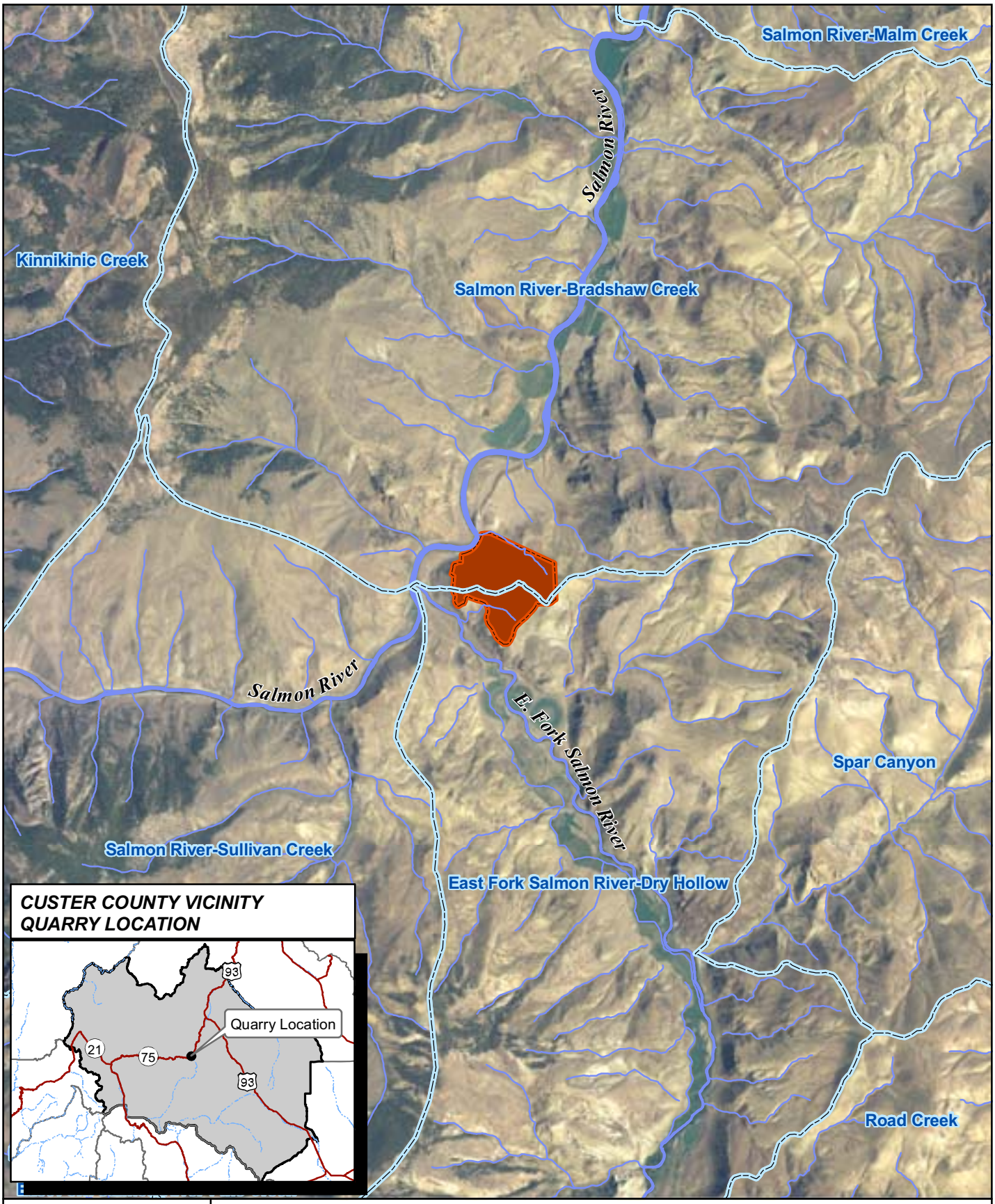


Legend

- Project Area
- Streams and Rivers
- Sub-Watershed Boundary

N W E S

Figure 3.1-5. Hydrology

0 3,000 6,000 12,000 Feet

1:71,000

Three Rivers Stone Quarry
L & W Stone

The Salmon River is listed in Section 303(d) of the Clean Water Act as impaired for water temperature and sediment from approximately Hell Roaring Creek downstream to the East Fork Salmon River. This section of river was retained on the 1998 303(d) list from the EPAs 1994 listing because of a lack of information at that time (IDEQ 2003). In 2003, IDEQ issued the Upper Salmon River Subbasin Assessment and Total Maximum Daily Load (TMDL). The mainstem Salmon River, from Redfish Lake to the East Fork of the Salmon River was found to be in full support of aquatic life beneficial uses, and no TMDL was developed for this reach (IDEQ 2003). The reach of the Salmon River below the East Fork Salmon River was not included on either the 1998 or the 2002/2003 303(d) list, nor was a load allocation developed for this reach. Further, the Salmon River, from Squaw Creek to Pennal Gulch, which includes the stretch below the quarry site was not listed in the 2002/2003 Integrated 303(d)/305 (b) report as impaired by pollutants (IDEQ 2002).

The Large River Beneficial Use Reconnaissance Project (BURP) process has sampled three sites on the Salmon River in the vicinity of the Upper Salmon River Subbasin for Fish River Index of Biotic Integrity (IBI). Fish River IBI values range from 0 to 100, and can be an indirect indicator of water quality and physical habitat as it relates to the native fish assemblage. A low IBI value indicates the fish community is substantially different from a minimally disturbed stream in the same geographic area and a high IBI value indicates the fish community is similar to a minimally disturbed stream in the same geographic region. The Salmon River at the Yankee Fork near Clayton and the Salmon River at the Pahsimeroi River near Challis produced some of the highest Fish River IBI scores (95 and 93, respectively), and are considered of reference quality for large rivers (IDEQ 2003). These scores indicate that the reaches of the Salmon River up and downstream of the Proposed Project Area fully support aquatic life beneficial uses and fisheries values. The Salmon River at Obsidian, substantially upriver from the quarry site, produced a slightly lower IBI of 87, though still considered a number that indicates full support of fisheries values. The two listed reaches of the Upper Salmon River do not require TMDLs because they fully support beneficial uses (IDEQ 2003).

Sediment monitoring completed by Environmental Science and Research Foundation at two sites on the Upper Salmon River show elevated depth of fine sediment on the 303(d) listed reach below the confluence of Hell Roaring Creek and below the confluence of Redfish Lake Creek. The percentage of depth fines less than 6.35 mm was recorded as 42 percent and 51 percent at the upper and lower sites respectively (IDEQ 2003). These reaches of the Salmon River are 59 and 45 miles upstream of the Project Area, respectively. Elevated levels of sediment in these reaches could be due to activities such as past logging, mining, road construction and use, farming, and livestock grazing. Land management techniques including riparian fencing and managed grazing have reduced the impacts to streambanks from

grazing, resulting in a reduction in sedimentation (IDEQ 2003). There is no sediment monitoring data for the reach of the Salmon River below the Proposed Project Area. However, during a site visit in November 2006 that coincided with a high rain event, sediment was observed entering the river via the quarry by the consultant.

No perennial streams occur within the perimeter of the proposed operations. The East Fork Salmon River is 320 feet from the southern edge of the existing Pit 1. The Salmon River is 800 feet from the northern end of Pit 1 and 60 feet from the entrance to the administrative area. There are two unnamed ephemeral streams at the quarry site, one along the northern side of the quarry near the administrative area and the other along the southern side of the quarry near the East Fork Salmon River Bench Area of Critical Environmental Concern /Research Natural Area (ACEC/RNA) (Figure 3.1-5). These streams drain water from the site during high intensity precipitation events (i.e., >0.5 inches/hour), as was observed by the consultant during the November 2006 site visit. The water table in the vicinity of the proposed operations intersects the ground surface in the valley floors at the Salmon and East Fork Salmon rivers at approximately 5,360 feet above mean sea level (amsl). There are no springs at the project site, and Pit 1 has not intercepted ground water to date.

Although rainfall is generally scant in this area, storms can be severe but of short duration when they occur. Because of the topography and low-density scattered vegetation, intense rainstorms of long duration have led to sediment delivery to the Salmon River. Drainage from the Proposed Project Area is generally contained before it passes under State Highway 75 (SH-75) through three, 18- to 24-inch culverts. However, during severe rain events, water also drains across the highway and runoff that passes through these culverts is often laden with sediment. An interceptor trench, straw bales, and a shallow sediment trap are currently in place on the border of the administrative area to contain sediment from runoff, but are not operating effectively and permit delivery of sediment to the Salmon River. Sediment is also delivered to the East Fork Salmon River during large rain events from the hard-packed mining roads in the quarry via the drainage in the East Fork Salmon River Bench ACEC/RNA.

3.1.7 Noise

Background

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting,

the time of day, and the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations, which travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by a number of variables including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of zero dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. An increase (or decrease) in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds.

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

Hertz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. A particular tone, which makes the drum skin vibrate 100 times per second, generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived as a tonal pitch of 100 Hz. Sound frequencies between 20 Hz and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork (a pure tone) contains a single frequency. In contrast, most sounds one hears in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the dB level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (Leq) is used. Leq is the energy-mean A-weighted sound level during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given source to equal the fluctuating level measured.

Finally, another sound measure known as the Day-Night Average Noise Level (Ldn) is defined as the A weighted average sound level for a 24 hour day. It is calculated by adding a 10 dB penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The Community Noise Equivalent Level (CNEL) is also defined as the A-weighted average sound level for a 24-hour day. It is calculated by adding a 5 dB penalty to sound levels in the evening (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The CNEL is used by various agencies to define acceptable land use compatibility with respect to vehicular traffic noise. Sound levels of typical noise sources and environments are provided in Table 3.1-3 to provide a frame of reference.

Table 3.1-3. Sound Levels of Typical Noise Sources and Noise Environments (A-Weighted Sound Levels).

Example Noise Source (at a Given Distance)	Scale of A-Weighted Sound Level in Decibels (from highest to lowest)	Example Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Military Jet Take-off with After-burner (50 ft)	140	Carrier Flight Deck	
Civil Defense Siren (100 ft)	130		
Commercial Jet Take-off (200 ft)	120		Threshold of Pain *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft)	100		Very Loud
Newspaper Press (5 ft)			*8 times as loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	*4 times as loud
Propeller Plane Flyover (1,000 ft)		Printing Press Plant	
Diesel Truck, 40 mph (50 ft)			
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft)			Moderately Loud

Table 3.1-3. Sound Levels of Typical Noise Sources and Noise Environments (A-Weighted Sound Levels).

Example Noise Source (at a Given Distance)	Scale of A-Weighted Sound Level in Decibels (from highest to lowest)	Example Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Living Room Stereo (15 ft)	70		(*Reference Loudness)
Vacuum Cleaner (3 ft)	70		(*Reference Loudness)
Electronic Typewriter (10 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	*1/2 as loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	Quiet *1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible
	10		Threshold of Hearing

Sound Level in the Project Area Vicinity

Long-term sound level measurements were taken on November 28 and 29, 2005, at the closest residences to the quarry to quantify the existing noise environment near the quarry site (Figure 3.1-6). The data were gathered at Monitoring Location 1 (ML1) using a Larson Davis Model 820 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter and at Monitoring Location 2 (ML2) using a Larson Davis Model 720 ANSI Type 2 Integrating Sound Level Meter. The meters were calibrated before and after each measurement period with a Larson Davis Model CAL150B acoustic calibrator. The meters were enclosed in a watertight container and the microphone was securely mounted on a fence or bush at a height of 5 feet above the ground to simulate the average height of the human ear. The measurements consisted of consecutive 10-minute averages. The following details the measurement locations. Figures 3.1-7 and 3.1-8 graphically represent the data collected.

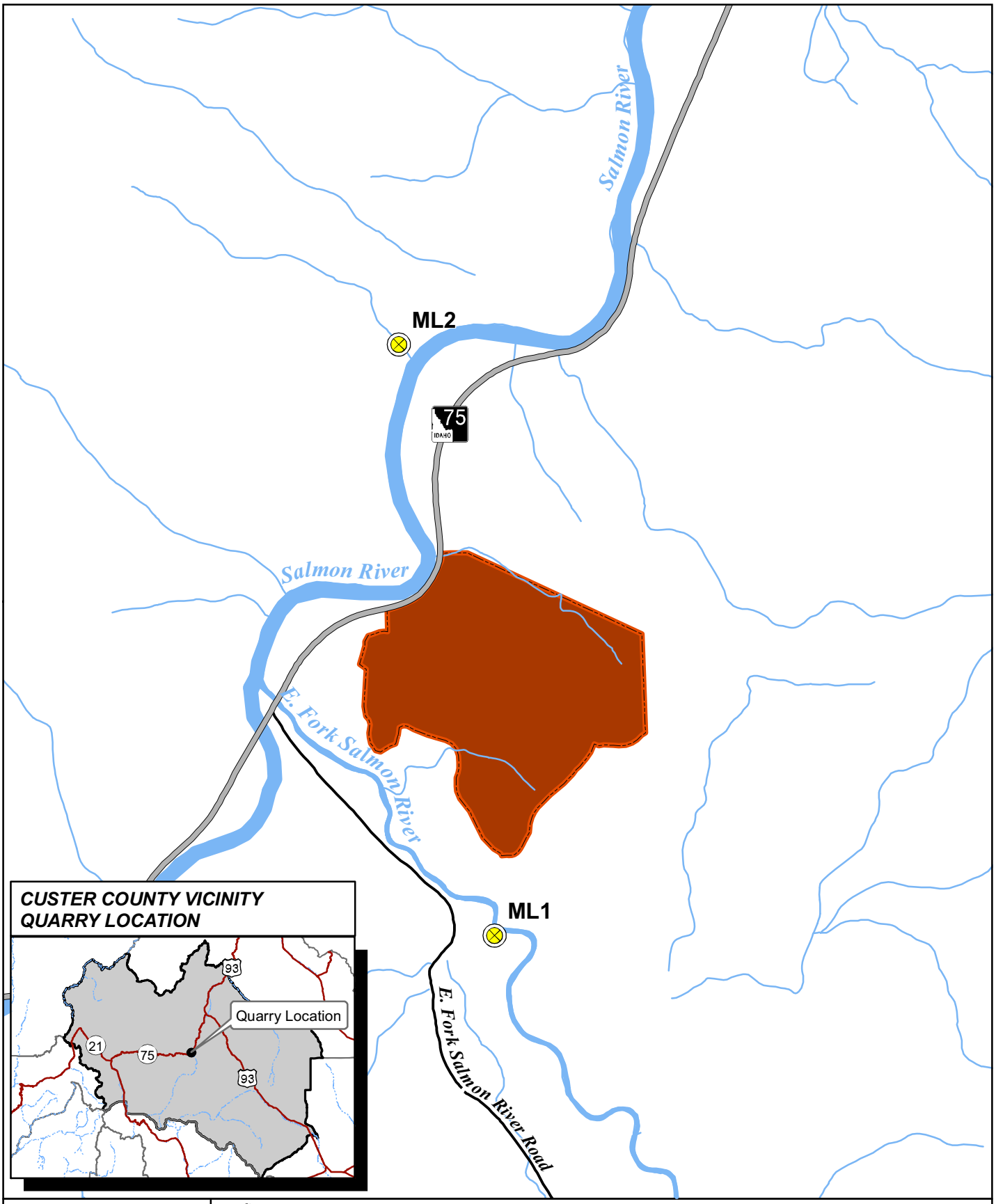
ML1 A 19-hour sound level measurement was conducted at the residence to the south of the quarry (Figures 3.1-6 and 3.1-7). The residence is in a valley surrounded by mountains on all sides. The residence is approximately 1,350 feet south of the southern quarry boundary and does not have a direct line-of-sight to the quarry due to a ridgeline. The measurement was taken between 2:30 p.m. on November 28, 2005 and 9:50 a.m. on November 29, 2005. Daytime noise sources consisted of birds vocalizing, the East Fork of the Salmon River to the north, equipment noise from the

quarry (loaders, dozers, back-up beepers, trucks), vehicular traffic on Highway 75, and people talking. A test blast was also conducted at the quarry on November 29, 2005 between 9:20 and 9:30 a.m. Nighttime noise sources consisted of noise from the Salmon River, crickets, and vehicular traffic on SH-75. The 10-minute L_{eq} ranged from 37.4 to 44.4 dBA (average = 39.4 dBA).

ML2 A 19-hour sound-level measurement was conducted at the west property line of a residence to the northwest with a direct line-of-sight to the quarry (Figures 3.1-6 and 3.1-8). The residence is near the Salmon River in a valley and is surrounded by mountains on all sides. The sound measurement was taken approximately 3,480 feet from the closest quarry boundary. The measurement was taken between 4:00 p.m. on November 28, 2005 and 11:40 a.m. on November 29, 2005. Daytime noise sources consisted of the Salmon River to the south, birds vocalizing, equipment noise from the quarry, and vehicular traffic on Highway 75. A test blast was also conducted at the quarry between 9:20 and 9:30 a.m. on November 29, 2005. Nighttime noise sources consisted of noise from the Salmon River and vehicular traffic on Highway 75. The 10-minute Leq ranged from 36.2 to 38.9 dBA (average = 36.4 dBA).

Activities at the Three Rivers Stone Quarry that were audible at ML1 and ML2 included noise from the diesel engines and back-up alarms on the heavy equipment, particularly when the equipment was operating near the top of the pits. Other activities that were audible on occasion included the metal scraping of the loader bucket on the rocks, trucks entering/leaving the site, and "thumps" during blasting.

Octave band sound level measurements were also taken at ML1 November 29, 2005 during the test blast. The data were gathered by a Larson Davis Model 824 ANSI Type 1 Integrating Sound Level Meter. The meter was calibrated before and after each measurement period with a Larson Davis Model CAL150B acoustic calibrator. The meter was mounted on a tripod at a height of 5 feet above the ground to simulate the average height of the human ear. The data gathered include: Leq, minimum sound pressure (Lmin), maximum sound pressure (Lmax), and peak in short and fast modes for A-weighting, C-weighting, and flat response. The spectrum was obtained in 1/3 octave band and center frequency octave band in dB (Table 3.1-4). The graphic comparison of sound levels before the blast and during the blast is shown in Figure 3.1-9**.**



Legend

- Noise Monitoring Loc.
- Streams and Rivers
- Project Area
- State Highway 75
- County Road

N W E S

Figure 3.1-6. Noise Monitoring Locations

0 625 1,250 2,500 3,750 5,000 Feet

1:26,000

Three Rivers Stone Quarry
L & W Stone

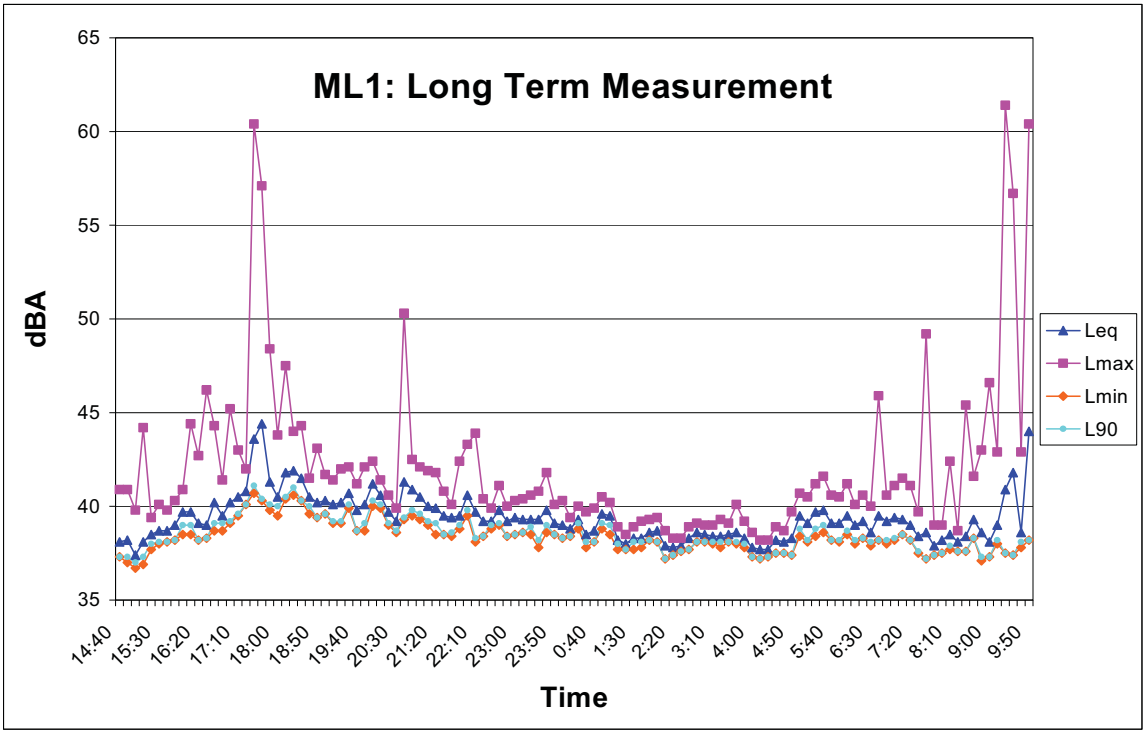


Figure 3.1-7. ML1: Long-Term Measurement.

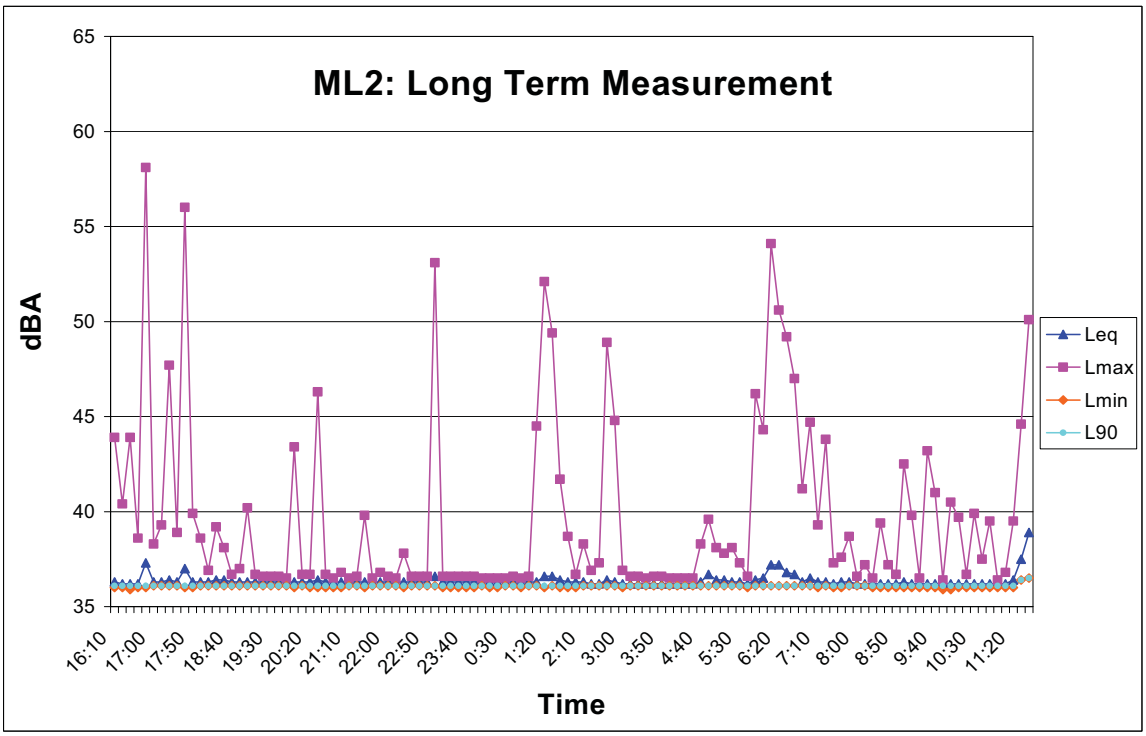


Figure 3.1-8. ML2: Long-Term Measurement.

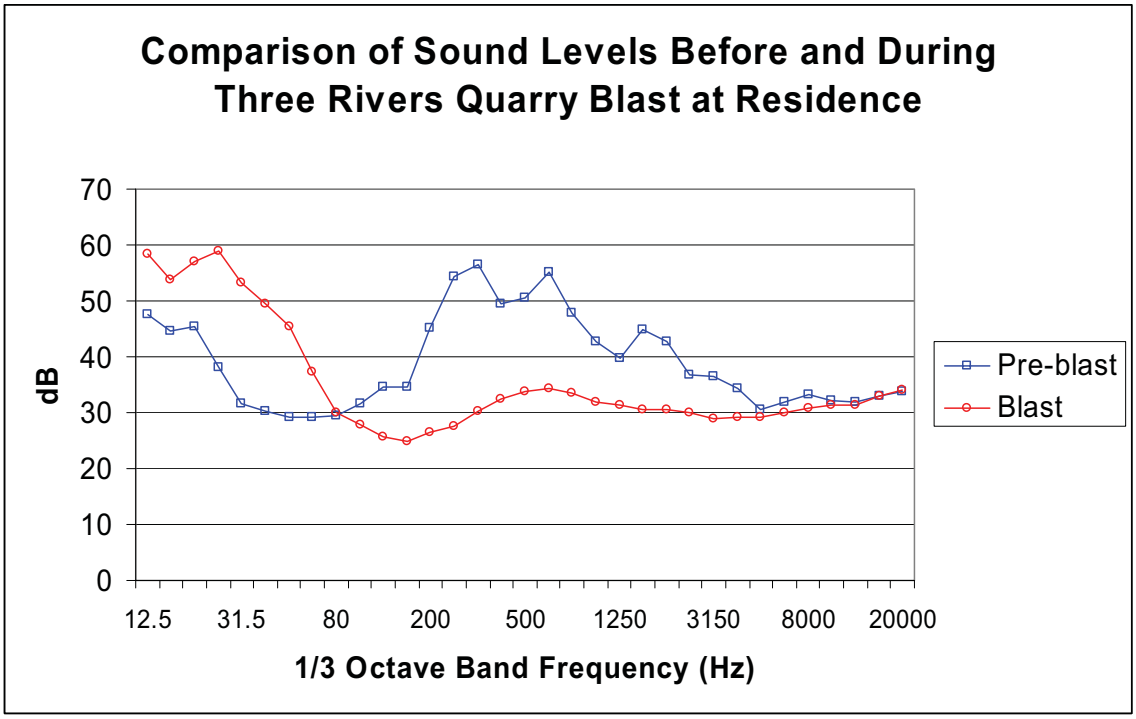


Figure 3.1-9. Comparison of Sound Levels Before and During Three Rivers Quarry Blast at Residence.

As illustrated in Figure 3.1-9, more energy was present during the blast in the lower frequencies (below 90 Hz), as is typical of blast noise. However, levels did not exceed 60 dB during either condition. The peaks in mid-frequencies (250 – 3500 Hz) that were present during the pre-blast measurement were not present in the blast measurement due to people talking at approximately 50 feet from the meter. The primary noise sources during both measurement periods consisted of birds vocalizing, the East Fork of the Salmon River, and some vehicular traffic on Highway 75. The blast was audible at the residence but overall sound levels were not perceived to vary during the blast. The following Table (3.1-4) summarizes the measurements.

Table 3.1-4. Sound Level Data Before and During Blast.

Noise Descriptor	Pre-blast			Blast		
	A Weighting (dB)	C Weighting (dB)	No Weighting (dB)	A Weighting (dB)	C Weighting (dB)	No Weighting (dB)
Leq	57.5	61.4	61.7	50.2	57.4	61.3
SEL	75.5	79.4	79.7	64.8	71.9	75.8
Peak	89.8	94.1	94.3	86.8	84.4	86.0
Lmax (slow)	72.5	76.2	76.2	62.9	67.9	72.5
Lmin (slow)	44.2	43.9	45.4	44.1	44.0	46.6
Lmax (fast)	79.7	83.2	83.2	70.5	74.4	79.7
Lmin (fast)	44.0	43.7	45.1	43.5	43.6	45.2
Lmax (impulse)	82.3	85.6	85.6	73.1	76.5	82.3
Lmin (impulse)	44.1	43.9	45.2	43.7	43.7	47.5

3.2 BIOLOGICAL RESOURCES

3.2.1 Vegetation

The vegetation type present in the Proposed Project Area and vicinity is sagebrush steppe. This vegetation type is characterized by sagebrush (*Artemisia tridentata*) and other low growing shrubs and short bunchgrasses and typically occurs in dry environments.

The Natural Resource Conservation Service has differentiated two plant community types on four soil complexes in the Proposed Project Area (USDA-NRCS 2006). The dominant plant community is Wyoming big sagebrush (*Artemisia tridentata sp. Wyomingensis*)/bluebunch wheatgrass (*Pseudoroegneria spicata*). Curlleaf mountain mahogany (*Cercocarpus ledifolius*)/bluebunch wheatgrass is the second classified community type but is rare in the Proposed Project Area, being restricted to a few isolated patches on rock outcrops. These plant communities combined comprise 57 percent of the quarry site and are referred to here as shrublands (Table 3.2-1 and Figure 3.2-1). Vegetative cover is sparse and consists of low growing sagebrush, grasses and forbs. Species present on site in the shrublands include, but are not limited to: Wyoming big sagebrush, mountain sagebrush (*Artemisia tridentata vaseyana*), mountain mahogany, bluebunch wheatgrass, Indian ricegrass (*Achnatherum hymenoides*), bluegrass (*Poa secunda.)*, phlox (*Phlox hoodii*), spiny hopsage (*Atriplex spinosa*), cutleaf daisy (*Erigeron compositus*), and prickly pear (*Opuntia* spp.). Grasslands are an additional, but minor plant community in the Proposed Project Area, occurring on approximately 5 percent of the quarry site (Table 3.2-1 and Figure 3.2-1). Grasslands are comprised of a mix of native and non-native perennial grass species such as bluebunch wheatgrass, Indian ricegrass, bottlebrush squirreltail (*Sitanion hystrix*), and bluegrass. Growth and establishment of vegetation is inhibited in much of the area within these plant communities due to the abundance of platy rock blanketing the surface. The remainder of the

Proposed Project Area does not support much, if any, vegetation due to the presence of talus slopes (platy rock blankets the surface and inhibits growth of vegetation; <1% of the quarry site), rock outcrops (contains an occasional plant; 7% of the quarry site), bare ground (alkali soils; <1% of the quarry site), and disturbed areas (mined, primarily non-vegetated; 30% of the quarry site). Acres by vegetation/cover type are summarized in Table 3.2-1 and depicted in Figure 3.2-1.

Table 3.2-1. Existing Vegetation at the Three Rivers Stone Quarry.

Plant Community/Cover Type	Acres
Shrubland	178
Grassland	16
Disturbed	92
Rock Outcrop	23
Talus Slope	<1
Bare Ground	<1
Total	**~310**

Vegetative communities at the Proposed Project Area have been slightly impacted by invasive species. Cheatgrass (*Bromus tectorum*) is present but sparse. Overall the native plant community is still intact and has been able to recover from small-scale disturbances (e.g., grazing). Due to current mining activities, the general lack of recreational activities that take place at the site (see Section 3.3.7, Recreation), and the limited amount of livestock grazing on site (see Section 3.3.8, Livestock Grazing), the state of the vegetative community has remained static with a slight upward trend in isolated areas. The East Fork Salmon River Bench ACEC/RNA contains a plant community exemplary of the native state of the sagebrush/bluebunch wheatgrass association and is considered to be at potential (see Section 3.3.9, Special Designations).

Surface disturbance and vehicle traffic associated with road building has led to an increase of noxious weeds at the site. Isolated patches of spotted knapweed *(Centaurea maculosa)* occur in the administrative area. Surface disturbance has also led to the establishment and spread of other invasive plants. Other invasive weed species observed along roadways at the quarry include (*Halogeton glomeratus*), common ryegrass (*Secale cereale*), yellow alyssum (*Alyssum alyssoides*), prostrate pigweed (*Amaranthus blitoides*), russian thistle (*Salsola iberica*), and kochia (*Kochia scoparia*) (USDI-BLM 2002).

There are no permits or sales for vegetation in the vicinity of the project site. No such permits or sales are anticipated for the project site in the foreseeable future.