

Supplemental Noise Report

Noise Levels with Operations at the Wahl

Extraction Permit Area

at Shine, Washington

**Produced for Fred Hill Materials, Inc.
Poulsbo, WA.**

By

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1.0 INTRODUCTION

Fred Hill Materials requested that Environalysis supplement a study of existing noise conditions at the Shine Pit (performed in October 2002) by addressing the following issues pertaining to the extraction of aggregate from the Wahl permit area:

- Determine the effect on sound levels due to moving the working face (and the front-end loader extracting aggregate) from its current location at the east slope of the existing permit area to the Wahl permit area;
- Ascertain the effect on sound levels due to the operation of a new conveyor belt from the Wahl permit area to the west edge of the existing processing area. The conveyor that now runs from the existing working face to the processing area would be removed.
- See if the Shine operations using the Wahl Extraction Permit area will meet King County's Maximum Permissible Noise Levels at the boundaries of the Thorndyke Tree Farm rather than the less stringent Washington State standards.
- Explain why the King County noise standards were selected as the applicable regulation for this project.

This report will address these issues and assess the impacts of extraction at the Wahl site using a combination of on-site noise measurements and noise prediction software.

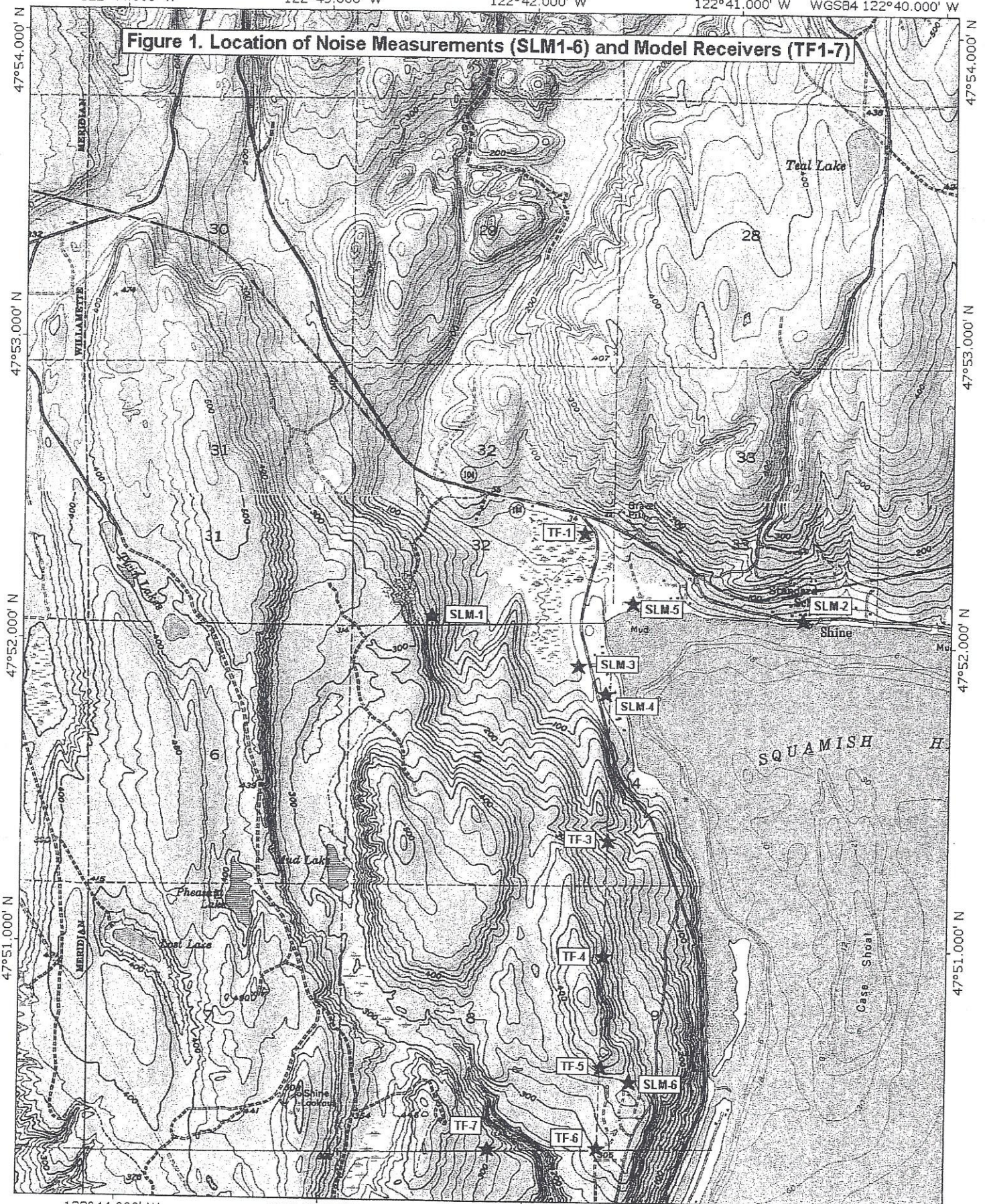
1.1 METHODOLOGY

The effect that operations at the Wahl Extraction permit area would have upon the Shine pit's noise emissions was analyzed by measuring the sound pressure level of the existing conveyor belt and then using the Environmental Noise Model to determine the pit's impacts at the Thorndyke Tree Farm's boundaries.

A Larson-Davis model 814 integrating Type 1 sound level meter was used to measure the sound pressure levels generated at a distance of 50 feet by the conveyor belt running from the existing working face uphill to the processing area. The calibration of the meter was checked before and after the measurements with an acoustic calibrator, itself calibrated to a known source.

The modeling phase involved using noise prediction software to determine the pit's noise impacts at the boundaries of the Thorndyke Tree Farm. The eastern and southern boundaries of the Tree Farm border residential areas would thus be the most sensitive to noise impacts. The locations where the pit's noise impacts were calculated are shown in Figure 1. Figure 1 also shows where noise measurements were taken in September 2002 (SLM1-6) to assess the noise impacts of the Shine operation in its current configuration.

Figure 1. Location of Noise Measurements (SLM1-6) and Model Receivers (TF1-7)



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The noise prediction software used was a comprehensive noise prediction computer program known as the Environmental Noise Model (ENM). This program required noise measurements of all major machinery used at the pit. This supplemental analysis used the machinery sound level data gathered for the October 2002 report, but added additional measurements for the conveyor belt and relocated the conveyor belt and front-end loader. Other inputs included detailed topographical information digitized from topological project site maps, the locations of the mining machinery and local meteorological data. The noise modeling assumed a general pit layout identical to that now existing, but with the new conveyor belt entering the processing site on the south-west side.

1.2 REGULATION OF NOISE

Introduction

As explained in the October 2002 report, Jefferson County has adopted Washington State's noise standards by reference, however Fred Hill Materials offered to adhere to King County's noise standards which mandate a lower permissible noise level for an industrial noise source and a residential receiver. Subsequently, the Jefferson County Board of Commissioners established a 690-acre Mineral Resource Overlay in the Shine-Thorndyke area by the passage of Ordinance No. 14-1213-02. This ordinance imposed the following conditions upon the project:

"1.b. Performance standards of Section 4:

- All extraction and reclamation activities that create a noise disturbance must take place between 7:00 a.m. and 7:00 p.m."

"2. As a matter of policy, the legal, nonconforming use (i.e., established prior to adoption of the UDC) at the Shine Pit hub of 144 acres (including an existing MRL overlay of 121 acres) shall be subject to operational standards a. and b. upon adoption of a Wahl Lake/Meridian MRL overlay and operational standards c. and d. when (and if) approval is granted through a permit review process for mineral extraction activities in the Wahl Lake/Meridian MRL overlay:

- a. The maximum permissible sound level at any and all receiving properties outside of the Thorndyke Tree Farm shall be 57 dB(A) between 7:00 a.m. and 7:00 p.m. on weekdays and 47 dB(A) on weekends, holidays, and between 7:00 p.m. and 7:00 a.m. on weekdays. Compliance protocol shall be established during review of future mineral extraction permit application. Any planned, temporary exceeding of these standards must be authorized beforehand by the Administrator and documented in the compliance case file."

Local Regulations

The maximum permissible sound levels cited in Jefferson County's ordinance are based on King County Noise Ordinance's Chapter 12.88 Section 020. The King County ordinance is similar to but is more stringent than Washington State's noise code (Maximum Permissible Environmental Noise Levels WAC 173-60-040), and specifies sound levels 3 decibels lower for an industrial source and

a rural receiver (57 dBA compared to 60 dBA). The King County standards are shown in Table 1 and the one most applicable to the Proposal is shown in **bold**. The maximum permissible noise levels are the limits a project can generate at its boundary with other land uses-- they are not the sum of a project and the background non-project sound levels.

**TABLE 1
KING COUNTY MAXIMUM PERMISSIBLE SOUND LEVELS in dBA**

Land Use of Source:	Land Use of Receiving Property			
	Rural	Residential	Commercial	Industrial
Residential	52	55	57	60
Commercial	55	57	60	65
Industrial	57	60	65	70

Notes:

Between the hours of 10 p.m. and 7 a.m. on weekdays and 10 p.m. and 9 a.m. during weekends, the maximum limits for rural and residential receivers are to be reduced by 10 dBA within residential receivers. For noises of short duration these limits can be exceeded by a maximum of 5 dBA for 15 minutes/hour, 10 dBA for 5 minutes/hour or 15 dBA for 1.5 minutes/hour.

Motor vehicle traffic traveling on public roads is exempt from the noise regulations summarized in Table 1; however, the project's onsite traffic is subject to the State's standards and is included in the ENM modeling.

2.0 PROJECT IMPACTS

The procedures to determine the noise impacts of the existing Shine Pit operations were detailed in a report submitted to Fred Hill Materials dated October 2002 and later presented to Jefferson County. Similar procedures were used to examine the potential noise impacts of extracting material from the Wahl permit area. Noise measurements were taken of the conveyor belt that carries material from the working face to the crushing/screening operations. The sound generated by the belt is so low that all other equipment in the processing area had to be shut down in order to obtain a measurement representative of the belt noise only. Measurements of the Shine pit's machinery are shown in Table 2. The measurement of the belt was taken in 1/3-octave band frequencies at a distance of 50 feet and was converted to A-weighted decibels for ease of comparison in Table 2. The measurement data represent the sound pressure level of each machine at a distance of 50 feet from the machine. This data was converted to sound power (the acoustic energy emitted by the machines) using the standard power law formula: Sound power level = sound pressure level + (10*LOG (2*pi*distance²)). For a measurement distance of 50 feet this formula adds 31.6 dBA to the measured sound pressure levels.

TABLE 2 SOUND LEVELS OF PIT MACHINERY in dBA

Process and Equipment	Sound Pressure Level at 50' from equipment	Sound Power Levels used in Modeling
Working face- CAT 980F	83	115
Primary Crusher – screens, conveyors	91	123
Wash Plant	82	114
Concrete Recycling plant	88	120
Asphalt plant	86	118
Gravel truck- loaded tandem on level surface at 25 mph	69	101
Conveyor belt	50	81

In general, the Shine Pit typically operates from as early as 4:30 a.m. to 8:00 p.m. six days a week in the summer and 7 a.m. to 4:30 p.m. in the winter. The 5-7 a.m. period on weekdays and the 5-9 a.m. period on weekends and holidays are considered nighttime operations and are subject to more stringent noise standards. The asphalt plant (not owned or operated by Fred Hill Materials) has State and County approval to operate 24 hours a day for critical State highways projects.

2.1 OPERATIONAL IMPACTS

Modeling of On-Site Equipment

Computer modeling of project-generated noise levels was used to predict its noise impacts at the noise monitoring sites, which are generally so distant from the pit that background sounds obscure the pit's noise. In addition, computer modeling allows the simulation of the pit under a variety of meteorological conditions that could enhance the dispersion of noise from the pit and that may coincide with noise complaints received by the County.

Modifications were made to the Environmental Noise Model that had been used for the analysis of existing noise impacts for the Shine Pit to reflect changes due to extraction operations moving to the Wahl Permit site. These modifications include:

- Expansion of the topographical data used in ENM further to the west include the Wahl Permit site
- Re-locating the Cat980 front-end loader from the current working face to the Wahl area
- Removing the conveyor between the current working face and the primary crusher
- Installing a new conveyor belt from the Wahl site to the western edge of the processing area
- Adding model calculation points (“receivers”) along the western and southern boundaries of the Thorndyke Tree Farm.

Table 3 summarizes the results of the ENM modeling.

TABLE 3 SHINE PIT-GENERATED SOUND PRESSURE LEVELS AT THE MEASUREMENT SITES

Receiver Site	Current Operations Noise Levels	Pit with Wahl Operations	King County Standard	Exceedance?
	Typical Conditions Day/Night	Typical Conditions Day/Night	Day/Night	Day/Night
SLM-1	47/47	40/40	70/70	NO/NO
SLM-2	35/33	33/29	57/47	NO/NO
SLM-3 (same as TF-2)	47/46	37/31	57/47	NO/NO
SLM-4	29/28	27/24	57/47	NO/NO
SLM-5	41/39	38/31	57/47	NO/NO
SLM-6	14/10	16/12	57/47	NO/NO
TF-1	NA	41/31	57/47	NO/NO
TF-3	NA	32/30	57/47	NO/NO
TF-4	NA	23/20	57/47	NO/NO
TF-5	NA	24/19	57/47	NO/NO
TF-6	NA	14/13	57/47	NO/NO
TF-7	NA	14/13	57/47	NO/NO

Notes:

Typical meteorology is defined as winds of 2 meters/second (4.5 mph) from the south-southeast (157°) in a neutral atmosphere (-1°/100 meters)

Summary of the Project's Operational Impacts

Mining operations on the Wahl Permit area will generate sound levels 2 to 10 dBA lower at all of the adjacent residential areas than the current pit operations now generate. This reduction is due to the re-location of the front-end loader further away from human habitations. Table 3 indicates that the project's noise levels at any receiver would not exceed the standards set out in the King County Noise Code for an industrial noise source impacting a residential noise receiver in a rural zone during typical meteorological conditions. Sound levels may be slightly higher during inversions; however the potential for noise exceedances during inversions should not be considered significant because of their infrequent occurrence in the Shine area. The pit would be audible if its modeled sound levels were more than 3 dBA greater than existing measured levels. None of the modeled receivers exceed background levels, thus the pit is not likely to be audible except for certain pure tone sounds (such as backup alarms) or as a result of unusual events.

3.0 MITIGATION MEASURES

No mitigation measures would be required for the pit's operation in order to meet the State's noise standards, as no exceedances are predicted. The pit may be occasionally audible when the background noise is very low. No mitigation measures are recommended for potential exceedances during inversions due to the infrequent occurrence of inversions in the Shine/ Hood Canal area.