To: Skamania County Community Development Department
Re: J.L. Storedahl & Sons Skamania Quarry Project DEIS
Date: July 6, 2026

In this letter, we will focus our comments on the noise and traffic impacts from the J.L. Storedahl & Sons Proposed Skamania Quarry, which would be inflicted upon the residents and recreational users of this area. We will detail specific conflicts and compliance issues with the West End Community Comprehensive Subarea Plan (as amended through April 2018) and expose potential methodological flaws within their Draft Environmental Impact Statement (DEIS) and appendices.

The purpose of a DEIS is to analyze and accurately depict the worst case adverse impacts. While some adverse noise impacts are depicted, they are, in our opinion and based upon information provided, understated, misleading, mask certain impacts and simply do not represent the worst case.

While neither of us are acoustical engineers, we have experience researching, analyzing and commenting on noise impacts that would have been foisted upon residents from a variety of proposed industrial and commercial developments (wind turbines, adventure parks and quarries). I, Keith Brown, have a PhD and have taught measurement techniques, evaluation procedures and statistical analysis at major universities. If this DEIS was done by one of my graduate students, I would reject it and require them to redo it. It does not meet the standards for accurately and clearly measuring, projecting and communicating the catastrophic noise impact to these rural areas, which historically and presently have exceptionally low baseline noise levels. The introduction of 500 gravel trucks a day with the concomitant noise increase would shatter the rural character, peace and tranquility that residents value and is specifically protected in the West End Community Comprehensive Sub-area Plan (WECCSAP).(1)

Vision Statement

West Skamania County will continue to be a predominately rural environment with large open tracts of field and forest lands with residential and limited small scale commercial development. Water quality and quantity will be maintained or improved, and wildlife will continue to abound. It will be a place where its residents can find refuge from the bustle and clamor of the urban and suburban areas of Clark County, Washington and Portland, Oregon. 2/27/07 – BCC Adopted Plan 5

Mission Statement

To promote conservancy by ensuring abundant natural spaces, preserving peace and quiet, protecting and maintaining air and water quality, and sustaining native flora and fauna.

General Goal 1. Primary Land Use:
Land developments within the West End Community shall be of a nature that promotes and enhances the rural and natural character of the community. This goal is premised upon the idea that certain qualities or values, which are viewed as "rural" by members of the West End community, should be preserved and enhanced. Those values include privacy; mixed residential, agricultural and forestry land uses; peace and quiet; lack of heavy traffic; clean air; clean water; wildlife and fish habitat; open spaces; recreational opportunities; and the least amount of governmental regulation consistent with preserving those and other values protected in the community subarea plan. 2/27/07 – BCC Adopted Plan 5

While the DEIS quotes from the vision statement and mission statement, it neglects to include the General Goal 1 (Chapter 3, pages 3.4-32 through 34), and it inaccurately states that with identified mitigation, "no significant noise impacts are anticipated". This is contradicted by their own findings in Section 3.3 and the Appendix E Sound Analysis. Further, as will be demonstrated in the body of these comments, their presentation of findings contains serious flaws.

The WECCSAP dictates strict land-use goals to preserve the rural character, natural resources, and recreational value of the area. The DEIS clearly reveals non-compliance with several core elements of this plan:

1. Non-Compliance with Rural Character Preservation: Subarea Plan Goal: **To preserve the quiet, rural, non-industrial character of the West End community.**
    - Quarry Conflict: Operating a 180-acre open-pit surface mine that introduces heavy industrial crushing, blasting, and **continuous haul-truck traffic directly violates the mandate to maintain a peaceful, rural residential environment.**
2. Non-Compliance with Recreational and Tourism Goals:
    - Subarea Plan Goal: **To support and enhance recreational opportunities, recognizing tourism and outdoor recreation (e.g., Cape Horn Trail, Columbia River Gorge National Scenic Area) as vital local assets.**
    - Quarry Conflict: Forcing hikers to share narrow rural roads and a high-risk highway intersection (SR 14/Salmon Falls Road) with heavy industrial trucks **undermines the recreational infrastructure, discourages tourism and creates a serious safety hazard.**
3. Non-Compliance with Environmental Protection Standards:

- Subarea Plan Goal: **To protect critical areas, pristine acoustic environments, and local air/water quality from degradation.**
- Quarry Conflict: The DEIS relies on industrial thresholds (WAC 60dBA and FHWA 67dBA limits) rather than subarea plan goals aimed at protecting the low background ambient levels (as low as 28dBA) native to the West End.

The Noise Report (Appendix E: Sound Analysis Report, January 2025) establishes existing ambient sound levels at six Measurement Locations supposedly representing residential properties and recreational areas. Ambient noise levels in these rural and natural environments are exceptionally low. For instance, at MA (Kellet Road residential area), the lowest daytime background ambient noise level was recorded at 28dBA Leq and averages 35dBA Leq. At MB (McCloskey Creek and Mabee Mines Road) it was 34dBA Leq and averaged 45dBA Leq (Appendix E, Table 4-2, Page 9).

Each 10 dB increase in sound is depicted as "only a doubling of loudness", which suggests to the reader that it is not significant. Though by every federal and state standard (including Washington State), an increase over 10 dB is deemed to be a significant adverse impact.(2) The projected increased noise levels along the proposed Storedahl Quarry gravel truck haul route would be devastating to nearby residents. **The increase in noise levels depicted in the report at residents' homes would be perceived as a doubling (10dBA), tripling (15dBA), quadrupling (20dBA), and even an eight-fold increase at 30dBA over existing measured ambient noise levels.**

Long-term sound measurements were done at two locations and 15-minute measurements were done at an additional four locations (pages 3.3-7 through 3.3-10). All of these measurements were done at the busiest traffic time of the year (July 17 - July 20, 2023) around the time of the National Motocross Races. **These measurements are not representative of what is experienced during the extensive quieter times of the year and thus, do not adequately depict the worst noise increases that will occur.** To address this deficit in the DEIS, long-term noise measurements need to be done in all locations during the naturally quietest times of the year.

Baseline vs Predicted Sound Levels - ALTERNATIVE Haul Route 1

On page 3.3-16, the DEIS states sound levels from truck traffic are expected to exceed day time levels by up to 30dBA. (Table 8-2, page 24 of Appendix E) This

number was determined by subtracting the **highest** daytime Leq 39dBA from the projected gravel truck noise level of 69dBA at sound analysis location AL1P1. **This methodology masks the possible worst impact.** Using the lowest daytime Leq for this location of 28dBA, results in a dBA increase of up to 41. **An increase of 40dBA represents a sixteen-fold increase in perceived loudness to the human ear.** The reality is the baseline dBA will vary hour by hour and the DEIS needs to include a table showing the difference between baseline and increased noise from the expected number of gravel trucks passing by at each hour. This number will likely vary from 50 to 100 trucks. (A decrease in truck traffic from 100 to 50 will decrease projected dBA by approximately 3dBA.)

This noise from the gravel trucks would occur in peaks and waves throughout each day. Their utilization of the highest Leq rather than using the lowest Leq to represent ambient noise, occurs throughout the sound analysis and thus underestimates and misrepresents the possible level of noise impact. On the same Table 8-2, the existing measured daytime Leq **is missing** for location TP61, even though later in the sound analysis, in Table 8-5, for TR6 (which is actually the same residence as TP61…262 McCloskey Creek Road) they use the nearest existing measured daytime Leq of 34-51dBA. Had this been accurately displayed in Table 8-2, the reader would see that the increase in sound at this location (TP61) could be 71 minus 34, or **up to a 37dBA increase**. The DEIS seems to ignore the fact that during the quietest periods of the day when ambient drops to 28-34dBA, the quarry truck traffic will spike noise levels to an unmitigated **increase** of up to 41dBA (Table 8-2 AL1P1, 69-28dBA).

In our review (using Mapsifter) of the closest point on the North property line of 262 McCloskey Creek to the midline of Kellet Road, the distance appears to be approximately 26 feet. Further, the SW corner for 101 Kellet Road property appears to be approximately 42 feet to the midline of McCloskey Creek Road. If the Cadna A Model 2 Road Traffic Model (3 & 7), which uses **FHWA Traffic Noise Model (TNM)** information including adjustments for rough gravel road and the steep grade, was **not** used in their analysis of the impact on private roads, their predicted sound levels may have been considerably underestimated *(see Comment Letter Appendix A, example 2)*. **Obviously, even from their flawed analysis, the Alternative 1 haul route, increased noise would have a significant adverse impact, making this route untenable.**

Low-Frequency Sound and Vibration: The report notes that heavy equipment and crushing generate substantial low-frequency noise. While the DEIS asserts that vibration levels will not exceed structural damage thresholds (Appendix E, Page 43), it glosses over the constant, low-frequency rumble that penetrates

residential walls, **causing significant physiological and psychological annoyance to local homeowners.**

ALTERNATIVE Haul Route 2

On page 3.3-18, the narrative makes an unfounded assumption that three trucks, which were passing by 592 Mabee Mines Road, would "continue from Mabee Mines Road on McCloskey Creek Road". This is a flawed assumption as the trucks could have stopped along Mabee Mines or continued on Mabee Mines without turning off on McCloskey Creek. This essentially invalidates Table 8-5. Even if one were to accept their flawed assumptions, they have used the estimated Leq (64dBA minus 49dBA) from 3 trucks to depict increases of up to 15dBA, rather than using the lower measured Leq 34dBA which would actually inflict a 30dBA noise increase upon the closest residential property structure T6R (262 McCloskey Creek Road located on a public road).

In Table 8-3, a 20dBA increase can clearly be seen at location T4P2, showing the truck traffic with "noise mitigation" as 58dBA minus existing Leq 38dBA. Although the narrative discounts this increase due to no heavy truck passing this location, this is likely the case throughout most times of the day…and most certainly true during the majority of and typically slow traffic months. This is further verified by the 26dBA increase at T5P (60dBA minus 34dBA). Thus, these increases more closely represent the worst case scenario based upon their noise projections for these particular locations along the private road portion of McCloskey Creek.

The analysis in Table 8-4, which considers the possibility that the continuation of McCloskey Creek Road is transitioned into public management (they offer no evidence that the County would make it a public road), should be discounted. The analysis of this section of McCloskey Creek Road should be based on property lines, not the setback to the location of the residence.

The "Berm" Mitigation Illusion: The DEIS claims that with the construction of an 8-12 foot perimeter noise berm (approximately 34 feet of which is proposed within the BPA's fee-owned corridor), truck traffic noise can possibly be mitigated to barely meet the 60dBA threshold (Appendix E, Table 8-3, Page 25). However, a reduction to 57-60dBA still represents an increase of 15-26dBA beyond the existing 34-45dBA rural acoustic environment. **In acoustics, a 15dBA increase is perceived by the human ear as a tripling of loudness, a 25dBA is a five-fold increase.** It is possible that if the Cadna A Model 2 Road Traffic Model for Rough Gravel Road were run, it may show a Leq of between 73-76dBA and thus, even the berm will not bring it down to the 60dBA threshold. *(See Comment Letter Appendix A, Example 2)*

The level of increase due to truck traffic at 592 Mabee Mines Road is depicted in the DEIS as 12dBA and at 632 Salmon Falls Road as 11dBA (Table 8-8, pages 34 & 35). The problem with this depiction, as admitted in the DEIS, during the traffic counts, no sound measurements were done, which is required by WSDOT and the Federal Highway Transportation Administration to validate the accuracy (+ or - 3dBA) of the FHWA model for calculating traffic noise.(6) As was stated before, long-term noise measurements at these locations during the quietest time of the year to ascertain accurate ambient noise levels would reveal real impact and **needs to be required.** Then, the Cadna A Model 2: Road Traffic Model (not the Cadna A Model 1: Industrial Mode/Moving Line Source), should be used to model road traffic and resulting noise increases at all locations during each hour of the day. **Note:** Nowhere in the DEIS nor its appendices does it share that the prediction models are only accurate to plus or minus 2.5dBA to 3dBA and that accuracy depends upon correct information input to model the worst case impacts. (3, 4 & 7)

Table 8-10, which depicts weekend peak hour sound levels, suffers from **at least two problems.** The first is the existing noise levels are projected from truck traffic during the busiest time of the year, ignoring the majority of the year when there is much less traffic. The motocross traffic for the Nationals was occurring during this exact weekend. This can be clearly seen in the decreased traffic going from 215 vehicles on Salmon Falls Road to Canyon Creek Road to only 33 on Mabee Mines Road (Table 8-9, page 36). The 16 decibel increase at 592 Mabee Mines Road may be a more accurate depiction of the increases which would be suffered on Salmon Falls residents during the quietest months of the year and times of the day. The second problem is that there was again, no sound measurements during the traffic counts, as described above.

What is not depicted in Storedahl's noise analysis is the even more significant adverse impact on those residences closest to the midline of the road. A cursory review of the Skamania County MapSifter revealed numerous residences closer than 100 feet from the midline. For example, 1631 Mabee Mines Road appears to be approximately 38 feet from the midline. 1171 Mabee Mines Road appears to be approximately 40 feet. The worst case analysis requires assessment at these and other residences (for example, 82 Salmon Falls Road) near steep grades and curves, homes that will experience the most impact. If this assessment was done, it will likely show that the predicted sound levels will exceed the Federal Highway Traffic Administration abatement criteria of 67 dBA. (*See Comment Letter Appendix A, Example 1)*

The significant adverse impact of noise increases up to 20dBA, as depicted in the DEIS, and likely exceeding 30dBA if compared to ambient noise levels

during the quieter times of the year, make the Alternative 2 Route as untenable as the Alternative 1 Route.

Traffic Impacts on Local Residences and Hikers

1. Truck Trips and Haul Routes

According to Appendix G: Transportation Impact Study (March 2026), the project will generate substantial heavy vehicle traffic.

- Trip Generation: Under Alternatives 1 and 2, the quarry is projected to generate an average of 500 daily truck trips (250 inbound, 250 outbound) during standard operations.
- The Haul Route: The primary haul route runs from the site via Mabee Mines Road, Salmon Falls Road, and onto State Route 14 (SR14) (DEIS, Chapter 1, Page 5).

2. Impacts on Local Residences

- Safety and Congestion: Salmon Falls Road and Mabee Mines Road are narrow, winding, rural two-lane roads with minimal shoulders. Introducing 500 heavy, multi-axle dump trucks/trailers per day heavily impacts local residential access. Given the curves and line-of-sight issues at many points along the haul route, residents will find it next to impossible to safely pull out of their driveways.
- Furthermore, as former firefighters, EMT's, a Fire Commissioner and Director of Skamania County Emergency Medical Services, we are deeply concerned regarding the risk for increased traffic accidents, fatalities and delayed response times. The DEIS does not even address the fact that SR14 from Salmon Falls Road to Marble Road has historically been an area of frequent accidents. No mention is made of the fact that this section of SR14 had been designated as a Safety Corridor in the recent past due to this treachery. We personally have responded to multiple traffic incidents, many with fatalities. How specifically will the dramatically increased congestion, truck breakdowns, slow traffic with no pull-out space available on the West End's rural, limited, narrow roads delay critical emergency response in the case of accidents, fires, and medical emergencies?(8) We fear, too many will suffer or even die.
- Frequency of Disruption: Assuming a standard 10-hour operational day (7:00 AM to 5:00 PM), 500 daily truck trips breaks down to an average of 50 truck transits per hour. This means a massive, multi-axle aggregate truck will pass local residences or cross the hiker corridor at the SR 14 /

Salmon Falls Road intersection every 72 seconds. During peak operational hours this can spike to 100 trucks per hour, or one truck every 36 seconds.

- Residences: At a rate of one truck every 36-72 seconds, local homeowners on Mabee Mines Road and Salmon Falls Road will experience a near-continuous low-frequency rumble and continuous exhaust brake and engine noise spikes from heavy gravel trucks accelerating and decelerating on steep inclines exceeding **80–85dBA.** (See Comment Letter Appendix A, Example 1) This rhythmic wave of rising and falling noise completely eliminates any intermittent "quiet periods" between trucks.

- Noise: Heavy trucks accelerating at full-throttle uphill and using engine brakes and down-shifting on steep grades introduce severe intermittent noise spikes (5, 6 & 7) **(frequently exceeding 80–85 dBA at residential setbacks**). The DEIS admits that off-site truck traffic will cause "significant noise increases" on public roads (Appendix E, Page 43, Summary "r"), but dismisses it because their projections do not cross the Federal Highway Traffic Administration (FHWA) Noise Abatement Criterion of 67dBA. **This ignores the severe disruption to residential peace.** The need to depict impacts on residences adjacent to steep grades is explained by how dramatically noise increases with trucks operating at full-throttle (See Comment Letter Appendix A, Example 1).

3. Impacts on Hikers

- The SR 14/Salmon Falls Road Intersection: This intersection is the primary access point for both the quarry haul trucks and hikers accessing the Cape Horn Trailhead. Hikers will be subjected to detrimental noise increases, decimating the trailhead entry and for a considerable distance along the trail, negatively altering the peaceful nature experience they seek and Cape Horn Trail provides. This trail should be considered a **Noise-Sensitive Land Use**, as “These places are valued as havens from the noise and rapid pace of everyday city life and they should be treated as noise-sensitive.” from page 3-8 of the Federal Transit Administration TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT May 2006.(2) As required in this assessment, **ambient noise needs to be measured and projected increased noise levels accurately depicted at the property line (approximately 37 feet from the midline of Salmon Falls Road).**

- The Pedestrian Crossing Analysis (Appendix G, Page 28) inadequately evaluated the safety risks to hikers accessing the Cape Horn Trailhead. At 500 trucks a day, the probability of a hiker trying to cross Salmon Falls Road at the exact moment a heavy truck is accelerating through the intersection skyrockets. **The 36-72 second interval between gravel trucks creates an environment of perpetual conflict between heavy industrial machinery and pedestrian recreationists**.
- Ignoring Pedestrian-Truck Asymmetry: The software calculates vehicular delay but fails to simulate the psychological deterrence and physical safety impacts on hikers crossing an intersection utilized by hundreds of heavy trucks. The software treats a "pedestrian unit" abstractly, completely missing the severe safety friction that would occur at the Cape Horn Trailhead access point.

In summary, in this West End rural setting, a traffic noise increase of 10, 15, to 20dBAs is catastrophic. The residents in this area enjoy an exceptionally low baseline noise level. That, in large measure, is why they live here and 250 of them (over 10% of the population) gathered to participate in more than a three year process of crafting the WECCSAP to protect this area. That is why they continue to show up in defiance of efforts to degrade the quality of life in this area. Introducing a continuous onslaught of gravel trucks with their incessant noise and inherent safety risks would shatter the rural character that residents specifically pay a premium to experience. Even a 10dBA increase is an adverse impact contrary to the WECCSAP. With the 15dBA increase, the rural peace would be completely broken resulting in community outrage and mobilization. This crosses the legal threshold for substantial degradation in almost all state environmental policies. **With the 20dBA increases depicted in the DEIS, this lovely rural residential area would effectively become industrialized.** It would sound like being directly next to a busy suburban commercial zone or major freeway. Even with windows shut, the low frequency rumble of heavy gravel trucks would actually vibrate through walls. Residents would quite justifiably feel like their property values are ruined and that their health is under attack.

This proposed quarry operation is not in compliance with the WECCSAP and due to the unavoidable and significant adverse impacts, should be denied a conditional use approval.

Respectfully submitted,

Keith Brown, PhD. and Teresa Robbins, West End Residents

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REFERENCES

1 **WEST END COMMUNITY COMPREHENSIVE SUBAREA PLAN**
Skamania County (2007) as amended amended April 17, 2018

2 **TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT** (May 2006)
U.S.Department of Transportation Federal Highway Administration FTA-VA-90-1003-06

3 **PREDICTION AND ASSESSMENT OF ROAD TRAFFIC NOISE IMPACT**
Jeffrey Peng (2020) Doctor of Philosophy Thesis , School of Mechanical and Manufacturing Engineering,The University of New South Wales Sydney, Australia

4 **FURTHER COMPARISON OF TRAFFIC NOISE PREDICTIONS USING THE CADNA A AND SOUND PLAN NOISE PREDICTION MODELS**
Peter Karantonis, Tracy Gowen and Mathew Simon, Proceedings of 20th International Congress on Acoustics (August 2010) Sydney, Australia

5 **COMPREHENSIVE TRUCK SIZE AND WEIGHT (TS&W) STUDY**
Phase 1-Synthesis Traffic Operations and Truck Size and Weight Regulations. Working Paper 6 February 1995 Prepared for Federal Highway Administration, U.S. Department of Transportation

6 **FHWA TRAFFIC NOISE MODEL (FHWA TNM®) TECHNICAL MANUAL**
U.S. Department of Transportation Federal Highway Administration
FHWA-PD-96-010 Final Report
DOT-VNTSC-FHWA-98-2 February 1998

7 **FHWA TRAFFIC NOISE MODEL TECHNICAL MANUAL** .U.S. Department of Transportation Federal Highway Administration, 2023. FHWA-HEP-17-053:

8 **COMMENT ON THE J.L. STOREDAHL & SONS SKAMANIA QUARRY DRAFT ENVIRONMENTAL IMPACT STATEMENT,** Skamania County Fire District # 4. JUNE 2026

APPENDIX A
CADNA A MODEL 2 ROAD TRAFFIC MODEL EXAMPLES

The Federal Highway Administration (FHWA) accounts for increased noise from heavy trucks on steep grades through the algorithmic structure of its official software, the **FHWA Traffic Noise Model (TNM)**. Instead of applying a simple "flat" decibel penalty or a static multiplier to a roadway, the FHWA handles a 6% grade by separating truck noise into specific physical components and performing a dynamic **full-throttle calculation**. This can be used within the CADNA A Model 2.

1. The Full-Throttle Emission Curve
For flat or rolling terrain, TNM calculates truck noise based on standard cruise emission curves, where noise varies directly with speed. However, when a roadway segment is inputted with a grade **exceeding 1.5%**, the model triggers an entirely different set of equations for heavy trucks:

- **The "Grade" Vehicle Sub-Source:** Heavy trucks are treated as full-throttle vehicles if they are climbing an upgrade.

- **Decoupling Noise from Speed:** On a flat road, a truck going 35 mph is relatively quiet because the engine is under a low load. On a 6% grade, a truck going 35 mph requires maximum horsepower. TNM overrides standard cruise variables and substitutes **maximum full-throttle acoustic energy curves** derived from nationwide empirical testing.

2. Dual-Height Noise Source Representation
The FHWA recognizes that a heavy truck under load does not emit noise from just one point. TNM breaks every heavy truck down into two distinct sub-sources of noise with different heights above the pavement:

- **0.0 feet (Tire-Road Interface):** Captures the tire pavement noise, which actually decreases slightly if the truck slows down on the hill.

- **11.5 feet (Exhaust Stack & Engine Block):** Captures the roar of the diesel engine, the turbocharger, and the exhaust. On a 6% upgrade, the software drastically increases the acoustic energy directed from this **11.5-foot elevated source**.

Because the dominant noise is elevated to 11.5 feet during a climb, it bypasses low roadside vegetation or standard 6-foot property fences much more easily than flat-ground tire noise.

3. Speed-and-Distance Iteration (Operational Time)
A steep 6% grade causes heavy trucks to lose speed as they climb. TNM accounts for this using a dual-effect calculation:

1. **The Acoustical Side:** The engine noise itself increases significantly due to the full-throttle load.

2. **The Temporal Side:** Because the truck slows down, it takes longer to pass by a given point. This increases the vehicle's **"operational time"** within a receiver's line of sight. Since hourly equivalent noise levels (Leq) are a measure of cumulative sound energy

over time, a slower, louder truck climbing a 6% grade delivers exponentially more sound energy to a nearby receiver than a truck cruising past on flat ground.

EXAMPLE 1

Combined Traffic Noise Levels - Cadna A Model 2 Road Traffic Model (TNM)

The table below provides an example of the **Maximum Sound Level (LMax)** for individual truck passbys alongside the **Combined Hourly Equivalent Sound Level (Leq)** for all 100 trucks passing during a single hour. These calculations assume a standard soft ground propagation drop-off rate (-4.5 dBA) per doubling of distance for line source (Leq) and (-6 dBA) for point source (LMax). To apply this example to a specific location, one would need to import the surrounding topography.

Distance	(LMax): Uphill (Accelerating)	(LMax): Downhill (Decelerating)	Combined Hourly Noise Level (Leq)
35 feet	87.1 dBA	83.1 dBA	**81.8 dBA**
50 feet	84.0 dBA	80.0 dBA	**79.5 dBA**
75 feet	80.5 dBA	76.5 dBA	**76.8 dBA**
100 feet	78.0 dBA	74.0 dBA	**74.9 dBA**

4. Adjustment for Rough Gravel Road on Steep Grade

When heavy trucks transition from smooth asphalt to a rough, unpaved gravel road, the acoustics change drastically. The tire-pavement mechanism shifts to mechanical rattling, chassis vibration, loose stones striking the undercarriage, and reduced traction.

Because standard regulatory traffic algorithms (like the FHWA's Traffic Noise Model or national road frameworks) do not explicitly support a native "rough gravel" pavement selection, acousticians applying an industrial model like CadnaA (ISO 9613-2) must manually add distinct source adjustments.

Standard "Rough Gravel Road" Adjustments
To accurately model this specific scenario, a total penalty of +4 to +9dBA must be added directly to the truck's baseline flat-asphalt Sound Power Level calculations, broken down by the following factors:

Surface Texture Correction (+2 to +4dBA): Rolling a heavy, multi-axle double-haul truck over loose, jagged stones causes massive structural tire vibration and carcass cavity resonance. This adds a mandatory surface penalty over standard asphalt.

Body and Mechanical Rattle (+2 to +3dBA): Empty gravel trucks bouncing on unpaved corrugated road surfaces generate severe body-panel vibrations, gate rattling, and empty trailer bed impact noise.

Low-Speed Traction/Slippage (+1 to +2dBA): Climbing a 6% gravel grade at 10 mph causes micro-slippage of the drive tires on loose stones, elevating the engine load and low-frequency exhaust tone beyond standard uphill asphalt calculations.
Undercarriage Stone Spray (Minor dBA, High Frequency): Flying gravel striking the vehicle's body creates a highly audible, high-frequency "clatter". While it rarely shifts the total dBA drastically, it significantly alters the perceived tone.

EXAMPLE 2

Modeled Noise Levels (Model 2 Truck + Rough Gravel Road with Steep Grade)
As an example: Assuming 100 total heavy vehicles per hour moving at 10 mph across a steep rough gravel track, using standard ISO 9613-2 propagation over mixed ground (G= 0.5)

- **At 35 feet: ~ 85 dBA (**Lmax peak pass-by**) / ~ 79 dBA (**Leq**)**
- **At 50 feet: ~ 82 dBA (**Lmax peak pass-by**) / ~ 76 dBA (**Leq**)**
- **At 75 feet: ~ 78 dBA (**Lmax peak pass-by**) / ~ 73 dBA (**Leq**)**
- **At 100 feet: ~ 75 dBA (**Lmax peak pass-by**) / ~ 70 dBA (**Leq**)**

EXAMPLE 3

Modeled Noise Levels (Model 2 Truck on Level Gravel Road)
As an example: Assuming 100 heavy vehicles per hour moving at 10 mph across a flat, unpaved gravel road using standard ISO 9613-2 propagation:

- **At 35 feet: ~ 82 dBA** (Lmax peak pass-by) / **~ 76 dBA** (Leq)
- **At 50 feet: ~ 79 dBA** (Lmax peak pass-by) / **~ 73 dBA** (Leq)
- **At 75 feet: ~ 75 dBA** (Lmax peak pass-by) / **~ 70 dBA** (Leq)
- **At 100 feet: ~ 72 dBA** (Lmax peak pass-by) / **~ 67 dBA** (Leq)

APPENDIX B
METHODOLOGICAL FLAWS OF THE DEIS

Methodological Flaws of the DEIS

1. Failure to Sample the "Slowest Seasons" (November through March)

An accurate Environmental Impact Statement must capture the true baseline conditions of an area. The DEIS fails this standard by skewing its data collection windows:

- Noise Baseline Flaw: Sound monitoring was conducted during periods when foliage was present and environmental noise (wind through trees, summer wildlife, existing seasonal traffic) was at its peak. **The DEIS completely failed to measure ambient sound levels during the slowest, quietest months (November through March)**. In winter, deciduous trees drop their leaves, which drastically reduces the natural acoustic buffering of the forest. Wildlife and accompanying noise levels are diminished. The true winter ambient noise level is likely far lower than that portrayed. By failing to record winter baselines, the DEIS vastly underestimates the perceived loudness and seasonal propagation of quarry operations and hauling when the natural landscape is bare.
- Traffic Baseline Flaw: Traffic counts were executed during peak summer and early fall operational windows (Appendix G, Section 2, Page 12). **By failing to measure or balance these numbers against the slowest seasonal traffic periods (Late Fall/Winter), the DEIS lacks a legitimate yearly baseline, masking how disproportionately dominant the quarry's heavy truck traffic will be during months when local residential and recreational traffic naturally thins out.**

2. Failure to Sample the "Slowest Times of Day" for Traffic

- Appendix G focuses heavily on the "PM Peak Hour" and "AM Peak Hour" of the adjacent street system to calculate the Level of Service (LOS) (Appendix G, Page 16-18).
- The Flaw: By evaluating impacts almost exclusively against periods when the roads are already busy with commuter and recreational traffic, the DEIS hides the true impact of the quarry during the "off-peak" or slowest times of the day (e.g., mid-morning and early afternoon). During these quieter hours, local residents currently experience wide-open, low-volume rural roads. Introducing a steady stream of heavy haul trucks during these off-peak windows completely alters the local traffic pattern. **The DEIS**

uses high commuter volumes to absorb the percentage increase of trucks mathematically, failing to disclose that during off-peak hours, quarry trucks will represent the vast majority of all vehicles on the road, drastically increasing noise and safety risks.

3. Flaws in the Use of Federal Transportation Modeling Software

The transportation analysis relies heavily on federal modeling software methodologies (Highway Capacity Manual / Synchro) to prove that intersections will continue to operate at acceptable Levels of Service (Appendix G, Page 16-18). This modeling is inherently flawed for this specific site for several reasons:

- Inability to Model Heavy Truck Dynamics on Steep Grades: Standard federal transportation models are optimized for standard passenger vehicles or uniform commercial traffic on relatively flat terrain. They systematically fail to simulate the real-world operational degradation caused by multi-axle aggregate trucks accelerating from a dead stop on steep, winding rural inclines—such as turning from SR 14 onto Salmon Falls Road.
- The "Platoon" and "Queue" Underestimation: Federal Highway Capacity Manual (HCM) models assume that traffic flows smoothly and that trucks accelerate linearly. The software cannot accurately model the compounding traffic backup (queuing) that occurs when a heavy, slow-moving gravel truck takes up to 10–15 seconds to clear the intersection from a stop sign on the steep Salmon Falls Road incline.
- As Skamania Fire District 4 pointed out in their comment letter, “Routine Level of Service analysis does not fully address heavy-vehicle incident management on a rural descending roadway that functions as a part of the emergency-response corridor.” (8)
- Underestimating "Gap Acceptance" and Sight Distance: The software assumes idealized driver behavior and linear acceleration characteristics. In reality, a heavy gravel truck requires a massively larger gap in oncoming SR 14 highway traffic to safely pull out than a standard vehicle. Appendix G includes a "Highway 14 Gap Analysis" (Appendix G, Page 31-32) which attempts to address this, but **the underlying software models fail to accurately capture the compounding delays and safety hazards caused when high-speed highway traffic rounding tight Gorge curves is forced to suddenly brake for a slow-moving, accelerating quarry truck.**

- Compounding Delay at 500 Trucks: At a volume of 500 trucks a day (one every 36-72 seconds), the software treats each truck as an isolated event. In reality, the massive "gap acceptance" delay required for a haul truck to safely turn onto SR 14 means that trucks will begin backing up behind one another. **This creates a continuous rolling wall of heavy vehicles, a physical reality that standard federal intersection software completely fails to simulate for steep, mountainous terrain.**