Patching Associates Acoustical Engineering Ltd.

Consultants in Acoustics, Noise Control and Vibrations

Conceptual Noise Assessment for The
Spy Hill Lands Development Project
Phase 1

Prepared for:
Brown & Associates.

Prepared by:

Patching Associates Acoustical Engineering Ltd.

Consultants in Acoustics, Noise Control and Vibrations

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Executive Summary

Patching Associates Acoustical Engineering Ltd. was retained by Brown & Associates to provide preliminary noise projections, noise criteria that may apply and a range of noise mitigation options for a proposed gravel operation in Northwest Calgary. The Spy Hill Lands Development is a 2 square mile section of land within the City of Calgary boundaries and lying adjacent to the M.D. of Rocky View on Sections 33, 28, - Twp 25 - Rge 2 W-5M. The area around the proposed development is next to existing gravel operations to the east, residential developments to the west, in the M.D. of Rocky View, and residential developments to the south within the City of Calgary. This report provides noise predictions for continuous operations from a conceptual mine layout with generic noise sources used in gravel operations. More refined noise projections will require site-specific information including mine layout and operating equipment.

The potential noise sources or operations that were used in the noise prediction model for the proposed Spy Hill Development include: a portable crusher plant operation, electrical power plant, a conveyor, front-end loaders, scrapers, haul truck traffic, and an engine/water pump, an asphalt plant and a concrete plant. The crusher plant was situated at two separate mining locations in the middle of Sections 28 and 33 for the purposes of noise modeling.

The City of Calgary Noise Bylaw (45M95) has established daytime and nighttime noise level criteria for industry at the receptor locations and is applicable for this development.
Noise modeling was used to predict the worst-case noise level at the west property line near receptors in the M.D. of Rocky View. The predicted worst-case (unmitigated) noise levels for the conceptual design models are 61 dBA L_{eq} (1-hour) daytime and above the City's 55 dBA L_{eq} (1-hour) nighttime levels with continuous operations of all equipment modeled in this study, with the exception of surface stripping and grading. In the case of surface equipment operating temporarily at the west property line, modeled noise levels can reach 69 dBA L_{eq}.

Several noise control techniques have been identified that can be used to reduce the overall noise levels at receptor locations to achieve acceptable levels. Through use of such techniques it should be feasible to meet the daytime noise level of 65.0 dBA L_{eq} (1-hour) established by the City of Calgary Noise Bylaw. The feasibility of operating in conformity with the Noise Bylaw nighttime standard will depend on specific details of operations and the effectiveness of any noise mitigation measures to be implemented.

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Introduction and Scope-of-Work

Patching Associates Acoustical Engineering Ltd. was retained by Brown & Associates, to provide preliminary noise projections, noise criteria that may apply, and a range of noise mitigation options for a proposed gravel operation in Northwest Calgary. The Spy Hill Lands Development is a 2 square mile section of land within the City of Calgary boundaries and lying adjacent to the M.D. of Rocky View on Sections 33, 28, - Twp 25 - Rge 2 W-5M. The area around the proposed development is next to existing gravel operations to the east, residential developments to the west, in the M.D. of Rocky View, and residential developments to the south within the City of Calgary. This report provides noise predictions from a conceptual gravel mine operation layout with generic noise sources used in gravel operations. More refined noise projections will require site-specific information including mine layout and operating equipment.

Overview of Sound

Sound level is typically measured using the A-weighting scale, and expressed as a L_{eq} value. The L_{eq} is the A-weighted equivalent-continuous sound level. This index is an energy average of the varying sound level over a specified period of time. The L_{eq} value considers both the sound level and the length of time that the sound level occurs. The use of this index permits the description of a varying sound level environment as a single number. As the L_{eq} is an "average" level, the measured sound level may exceed a criterion level without affecting the "average", provided that the duration of the exceedance is limited.

A detailed explanation of the L_{eq} index and description of basic noise criteria is found in Appendix A.

Noise Criteria

The City of Calgary Noise Bylaw (45M95) has established daytime and nighttime noise level criteria for industry at residential locations and is applicable for this development.

Other noise criteria that may be considered due to the proximity to the M.D. of Rocky View include the M.D. of Rocky View noise by-law, and the Alberta Energy and Utilities Board (EUB) Noise Control Directive ID 99-8 and accompanying Guide 38.

City of Calgary Noise Bylaw (45M95)

The current City of Calgary Noise Bylaw (45M95) restricts allowable noise levels within the City. In the bylaw, there are different noise levels allowed for daytime periods and nighttime periods. Nighttime is defined as being from 22:00 (10 PM) to 07:00 (7 AM) the following morning, if the following day is a "weekday" {which includes Saturdays; if the following day is a Sunday or statutory holiday, the night does not officially end until 09:00 (9 AM)}. The bylaw uses the

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equivalent-continuous, or L_{eq}, index for assessing noise levels - this is the "energy-averaged" level measured over a specified time period, which in the bylaw is set as a one-hour interval. A copy of the City of Calgary Noise Bylaw (45M95) is found in Appendix B.

The allowable level, measured at any point on the receiver's property, is set at 65 dBA L_{eq} (1 hour) during the daytime, and 55 dBA L_{eq} (1 hour) during nighttime hours. However, if the ambient noise levels are already high (above 50 dBA at night or 60 during the day) in the area due to activities which are not part of the facility or operation in question, the allowable levels are the measured ambient level plus 5 dBA, if this exceeds the stated limits.

M.D. of Rocky View Noise Bylaw

The M.D. of Rocky View has a generic noise bylaw that is open to interpretation. As it applies to gravel operations, in a number of instances, the M.D. has imposed conditions of 55 dBA L_{eq} (1-hour) at the property line, and continuous noise monitoring to monitor noise levels.

EUB Noise Directive ID 99-8

The Alberta Energy and Utilities Board (AEUB) Noise Directive ID 99-8, specifically applies to the energy industry. Alberta Environment has applied the Directive in the past to non-energy related industry, where there have been no clear noise regulations in place.

The Directive permits specified sound levels attributable to energy industry facilities at designated receptor points. These allowable limits are dependent on the population density, proximity to heavily traveled transportation routes (motor vehicles, rail and aircraft) and other specified adjustments. The Directive permits the daytime sound level to be as much as 10 dB above the nighttime sound level. The Directive is receptor based and is addressed on a case-by-case basis for existing facilities.

Methodology

Noise Sources and Operations

Generic noise source data, for equipment and operations for the proposed Spy Hills Development were entered into a sound propagation model to predict noise levels at the property line. This information was obtained from historical databases or from theoretical calculations. The data is generic in nature and it serves as an excellent framework from which to base the noise predictions. Once a gravel mining operation plan and equipment list is developed, a site-specific noise propagation model can be developed.

The potential noise sources or operations that were used in the model for the proposed Spy Hill Development include:

- scrapers
- haul trucks

- font-end loaders
- power plant
- crusher plant and screening operation
- conveyor
- water pump and engine
- asphalt plant
- cement plant

Sound power levels of these noise sources used in the noise predictions are provided in Table 1.

Table 1: Sound Power Levels of Noise Sources and Equipment Typically Found in Gravel Mining Operations

Noise Source	Frequency (Hz)										
	31.5	63	125	250	500	1000	2000	4000	8000	Total (dBL)	Total (dBA)
Average Haul Truck (to calibrate model)	107.0	116.0	105.9	101.7	100.9	100.7	97.8	92.8	87.3	117.3	105.1
Front End Loader	117.2	112.2	108.8	108.8	103.5	102.8	98.2	91.3	91.3	119.5	107.3
Front End Loader	121.1	124.8	116.8	114	107.4	107.2	103.3	96.3	93.4	127.1	112.2
Power Plant	101.8	113.9	118.3	104.2	99.0	102.9	98.0	89.2	79.9	120.0	107.3
Water Pump	132.8	118.8	119.8	117.9	112.2	109.9	106.3	98.9	91.5	133.3	115.5
Asphalt Plant	117.2	116.4	112.2	110.5	108.3	107.4	107.3	102.6	98.7	121.6	113.2
Concrete Plant	113.2	122.5	119.1	116.3	113.0	115.0	107.9	100.7	88.3	125.8	117.7
Conveyor	113.1	114.2	118.9	111.2	110.4	110.6	109.1	100.3	96.7	122.3	115.2
Scraper	125.1	123.2	120.7	111.6	112.8	115.5	115.2	112.0	110.5	128.9	120.9
Crusher	122.4	126.0	130.1	125.3	117.1	114.6	111.6	105.6	98.1	133.1	121.8

Noise Modelling

The sound propagation calculations were undertaken using the **ENM** noise propagation software package. **ENM** is an advanced noise propagation model that considers geometric spreading, atmospheric sound absorption, ground impedance effects, site topography, vegetation and environmental conditions. Octave-band sound power level information was used for the potential major noise sources that will operate at the proposed Spy Hill Development. The frequency dependency of sound propagation calculations such as ground absorption and air absorption are considered in the model. The ground type used in the model attempted to replicate conditions expected during the mining operation. The weather conditions modeled were 0° C with 80% relative humidity and wind from the east at 7.5 Km per hour. The east wind condition was used to predict a "worst-case" noise level at the west property line nearest the residences in the M.D. of Rocky View. Two gravel pit layouts were modeled; one in Section 28 and one in Section 33. In both cases the crusher operations, and power plant were located at the center of the sections at the top of the gravel layer to predict the short-term worst-case noise levels during the initial stages of the gravel operation at the west property line. The scraper and pit loading operations were

situated near the west property in both sections. The asphalt and concrete plants were located near the east property line.

The **ENM** model calculates the contribution level of each noise source at each receiver location in octave bands as well as calculating the overall operation sound level in octave bands and overall dBA level.

Results and Discussion

Potential noise sources at the proposed Spy Hill Development include a portable crusher plant operation, electrical power plant, a conveyor, front-end loaders, scrapers, haul truck traffic, an engine/water pump, a concrete plant and an asphalt plant. The mining will occur primarily in two areas in sections 28 and 33, with the operational layout yet to be determined.

The predicted noise levels and site layout for the conceptual design with an east wind and continuous operations are shown in Figure1 and Figure 2. The order ranking of the sound sources for the worst-case predictions for the west property line with an east wind at 7.5 km per hour is shown in Table 2.

Table 2 Order ranking of continuous noise sources using worst-case conditions and location at the west property line

Ranking	Source	Section 28 Gravel operation	Source	Section 33 Gravel operation
		Noise level dBA (L_{eq})		Noise level dBA (L_{eq})
1	Crusher	57	Crusher	58
2	Loading in pit	55	Road F	54
3	Road C	52	Loading in pit	52
4	Conveyor	51	Conveyor	51
5	Water pump	50	Water pump	49
6	Concrete Plant	48	Loading near crusher	44
7	Loading near crusher	44	Power Plant	43
8	Road B	44	Road E	43
9	Power Plant	43	Concrete Plant	42
10	Asphalt Plant	41	Asphalt Plant	42
11	Road A	40	Road D	39
	Total Level	**61**	**Total Level**	**61**

During the majority of the life of the gravel mining operation, the extraction and crushing of gravel will occur below the surface. However there will be times when surface operations of stripping of the overburden will occur to expose the gravel layers. During these times, there would be heavy equipment (scrapers) on the surface moving earth, not unlike the equipment found in the initial phases of a new residential development. The noise level associated with this surface noise source at the residences will vary with the distance that the equipment is from the receiver. The scrapers would be the loudest at the receivers when they are nearest the west

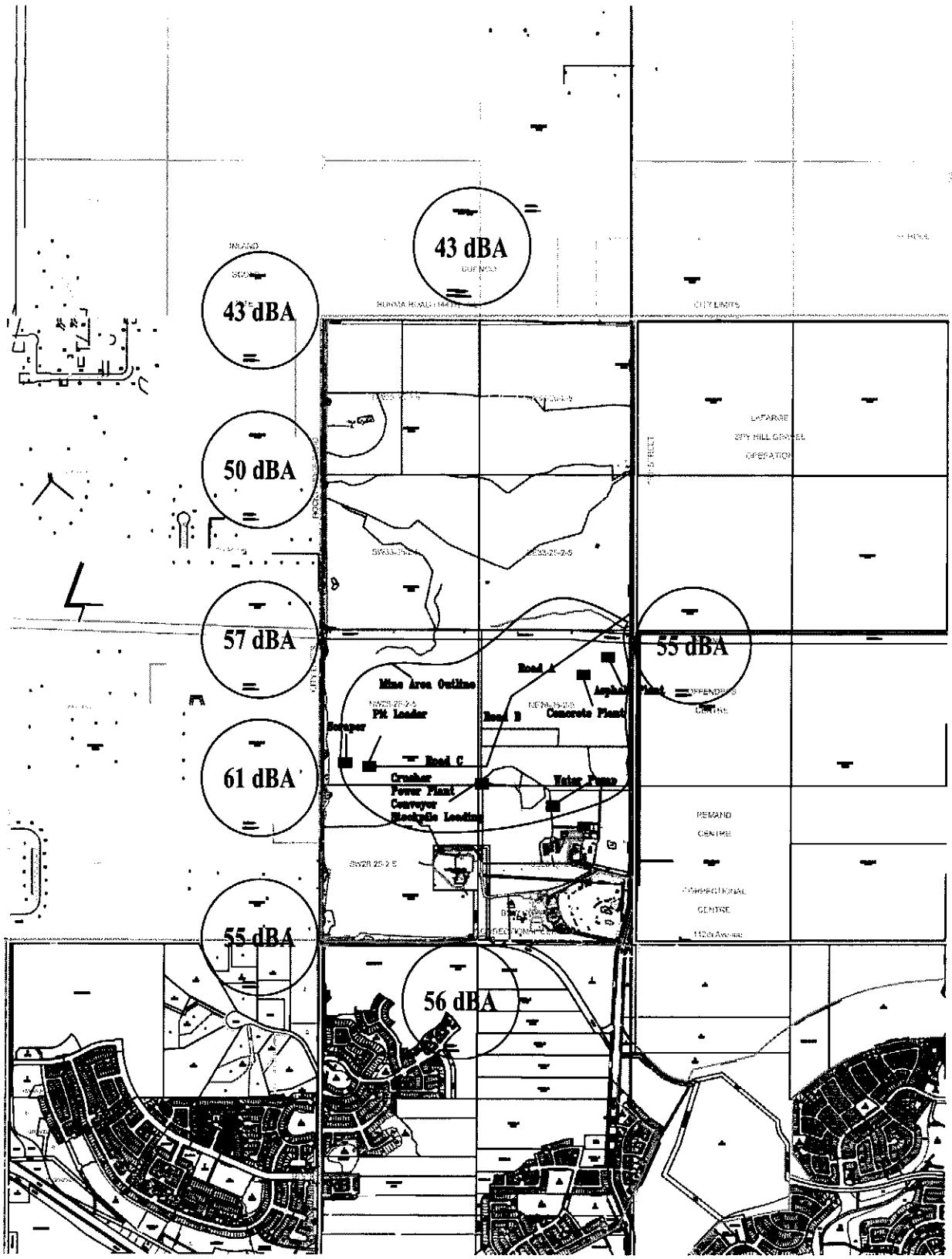

Figure 1: Noise Projections With An East Wind For Continuous Operations At The Spy Hill Development Located On Section 28 (Scraper Noise Not Included)

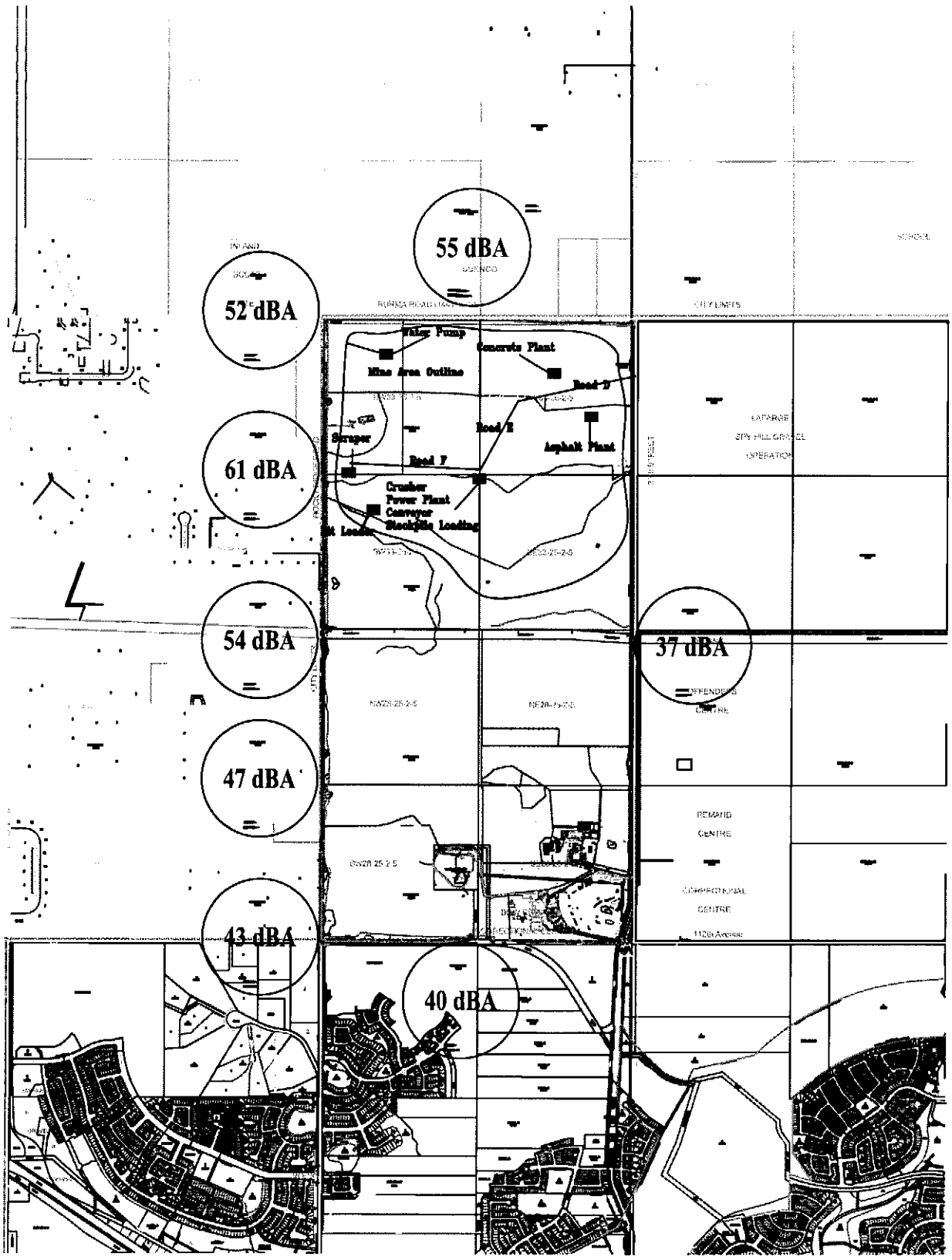

Figure 2: Noise Projections With An East Wind For Continuous Operations At The Spy Hill Development Located On Section 33(Scrapers Not Included)

property line. The predicted worst–case noise level of continuous operation the scrapers at the property line using the conceptual mine layout is shown in Table 3.

Table 3 Predicted continuous noise level of scrapers using worst-case conditions at the west property line

Source	Section 28 Gravel operation	Source	Section 33 Gravel operation
	Noise level dBA (L_{eq})		Noise level dBA (L_{eq})
Scrapers	63	Scrapers	69

Noise Control Considerations

Noise control considerations that could be considered to reduce the overall noise levels at receptor locations is achievable in a number of ways including:

- enclosing the crusher plant
- rubber liners at all transfer points to reduce impact noise
- Installing a berm
- installing noise reducing accessories for equipment if available (e.g. silencers)
- the use of stockpiles of gravel in strategic locations to provide a barrier effect to the receiver locations, and thereby also reducing noise levels
- orientation of the equipment to direct noise to an appropriate direction away from the receptor location, thereby also reducing the noise level
- enclosing the conveyor
- locating noise sources at lower depths
- adding additional noise control to the electrical power plant enclosure
- operator awareness when operating mobile equipment
- limiting the duration of an activity in a particular location
- keeping equipment maintained for peak efficiency and overall reduction of noise

The effectiveness of any applied noise control measure can be quite variable, particularly for mobile noise sources. Mobile noise sources are on the go during the course of the mining operation and the variables that affect noise levels include distance to the receiver, the duration at any one location, the specific cycle of the operation and topography, etc. Stationary sources typically easier to treat but are also faced with a number of variables that determine the effectiveness of a noise control measure.

Comparison to Noise Criteria

The maximum predicted noise level for the gravel extraction activity is 61 dBA L_{eq}, which is below the City of Calgary daytime criteria of 65 dBA L_{eq} (1-hour). The worst-case predicted noise

levels for the west property line near the conceptual Spy Hill Development are just above the 65.0 dBA L_{eq} (1-hour) daytime when including the temporary surface stripping operation (near the west property line) and continuous operations of all equipment, and above 55 dBA L_{eq} (1-hour) nighttime levels allowed by the City of Calgary.

The major noise contributors for these worst-case predictions at the west property line are the scrapers (when they are continuously operating near the property line), crusher plant operations, conveyor and the front-end loader operations. For the majority of the gravel mining operation the scrapers will not be operating continuously and nor in close proximity to the property line. The crusher, power plant and conveyor were modelled at the top of the gravel layer to provide a worst-case prediction during the early stages of the gravel operation. For the majority of the time, these noise sources will be located up to 25 metres below the top of the gravel layer, where the noise levels will be attenuated by the topography. Several noise control measures can be considered to reduce the overall noise levels at the receptor locations to achieve acceptable levels.

It is feasible to meet the daytime noise level of 65.0 dBA L_{eq} (1-hour) daytime established by the City of Calgary Noise Bylaw (45M95).

Summary

Noise modeling was used to predict the worst-case noise level at the west property line near receptors in the M.D. of Rocky View. The predicted worst-case (unmitigated) noise levels for the conceptual design models are 61 dBA L_{eq} (1-hour) daytime and above the City's 55 dBA L_{eq} (1-hour) nighttime levels, with continuous operations of all equipment modeled in this study, with the exception of surface stripping and grading. In the case of surface equipment operating temporarily at the west property line, modeled noise levels can reach 69 dBA L_{eq}.

Several noise control techniques have been identified that can be used to reduce the overall noise levels at receptor locations to achieve acceptable levels. Through use of such techniques it should be feasible to meet the daytime noise level of 65.0 dBA L_{eq} (1-hour) established by the City of Calgary Noise Bylaw. The feasibility of operating in conformity with the Noise Bylaw nighttime standard will depend on specific details of operations and the effectiveness of any noise mitigation measures to be implemented.

APPENDIX A

An Explanation of Technical Details Regarding Sound Measurement and Analysis

Technical Details

Sound is the phenomena of vibrations transmitted through the air, or other medium such as water or a building structure. The range of pressure amplitudes, intensities, and frequencies of the sound energy is very wide, and many specialized fields have developed using different ranges of these variables, such as room acoustics and medical ultrasound.

Due to the wide range of intensities which are perceived as sound, standard engineering units become inconvenient. Sound levels are commonly measured on a logarithmic scale, with the level (in deci-Bels, or dB) being proportional to ten times the common logarithm of the sound energy or intensity. Normal human hearing covers a range of about twelve to fourteen orders of magnitude in energy, from the threshold of hearing to the threshold of pain. On the decibel scale, the threshold of hearing is set as zero, written as 0 dB, while the threshold of pain varies between 120 to 140 dB. The most usual measure of sound is the sound pressure level (SPL), with 0 dB SPL set at 2.0×10^{-5} N/m^2 (also written 20 μPa), which corresponds to a sound intensity of 10^{-12} Watts per square metre (or 1 picoWatt per square metre, written 1 pW/m^2).

Normal human hearing spans a frequency range from about 20 Hertz (Hz, or cycles per second) to about 20,000 Hz (written 20 kHz). However, the sensitivity of human hearing is not the same at all frequencies. To accommodate the variation in sensitivity, various frequency weighting scales have been developed. The most common is the A-weighting scale, which is based on the sensitivity of human hearing at moderate levels; this scale reflects the low sensitivity to sounds of very high or very low frequencies. Sound levels measured on the A-weighted scale are written in A-weighted decibels, commonly shown as dBA or dB(A).

When sound is measured using the A-weighting scale, the reading is often called the "Noise level", to confirm that human sensitivity and reactions are being addressed. A table of some common noise sources and their associated noise levels are shown in Table A-1.

When the A-weighting scale is <u>not</u> used, the measurement is said to have a "linear" weighting, or to be unweighted, and may be called a "linear" level. As the linear reading is an accurate measurement of the physical (sound) pressure, the term "Sound Pressure Level", or SPL, is usually (but not universally) reserved for unweighted measurements.

Noise is usually defined as "unwanted sound", which indicates that it is not just the physical sound that is important, but the human reaction to the sound which leads to the perception of sound as noise. It implies a judgment of the quality or quantity of sound experienced. As a human reaction to sound is involved, noise levels are usually given in A-weighted decibels (dBA). An alternate definition of noise is "sound made by somebody else", which emphasizes that the ability to control the level of the sound alters the perception of noise.

Technical Details (continued)

TABLE 1
NOISE LEVELS OF FAMILIAR SOURCES

Source or Environment	Noise Level (dBA)
High Pressure Steam Venting to Atmosphere (3 m)	121
Steam Boiler (2 m)	90-95
Drilling Rig (10 m)	80-90
Pneumatic Drill (15 m)	85
Pump Jack (10 m)	68-72
Truck (15 m)	65-70
Business Office	65
Conversational Speech (1 m)	60
Light Auto Traffic (30 m)	50
Living Room	40
Library	35
Soft Whisper (5 m)	20-35

The single number A-weighted level is often inadequate for engineering purposes, although it does supply a good estimate of people's reaction to a noise environment. As noise sources, control measures, and materials differ in the frequency dependence of their noise responses or production, sound is measured with a narrower frequency band-width; the specific methodology varies with the application. For most work, the acoustic frequency range is divided into frequency bands where the centre frequency of each band is twice the frequency of the next lower band; these are called "Octave" bands, as their frequency relation is called an "Octave" in music, where the field of acoustics has its roots. For more detailed work, the octave bands, and certain standard octave and 1/3 octave bands have been specified by international agreements.

Where the noise at the receiver is steady, it is easy to assess the noise level. However, both the production of noise at the source and the transmission of noise can vary with time; most noise levels are not constant, either because of the motion of the noise source (as in traffic noise), because the noise source itself varies, or because the transmission of sound to the receiver location is not steady as over long distances. This is almost always the case for environmental noise studies. Several single number descriptors have been developed and are used to assess noise in these conditions.

Technical Details (continued)

The most common is the measurement of the "equivalent continuous" sound level, or $L_{eq,}$ which is the level of a hypothetical source of a constant level which would give the same total sound energy as is measured during the sampling period. This is the "energy" average noise level. Typical sampling periods are one hour, nighttime (9 hours) or one day (24 hours); the sampling period used must be reported when using this unit.

The greatest value of the L_{eq} is that the contributions of different sources to the total noise level can be assessed, or in a case where a new noise source is to be added to an existing environment, the total noise level from new and old sources can be easily calculated. It is also sensitive to short term high noise levels.

Statistical noise levels are sometimes used to assess an unsteady noise environment. They indicate the levels that are exceeded a fixed percentage of the measurement time period measured. For example, the 10%-ile level, written $L_{10,}$ is the levels exceeded 10% of the time; this level is a good measure of frequent noisy occurrences such as steady road traffic. The 90% level, $L_{90,}$ is the level exceeded 90% of the time, and is the background level, or noise floor. A steady noise source will modify the background level, while an intermittent noise source such as road or rail traffic will affect the short-term levels only.

One disadvantage with the L_{eq} measure, when used alone, is that nearby loud sources (e.g. dogs barking, or birds singing) can confuse the assessment of the situation when it is the noise from a distant plant that is the concern. For this reason, the equivalent level and the statistical levels can be used together to better understand the noise environment. One such indication is the difference between the L_{eq} and the L_{90} levels. A large difference between the L_{eq} and $L_{90,}$ greater than 10 dB, indicates the intrusion of short term noise events on the general background level. A small difference, less than 5 dB, indicates a very steady noise environment. If the L_{eq} value exceeds the L_{10} value this indicates the presence of significant short term loud events.

APPENDIX B

City of Calgary Noise Bylaw

OFFICE CONSOLIDATION

BYLAW NUMBER 45M95

BEING A BYLAW OF THE CITY OF CALGARY TO REGULATE NOISE IN THE CITY OF CALGARY

(Amended by B/L Numbers 56M96, 57M96, 52M99, 1M2000, 22M2000)

BACKGROUND

The Municipal Government Act, S.A. 1994, Chapter M-26.1, as amended or replaced from time to time, permits the Council to pass bylaws respecting the welfare of the people of Calgary, the protection of property, and nuisances.

It is desirable to regulate noise in the City of Calgary, particularly where the type, source or location of such noise may annoy or disturb persons working or living in places affected by such noise.

NOW, THEREFORE, THE COUNCIL OF THE CITY OF CALGARY ENACTS AS FOLLOWS:

TITLE

1. This Bylaw may be cited as the "Noise Control Bylaw".

DEFINITIONS

2. In this Bylaw, unless the context otherwise requires:

(a) "Ambient Sound Level" means the Sound Level measured at a Point of Reception, which excludes the Noise generated by an activity with respect to which a complaint about Noise has been made.

(b) "Chief Bylaw Officer" means the Chief Executive Officer or his designate.

(b.1) "Chief Executive Officer" means the person designated by Council as its chief administrative officer, or his designate.

(c) "City" means:

(i) The City of Calgary, a municipal corporation under the laws of Alberta; or

(ii) the area within the legal boundaries of The City of Calgary,

as the context requires.

(d) REPEALED BY B/L 1M2000, 2000 JANUARY 24.

(e) "Concrete Mixer" means a machine that is mounted on a truck chassis or trailer capable of carrying concrete in a mixed or partially mixed form and pouring it at the location where it is to be used.

(f) "Construction" means the temporary process of demolishing or building any structure, or repairing or improving a building that already exists, including landscaping, home repair, property improvement and any work in connection with that process.

(g) "Continuous Sound" means any Sound Level that occurs:

(i) for a continuous duration of more than 3 minutes; or

(ii) sporadically for a total of more than 3 minutes, in any continuous 15 minute time period.

(h) "Daytime" means the period:

(i) beginning at 7:00 A.M. and ending at 10:00 P.M. of the same day on Weekdays and

(ii) beginning at 9:00 A.M. and ending at 10:00 P.M. of the same day on a Weekend.

(h.1) "Downtown" means the area in the City of Calgary bounded on the east by 3rd Street E., on the south by the CPR tracks, on the west by 9th Street W. and on the north by 4th Avenue S. between 9th Street W. and 6th Street W., 3rd Avenue S. between 6th Street W. and Centre Street, and 4th Avenue E. between Centre Street and 3rd Street E.

(i) "Emergency Vehicle" has the same meaning as in the Highway Traffic Act.

(j) "Field Calibrator" means an instrument (as established by the American National Standards Institute "A.N.S.I.") to be used for the calibration of a Sound Level Meter. The Field Calibrator must be approved by the manufacturer for use with the Sound Level Meter being used and must also be certified and calibrated by the manufacturer within the previous 12 months prior to its use.

(k) "Garbage Truck" means any Vehicle equipped for transporting refuse or any Vehicle equipped to load, unload and transport containers for handling refuse.

(l) "Highway Traffic Act" means the Highway Traffic Act R.S.A. 1980, Chap. H-7, as amended or replaced from time to time.

(m) "Holiday" has the same meaning as in the Interpretation Act, R.S.A. 1980, Chap. I-7, as amended or replaced from time to time.

(n) "including" when introducing a list of items, does not limit the meaning of the words to those items or to items of a similar kind.

(o) "Justice" has the same meaning as in the Provincial Offences Procedures Act.

(p) "Land Use Bylaw" means The City of Calgary Land Use Bylaw, Number 2P80, as amended or replaced from time to time.

(q) "Land Use District" means a Land Use District designated by the Land Use Bylaw.

(r) "Leq" means the equivalent continuous Sound Level over periods of time as specified in this Bylaw at a specified location as measured by a Sound Level Meter.

(r.1) "Major Event" means any outdoor concert, festival, sporting event, performance, attraction, revival or other event, for which either at least 5,000 tickets are available for paid admission or 5,000 or more people can be accommodated if there is no admission charge.

(s) "Motorized Garden Tool" means any tool used for horticulture that is powered by an electric or internal combustion engine of any kind.

(t) "Night-time" means the period beginning at 10:00 P.M. and ending the following day at:

(i) 7:00 A.M. if the following day is a Weekday; or

(ii) 9:00 A.M. if the following day is a Weekend.

(v) "Noise" means any sound that annoys or disturbs humans, or that endangers or injures the health and safety of humans including any loud outcry, clamour, shouting, or movement, or any sound that is loud or harsh or undesirable.

(w) "Non-Continuous Sound" means any Sound Level that is not a

Continuous Sound measured with a Sound Level Meter.

(x) "Non-Residential Development" means any land or building that is not a Residential Development or Residential Building.

(y) "Officer" means a Bylaw Enforcement Officer of the City or a member of The Calgary Police Service.

(z) "Outdoor Speaker System" means any sound amplification device that converts electrical impulses into sound, whether the device is independent or incorporated into a radio, stereo, television, public address or other system, which is used for general listening purposes and positioned:

(i) outside of a building; or

(ii) inside a building and within 2 metres of any opening in the building including a window or doorway, where it is directed outside of the building.

(aa) "Person" means an individual or any business entity including a firm, partnership, association, corporation, company, or society but does not include The City.

(ab) "Point of Reception" means any outdoor location at the place of work or residence where Noise or Sound Levels are heard by a complainant as determined by the Test to be appropriate in each circumstance.

(ac) "Power Tool" includes any tool powered by an engine, motor or compressed air.

(ad) "Provincial Court" means The Provincial Court of Alberta.

(ae) "Provincial Offences Procedures Act" means the Provincial Offences Procedures Act, S.A. 1988, Chap. P-21.5 as amended or replaced from time to time.

(af) "Residential Building" means a structure that contains one or more dwelling units including a house, multi-family dwelling, housing project, apartment building, lodging house, senior citizen complex or hospital.

(ag) "Residential Development" means any land which is the site of a Residential Building and is designated as one of the following Land Use Districts under the Land Use Bylaw:

(i) RR-1, R-1, R-2, R-2A, R-MH, RM-1, RM-2, RM-3, RM-4, RM-5, RM-6, RM-7; or

(ii) Direct Control, where the applicable land use guidelines allows a

use which is residential; or

(iii) any other Land Use District which allows residential uses.

(ah) "Signalling Device" means any device that produces an audible sound used for the purpose of drawing a Person's attention, including a horn, gong, bell, klaxon or public address system.

(ai) "Sound Level" means the sound pressure measured in decibels using the "A" weighted network of a Sound Level Meter with Fast Response.

(aj) "Sound Level Meter" means any Type 2 or better integrating instrument (as established by the standards of the American National Standards Institute "A.N.S.I") that measures Sound Levels.

(ak) "Tester" means an individual appointed pursuant to Section 16.

(al) "Tractor Trailer" means the combination of a Truck-Tractor and a trailer as defined in the Highway Traffic Act.

(am) "Truck" means any Vehicle that has a gross vehicle weight in excess of 4000 kilograms but does not include a Concrete Mixer, Tractor Trailer, or Garbage Truck.

(an) "Truck-Tractor" has the same meaning as in the Highway Traffic Act.

(ao) "Vehicle" has the same meaning as in the Highway Traffic Act.

(ap) "Weekday" means Monday through Saturday, inclusive unless it falls on a Holiday.

(aq) "Weekend" means Sunday and any other Holiday.

(B/L 56M96, 1996 November 25)
(B/L 57M96, 1996 December 16)
(B/L 1M2000, 2000 January 24)

GENERAL PROHIBITION

3. Except to the extent specifically authorized pursuant to Sections 15 or 25 and subject to Sections 14 and 15 of this Bylaw, a Person must not:

(a) make, continue, cause, or allow to be made or continued any Noise; or

(b) permit any real or personal property that is owned, occupied or controlled by that Person to be used in a way that any Noise emanates from that property.

3.1 Whether any sound annoys or disturbs humans or endangers or injures the health and safety of humans, or otherwise constitutes a Noise, is a question of fact to be determined by a Court hearing a prosecution pursuant to Section 3 of this Bylaw.

(B/L 22M2000, 2000 May 15)

CONTINUOUS SOUND IN RESIDENTIAL DEVELOPMENTS

4. Subject to Section 20, a Person must not cause or permit to be caused a Continuous Sound that exceeds the greater of the following Sound Levels:

(a) (i) 65 decibels (dBA) Leq measured over a one (1) hour period during the Daytime;

(ii) 55 decibels (dBA) Leq measured over a one (1) hour period during the Night-time; or

(b) that exceeds 5 decibels (dBA) Leq over the Ambient Sound Level measured over a two (2) hour period during either the Daytime or Night-time,

at any Point of Reception within a Residential Development.

NON-CONTINUOUS SOUND IN RESIDENTIAL DEVELOPMENTS

5. A Person must not cause or permit to be caused a Non-Continuous Sound that exceeds:

(a) 85 decibels (dBA) Leq measured over a period of 15 minutes during the Daytime; or,

(b) 75 decibels (dBA) Leq measured over a period of 15 minutes during the Night-time,

at any Point of Reception within a Residential Development.

ACTIVITIES IN RESIDENTIAL DEVELOPMENTS

6. A Person must not operate:

(a) a hand lawn mower;

(b) a Motorized Garden Tool;

(c) a Power Tool outside of any building or structure;

(d) a model aircraft driven by an internal combustion engine of any kind; or