

## **Noise and Vibration Assessment**

BURROUGHS MATERIAL CORPORATION.

Proposed Springfield Township Site

May 30, 2025

This report assesses the potential impacts from noise and vibration resulting from the proposed sand and gravel mining operation on Ormond Road in Springfield Township. This assessment is based on research of past studies, a study produced specifically for the proposed mining equipment, and standard governmental guidelines.

### **Noise**

Springfield Township Ordinances set standards for acceptable limits of noise from operations and activities that may be of nuisance to the community. Specifically, Chapter 40 ZONING, ARTICLE VI. - ENVIRONMENTAL PERFORMANCE STANDARDS, Sec. 40-883-NOISE (Noise Ordinance) applies to the proposed operation.

The Springfield Township Noise Ordinance measures sound levels using “A weighted” metric, referred to as dBA, which is common for most noise measurement practices and community noise standards. Consistent with township extractive related ordinances, the proposed mining and processing activities shall be limited to 6:00 a.m. to 7:00 p.m., extended to 8:00 p.m. during daylight savings time, and prohibited on Sundays and legal holidays. The standard sound limitations set by the Noise Ordinance are based on the “receiving land use,” which for this project are for properties in residential, recreational, or institutional land uses. This category of land use regulation is the most restrictive category in the ordinance and will be used as the basis for this assessment. Pursuant to Table 1 of the Noise Ordinance, the sound experienced at the property line or on adjacent property should not exceed 60 dBA from 7am to 7pm, 55 dBA from 7pm to 10pm, and 50 dBA from 10pm until 7am.

The appropriate noise standard for truck traffic on public roads is established in the Michigan Vehicle Code, which states, measuring 50 feet from a vehicle, a stationary truck shall not generate over 88 dBA; at 35 mph or less the limit is 86 dBA, and over 35 mph the limit is 90 dBA. While additional truck traffic resulting from the proposed operation will sporadically increase noise levels along the route, the proposed haul route roads are publicly owned facilities that allow the legal use of trucks. The current design of the site allows for stacking of trucks in the 700-foot distance between the Ormond Road entry and the scale office, which will significantly reduce truck idling and, therefore, noise within the Ormond Road right of way.

In its existing condition, noise on site is generated by traffic on adjacent public roads, the use of farm equipment and machinery on-site and adjacent off-site agricultural fields, activity on adjacent residential properties, and natural sounds such as wind in the trees, birds, etc. A commonly assumed daytime level of ambient noise levels for rural areas is between 30 and 45 dBA, with higher levels experienced when farm equipment is being used. Lands adjacent to local rural roads typically experience average sound levels around 50 to 55 dBA.

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Based on review of past studies, the study produced specifically for the proposed mining equipment, and relevant governmental guidelines, the following are basic assumptions about sound levels:

1. Sound levels decrease by 6 dBA every time you double the distance from the source.
2. A rise of 10 dBA is perceived by the human ear as doubling the level of sound.
3. A 3 to 5 dBA increase is considered audibly different from background sounds.
4. Outdoor noise levels less than 55 dBA are assumed not to interfere with outdoor activities nor cause annoyance.
5. Noise generated from traffic on rural roads traveling at 45 mph can range from 68 to 84 dB when measured 50 feet from the roadway.
6. An earthen screening berm, at the proposed heights and locations, can attenuate approximately 10 to 15 dBA. While noise levels do not travel in a straight line, the bulk of noise travels in a direct path, and breaking the visual connection between the source of noise and the recipient of the sound is an effective method of minimizing noise issues.
7. Excavating the mine site such that the face is oriented away from the adjacent properties offers additional sound attenuation. The proposed operation is designed to excavate in this manner. The attenuation offered by the combination of mine face orientation and screening berm is about 15 dBA.
8. The closer to the berm that the source of the noise is, the more effective the sound reduction is. As mining activity gets closer to a residence, though the positive effect of distance is reduced, a berm has an increasingly significant noise attenuation.
9. Noise is not arithmetically additive; sound levels of the loudest equipment generally establish the overall sound levels in each area.
10. Similarly, doubling sound energy yields an increase of three decibels. For example, if a front-end loader is generating 70 decibels and a nearby truck starts generating 70 decibels, the actual increase caused by the truck is 3 dBA for a total of 73 dBA.
11. Although some mobile equipment noise will be intermittent, the combined noise from the plant and mobile equipment is generally continuous during plant operating hours, resulting in it being perceived as ambient background noise.

Anticipated equipment used on site includes:

- A. Soils Excavation and Reclamation Equipment
  1. Dozers
  2. Pan Scrapers
  3. Excavators
  4. Articulated Dump Trucks
- B. Pit Equipment
  1. Front-end Loaders
  2. Conveyors
  3. Dragline Crane or small Dredge
  4. Articulated Dump Trucks

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- C. Plant Equipment
  - 1. Sand and Gravel Wash Plant
  - 2. Stone Crushers
  - 3. Front-end loaders
  - 4. Hauling Trucks
  - 5. Conveyors

There are three major sources for noise at a sand and gravel operation, such as the one proposed in Springfield Township: the initial work to strip overburden soils from a given phase of work and installation of screening berms, pit operations, and the processing plant. The noise levels generated by the pit operations and processing plant are derived from studies of sites with similar equipment, and for purposes of this report are conservative in nature (i.e., on the higher end of the range presented in applicable studies).

1. **Berm Installation:** The proposed sand and gravel mining operation will generate additional noise from earthmoving equipment during berm installation. Assuming known typical sound levels created by earthmoving equipment, these sounds may exceed the sound levels outlined in Table 1 but are temporary in nature and for the purpose of reducing noise levels in the medium and long term. Berm construction activity will be completed in three stages as mining progresses through the Project Site. At each stage of berm construction, the earthwork will be completed in a concentrated period, typically lasting four to eight weeks in duration. Berm construction activities will occur within the hours stipulated in the Noise Ordinance, which states “Construction, earth moving, land balancing, clearing or other similar land development activities shall be restricted to the hours between 7:00 a.m. and 8:00 p.m.” The impact from these activities is considered limited and temporary, and necessary to construct the noise attenuating berms.
2. **Pit Operations:** For purposes of estimating the noise generated by the pit operations we assumed the use of two large machines (two loaders, or a dragline with a loader) along with a hopper and conveyor. At the face of the mine, on the pit floor, loaders and conveyor equipment will operate no closer than approximately 250 feet from the nearest neighbor’s property line. As noted elsewhere, active mining will occur below surface grade and will utilize the mining face and screening berms as buffers for residences. At a distance of 50 ft from pit machines, noise levels are expected to be about 82.5 dBA. With distance and berm / mine face buffer accounted for, the estimated level of noise related to pit operations at the adjacent property lines is anticipated to be between 51 to 54 dBA.
3. **Processing Plant:** The proposed processing plant will be the loudest source of sound at the site. The plant will be located in the central / western side of the mining area, and the minimum distance between the core of the plant (i.e., the loudest noise generator) and an adjacent property line is 1,450 feet which provides significant sound attenuation. The proposed operation will include stone crushing equipment, and the additional sound generated by the stone crusher was integrated into the estimate of sound levels. At a distance of 50 ft from the processing plant the noise level is expected to be about 85 dBA. This estimate is based on the attenuation from distance only (i.e., not factoring mitigation by the mine face and berms), as the further from the berm the sound source

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is, the less effective it is in sound reduction. The estimated noise level related to the processing plant at the adjacent property lines is anticipated to be between 48 and 54 dBA.

Mining equipment to be utilized at the plant site and in the pit include safety alarms that signal when equipment is backing up. Back up alarms monitor background sound levels and emit a “whooshing” or “pshh-pshh” sound across a wide range of frequencies, rather than at an indiscriminate, louder level. These alarms effectively limit the impact of intermittent sounds, while maintaining conformance to safety regulations.

Noise levels were estimated at four residential lots located closest to the processing plant on the north, east and south boundaries of the mining area. The estimate assumed that the processing plant was operational, that pit operations were occurring directly adjacent to the residential lots, and the attenuation from the mining face and berms only reduced sound from the pit operations and not the plant (i.e., the loudest possible scenario.) As noted above, sound is not arithmetically additive and the cumulative sound levels are assumed to be closer to the sound generated by the loudest source; however, an additive amount of noise above the loudest source was factored in to fully consider the impact of the two sources of sound.

The residential lots adjacent to the site vary in distance from the processing plant and from pit operations. The residential lots nearer to the processing plant typically will be further from pit operations (at their closest), while those lots further from the processing plant will typically be nearer to pit operations (at their closest). As a result of this inverse relationship, the anticipated noise levels at the property line are consistently estimated at either 54 or 55 dBA, well below the daytime threshold of 60 dBA established by the township. It is also worth noting that due to weather conditions, mining operations shut down each year for the winter months.

In summary, noise levels in the vicinity of the Project Site will increase because of the proposed mining activity due to the operation of mining equipment. It is anticipated that these impacts will be minor, short-term, limited to the hours of operation and mining season, and within the requirements of Township ordinances.

## **Vibration**

Springfield Township Ordinances set standards for acceptable vibration limits from operations and activities that may be of nuisance to the community. Specifically, Chapter 40 ZONING, ARTICLE VI. - ENVIRONMENTAL PERFORMANCE STANDARDS, Sec. 40-884. – VIBRATION (Vibration Ordinance) applies to the proposed operation.

Vibrations caused by the extraction and processing of the sand and gravel are limited to those associated with standard earth moving, processing, and trucking. These sources of vibration are isolated from residential development by the mining setback and by the distance from the processing plant to the perimeter of the project site (minimum distance is 1,450 feet).

Vibrations from the identified sources are known to dissipate through the soil immediately surrounding the source and do not negatively impact adjacent properties given the mitigating factors noted above. No

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vibration impacts associated with the processing of sand and gravel are anticipated. There are no known or documented cases of vibrational damage to adjacent properties related to sand and gravel operations owned by BMC and its affiliated companies.

No explosives will be used, or blasting undertaken, at the proposed mine site.