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**SOUND ANALYSIS**

**for**

**SEGALE CUMBERLAND AGGREGATE MINE AND ASPHALT PLANT  
KING COUNTY, WASHINGTON**

**Submitted to:**

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## **1. INTRODUCTION**

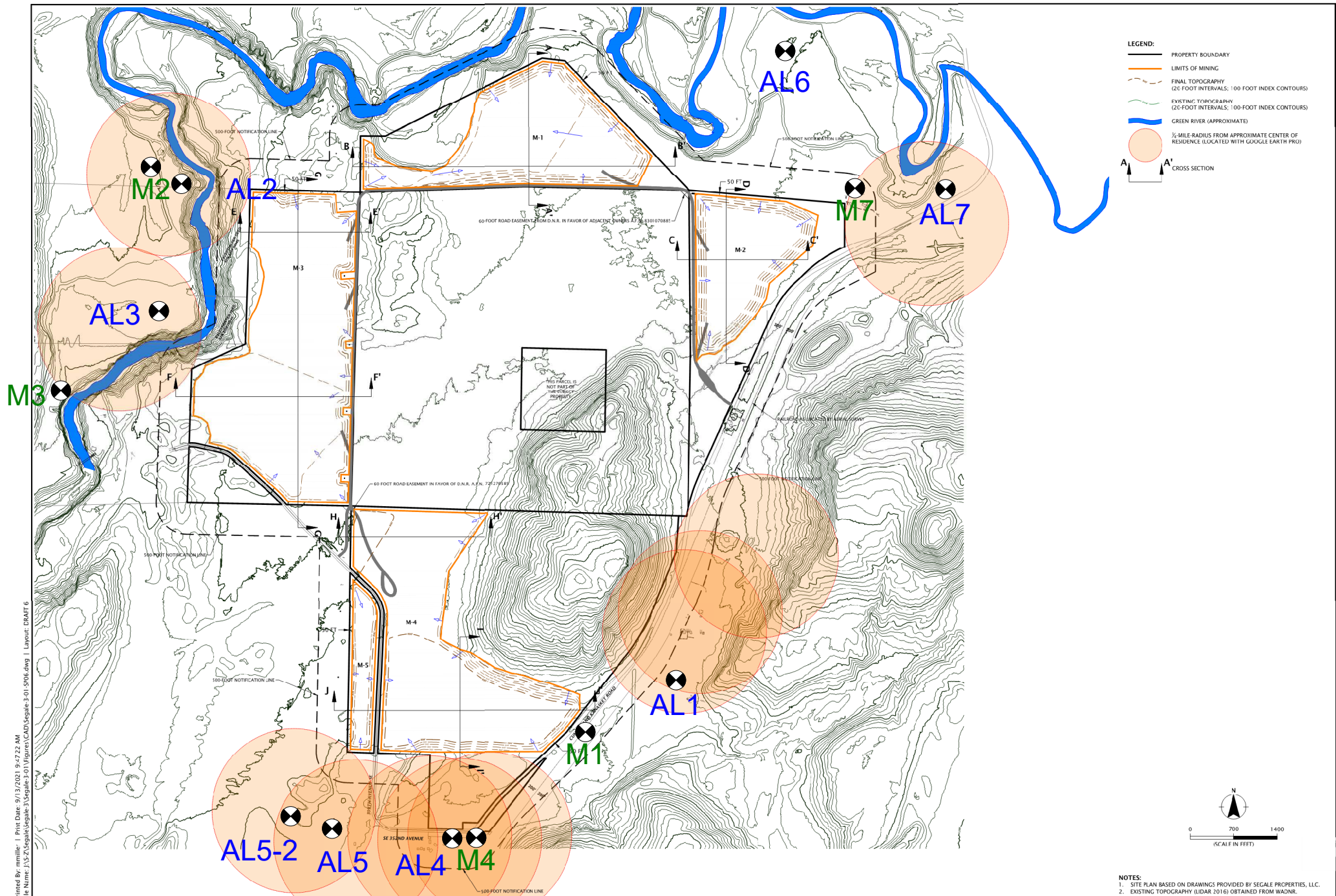
This report describes sound levels associated with the proposed Segale Properties gravel/aggregate mining operation and asphalt plant near Cumberland in King County, Washington. The report presents existing baseline sound levels at surrounding properties, noise-emission characteristics of proposed noise sources, calculated sound levels due to the proposed operations, and recommended noise mitigation measures.

## **2. PROJECT SITE AND SURROUNDING LAND USES**

A vicinity map of the project site, surrounding properties, and sound measurement and analysis locations are shown in Figure 2-1.

The project site is located in unincorporated King County, Washington, on Cumberland-Kanaskat Road just north of the town of Cumberland. The potential mining operation comprises fifteen King County parcels with a total area of 990 acres, which are zoned Forest with a comprehensive-plan designation of F (Forest).

The current use of the site is forestry. Adjacent properties are also largely in forest use. Kanaskat-Palmer State Park borders the northeast portion of the proposed site. South of the proposal is the town of Cumberland, and several residences are located on the south side of SE 352<sup>nd</sup> Street, more than 200 feet away from the nearest parcels containing proposed mining operations. Additional distance will be provided in the form of mining setbacks from property lines. An additional single-family residence is located relatively close to the proposed site entrance on Cumberland-Kanaskat Road.



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					Figure 2-1
		Date	Name	<b>Segale Cumberland Aggregate Mine Sound Analysis</b>  Project Site and Sound-Analysis Locations	
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Checked					
				BRC Acoustics & Audiovisual Design	

### 3. SOUND LEVEL DESCRIPTORS AND CRITERIA

#### **3.1 Sound Level Descriptors**

Sound is measured as sound level in units of decibels, dB. Environmental sound is often measured as A-weighted sound level in dBA. The A-weighting is a specific weighting filter in a sound level meter that corresponds to human hearing sensitivity at the various sound frequencies. People normally experience sound levels between about 30 and 90 dBA, depending on their activity. For example, a loud nearby vehicle, radio, or power tool may produce 80 to 90 dBA, normal conversation is about 50 to 60 dBA, and a bedroom or quiet office is about 30 to 40 dBA.

Each 10-dB increase in sound level corresponds to a tenfold increase of sound energy but is judged by a listener as only a doubling of loudness. The smallest changes in sound level considered clearly noticeable are about 3 to 5 dB.

Sound levels from two or more sources are combined using logarithms, not by adding the levels. When two levels are combined, the louder level predominates, and the combined level is the louder level plus 0 to 3 dBA. Some examples: 50 dBA combined with 50 dBA is 53 dBA; 50 dBA combined with 40 dBA results in 50.4 dBA, which is rounded off to 50 dBA since fractions of a dB are negligible from the point of view of human hearing.

Because sound levels fluctuate over time, several A-weighted sound level descriptors are used to characterize the sound over time. In this Analysis, the following descriptors are used:

<b>Leq</b>	<b>Equivalent sound level, Leq</b> , is the most commonly used descriptor for measuring fluctuating sound. The Leq is the level of a constant sound that, over a given time period, contains the same amount of sound energy as the measured fluctuating sound.
<b>Lmax</b>	<b>Maximum sound level, Lmax</b> , is the highest instantaneous sound level for a given sound source, event, or time period. Because the Lmax in a neighborhood will, unlike Leq, typically have large fluctuations from hour to hour and day to day, Lmax is seldom used to measure noise impact, except in cases where brief high-level sound is causing an impact such as sleep disturbance.

### **3.2 King County Noise Regulations**

Relevant King County regulations are contained in Section 12.86 – *Noise* of the King County Code (KCC).

Permissible sound levels are based on the District of source and receiving properties. KCC 12.86.030.E assigns District designations of Commercial, Industrial, Residential, or Rural according to land-use zones. The primary daytime noise limits of KCC 12.86.110 are shown in Table 3-1. For the purpose of KCC 12.86, daytime is defined as the hours of 7 a.m. and 10 p.m. on weekdays and 9 a.m. to 10 p.m. on weekends. Nighttime is defined as the hours of 10 p.m. and 7 a.m. on weekdays and 10 p.m. to 9 a.m. on weekends.

<b>TABLE 3-1 KING COUNTY DAYTIME PERMITTED SOUND LEVELS (dBA)</b>				
<b>Sound Source District</b>	<b>District of Receiving Property</b>			
	<b>Rural</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>
Rural	49	52	55	57
Residential	52	55	57	60
Commercial	55	57	60	65
Industrial	57	60	65	70

During the nighttime hours, the noise limits listed in Table 3-1 are reduced by 10 dBA for receivers in Rural or Residential Districts.

King County Zone F (Forest) is not listed under any specific District in KCC 12.86.030.E. The proposed mining operation is assumed to be considered an Industrial district, based on the similarity in nature and intensity of activity between mining and heavy industry. As a conservative (worst-case) assumption in this sound analysis, neighboring residential properties zoned F are considered part of the Rural District, which is the district subject to the most restrictive noise limits. Surrounding properties zoned RA are considered part of the Rural District.

Considering these assumptions, the noise limits considered for this Sound Analysis are listed in Table 3-2.

<b>TABLE 3-2 SEGALE CUMBERLAND PERMITTED SOUND LEVELS* (dBA)</b>		
<b>Time of Day</b>	<b>Zoning of Receiving Property with Residential Land Use</b>	
	<b>RA-2.5 to 10</b>	<b>F</b>
Daytime	57	57
Nighttime	47	47

*\*Considering Source property Industrial District and Receiving Residence Rural District*

The noise limits in Table 3-2 apply to the hourly Leq sound levels. The limit on the hourly Lmax is 15 dBA higher than the limits on Leq. This represents a limit on the hourly Lmax of 72 dBA during the day and 62 dBA at night. This allowed exceedance applies, for example, to single pass-bys from trucks.

The noise limits in Table 3-2 apply to mining and processing equipment at the site and to trucks operating within the project property. Noise from traffic on public roads is exempt from the noise limits of Table 3-2, according to KCC 12.86.250.

## **4. EXISTING SOUND LEVELS**

### **4.1 Sound Measurement Locations**

Seven locations were selected for measurements of baseline sound levels and are shown in Figure 2-1 as Locations M1, M2, AL3, M4, AL5, AL6, and M7. The measurement locations were selected among accessible properties to approximate as best as possible the Sound Analysis locations presented in Section 6.2 and also shown in Figure 2-1.

Locations M1, M2, M3, M4, and M7 are located on public property and were selected to represent existing sound levels at nearby rural-residential properties surrounding the project (AL1, AL2, AL3, AL4, and AL7).

Locations AL5 is the east property line of the rural-residential property at 30432 SE 352<sup>nd</sup> St. Location AL6 represents the nearest recreational land uses north of the project site.

### **4.2 Continuous and Short-Term Sound Measurements**

Existing sound levels were monitored continuously for 24 hours at Locations M3, AL5, and M7, starting between 10:30 and noon on Thursday, December 2, 2021.

Additional, short-term (15- to 20-minute) measurements of sound levels in one-octave bands and A-weighted were conducted at Locations M1, M2, M4, and AL6. The short-term measurements took place from noon to 1 p.m. on Thursday, December 2 and from 1 to 2 p.m. on Friday, December 3, 2021.

The long-term noise monitoring was conducted using two Bruel & Kjaer 2238 and one RION NL-32 Sound Level Meter. The short-term measurements were conducted using a Bruel & Kjaer 2250 Real-Time Spectrum Analyzer. All instruments conform to the specifications of ANSI S1.4 for Type I instruments.

All measurements were conducted at the first-story elevation of five feet above ground elevation.

Weather conditions were cloudy with average wind speeds of 5 to 10 mph from variable directions, daytime temperatures in the high 40s, and nighttime temperatures in the low to mid-40s degrees Fahrenheit. The weather conditions were within the range recommended by WAC 173-58, *Sound Level Measurement Procedures*.

A summary of the long-term and short-term measured sound levels, including overall Leq sound levels over daytime and nighttime hours where available, is presented in Table 4-1.

<b>TABLE 4-1 SUMMARY OF SOUND-LEVEL MEASUREMENTS (dBA)</b>		
<b>Measurement Location</b>	<b>Measured Leq Sound Levels, dBA</b>	
	<b>Daytime (7 a.m. to 10 p.m.)</b>	<b>Nighttime (10 p.m. to 7 a.m.)</b>
M1*	55	<i>not measured</i>
M2*	40	<i>not measured</i>
M3	56-66 Overall 57	56-57 Overall 56
M4*	63	<i>not measured</i>
AL5	30-55 Overall 42	25-44 Overall 35
AL6*	43	<i>not measured</i>
M7	34-57 Overall 44	32-59 Overall 45
<i>*15-minute daytime measurement</i>		

The main sources of existing noise at most measurement locations were distant traffic, residential activity, and occasional aircraft flyovers. Traffic on Cumberland-Kanaskat Drive was the dominant noise source at Location M1, and the Green River dominated sound levels at Location M3 and M4.

As shown in Table 4-1, the results of the continuous noise monitoring and short-term sound measurements were generally below King County daytime and nighttime noise limits pertaining to Industrial noise sources and Rural receivers, with the exception of Location M3. The comparison with noise limits is presented for reference only. The measured sound levels are produced by sources such as traffic, aircraft flyovers, and river flow, which are not subject to the noise limits of Table 3-1.



## 5. PROPOSED OPERATIONS AND SOUND EMISSIONS

### **5.1 Proposed Operations**

Activities at the proposed Segale Cumberland mine that represent potential sources of environmental noise consist of clearing terrain, aggregate mining, on-site transportation by truck and conveyor, processing of mined aggregates, asphalt production, and load-out.

General hours of operation would be from 7:00 a.m. to 5:30 p.m. seven days a week. During construction season, extended hours would be necessary to provide rock and asphalt paving product to jobs that occur at night. According to discussions with the Applicant, nighttime activities would be limited to asphalt production and transport off-site.

The locations and activities related to each of the operation's components, as assumed in the Sound Analysis, are described briefly below. The assumptions are based on discussions with the Applicant and on the Conceptual Development Plan prepared by NV|5 and dated September 2021.

Clearing of existing forest cover and topsoil stripping would occur in each of five areas (shown in Figure 2-1 as M-1 to M-5) prior to aggregate mining. The equipment assumed for the clearing operation comprises a bulldozer, front-end loader, and dump trucks.

Aggregate mining would occur in the same five areas (M-1 to M-5) in four stages of operation, until each mining area reaches the proposed final depth of 740' to 780' above mean sea level (ASL). Mining would be effected by heavy equipment such as excavators, front-end loaders, and bulldozers. The resulting material would be transported to the aggregate processing plant by off-highway trucks and conveyors.

Material processing (crushing, washing, and screening) would occur in area M-1 (the northernmost area) during the first stage of operations and in area M-3 (western area) during subsequent stages. The resulting material would be transported from the crushing plant to stockpiles using an off-highway truck. Three loaders would transfer aggregate from the stockpiles onto road trucks for transportation off site. One loader would transport aggregate from stockpiles to the asphalt-production facility.

Hot-Mix Asphalt Production and Asphalt Recycling would take place at the east end of area M-1, at the existing ground elevation of 840' ASL. Aggregates produced at the mine, imported recycled asphalt pavement, and imported liquid asphalt would be processed in the asphalt plant. Equipment includes a burner, bag-house with blower, hopper for loading trucks, and crusher for recycled asphalt.

Highway Haul Trucks transporting rock and asphalt products off site or importing recycled asphalt pavement and liquid asphalt would access the site using the primary access point from Cumberland-Kanaskat Road, south of area M-2. Trucks would use an on-site route to access

the asphalt plant or material stockpiles in areas M-1 or M-3. A secondary entrance from SE Green River Gorge Road would be used for emergency access only.

Total daily trips generated by the site would range from 200 to a high of approximately 550 during specific construction projects and the paving season. The higher traffic volumes would coincide with periods requiring nighttime or early-morning transportation and would, therefore, be distributed over 18 hours or more. The resulting hourly volume would range from 23 to 31 round-trips.

For a conservative assumption, 31 hourly round-trips by highway trucks were considered between the east entrance and area M-3 during Stages 2 to 4. In reality, some of the trips would only travel as far as the asphalt plant in area M-1.

Equipment Maintenance would take place at the maintenance-shop building and yard located in area M-1 at the existing elevation of 840' ASL, near the asphalt plant.

## **5.2 Equipment Sound Emissions**

Reference sound levels of equipment proposed for the Segale Cumberland project were measured at the Icon Inc. mining operation located on Segale Properties land in Auburn, WA. According to the Applicant, the equipment operating at the Auburn facility are representative of proposed Cumberland operation. Proposed equipment will in no event be noisier. Sound measurements took place on Thursday, December 9, 2021.

Due to an irregularity in the measurement, the data for the off-highway truck were not used. Instead, a previous measurement by BRC Acoustics of an off-highway truck at the Cadman High Rock operation was used.

The measured source sound levels normalized to a reference distance of 50 feet are shown in Table 5-1.

<b>TABLE 5-1 REFERENCE SOUND LEVELS OF PROPOSED EQUIPMENT</b>	
<b>Source</b>	<b>Sound Level at 50 Feet</b>
<b>Aggregate Mining</b>	
Front-end Loader	79
Excavator	78
Bulldozer	80
Off-highway truck*	78
<b>Material Processing</b>	
Jaw crusher	83
Two cone crushers	91
Screen	79
<b>Haul Trucks</b>	
Off-site road truck	67
<b>Equipment Maintenance</b>	
Pneumatic wrench	73
<b>Hot-Mix Asphalt Production</b>	
Burner	79
Bag-house blower	75
<b>Asphalt Recycling</b>	
Recycled asphalt crusher	78
<i>*Measured at Cadman High Rock</i>	

According to the King County noise regulation (KCC 12.86.500.G), warning devices such as back-up alarms are exempt from the noise limits of Table 3-1.

## 6. CALCULATED SOUND LEVELS AND EVALUATION

### 6.1 Methodology for Sound Modeling

The sound-level calculations were performed using the CadnaA program, which is based on International Standard ISO 9613 for the prediction of environmental noise. The model takes into account the sound power level, directivity, location, and height of the noise source, distance, ground cover and topography between the noise source and receiver, atmospheric conditions, and location and height of the receiver.

Table 6-1 lists the modeled scenarios and assumptions regarding location of equipment during proposed activities without additional noise mitigation.

**TABLE 6-1  
 NOISE MODELING SCENARIOS FOR PROPOSED OPERATIONS  
 WITHOUT ADDITIONAL NOISE MITIGATION**

Variant	Topographical Conditions	Scenario Description	Sound Source Locations
00	All mining areas M-1 to M-5 at existing elevations; <i>Development Plan Figure Draft 1</i>	<b>Prior to mining.</b> No mining equipment	
		No processing or asphalt production	
		Topsoil clearing in areas M-1, M-2, M-3	One bulldozer, front-end loader, and off-highway truck in each area at existing elevations
10	Mining area M-1 partially down to 770'. Area M-2 down to 760'. Area M-3 partially down to 780'. Mining areas M-4 and M-5 at existing elevations; <i>Development Plan Figure Draft 2</i>	<b>Stage 1.</b> Aggregate mining in areas M-1, M-2, M-3	One dozer, one excavator, and one loader in each mining area, on benches above the mine floor.
		processing and load-out operations in area M-1, at elevation 770'.	<ul style="list-style-type: none"> <li>One jaw and two cone crushers, wash plant, screens, off-highway truck, three loaders.</li> <li>31 highway truck round-trips on the road from the east access to area M-1.</li> <li>Off-highway trucks running continuously between the processing plant and areas M-2 and M-3.</li> </ul>
		Asphalt plant and equipment maintenance in area M-1 at top elevation 840'.	Asphalt plant, asphalt crusher, loader, maintenance equipment.
20	Mining area M-1 partially down to 740'-760' and M-2 partially down to 760'. Area M-3 partially down to 770'-780'. Mining areas M-4 and M-5 at existing elevations; <i>Development Plan Figure Draft 3.</i>	<b>Stage 2.</b> Aggregate mining in areas M-1, M-2, M-3.	One dozer, one excavator, and one loader in each mining area, on benches above the mine floor.
		processing and load-out operations in area M-3 at elevation 780'.	<ul style="list-style-type: none"> <li>One jaw and two cone crushers, wash plant, screens, off-highway truck, three loaders.</li> <li>31 truck round-trips on the road from the east access to area M-3</li> <li>Off-highway trucks running continuously between the processing plant and areas M-1 and M-2.</li> </ul>

**TABLE 6-1  
 NOISE MODELING SCENARIOS FOR PROPOSED OPERATIONS  
 WITHOUT ADDITIONAL NOISE MITIGATION**

Variant	Topographical Conditions	Scenario Description	Sound Source Locations
		Asphalt plant and equipment maintenance in area M-1 at top elevation 840’.	<ul style="list-style-type: none"> <li>Asphalt plant, asphalt crusher, loader, maintenance equipment.</li> <li>One loader traveling continuously between stockpiles in area M-3 and the asphalt plant.</li> </ul>
		Topsoil clearing in area M-4.	One bulldozer, front-end loader, and off-highway truck in area M-4, at existing elevation
30	Mining area M-1 down to final 740’-760’ and M-2 down to final 760’. Area M-3 partially down to 770’-780’. mining area M-4 partially down to 800’-820’; mining area M-5 at existing elevations; <i>Development Plan Figure Draft 4</i>	<b>Stage 3.</b> Aggregate mining in area M-3, M-4.	One dozer, one excavator, and one loader in each mining area, on benches above the mine floor.
		Processing and load-out operations in area M-3 at elevation 780’.	<ul style="list-style-type: none"> <li>One jaw and two cone crushers, wash plant, screens, off-highway truck, three loaders.</li> <li>31 truck round-trips on the road from the east access to area M-3</li> <li>Off-highway trucks running continuously between the processing plant and area M-4.</li> </ul>
		Asphalt plant and equipment maintenance in area M-1 at top elevation 840’.	<ul style="list-style-type: none"> <li>Asphalt plant, asphalt crusher, loader, maintenance equipment.</li> <li>One loader traveling continuously between stockpiles in area M-3 and the asphalt plant.</li> </ul>
		Topsoil clearing in area M-5.	One bulldozer, front-end loader, and off-highway truck in area M-5, at existing elevation.
40	Mining area M-1 down to final 740’-760’ and M-2 down to final 760’.	<b>Stage 4.</b> Aggregate mining in areas M-4, M-5.	One dozer, one excavator, and one loader in each mining area, on benches above the mine floor.

**TABLE 6-1  
 NOISE MODELING SCENARIOS FOR PROPOSED OPERATIONS  
 WITHOUT ADDITIONAL NOISE MITIGATION**

Variant	Topographical Conditions	Scenario Description	Sound Source Locations
	Area M-3 down to final 760'-780'. mining areas M-4 partially down to 800'-820' and M-5 partially to 770'; <i>Development Plan Figure Draft 5</i>	Processing and load-out operations in area M-3 at elevation 780'.	<ul style="list-style-type: none"> <li>• One jaw and two cone crushers, wash plant, screens, off-highway truck, three loaders.</li> <li>• 31 truck round-trips on the road from the east access to area M-3</li> <li>• Off-highway trucks running continuously between the processing plant and areas M-4 and M-5.</li> </ul>
		Asphalt plant and equipment maintenance in area M-1 at top elevation 840'	<ul style="list-style-type: none"> <li>• Asphalt plant, asphalt crusher, loader, maintenance equipment.</li> <li>• One loader traveling continuously between stockpiles in area M-3 and the asphalt plant.</li> </ul>
50	All Mining areas at final elevations:  Area M-1 down to 740'-760'; M-2 760' ASL; M-3 760'-780', M-4 800'-820', M-5 780'.  <i>Development Plan Figure Draft 6</i>	<b>Final stage.</b> Final aggregate mining in areas M-4, M-5.	One dozer, one excavator, and one loader in each mining area, at the mine floor.
		Processing and load-out operations in area M-3 at elevation 780'.	<ul style="list-style-type: none"> <li>• One jaw and two cone crushers, wash plant, screens, off-highway truck, three loaders.</li> <li>• 31 truck round-trips on the road from the east access to area M-3</li> <li>• Off-highway trucks running continuously between the processing plant and areas M-4 and M-5.</li> </ul>
		Asphalt plant and equipment maintenance in area M-1 at top elevation 840'.	<ul style="list-style-type: none"> <li>• Asphalt plant, asphalt crusher, loader, maintenance equipment.</li> <li>• One loader traveling continuously between stockpiles in area M-3 and the asphalt plant.</li> </ul>

## **6.2 Sound Analysis Locations**

For the purpose of analyzing sound levels from proposed operations, eight sound-analysis locations were selected to represent noise-sensitive properties that may be affected by project sounds. The analysis locations are listed in Table 6-2 and shown in Figure 2-1. All analysis locations are at the first-floor elevation of 5 feet above ground elevation.

<b>TABLE 6-2 DESCRIPTION OF SOUND ANALYSIS LOCATIONS</b>			
<b>Analysis Location</b>	<b>Description</b>	<b>Zoning</b>	<b>KCC12.86 District</b>
AL1	Southwest corner of Parcel 222107-9007, 32633 SE 341 <sup>st</sup> St.	F	Rural
AL2	East edge of clearing on Parcel 082107-9026, 29755 SE 318 <sup>th</sup> St.	RA-5	Rural
AL3	East corner of Parcel 172107-9044, 32706 293 <sup>rd</sup> Ave. SE	F	Rural
AL4	North property line of Parcel 187140-0285, 31207 SE 352 <sup>nd</sup> St	RA-2.5	Rural
AL5	On power-utility easement near east property line of Parcel 202107-9027, 30432 SE 352 <sup>nd</sup> St.	RA-10	Rural
AL5-2	2 <sup>nd</sup> -story window of residence on Parcel 202107-9027, 30432 SE 352 <sup>nd</sup> St.	RA-10	Rural
AL6	Camping area at Kanaskat-Palmer State Park, Parcel 102107-9011	F	Rural
AL7	West property line of Parcel 102107-9091, 31919 Cumberland-Kanaskat Rd. SE	F	Rural

## **6.3 Calculated Sound Levels without Additional Noise Mitigation**

Calculated Leq sound levels from proposed mining, processing, asphalt production, and transportation operations are shown in Table 6-3. The table also show King County daytime and nighttime noise limits and the results of baseline sound measurements. The King County nighttime noise limits apply to nighttime asphalt production and transportation during the paving season and to all operations taking place during the hours of 7 a.m. to 9 a.m. on weekends.

**TABLE 6-3  
 CALCULATED SOUND LEVELS (dBA)  
 WITHOUT ADDITIONAL NOISE MITIGATION**

BRC Ref.	Scenario Description	Sound Levels at Analysis Locations							
		1	2	3	4	5	5-2	6	7
00	Leq during topsoil clearing prior to mining	26	37	39	23	24	25	38	37
10	Leq during Stage 1	33	40	40	29	30	32	46	41
20	Leq during Stage 2	32	45	47	35	35	36	44	40
30	Leq during Stage 3	32	44	47	38	43	45	38	34
40	Leq during Stage 4	29	45	47	37	43	43	38	34
50	Leq during Final Stage	38	45	47	40	39	41	38	34
	King County daytime noise limits for Leq	57	57	57	57	57	57	57	57
	King County nighttime noise limits for Leq	47	47	47	47	47	47	47	47
	Existing daytime Leq	55	40	57	63	42	42	43	44
	Existing nighttime Leq (where measured)	--	--	56	--	35	--	--	45



## **6.4 Evaluation of Sound Levels without Noise Mitigation**

As shown in Table 6-3, calculated Leq sound levels from proposed mining, processing, asphalt production, and transportation activities at the Segale Cumberland aggregate mine meet King County daytime and nighttime noise limits at all Analysis Locations.

The results of Table 6-3 also show that, in general, calculated sound levels from proposed activities at the Seage Cumberland mine are in the range of existing measured sound levels, with two exceptions.

At properties to the west, represented by Analysis Locations 2 and 3, sound levels from processing activities in are M-3 in Stages 2 and later approach the nighttime noise limit of 47 dBA and produce increases of 5 dBA over existing sound levels.

During Stages 3, 4, and the final stage, sound-level increases of 8 to 10 dBA over existing nighttime sound levels are expected at properties to the south, represented by Analysis Locations 5 and 5-2. These increases are produced principally by top-soil clearing in area M-5 and mining in areas M-4 and M-5. No comparable sound increases are shown over existing daytime sound levels.

Section 7 discusses measures to mitigate the expected sound-level increases.

## **7. NOISE MITIGATION MEASURES**

As presented in Section 6.4, calculated sound levels from proposed operations at the Segale aggregate mine meet King County daytime and nighttime noise limits at all Analysis locations. Nevertheless, additional noise-mitigation measures are recommended to keep sound-level increases over baseline conditions to a minimum.

Recommended noise mitigation measures are as follows:

- Maintain stockpiles of minimum 20-foot height in area M-3, west of the processing plant, beginning in Stage 2.
- Delay the start of topsoil-clearing and aggregate mining in areas M-4 and M-5 until 9 a.m. on weekends.

With these noise mitigation measures in place, future sound levels from proposed mining, processing, asphalt-production, and on-site transportation of materials are expected to be in the range of existing sound levels at neighboring, noise-sensitive properties.

## 8. SUMMARY AND CONCLUSIONS

The findings of the Sound Analysis are summarized as follows:

- Calculated sound levels from proposed operations at the Segale Cumberland mine without additional noise mitigation meet King County daytime and nighttime noise limits at all sound-analysis locations.
- Additional noise mitigation is recommended in the form of (1) maintaining stockpiles of minimum 20-foot height to the west of the aggregate processing plant in area M-3 and (2) restricting the weekend hours of mining and topsoil-clearing in areas M-4 and M-5 to after 9 a.m.
- With these noise mitigation measures in place, future sound levels from proposed mining, processing, asphalt-production, and on-site transportation of materials are expected to be in the range of existing sound levels at neighboring, noise-sensitive properties. No significant noise impacts are expected from proposed operations with noise mitigation.

*--- End of Report Text ---*