BUREAU OF RECLAMATION

Boise River Basin Feasibility Study

Specialist Report:

Noise

Boise Project, Idaho

Interior Region 9: Columbia Pacific Northwest

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Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
Adj_{usage}	usage factor
ANSI	American National Standards Institute
dB	decibel
dBA	A-weighted decibels
FTA	Federal Transit Administration
HD	Highway District
L_{dn}	day-night sound level
L_{eq}	equivalent noise level
USFS	U.S. Forest Service

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1. Introduction

The Boise River Basin Feasibility Study is a feasibility study to evaluate increasing water storage opportunities within the Boise River basin by expanding Anderson Ranch Reservoir. The project is located at Anderson Ranch dam and reservoir, the farthest upstream of the three reservoirs within the Boise River system and located 28 miles northeast of the city of Mountain Home in Elmore County, Idaho. Anderson Ranch Dam is a zoned earth fill embankment structure that provides irrigation water, flood control, power generation, and recreation benefits. The reservoir also provides a permanent dead storage pool for silt control and the preservation and propagation of fish and wildlife. Anderson Ranch Dam is operated by the Bureau of Reclamation (Reclamation). Reclamation, in partnership with the Idaho Water Resource Board (IWRB), proposes to raise Anderson Ranch Dam. New water storage would provide the flexibility to capture additional water when available, for later delivery when and where it is needed to meet existing and future demands. The alternatives analyzed in this document include the No-Action Alternative (Alternative A), a 6-foot raise of Anderson Ranch Dam (Alternative B), and a 3-foot raise of Anderson Ranch Dam (Alternative C).

Alternative A provides a basis for comparison with the two action alternatives, Alternative B and Alternative C. Under Alternative A, current baseline conditions would continue, without increasing Anderson Ranch Dam height or constructing associated reservoir rim projects, access roads, or facilities. The expected project duration of Alternative B is approximately 51 months and Alternative C is 44 months. Reclamation would continue existing operations of Anderson Ranch Dam. Alternative B proposes to raise the dam by 6 feet from the present elevation of 4196 feet to 4202 feet to capture and store approximately 29,000 additional acre-feet of water. Alternative B would inundate an estimated 146 acres of additional land around the reservoir above the current full pool elevation of 4196 feet. Alternative C proposes to raise the dam by 3 feet to 4199 feet, allowing for the ability to capture and store approximately 14,400 additional acre-feet of water. Alternative C would inundate an estimated 73 acres of additional land around the reservoir above the current full pool elevation of 4196 feet.

Each of the two action alternatives, Alternative B and Alternative C, includes two separate, but similar, structural construction methods for the dam raise, downstream embankment raise, or mechanically stabilized earth wall raise. Otherwise, the only difference is the dam raise elevations of 6 feet for Alternative B and 3 feet for Alternative C. Project areas and construction durations for each method are nearly identical, except for a 200-foot difference in approach road length at the right abutment and an approximate 1-month difference in construction duration. The longer road length is within the dam footprint on previously disturbed ground. Because these differences are negligible, they are not differentiated within the analysis of each alternative. Alternative analysis assumes the longer road length and construction duration, however, a final construction method will be chosen during later phases of engineering evaluation.

Chapter 1 and Chapter 2 of the Boise River Basin Feasibility Study Environmental Impact Statement (EIS) provide a detailed description of the proposed action, project's purpose and need, project area, and alternatives including design features applicable to the action alternatives. This specialist report supports the analysis of expected impacts on noise as described in the EIS.

1.1 Regulatory Framework

No federal regulation establishes a limit on overall environmental noise levels. Noise guidelines are available from the U.S. Environmental Protection Agency (1974) to assist state and local government entities with developing state and local ordinances for noise; however, changes to noise from these alternatives are limited to temporary construction activities. During construction, on-site noise levels are regulated through the U.S. Occupational Safety and Health Administration. Construction worker noise exposure is regulated at 90 A-weighted decibels (dBA) over an 8-hour work shift (29 Code of Federal Regulations §1926.52). Neither Elmore County nor the state of Idaho have established numeric limits that regulate off-site levels of construction noise.

2. Affected Environment

This Noise Specialist Report describes the affected environment for the proposed alternatives under the Boise River Basin Feasibility Study. Chapter 1 of the EIS describes the project area noise levels potentially affected by the evaluated alternatives under the Boise River Basin Feasibility Study. The alternatives are evaluated in their respective areas below.

The primary study area refers to the general vicinity in and around Anderson Ranch Reservoir. Land use and access are limited by heavily forested and steep mountainous terrain. Potential sources of noise in the study area include traffic and recreational vehicles. The closest residential areas are the unincorporated communities of Pine and Featherville, located on the South Fork Boise River, 11 miles and 20 miles upstream of the dam, respectively. These communities include a mix of residential and commercial developments as well as permanent residences and secondary (weekend and vacation use) residences.

Roads used to access the dam and reservoir area include jurisdictional county roads maintained by highway districts. Several National Forest System roads are used to access the reservoir's recreational sites and provide shoreline access. Roads are referred to as either Highway District (HD) roads indicating roads not under U.S. Fish and Wildlife Service jurisdiction, or National Forest System roads as maintained by the U.S. Forest Service (USFS). The closest major highway to the Anderson Ranch Reservoir area is U.S. Highway 20 (U.S. 20). Anderson Dam Road (HD 134) crosses the dam and serves as the main access to the west side of the reservoir and the South Fork Boise River below the dam.

Recreation is another land use in the area. Multiple managed overnight campgrounds and boat launches surround the reservoir. During low water, shorelines are popular for camping and off-road, all-terrain vehicle use. The South Fork Boise River is popular for recreational use as well, including fishing, whitewater rafting, kayaking, and canoeing. Many developed and undeveloped access sites are present upstream and downstream of the reservoir. For the purpose of this analysis, impacts to recreation are covered in the Recreation Specialist Report.

Because existing ambient sound levels vary both temporally and spatially, a single value for ambient noise does not exist. For example, at the same location, days with wind blowing through vegetation would create different sound levels than days with calm conditions. Changes in traffic patterns or seasonal agricultural activities would also result in different levels of sound. Boating and recreational users represent both a noise source and a receiver, and water flowing in the river also generates sound.

The American National Standards Institute (ANSI) Standard 12.9-2013/Part 3 provides a table of approximate background sound levels based on land use and population density (ANSI 2013). The ANSI standard estimation divides land uses into six distinct categories. Descriptions of these land use categories, along with the typical day and nighttime levels, are provided in Table 1. Of the six categories identified in Table 1, the potential noise sensitive areas (e.g., residences, campgrounds) predominantly comprises Category 5 or Category 6 where sound levels are expected to range between 34 dBA and 45 dBA.

Table 1. A-weighted sound levels corresponding to land use and population density

Category	Land Use	Description	People per square mile	Day (dBA)	Night (dBA)
1	Noisy commercial and industrial areas and very noisy residential areas	Very heavy traffic conditions, such as in busy “downtown” commercial areas; at intersections for mass transportation or for other vehicles, including elevated trains, heavy motor trucks, and other heavy traffic; and at street corners where many motor buses and heavy trucks accelerate.	63,840	66	58
2	Moderate commercial and industrial areas and noisy residential areas	Heavy traffic areas with conditions similar to Category 1 but with somewhat less traffic; routes of relatively heavy or fast automobile traffic, but where heavy truck traffic is not extremely dense.	20,000	61	54
3	Quiet commercial, industrial areas, and normal urban and noisy suburban residential areas	Light traffic conditions where no mass transportation vehicles and relatively few automobiles and trucks pass, and where these vehicles generally travel at moderate speeds. Residential areas and commercial streets and intersections with little traffic comprise this category.	6,384	55	49
4	Quiet urban and normal suburban residential areas	These areas are similar to Category 3, but for this group the background is either distant traffic or is unidentifiable. Typically, the population density is one-third the density of Category 3.	2,000	50	44
5	Quiet residential areas	These areas are isolated, far from significant sources of sound, and may be situated in	638	45	39

Category	Land Use	Description	People per square mile	Day (dBA)	Night (dBA)
		shielded areas such as a small wooded valley.			
6	Very quiet, sparse suburban, or rural residential areas	These areas are similar to Category 4, but are usually in sparse suburban or rural areas, and for this group there are few if any near sources of sound.	200	40	34

Note: At times, day and night sound levels are louder or quieter than the levels stated, and ANSI notes the "95% prediction interval [confidence interval] is on the order of +/- 10 dB."
Source: ANSI S12.9-2013/Part 3.

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3. Environmental Consequences

3.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this evaluation are summarized in Table 2.

Table 2. Definitions of acoustical terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient noise level is typically defined by the Leq level.
Sound pressure (noise) level decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound pressure (noise) level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound (noise) levels in this report are A-weighted.
Equivalent Noise Level (Leq)	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Day-night noise level (Ldn or DNL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 dBs from 10:00 p.m. to 7:00 a.m.

L_{eq} = equivalent noise level

L_{dn} = day-night sound level

A-weighted sound levels are typically measured or presented as equivalent noise level (L_{eq}), defined as the average noise level on an equal-energy basis for a stated period of time. A-weighted sound is commonly used to measure steady-state sound or noise that is usually dominant.

Some metrics used in determining the impact of environmental noise consider the different response of people to daytime and nighttime noise levels. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night, and exterior noise becomes more noticeable. Furthermore, most people sleep at night and are sensitive to intrusive noises. To account for human sensitivity to nighttime noise levels, the day-night sound level (L_{dn} or DNL) was developed. L_{dn} is a noise index that accounts for the greater annoyance of noise during the nighttime hours.

L_{dn} values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period and applying a weighting factor of 10 decibels (dBs) to nighttime L_{eq} values. The weighting factor, which reflects the increased sensitivity to noise during nighttime hours, is added to each hourly L_{eq} sound level before the 24-hour L_{dn} is calculated. For the purposes of assessing noise, the 24-hour day is divided into two time periods, with the following weightings:

Daytime: 7 a.m. to 10 p.m. (15 hours) weighting factor of 0 dB

Nighttime: 10 p.m. to 7 a.m. (9 hours) weighting factor of 10 dB.

The two time periods are averaged to compute the overall L_{dn} value. For a continuous noise source, the L_{dn} value is computed by adding 6.4 dBA to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from a noise source is 60.0 dBA, the resulting L_{dn} from the facility would be 66.4 dBA.

3.2 Methods for Evaluating Impacts

No modifications that change operational noise levels of the dam are proposed. Noise levels from construction activities were estimated based on data and methods derived from the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). This manual represents the most recent and comprehensive tabulation of noise from common pieces of construction equipment. The noise levels from the FTA manual are presented in Table 3.

Table 3. Construction equipment noise emission levels

Equipment	Typical Noise Level 50 feet from Source, dBA
Air compressor	80
Backhoe	80
Ballast equalizer	82
Ballast tamper	83
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, derrick	88
Crane, mobile	83
Dozer	85
Generator	82
Grader	85
Impact wrench	85
Jack hammer	88
Loader	80
Paver	85
Pile-driver (Impact)	101
Pile-driver (Sonic)	95
Pneumatic tool	85
Pump	77
Rail saw	90
Rock drill	95
Roller	85
Saw	76
Scarifier	83
Scraper	85

Equipment	Typical Noise Level 50 feet from Source, dBA
Shovel	82
Spike driver	77
Tie cutter	84
Tie handler	80
Tie inserter	85
Truck	84

Source: Table 7-1, FTA, 2018.

As described by FTA, the average noise level from each piece of equipment is determined by the following formula for geometric spreading.

*Typical Noise Level at 50 feet + 10*log (Adj_{usage}) – 20*log (distance to receptor/50) – 10*G*log(distance to receptor/50)*

3.2.1 Assumptions

Because specific construction methods and daily schedules for the proposed action are not understood at this phase of the analysis and design process, the following typical values were used: usage factor (Adj_{usage}) is 1 (i.e., equipment is operating continuously), and ground effect factor (G) is 0, representing hard ground (i.e., a ground condition that does not result in additional attenuation). The total noise level then becomes solely a function of the type of equipment operating and the distance from the equipment to the noise receptor. This approach is a conservative assessment of propagation over long distances, which can be further attenuated by atmospheric absorption. Additional details are provided in *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018).

Review of construction equipment noise levels presented in Table 4 indicates that the loudest equipment generally emits noise in the range of 80 dBA to 90 dBA at 50 feet. For this analysis, noise at any specific receptor is dominated by the closest and loudest equipment. The types, numbers, and duration of equipment anticipated to be used during construction of the structural alternatives near any specific receptor location will vary over time. A general construction noise estimate was developed based on the general assumption of multiple pieces of loud equipment operating near each other. Specifically, the analysis uses the following assumptions:

- One piece of equipment generating a reference noise level of 85 dBA at 50 feet at the edge of the construction area.
- Two pieces of equipment generating reference 85 dBA noise levels located 50 feet farther away from the edge of construction.

- Two more pieces of equipment generating reference 85 dBA noise levels located 100 feet farther away the edge of construction.

Expected average construction equipment noise levels at various distances, based on this scenario, are presented in Table 4.

Table 4. Average construction equipment noise levels versus distance

Distance from Construction Boundary (feet)	Anticipated Construction Activities Leq Noise Level (dBA)
50	87
100	83
200	78
400	73
800	67
1600	62
3200	56
6400	50

Based on construction details in the 6-foot Dam Raise Engineering Summary (Appendix C), the dam raise activities are estimated to require an average of 21 pieces of construction-related equipment operating with an anticipated maximum of 39 pieces operating simultaneously. Table 5 presents the anticipated average construction equipment sound levels for average and maximum equipment scenarios at various distances from the dam based on a reference equipment sound level of 85 dBA at 50 feet.

Table 5. Dam raise construction equipment noise levels versus distance

	Anticipated Construction Activities Leq Noise Level (dBA)	
Distance from Dam (miles)	**Average Condition (21 pieces of equipment)**	**Maximum Condition (39 pieces of equipment)**
0.5	64	66
1	58	60
2	52	54
3	48	51
4	46	48
5	44	46
6	42	45
7	41	44
8	40	42
9	39	41
10	38	40
11	37	40

Based on construction details in the 6-foot Dam Raise Engineering Summary (Appendix C), the Pine airstrip construction and associated roadway project construction activities are estimated to require an average of 13 pieces of construction-related equipment operating with an anticipated maximum of 16 pieces operating simultaneously. Table 6 presents the anticipated average construction equipment sound levels for average and maximum equipment scenarios at various distances from these construction activities based on a reference equipment sound level of 85 dBA at 50 feet.

Table 6. Pine airstrip construction equipment noise levels versus distance

	Anticipated Construction Activities Leq Noise Level (dBA)	
Distance (feet)	**Average Condition (10 pieces of equipment)**	**Maximum Condition (16 pieces of equipment)**
300	79	81
500	75	77
750	71	74
1,000	69	71
1,250	67	69
1,500	65	67
1,750	64	66
2,000	63	65
2,250	62	64
2,500	61	63
2,750	60	62
3,000	59	61

Based on construction details in the 6-foot Dam Raise Engineering Summary (Appendix C) and as listed in Table 3, pile drivers may result in a noise level of 101 dBA at 50 feet. Pile driving sound levels would be expected to decrease at a rate of 6 dBA per doubling of distance. Table 7 presents the predicted sound level from impact pile driving at various distances. Sonic piling would be anticipated to be 6 dBA quieter than impact. Pile driving is conducted for a limited portion of the overall construction period.

Table 7. Pine Bridge impact pile driving noise levels versus distance

Distance (feet)	Leq Noise Level (dBA)
50	101
100	95
200	89
400	83
800	77
1600	71
3200	65
6400	59

3.2.2 Impact Indicators and Significance Criteria

Because the project will not change (future) operational sound levels, operational noise was considered not significant. Therefore, this evaluation focused on temporary (short-term) construction noise.

Temporary construction noise was considered significant if it exceeded the construction noise guidelines established in the FTA manual. The FTA general guidelines are 90 dBA during the day and 80 dBA at night for residential land uses and 100 dBA during the day or night at commercial or industrial land uses. The more detailed guidelines establish lower sound levels and are used as the impact indicators and significance criteria in this assessment (Table 8).

Table 8. Impact indicators and significance criteria

Land Use	8-hour L_{eq}, dBA		L_{dn}, 30-day Average
	Day	Night	
Residential	80	70	75[a]
Commercial	85	85	80[b]
Industrial	90	90	85[b]

[a]Without nighttime construction, 75 Ldn is achieved with 77 dBA during daytime hours.

[b]Use a 24-hour $L_{eq(24hr)}$ instead of $L_{dn\ (30day)}$.

Source: Table 7-3 (FTA, 2018)

3.3 Direct, Indirect, and Cumulative Impacts

3.3.1 Alternative A – No Action

Under Alternative A, current noise sources would continue to be present including noise from cars, trucks, motorcycles, and all-terrain vehicles traveling on roads and off roads as well as boats and jet skis on the reservoir. Alternative A would not create project-related increases in noise from haul trucks, blasting, pile driving, or earthwork. Therefore, no new short-term or long-term effects on noise receptors are expected with Alternative A.

3.3.2 Alternative B – Anderson Ranch Dam Six-Foot Raise

For Alternative B, direct and indirect noise impacts from construction activities will be of similar magnitude. Construction activities and trucks hauling materials to construction sites via the designated haul routes will create noise. Noise emissions will be temporary and attenuate with distance from the activity area as indicated in Table 4 through Table 7.

The closest residential area, the unincorporated community of Pine, is 11 miles from the dam. As indicated in Table 5, at this distance, the construction sound levels will be well below the construction noise significance criteria. Additionally, potential impacts to recreation are expected to be limited to receptors within 0.5 mile of the dam construction, specifically recreational boaters close to the dam construction exclusion area. There would be no noise related impacts to recreation users at Elk Creek Boat Ramp or Spillway Campground because those sites would be closed to the public throughout the duration of dam construction.

The Pine airstrip and associated roadway construction project are anticipated to last 1 month to 2 months and use up to 16 pieces of construction equipment. All but a small segment of the roadway construction project is more than 500 feet from the closest residences. At this distance, construction sound levels would be below the construction noise significance criteria (Table 6). Ten or fewer pieces of construction equipment are anticipated to be used for the small segment of roadway construction that is approximately 300 feet from the residences. This scenario also results in sound levels below the construction noise significance criteria, therefore no significant impacts are expected.

As described in the Engineering Summary (Reclamation, 2020), the Pine Bridge construction may not be required if Reclamation can obtain a variance on the required minimum freeboard. If the minimum freeboard waiver is not obtained, residents of Pine would hear noise associated with raising the Pine Bridge over the South Fork Boise River, specifically pile driving, one of the louder potential construction activities. Pile driving would be limited to daytime hours and last approximately 1 week for each side of the bridge (2 weeks total duration; however, active hammering occurs only during a portion of the overall duration). The closest structures in Pine are approximately 700 feet from where pile driving would occur. The expected sound level at this location is 78 dBA (Table 7). Pile driving is a short-term, daytime-only activity, and the predicted sound level of 78 dBA is less than the 80 dBA daytime significance criteria, therefore no significant noise impacts will occur.

As described in the Transportation and Infrastructure Specialist Report (Appendix B), up to 34 round trips per day are estimated to haul locally excavated material along HD 121 between the existing borrow pits and Anderson Ranch Dam. These existing borrow pits are within 0.5 mile of reaches of the South Fork Boise River used by wading anglers and within approximately 1 mile of the Tailwaters boat launch, locations described in more detail in the Recreation Specialist Report. Assuming up to five haul trucks are operating in proximity, consistent with Table 6, the sound level at anglers 400 feet away would be 73 dBA.

Also, as described in the Transportation and Infrastructure Specialist Report (Appendix B), improvements to Cow Creek Road (HD 131) involve some new alignments, road improvements, and winter snow removal resulting in brief traffic delays during the approximately 43 days of construction along HD 131. However, because additional temporary noise from construction and increased traffic using the HD 131 detour is farther from noise receptors than other construction activities, no impacts from noise are expected from HD 131 construction and traffic. Table 9 summarizes the anticipated noise at receptors for the three loudest construction activities. Boat ramps and campgrounds are used as surrogates for (mobile) boaters. Anticipated sound levels do not exceed the significance criteria detailed in Table 8.

Table 9. Summary of anticipated noise by receptor and construction activity

Receptor[a]	Noise from Dam Construction (dBA) (Table 4 and Table 5)	Noise from Pine Airstrip Construction (dBA) (Table 6)	Noise from Pine Bridge Pile Driving (dBA) (Table 7)
Community of Pine residences closest to construction activity	40	77	78
Pine Airstrip Campground	<50	Campground closed during airstrip construction.	<70
Curlew Creek boat ramp and campground	<50	<60	<60
Fall Creek Resort and boat ramp	<50	<60	<60
Castle Creek campground	<50	<60	<60
Evans Creek boat ramp and campground	<50	<60	<60
Little Wilson Creek campground	<60	<60	<60
Anglers and boaters along HD 121 and the South Fork Boise River	73	<60	<60

[a]Elk Creek Boat Ramp and Spillway Campground are excluded because both will be closed for the duration of dam construction.

3.3.3 Alternative C – Anderson Ranch Dam Three-Foot Raise

Alternative C is the same as Alternative B, except for two important differences: no construction activities required at Pine Airstrip or Pine Bridge. The duration of noise generating construction activities for Alternative C is 7 months shorter than Alternative B. All other conditions would be similar to noise impacts associated with Alternative B. The same construction equipment and methods would be used, resulting in the same sound levels.

In summary, noise from construction activities for Alternative C would be minor, and no exceedance of the construction noise guidelines established in the FTA manual would occur. There would be no expected long-term effects to noise levels due to Alternative C.

3.4 Cumulative Effects

Cumulative effects are analyzed for Alternative B and Alternative C. Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The cumulative effects analysis considers projects, programs, and policies that are not speculative and are based on known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable. Reclamation has identified two past projects: Pine Bridge replacement and the Anderson Ranch Dam crest raise for security enhancement. Reclamation has also identified two potential future projects to be considered for the cumulative impact analysis: Cat Creek Energy Project and South Fork Boise River Diversion Project. Additional project proposal information for these, as known by Reclamation to date, is provided in Chapter 2 of the EIS.

The 2018 construction of the Pine Bridge and 2010 crest raise are well removed in time from the proposed 2025 rim projects and dam construction. Any potential direct or indirect impacts from construction of the new Pine Bridge or dam raise would not be additive. No other potential direct or indirect impacts to noise are recognized and no cumulative effects are identified for past actions.

Cumulative effects are analyzed for the Alternative B and Alternative C. Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The cumulative effects analysis considers projects, programs, and policies that are not speculative and are based on known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable. Reclamation has identified two potential future projects to be considered for the cumulative impact analysis: the Cat Creek Energy Project and South Fork Boise River Diversion Project. Additional project proposal information for these, as known by Reclamation to date, is provided in Chapter 2 of the EIS.

In the unlikely scenario two or more of the projects would be constructed simultaneously, construction-related noise may increase. The overall sound level is most strongly dependent on the closest noise source. Thus, the precise level of the increase would depend on the how far the Cat Creek Energy and South Fork Boise River Diversion Projects were from receptors. In the unlikely event all three projects are constructed simultaneously, the maximum increase is 5 dBA, which would be considered noticeable (given the logarithmic nature of decibel addition, the sum of three sound levels will be no greater than the 5 dBA above the highest level and this occurs when all sound levels are equal or within a dBA. For example, 50 dBA + 50 dBA + 50 dBA = 55 dBA resulting in a 5 dBA increase over the highest contributor, 49 dBA + 50 dBA + 51 dBA = 55 dBA, resulting in a 4 dBA increase over the highest contributor and 50 dBA + 58 dBA + 60 dBA = 62 dBA, resulting in a 2 dBA increase over the highest contributor).

The only receptors within 5 dBA of the identified significant threshold are the residences in the Community Pine who are close to the Pine Airstrip or Pine Bridge construction activities.

As the Cat Creek Energy Project and South Fork Boise River Diversion Project would be located along the reservoir rim, they are far away from these residences and their contribution to the sound level is reduced substantially be distance, thus the resulting increase would be less than 5 dBA. Thus, the potential for significant cumulative short-term impacts is low.

3.5 Mitigation

No significant impacts are identified; therefore, no mitigation would be required. Minimization measures for consideration include establishing communication methods to inform residences and recreational users about upcoming construction activity and establishing a noise complaint resolution process.

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4. References

American National Standards Institute, 2013. American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound – S12.9 Part 3: Short-Term Measurements with an Observer Present.

Bureau of Reclamation (Reclamation), 2020. *Engineering Summary – Boise River Basin Feasibility Report*.

Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September.

U.S. Environmental Protection Agency, 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. EPA-550/9-74-004. March.