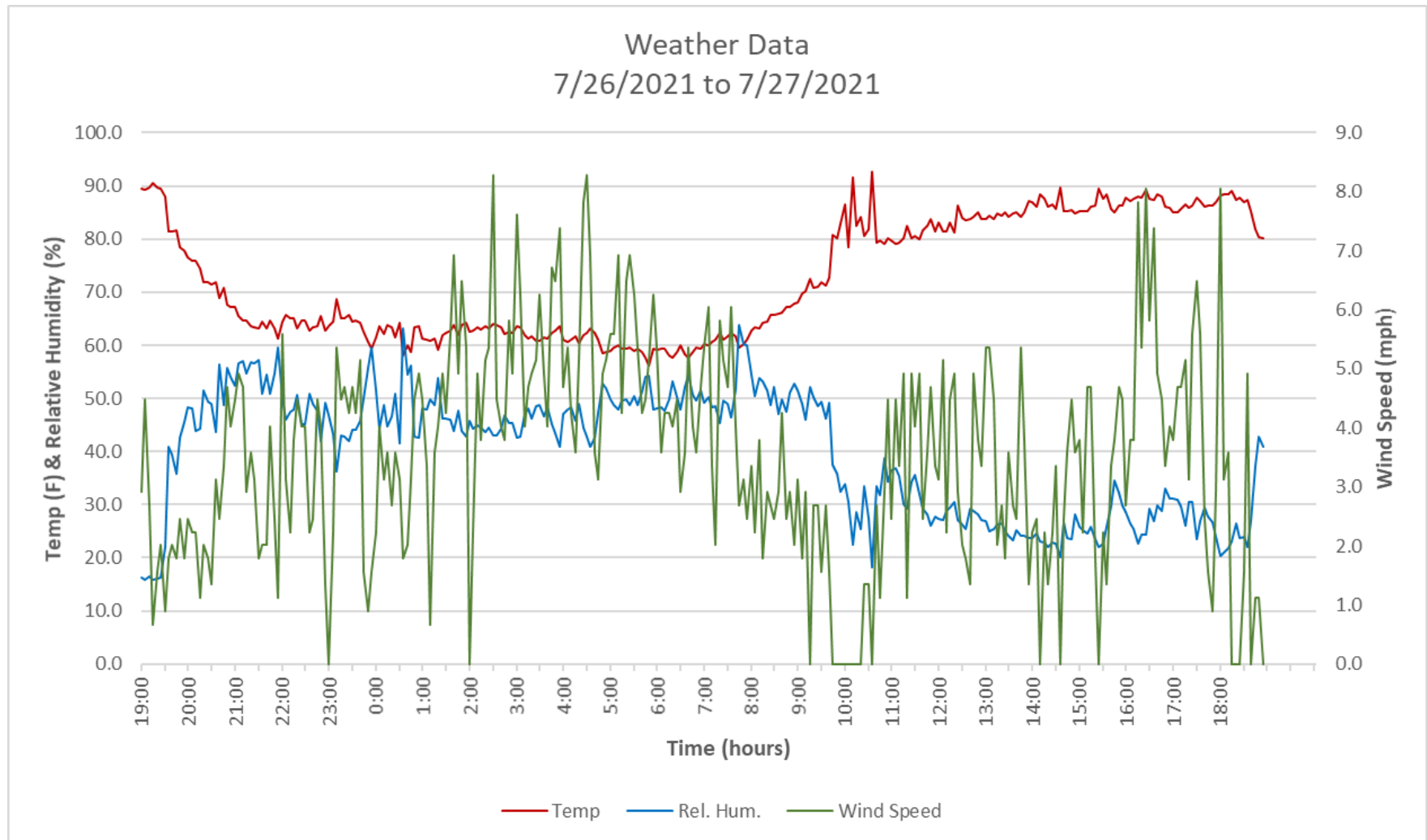
American National Standards Institute (ANSI). 2017. *Quantities and Procedures for Description and Measurement of Environmental Sound – Part 5: Sound Level Descriptors for Determination of Compatible Land Use*. ANSI/ASA S12.9-2007 (R2017).

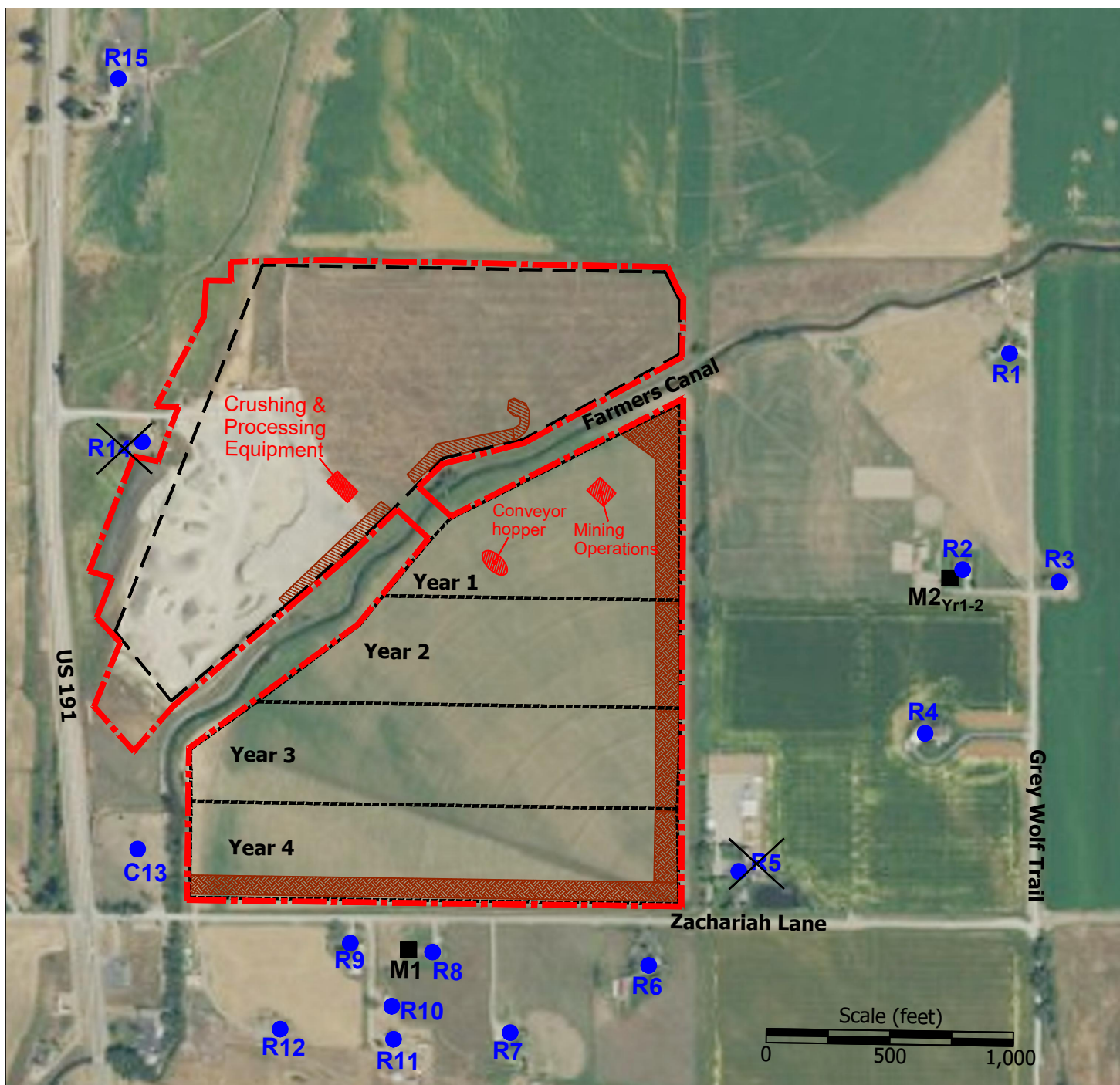
Big Sky Acoustics (BSA). 2020. Amendment #2 Morgan Family LLC Site Environmental Noise Study – Revision 3. October 21.

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. FTA Report No. 0123. September.

World Health Organization (WHO). 1999. Guidelines for Community Noise.

ATTACHMENT 1





- Boundaries
- Existing Morgan pit
- Amendment Area (by year)
- Morgan Pit berm
- Receptor location
- Noise monitoring location
- Amendment berm
- X Owner/operator residence

FIGURE 1

July 27, 2021

Noise Monitoring and Receptor Locations
TMC Morgan Family LLC Amendment #2