CHAPTER 8. NOISE

8.1 INTRODUCTION

This chapter describes the potential utilities and traffic noise-related consequences associated with implementing the alternatives. Refer to the respective chapters of Volume 2 for a description of the affected environment for all resources. The locations described in that Volume include the region of influence for the utilities and off base roadway projects component of the proposed action. Analysis of long-term alternatives was not done because those alternatives are not yet ripe for project specific analysis.

8.2 ENVIRONMENTAL CONSEQUENCES

8.2.1 Approach to Analysis

Potential sound-generating events associated with the proposed action were identified and the potential sound levels that could result from these activities were estimated on the basis of published military information on sound sources. These estimated sound levels were reviewed to determine whether they would represent a significant increase in the current ambient sound level, would have an adverse impact on a substantial population of sensitive receptors, or would be inconsistent with any relevant and applicable standards. Detailed descriptions of activities and analysis of noise resulting from them are provided in their respective chapters.

8.2.1.1 Methodology

Utilities

Construction

Construction noise is generated from heavy equipment on job sites and Table 8.2–1 provides a list of representative samples of construction equipment and associated noise levels. Impact devices typically generate more noise than non-impact devices. Acoustical usage factor refers to the percentage of time the equipment is running at full power on the job site. The Federal Highway Administration (FHWA) published a Roadway Construction Noise Model to predict noise levels adjusted from empirical data for construction operations to the actual distance of a receptor (FHWA 2006b).

Table 8.2–1. Samples of Construction Noise Equipment

Equipment Description	*Impact Device*[1]	*Acoustical Usage Factor*[2] *(%)*	*Actual Measured L_{max} @ 50 feet*[3] *(dBA, slow) (Samples Averaged)*	*Number of Actual Data Samples*[4] *(Count)*
All Other Equipment > 5 HP	No	50	NA	0
Backhoe	No	40	78	372
Clam Shovel (dropping)	Yes	20	87	4
Compactor (ground)	No	20	83	57
Compressor (air)	No	40	78	18
Concrete Mixer Truck	No	40	79	40
Concrete Saw	No	20	90	55
Crane	No	16	81	405
Dozer	No	40	82	55
Dump Truck	No	40	76	31
Excavator	No	40	81	170
Front End Loader	No	40	79	96
Generator	No	50	81	19
Grader	No	40	NA	0
Impact Pile Driver	Yes	20	101	11
Jackhammer	Yes	20	89	133
Pavement Scarifier	No	20	90	2
Paver	No	50	77	9
Pneumatic Tools	No	50	85	90
Roller	No	20	80	16
Scraper	No	40	84	12
Tractor	No	40	NA	0
Vibratory Pile Driver	No	20	101	44

Notes: [1] Indicates whether or not the equipment is an impact device.
[2] The acoustical usage factor refers to the percentage of time the equipment is running at full power on the job site and is assumed at a typical construction site for modeling purposes.
[3] The measured "Actual" emission level at 50 feet for each piece of equipment based on hundreds of emission measurements performed on Central Artery/Tunnel, Boston, MA work sites.
[4] The number of samples that were averaged together to compute the "Actual" emission level.
Legend: dBA = A-weighted decibel; HP = horsepower; L_{max} = Maximum Sound Level; NA = not applicable.
Source: FHWA 2006a.

Maximum sound levels (L_{max}) are the greatest sound pressure level generated by the source. Another way of describing fluctuating sound is to describe the fluctuating sound heard over specific periods as if it had been a steady, unchanging sound. For this condition, the equivalent sound level (L_{eq}) can be computed. L_{eq} is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. Sound pressure levels reported in this chapter are L_{max} and 1 hour L_{eq}.

The decibel (dB) level of a sound decreases (or attenuates) exponentially as the distance from the source increases. For a single point source, like a construction bulldozer, the sound level decreases by approximately 6 dB for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about 3 dB for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending on their nature, such features can range from minimal to substantial ability to reduce noise levels.

Operational Noise

Operational noise associated with utility and roadway projects would be noise levels for operating conditions of power generation facilities, water treatment facilities, wastewater facilities, and landfills.

Operational roadway noise would be due to the traffic on the roadways. FHWA has prepared a traffic study and road traffic noise is included in Volume 2, Chapter 6, Section 6.2. Power transmission lines carrying high voltage can make a buzzing noise, but generally at low levels and is not discussed further in this Environmental Impact Statement.

Off Base Roadways

Noise analysis for the proposed roadway improvement projects is performed following FHWA procedures outlined in 23 Code of Federal Regulations 772 and Guam Department of Public Works (GDPW) Traffic Noise Abatement Policy (GDPW 2009). The following paragraphs provide a brief description of:

- Noise characteristics
- Applicable policies on noise on Guam
- Noise modeling procedures performed as part of the noise analysis

As required by FHWA, the noise analysis presented in this section includes year 2030 no-action alternative, Alternatives 1, 2, 3, and 8 traffic noise level predictions, noise impact evaluation, and noise abatement for primary noise sources in the project study area resulting from local traffic.

Noise Characteristics

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid, and it is capable of being detected by the hearing organs. Noise is defined as unwanted sound. It is emitted from many sources, including airplanes, factories, railroads, power generation plants, and highway vehicles. Highway noise or traffic noise is usually a composite of noise from engine, exhaust, and tire-roadway interaction. The magnitude of noise is usually described by its sound pressure. Because the range of sound pressure varies greatly, the logarithmic scale dB is used to relate sound pressure. Sound pressures described in decibels are often defined in terms of frequency-weighted scales (i.e., A, B, C, or D). The A-weighted decibel (dBA) scale is used in vehicle noise measurements because it reflects the frequency range to which the human ear is most sensitive (i.e., 500 to 6,000 Hertz). Sound measured using an A-weighted decibel scale is generally expressed as dBA. Throughout this chapter, all noise levels are expressed in dBAs. Several examples of sound pressure levels in dBA scale are listed in Figure 8.2-1. The degree of disturbance or annoyance of unwanted sound depends essentially on three factors:

- The amount and nature of the intruding noise
- The relationship between background noise and the intruding noise
- The type of activity occurring where the noise is heard

Because sound is described in a logarithmic scale, sound levels cannot be added by ordinary arithmetic means. In fact, a doubling of the sound energy produces only a 3-dBA increase in the decibel level. Studies have shown that this increase is barely perceptible to the human ear, whereas a change of 5 dBA is readily perceptible. As a general rule, an increase or decrease of 10 dBA in sound level is perceived by an observer to be a doubling or halving of the sound, respectively.

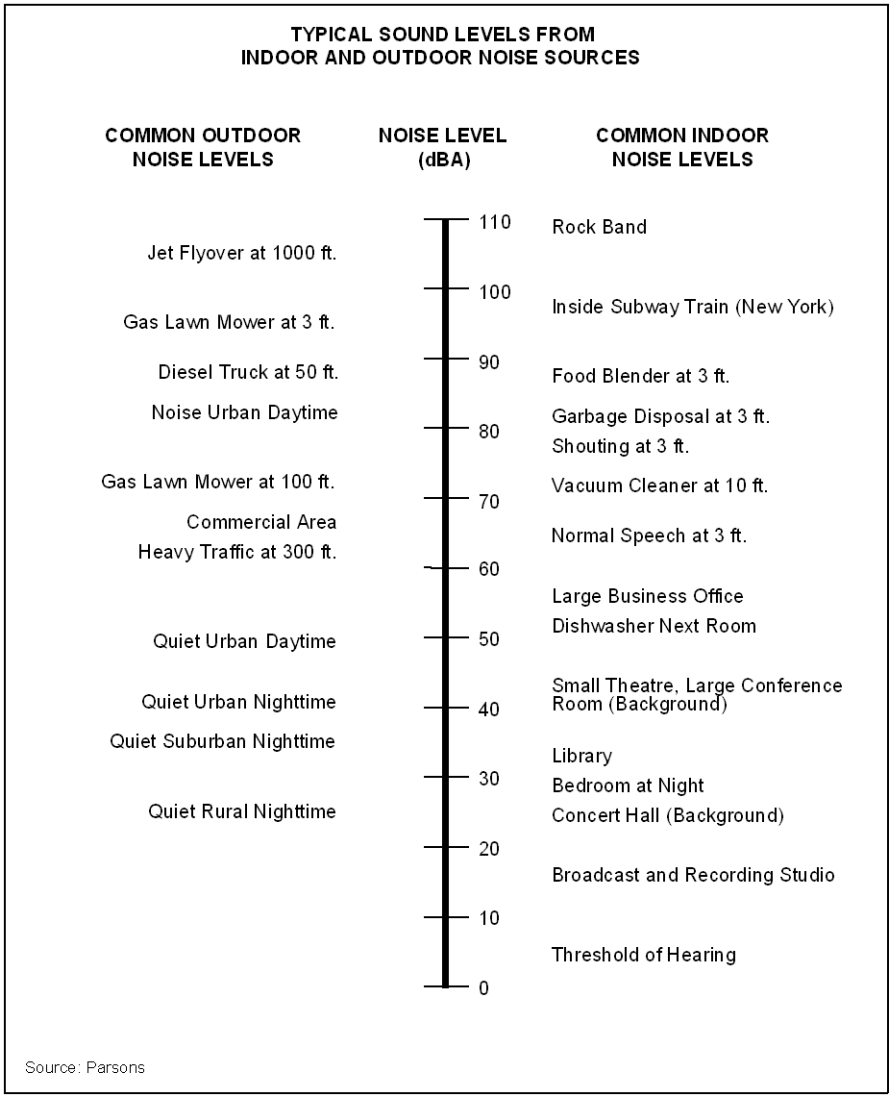

Figure 8.2-1. Typical A-Weighted Noise Levels

Decibels measure sound levels at just one moment, and because very few sounds are constant in nature, other ways of describing sound over more extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating sound heard over specific periods, as if it had been a steady, unchanging sound. For this condition, a descriptor called the L_{eq} can be computed. L_{eq} is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. All sound pressure levels reported in this chapter would be $L_{eq(1)}$.

Noise Model

The FHWA Traffic Noise Model version 2.5 was used for noise computations (FHWA 2004). Traffic Noise Model input data are based on a three-dimensional model created for the terrain of the study area being modeled. All roadway, barrier, and receiver points are defined by their x, y, and z coordinates.

Roadways and barriers are coded into Traffic Noise Model as line segments defined by their end points. Receptors, defined as single points in an array perpendicular to the alignment for each Guam Road Network (GRN), were used to determine the distance from the alignment center line at which the future traffic-generated noise for different alternatives could impact a noise-sensitive receiver. Receivers were modeled at a height of 5 feet (ft) (2 meters [m]) above ground elevation. After noise impacts were determined, mitigation analysis was completed by adding an array of receptors parallel to alignment for noise impacted areas that were determined to be feasible for mitigation.

Morning and evening (a.m. and p.m.) peak-hour traffic volumes were used in the noise model. However, for most of the modeled cases, the p.m. peak traffic volumes were used because the future peak afternoon traffic volumes are typically larger than the future traffic volumes for the morning. Where future traffic peak-hour traffic volumes were Level of Service (LOS) D or worse, LOS C was used to represent the worst-case future noise condition because highest traffic noise levels occur when traffic is heavy, but remains free-flowing. Studies have demonstrated that high LOS C or low LOS D volumes and related speeds create the highest traffic noise levels. While normal stop-and-go situations at intersections could generate localized instantaneous elevated noise levels, noise impacts are determined from the average hourly noise levels. Stop-and-go conditions near intersections produce lower traffic noise levels than similar conditions in congested peak hour traffic (i.e., free flowing traffic results in higher noise levels than at intersections). Volumes and speeds used in the traffic analysis represent the highest traffic noise levels associated with each roadway.

8.2.1.2 Determination of Significance

Noise impacts result from perceptible changes in the overall noise environment that increase annoyance or affect human health. Annoyance is a subjective impression of noise and is subject to both physical and emotional variables. To increase annoyance, the cumulative noise energy must increase measurably. Human health effects, such as hearing loss and noise-related awakenings can result from noise. For this Environmental Impact Statement, noise is evaluated for both construction and operational activities. It is not anticipated that maintenance activities would noticeably contribute to the noise environment due to their intermittent nature and short duration. The threshold level of significant impacts for noise is:

- Facility construction noise resulting in an hourly L_{eq} of 75 dBA (based on United States Environmental Protection Agency data for construction noise) at a sensitive receptor (such noise exposure would be equivalent to noise Zone III) or consistent exposure to noise levels at 85 dBA, over an 8-hour period, the National Institute for Occupational Safety and Health recommended exposure limit.
- Road construction noise uses a significance threshold based on Federal Transit Authority guidelines of 80 dBA during daylight hours and 70 dBA during nighttime (10 p.m. to 7 a.m.). This threshold differs from facility construction thresholds because facility construction is concentrated at the same location and typically lasts for longer durations. In contrast, road construction proceeds along the road alignment and sensitive receptors are affected for shorter durations.

For road traffic noise, federal and Guam regulations, standards, and policies relating to traffic noise are discussed in detail in the GDPW Traffic Noise Abatement Policy (2009). The following is a brief discussion of Guam regulations, standards, and policies.

GDPW Traffic Noise Abatement Policy

The purpose of this Traffic Noise Abatement Policy is to protect the public from traffic noise associated with highways and maintain quality of life for the public by setting forth methods to: (a) identify potential noise-sensitive areas; (b) provide the basis for uniformity in analysis of traffic noise; and (c) determine feasibility and reasonableness of noise abatement measures. This policy adopted by the GDPW is in reference to the currently accepted practices and procedures used by FHWA to assess highway-related traffic noise levels.

The Traffic Noise Abatement Policy has seven sections: Introduction, Definitions, Noise Abatement Criteria, Noise Impact Determination, Feasibility and Reasonableness of Abatement, Noise Abatement Implementation and Public Involvement, and Extenuating Circumstances.

Under the GDPW policy, future traffic noise levels would be considered as posing an impact, if any noise sensitive receiver that has a loudest hourly noise level $L_{eq(h)}$ approaching (within 1 dB) or exceeding the Noise Abatement Criteria (NAC) as summarized in Table 8.2–2 for the corresponding land use category, or exceeding existing noise levels by 12 dB.

Table 8.2–2. Activity Categories and Noise Abatement Criteria

Activity Category	*$L_{eq(h)}$ dBA*	*Description of Activity Category*
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, places of worship, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	NA	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Legend: dBA = A-weighted decibel; L_{eq} = equivalent sound level.
Source: Guam Department of Public Works.

When potential impacts are identified, GDPW would consider noise abatement measures and make a determination regarding the feasibility and reasonableness of such measures. GDPW policies provide that only abatement measures that have been determined to be feasible and reasonable would be incorporated in projects. Feasibility depends primarily on engineering considerations, such as the local topography, safety, road maintenance requirements, or the ability to achieve at least a 5 dBA reduction in noise at an impacted receptor. Findings based on common sense and good judgment should be cited in the determination of reasonableness. Factors such as the ability to achieve at least a 5 dBA reduction in noise for at least one first row receptor, the number of receptors that would benefit from the noise barrier, the cost of the noise barrier per benefited receptor (with a maximum allowance of $35,000 per benefited receptor), neighborhood opinions, and environmental effects are considered when determining reasonableness. Each benefited nonresidential receptor, such as schools, parks, and cemeteries, would be counted as one benefited residential receptor per 100 ft (30 m) of frontage outdoor land use along the roadway. A memo disseminated by FHWA in 1995 added cemeteries to NAC Category B (FHWA 1995). GDPW coordinates with local governments to support compatible land use development. GDPW would identify noise receptors within project corridors that are on or along developed land. GDPW would also

identify noise receptors on undeveloped land for which development is planned, provided such development includes activity sites of the types described in the NAC and provided that local permits for the development have been acquired or applied for on or before commencement of the noise analysis. GDPW would furnish the results of highway traffic noise analyses to local government officials and would encourage local communities and developers to practice noise-compatible development. Local government coordination would be accomplished through the distribution of highway project environmental documents and noise study reports.

The significance criteria expressed in this section applies to human receptors, but noise could also affect biological resources, land use, and cultural resources. Refer to specific resource sections for details about the noise impacts to biological and other resources.

8.2.1.3 Issues Identified During Public Scoping

The Scoping Summary Meeting Report did not specifically mention public concerns about increased noise pollution due to the proposed action for the utility and roadway construction.

8.2.2 Power

8.2.2.1 Basic Power Alternative 1 (Preferred Alternative)

Basic Power Alternative 1 would recondition up to five existing Guam Power Authority permitted facilities to provide peaking power/reserve capacity and would not require new construction at or enlargement of the existing footprint of the facility. This work would be undertaken by the Guam Power Authority on its existing permitted facilities. Reconditioning would be made to existing permitted facilities at the Marbo, Yigo, Dededo (2 units), and Macheche Combustion Turbines (CTs). These CTs are not currently being used up to permit limits. In addition, Transmission and Distribution (T&D) system upgrades would be on existing above ground and underground transmission lines. This alternative supports Main Cantonment Alternatives 1 and 2. Main Cantonment Alternatives 3 and 8 would require additional upgrades to the T&D system.

Construction

The only construction activities associated with this alternative would be installing transmission lines. Power transmission line installation typically does not involve a concentration of heavy equipment. Specifically, for overhead transmission line upgrades there is usually a grader for site preparation, concrete work for foundations, and a crane for tower installation. The footprint of transmission towers are usually small and the equipment would not remain in place for long periods of time. Therefore, there are less than significant noise impacts because the construction of transmission lines is expected to be minimal and very short-term.

Some of the transmission lines would be installed underground. Construction equipment associated with installing underground utilities primarily includes backhoes and trenchers for digging the trench and backhoes, pavers, and rollers for refilling and finishing the surface creating noise levels of about 80 dBA at 50 ft (15 m) from the source attenuating to 68 dBA L_{eq} at 250 ft (76 m). Installing transmission lines involves excavating a portion of the trench, installing a segment of the line and backfilling the trench. Usually this occurs in segments anywhere from 100 ft (31 m) to 1,000 ft (305 m) or more and the activities move relatively rapidly along the corridor, thus not impacting any single receptor for much more than a couple of days. Therefore, impacts would be considered less than significant.

Operation

CTs generate noise similar to jet aircraft engines, but sound generation can be controlled by the facility since the turbine is located inside a building. Since Basic Power Alternative 1 would be for reconditioning only, the expected sound levels would remain about the same as the existing noise levels. Therefore, there would be no new noise impacts.

Proposed Mitigation Measures

The only noise impacts identified for Basic Power Alternative 1 would be due to installing transmission lines and be less than significant (Table 8.2–3); therefore, no mitigation is proposed.

Table 8.2–3. Summary of Potential Noise Impacts – Power

Potentially Impact	*Basic Power Alternative 1**
Construction (direct and indirect same)	LSI
Operation (direct and indirect same)	NI

Legend: LSI= Less than significant impact; NI = No impact. *Preferred Alternative.

The Basic Power Alternative 1 would have minimal noise impacts because this project predominately uses existing facilities. No mitigation would be required for Basic Power Alternative 1 of this proposed action.

8.2.3 Potable Water

8.2.3.1 Basic Alternative 1 (Preferred Alternative)

Basic Alternative 1 would provide additional water capacity of 11.3 MGd (42.8 MLd), which is anticipated to be met by an estimated 22 new wells at Andersen Air Force Base (AFB), rehabilitate existing wells, interconnect with the Guam Waterworks Authority (GWA) water system, and associated treatment, storage and distribution systems. Two new 2.5 MG (9.5 ML) water storage tanks would be constructed at ground level at NCTS Finegayan. Up to two new elevated 1 MG (3.8 ML) water storage tanks would be constructed at Finegayan within the Main Cantonment footprint.

Construction

At Andersen AFB, the anticipated new water wells (including one contingency well) would be drilled. A 1,000-ft (305-m) wellhead protection arc is generated at each well that constrains land use within the arc. Drill rig augers create noise levels of 84.4 dBA L_{max}. At 1,000 ft (305 m), the noise would attenuate to a level of 58.3 L_{max} and 52.5 L_{eq}, both well under the acceptable standard limits of 75 dBA.

New storage tanks are proposed on Naval Computer and Telecommunications Station Finegayan and Air Force Barrigada. Erecting storage tanks would involve using graders, cranes, man-lifts, welders, and other equipment generating noise levels up to about 80 dBA. At 250 ft (76 m), this would attenuate to 64 dBA L_{eq} and about 58 dBA at 500 ft (152 m).

Distribution pipelines would be installed underground. The alignment of the pipelines would be along the southern boundary of Andersen AFB and along Route 3. Water main replacement would occur at numerous locations throughout Guam. Construction equipment associated with installing pipelines primarily includes backhoes and trenchers for digging the trench, and backhoes, pavers, and rollers for refilling and finishing the surface. This equipment would create noise levels of about 80 dBA at 50 ft (15 m) from the source attenuating to 68 dBA L_{eq} at 250 ft (76 m). Installing pipelines involves excavating a portion of the trench, installing a segment of pipeline, and backfilling the trench. Usually this work occurs in segments anywhere from 100 ft (31 m) to 1,000 ft (305 m) or more and the activities

move relatively rapidly along the work corridor. Consequently, any single receptor would not be impacted for much more than a couple of days. Therefore, potential noise impacts would be less than significant.

Operation

Wells would be located within the property. Overhead tanks do not create operational noise, and once installed, the pipeline would not make any noise. Although nowhere near as noisy, similar to power plant design, design engineers would take into consideration noise producing equipment and design appropriate sound dampening equipment, if necessary. Therefore, potential noise impacts would be less than significant.

Proposed Mitigation Measures

No long-term adverse noise impacts were identified. No mitigation is proposed.

8.2.3.2 Basic Alternative 2

Basic Alternative 2 would provide additional water capacity of 11.7 MGd (44.3 MLd), which is anticipated to be met by an estimated 20 new wells at Andersen Air Force Base (AFB) and 11 new wells at Air Force Base Barrigada, rehabilitate existing wells, interconnect with the Guam Waterworks Authority (GWA) water system, and associated treatment, storage and distribution systems. Two new 1.8 MG (6.8 ML) water storage tanks would be constructed at ground level at NCTS Finegayan and one 1 MG (3.8 ML) water storage tank would be construction at Air Force Base Barrigada. Up to two new elevated 1 MG (3.8 ML) water storage tanks would be constructed at Finegayan within the Main Cantonment footprint.

Construction

Construction noise would be the same as Alternative 1.

Operation

Operational noise would be the same as Alternative 1.

Proposed Mitigation Measures

No long-term adverse noise impacts were identified. No mitigation is proposed.

8.2.3.3 Summary of Impacts

Table 8.2–4 summarizes the potential impacts of each basic alternative. A text summary is provided below.

Table 8.2–4. Summary of Potential Noise Impacts – Potable Water

Potentially Impact	*Basic Alternative 1**	*Basic Alternative 2*
Construction (direct and indirect same)	LSI	LSI
Operation (direct and indirect same)	NI	NI

Legend: LSI= Less than significant impact; NI= No impact; *Preferred Alternative.

Noise impacts associated with the potable water installation projects would be limited to pipeline installation and replacement. Construction noise could approach 68 dBA as the construction progresses, but would be short-term, lasting only a few days or weeks in the particular section of pipeline being installed at the time. Therefore, based on the above noise analysis, both Potable Water Alternatives 1 and

2 are deemed to have less than significant impacts from additional noise during construction and no impact during operation to the inhabitants and environment of Guam.

8.2.4 Wastewater

8.2.4.1 Basic Alternative 1a (Preferred Alternative) and 1b

Basic Alternative 1 (Alternative 1a supports Main Cantonment Alternatives 1 and 2; and Alternative 1b supports Main Cantonment Alternatives 3 and 8) combines upgrades to the existing primary treatment facilities and expansion to secondary treatment at the Northern District Wastewater Treatment Plant (NDWWTP). The difference between Alternatives 1a and 1b is a requirement for a new sewer line from Barrigada housing to NDWWTP for Alternative 1b.

Construction

Sewer lines would be placed within areas where there are no sensitive noise receptors, such as residential areas, schools, and hospitals. Similarly, the sewer lines would not be constructed in the threatened and endangered species sensitive areas. As such, construction noise impacts associated with refurbishing the existing NDWWTP would be temporary and short-term, resulting in less than significant noise impact.

Constructing the secondary treatment portion of the NDWWTP would be in an area where there are no sensitive noise receptors, such as residential areas, schools, and hospitals. This area is not in any threatened and endangered species sensitive areas. As such, construction noise impacts associated with the new secondary treatment portion of the NDWWTP would be temporary and short-term, resulting in less than significant noise impact.

Operation

There would be no operational noise impacts associated with refurbishing the existing NDWWTP and expanding the secondary treatment portion to the existing NDWWTP.

Proposed Mitigation Measures

No adverse noise impacts were identified and no mitigation is proposed.

8.2.4.2 Summary of Impacts

Table 8.2–5 summarizes the potential impacts of each interim alternative. A text summary is provided below.

Table 8.2–5. Summary of Potential Noise Impacts – Wastewater Projects

Potentially Impact	*Basic Alternative 1a**	*Basic Alternative 1b*
Construction (direct and indirect same)	LSI	LSI
Operation (direct and indirect same)	NI	NI

Legend: LSI= Less than significant impact; NI= No impact; *Preferred Alternative.

The only noise impacts associated with the wastewater projects would be during installation of pipelines, refurbishment of the primary treatment capability at the existing NDWWTP, and construction of the new secondary treatment portion at the existing NDWWTP, which would be less than significant as these impacts would be short-term and not elevate noise in any particular area for more than several days.

8.2.5 Solid Waste

8.2.5.1 Basic Alternative 1 (Preferred Alternative)

The Preferred Alternative would be to continue to use the Navy landfill at Apra Harbor for municipal solid waste (MSW) until the new GovGuam Layon Landfill at Dandan is available for use. Disposal of other waste streams excluded from Layon Landfill would continue at the Navy landfill. Construction and demolition (C&D) debris would continue to be disposed of at the Navy hardfill.

Construction

Since there is no new construction involved in this alternative, there would be no noise impacts from construction.

Operation

For operations, there would be a higher solid waste generation from the Department of Defense relocation. Thus, there could be additional hours of operations required and additional truck traffic for hauling solid waste. The operations are adequately isolated to prevent significant noise impacts to the surrounding environment. Increased noise from traffic is analyzed in the traffic section in this chapter.

8.2.5.2 Summary of Impacts

Table 8.2–6 summarizes the potential impacts of the basic alternative.

An analysis of long-term alternatives was not developed because the alternatives are not ready for project-specific analysis. A text summary is provided below.

Table 8.2–6. Summary of Potential Noise Impacts – Solid Waste Projects

Potentially Impact	*Basic Alternative 1**
Construction (direct and indirect same)	NI
Operation (direct and indirect same)	LSI

Legend: LSI= Less than significant impact; NI= No impact. *Preferred Alternative.

The only noise impacts associated with the solid waste alternative would be during operations, which would be less than significant as these impacts are a small increase to the current situation and adequately isolated from the surrounding environment.

8.2.6 Off Base Roadways

Noise impacts for each alternative were analyzed by first calculating the distance from the alignment center line at which each GRN future traffic would cause noise impacts at noise-sensitive receptor locations. Then, a 66-dBA noise contour line was placed along each alternative alignment to determine the number of noise-impacted areas per alternative. The 66-dBA noise contour line was used because 66 dBA is considered to approach the NAC of 67 dBA as defined in Guam's Noise Abatement Policy. Each nonresidential receptor, such as schools and parks, is considered as one outdoor use receptor per 100 ft (30 m) of frontage outdoor use area along the roadway. Within each geographic region, impacted noise-sensitive receptors were then grouped together as representative areas adjacent to the alignment. The noise abatement evaluation was then conducted for these identified areas.

8.2.6.1 Alternative 1

Year 2014 (Peak Construction and Peak Population)

Noise impacts during year 2014 would mostly be derived from construction activities. Construction noise impacts in each geographical region would be similar. Because the Territory of Guam does not have an ordinance covering construction noise, the FHWA daytime construction noise limit for residential land uses is to be used for this project, as recommended in the 2006 FHWA Construction Noise Handbook (FHWA 2006a). Table 8.2–7 summarizes the FHWA allowable construction noise levels. These limits are for 8-hour average noise levels (L_{eq}) at the property line of the nearest location to the construction site.

Table 8.2–7. Allowable Construction Noise Levels

Land Use	*Daytime (7 a.m. to 10 p.m.) L_{eq}, dBA*	*Nighttime (10 p.m. to 7 a.m.) L_{eq}, dBA*
Residential	80	70

Legend: dBA = A-weighted decibel; L_{eq} = equivalent sound level.
Source: FHWA 2006a.

Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, making it difficult to accurately estimate levels of construction noise. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. The engine, that is usually diesel, is the dominant noise source for most construction equipment.

Table 8.2–8 summarizes typical construction noise emission levels (L_{max}) of construction equipment operating at full power at a reference distance of 50 ft (15 m), and an estimated equipment usage factor (UF) based on experience with other similar construction projects. The UF is a fraction that accounts for the total time during an 8-hour day in which a piece of construction equipment is producing noise under full power. Although the noise levels in Table 8.2–8 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment. Distance (D) is also considered in the construction noise analysis. In all areas between the alignment and noise sensitive receptors, a ground factor (G) of 0.0 was used. This factor represents an acoustically hard ground cover, representing the ground effect as the sound propagates from the source to the receptor. The calculation used to determine average construction noise exposure for each piece of equipment is based on the above factors using the following equation:

$$L_{eq} = L_{max} + 10\ \mathrm{Log}(UF) - 20\ \mathrm{Log}(D/50) - 10\ G\ \mathrm{Log}(D/50)$$

Where:

- L_{eq} is the 8-hour average noise level in dBA
- L_{max} is the maximum noise level at 50 ft in dBA
- UF is the usage factor of the construction equipment
- D is the distance to the affected noise sensitive area
- G is the ground factor characterizing the sound absorption of the ground between the source and the receiver

After calculating noise exposure for each piece of equipment, the noise exposures for all equipment being used in a construction stage were combined together to determine the total noise impact. The equipment noise levels within a particular stage were combined together to obtain a total noise exposure for each stage (listed as shaded entries in Table 8.2–8). This total noise evaluation process does not combine noise levels of different

stages because they would not occur at the same time in a given area. Because the distance between most of the noise-sensitive receptors and the construction site is greater than 75 ft (23 m), no noise impacts due to construction activities are anticipated except for a few areas where residences are located next to the roadway.

Table 8.2–8. Estimated Construction Noise Levels

No. of Items	*Equipment Type*	*Maximum Equipment of Noise Level at 50 ft, dBA*	*8 Hour Equivalent Noise Level at 50 ft, dBA*	*8 Hour Equivalent Noise Level at 75 ft, dBA*	*8 Hour Equivalent Noise Level at 100 ft, dBA*
Full-Depth Reconstruction					
1	Wheel Loader	74	69	65	63
1	Scraper	76	71	67	65
1	Asphalt Zipper	80	72	68	66
2	Grader	76	68	64	62
2	Roller	78	73	69	67
2	Backhoe	81	76	72	70
1	Paving Machine	79	74	70	68
		Combined $L_{eq(h)}$	**83**	**79**	**77**
Mill and Overlay					
1	Milling Machine	81	73	69	67
2	Roller	78	73	69	67
1	Backhoe	81	76	72	70
1	Paving Machine	79	74	70	68
		Combined $L_{eq(h)}$	**81**	**77**	**75**
Widening					
1	Wheel Loader	74	69	65	63
2	Scraper	76	71	67	65
1	Grader	76	68	64	62
2	Roller	78	73	69	67
2	Backhoe	81	76	72	70
1	Paving Machine	79	74	70	68
		Combined $L_{eq(h)}$	**82**	**79**	**76**

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level.
Source: Parsons Transportation Group.

Abatement Measures

During the construction period, some of the sensitive receptors that are close to the roadway may be exposed to noise levels greater than 80 dBA. A combination of noise abatement techniques with equipment noise control and administrative measures may be selected to provide the most effective means to minimize effects of the construction activity noise as discussed below.

Equipment noise control:

- Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators, intact and operational.
- Inspect all construction equipment at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
- Turn off idling equipment.

Administrative measures:

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times least sensitive to receptors.

- Avoid scheduling construction during nighttime hours (10:00 p.m. to 7:00 a.m.) and on weekends.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to the unavoidable construction impacts. Provide frequent activity updates of all construction activities.

Application of these potential noise abatement measures would reduce the construction noise at the sensitive receptors; however, a temporary increase in noise would likely occur.

Year 2030

North

Under Alternative 1, potential traffic noise impacts on noise-sensitive receptors were assessed for 16 representative areas within the North Region, and the number of impacts per area is shown in Table 8.2–9. There are 88 noise sensitive receptor areas (indicated as number of receptors in the table) that would experience sound levels approaching or exceeding the NAC of 67 dBA compared to 49 receptors that experience sound levels approaching or exceeding the NAC of 67 dBA under the no-action alternative. While impacts from the no-action alternative are not caused by the project because these impacts are within the project area, FHWA requires that they be considered for abatement.

Table 8.2–9. Number of Potentially Impacted Receptors within the North Region, Alternative 1

	Number of Predicted Impacted Receptors	
Type of Noise Sensitive Receptors	*Alternative 1*	*No-Action Alternative*
Area 1: Single Family Residences and a Church	17	17
Area 2: Multi-Family Residences	0	0
Area 3: Single Family Residences	2	0
Area 4: Single Family Residences	4	0
Area 5: Single and Multi-Family Residences	0	0
Area 6: Military Outdoor Physical Training Area	4	0
Area 7: Single Family Residences	0	0
Area 8: Military Outdoor Recreational Area	12	0
Area 9: Single Family Residences and Golf Course	0	0
Area 10: Single Family Residences	1	0
Area 11: Single Family Residences, Multi-Family Residences, and a School	10	0
Area 12: Single Family Residences	7	7
Area 13: Single Family Residences	8	4
Area 14: Single and Multi-Family Residences	13	11
Area 15: School	0	0
Area 16: Single Family Residences and a Church	10	10
Total	**88**	**49**

Source: Parsons Transportation Group.

The type and number of impacted noise-sensitive receptors for each area are described as follows:

- Area 1: Outdoor use areas for 16 single-family residences and one church within Area 1 would be impacted from traffic noise under Alternative 1. Sheets 1 and 2 in Appendix G show the location of Area 1.

- Area 2: None of the outdoor use areas for the multi-family residences within Area 2 would be impacted from traffic noise under Alternative 1. Sheet 4 in Appendix G shows the location of Area 2.
- Area 3: Outdoor use areas for two single-family residences within Area 3 would be impacted from traffic noise under Alternative 1. Sheets 3 and 4 in Appendix G show the location of Area 3.
- Area 4: Outdoor use areas for four single-family residences within Area 4 would be impacted from traffic noise under Alternative 1. Sheets 4 and 5 in Appendix G show the location of Area 4.
- Area 5: None of the outdoor use areas for single- and multi-family residences within Area 5 would be impacted from traffic noise under Alternative 1. Sheets 5, 6, and 7 in Appendix G show the location of Area 5.
- Area 6: This area represents a military outdoor physical training site and has four frontage outdoor use areas. The four frontage outdoor use areas within Area 6 would be impacted from traffic noise under Alternative 1. Sheet 6 in Appendix G shows the location of Area 6.
- Area 7: None of the outdoor use areas for the single-family residences within Area 7 would be impacted from traffic noise under Alternative 1. Sheets 7 and 8 in Appendix G show the location of Area 7.
- Area 8: This area represents a military outdoor recreational site and has 12 frontage outdoor use areas. The 12 frontage outdoor use areas within Area 8 would be impacted from traffic noise under Alternative 1. Sheets 7 and 8 in Appendix G show the location of Area 8.
- Area 9: None of the outdoor use areas for the single-family residences and the golf course within Area 9 would be impacted from traffic noise under Alternative 1. Sheets 9, 10, and 11 in Appendix G show the location of Area 9.
- Area 10: Outdoor use areas for one single-family residence within Area 10 would be impacted from traffic noise under Alternative 1. Sheets 11 and 12 in Appendix G show the location of Area 10.
- Area 11: Outdoor use areas for 10 single-family residences within Area 11 would be impacted from traffic noise under Alternative 1. Sheets 12, 13, and 14 in Appendix G show the location of Area 11.
- Area 12: Outdoor use areas for seven single-family residences within Area 12 would be impacted from traffic noise under Alternative 1. Sheets 15 and 16 in Appendix G show the location of Area 12.
- Area 13: Outdoor use areas for eight single-family residences within Area 13 would be impacted from traffic noise under Alternative 1. Sheets 15, 16, and 17 in Appendix G show the location of Area 13.
- Area 14: Outdoor use areas for nine single- and four multi-family residences within Area 14 would be impacted from traffic noise under Alternative 1. Sheets 17, 18, and 19 in Appendix G show the location of Area 14.
- Area 15: This area represents a school and has three frontage outdoor use areas. None of the school's outdoor recreational areas or its indoor use areas within Area 15 would be impacted from traffic noise under Alternative 1. Sheet 18 in Appendix G shows the location of Area 15.

- Area 16: Outdoor use areas for nine single-family residences and one church within Area 16 would be impacted from traffic noise under Alternative 1. Sheet 19 in Appendix G shows the location of Area 16.

Central

Under Alternative 1, potential traffic noise impacts to noise-sensitive receptors were assessed for 48 representative areas within the Central Region. Table 8.2–10 shows the number of impacts per area. As shown on this table, there are 378 noise sensitive receptors that would experience sound levels approaching or exceeding the NAC of 67 dBA compared to 342 receptors that experience sound levels approaching or exceeding the NAC of 67 dBA under the no-action alternative. While the no-action impacts are not caused by the project because these impacts are within the project area, FHWA requires that they be considered for abatement.

The type and number of impacted noise-sensitive receptors for each area are described in the following text:

- Area 17: Outdoor use areas for 13 single- and two multi-family residences within Area 17 would be impacted from traffic noise under Alternative 1. Sheets 20, 21, and 22 in Appendix G show the location of Area 17.
- Area 18: Outdoor use areas for seven single-family residences and 10 frontage outdoor use areas for a park within Area 18 would be impacted from traffic noise under Alternative 1. Sheets 20, 21, and 22 in Appendix G show the location of Area 18.
- Area 19: A park within Area 19 would have eight frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 22 and 23 in Appendix G show the location of Area 19.
- Area 20: Outdoor use areas for two single- and two multi-family residences within Area 20 would be impacted from traffic noise under Alternative 1. Sheets 22 and 23 in Appendix G show the location of Area 20.
- Area 21: Outdoor use areas for one single- and two multi-family residences and three frontage outdoor use areas for a park within Area 21 would be impacted from traffic noise under Alternative 1. Sheet 23 in Appendix G shows the location of Area 21.
- Area 22: Outdoor use areas for seven single- and two multi-family residences, as well as one frontage outdoor use area for a playground, within Area 22 would be impacted from traffic noise under Alternative 1. Sheets 23 and 24 in Appendix G show the location of Area 22.
- Area 23: Outdoor use area for one single-family residence and six frontage outdoor use areas for a park within Area 23 would be impacted from traffic noise under Alternative 1. Sheets 24 and 25 in Appendix G show the location of Area 23.
- Area 24: Outdoor use areas for two multi-family residences within Area 24 would be impacted from traffic noise under Alternative 1. Sheet 25 in Appendix G shows the location of Area 24.
- Area 25: Outdoor use areas for two single-family residences and four frontage outdoor use areas for a park within Area 25 would be impacted from traffic noise under Alternative 1. Sheets 25 and 26 in Appendix G show the location of Area 25.
- Area 26: A cemetery within Area 26 would have six frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheet 25 in Appendix G shows the location the location of Area 26.

Table 8.2–10. Number of Potentially Impacted Receptors within the Central Region, Alternative 1

Type of Noise Sensitive Receptors	*Number of Predicted Impacted Receptors*	
	Alternative 1	*No-Action Alternative*
Area 17: Single Family Residences and a Multi-Family Residence	15	15
Area 18: Single Family Residences and a Park	17	17
Area 19: Park	8	0
Area 20: Single Family Residences and a Multi-Family Residence	4	4
Area 21: Park, a Single Family Residence, and a Multi-Family Residence	6	3
Area 22: Playground, a Single Family Residence, and a Multi-Family Residence	10	10
Area 23: Park and a Single Family Residence	7	4
Area 24: Multi-Family Residences	3	3
Area 25: Park and Single Family Residences	6	2
Area 26: Cemetery	6	0
Area 27: Park	20	11
Area 28: Park	2	2
Area 29: Park	4	4
Area 30: Park	9	9
Area 31: Park	4	4
Area 32: Multi-Family Residence	4	4
Area 33: Multi-Family Residence	0	0
Area 34: School	8	8
Area 35: Park, a Single Family Residence, and Multi-Family Residences	15	15
Area 36: One School and Two Churches	6	6
Area 37: Multi-Family Residences	0	0
Area 38: Multi-Family Residences	1	1
Area 39: Single Family Residences	21	21
Area 40: Multi-Family Residences	0	0
Area 41: Single Family Residences	0	0
Area 42: Single Family Residences	0	0
Area 43: Single Family Residences	18	18
Area 44: Single Family Residences	0	0
Area 45: Park, Single Family Residences, and Multi-Family Residences	30	30
Area 46: Single Family Residences	0	0
Area 47: Single Family Residences	12	12
Area 48: Single Family Residence, and Multi-Family Residences	9	7
Area 49: Single Family Residences and Multi-Family Residences	21	21
Area 50: Outdoor Sport Complex	9	9
Area 51: School	0	0
Area 52: Multi-Family Residence and Motel	9	8
Area 53: Multi-Family Residences	10	10
Area 54: Multi-Family Residences	0	0
Area 55: Single Family Residence and a Motel	1	1
Area 56: Single Family Residences and Multi-Family Residences	11	11
Area 57: Single Family Residences and Multi-Family Residences	11	11
Area 58: Military Outdoor Recreational Area	0	0
Area 59: Single Family Residences	6	6
Area 60: Single Family Residences	3	3
Area 61: Single Family Residences, Multi-Family Residences, and a Funeral Home	7	7
Area 62: Multi-Family Residences	0	0
Area 63: Single Family Residences, a Multi-Family Residence, and a Church	23	23
Area 64: Single Family Residences, Multi-Family Residences, and a School	22	22
Total	**378**	**342**

Source: Parsons Transportation Group.

- Area 27: A park within Area 27 would have 20 frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 27 and 28 in Appendix G show the location of Area 27.
- Area 28: A park within Area 28 would have two frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheet 28 in Appendix G shows the location of Area 28.
- Area 29: A park within Area 29 would have four frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 28 and 29 in Appendix G show the location of Area 29.
- Area 30: A park within Area 30 would have nine frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 29, 30, and 31 in Appendix G show the location of Area 30.
- Area 31: A park within Area 31 would have four frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheet 32 in Appendix G shows the location of Area 31.
- Area 32: Outdoor use areas for four multi-family residences within Area 32 would be impacted from traffic noise under Alternative 1. Sheet 33 in Appendix G shows the location of Area 32.
- Area 33: None of the multi-family residences outdoor use areas within Area 33 would be impacted from traffic noise under Alternative 1. Sheet 34 in Appendix G shows the location of Area 33.
- Area 34: A school within Area 34 would have eight frontage outdoor use areas that would be impacted from traffic noise under Alternative 1; however, none of the school's indoor use areas would be impacted from traffic noise under Alternative 1. Sheets 34 and 35 in Appendix G show the location of Area 34.
- Area 35: Outdoor use areas for 11 multi-family residences and four frontage outdoor use areas for a park within Area 35 would be impacted from traffic noise under Alternative 1. Sheets 35 and 36 in Appendix G show the location of Area 35.
- Area 36: A park with four frontage outdoor use areas and two churches within Area 36 would be impacted from traffic noise under Alternative 1. Sheets 36 and 37 in Appendix G show the location of Area 36.
- Area 37: None of the multi-family residences outdoor use areas within Area 37 would be impacted from traffic noise under Alternative 1. Sheets 37 and 38 in Appendix G show the location of Area 37.
- Area 38: None of the multi-family residences outdoor use areas and one frontage outdoor use area for a church within Area 38 would be impacted from traffic noise under Alternative 1. Sheet 38 in Appendix G shows the location of Area 38.
- Area 39: Outdoor use areas for 21 single-family residences within Area 39 would be impacted from traffic noise under Alternative 1. Sheets 39 and 40 in Appendix G show the location of Area 39.
- Area 40: None of the multi-family residences outdoor use areas within Area 40 would be impacted from traffic noise under Alternative 1. Sheet 41 in Appendix G shows the location of Area 40.

- Area 41: None of the single-family residences outdoor use areas within Area 41 would be impacted from traffic noise under Alternative 1. Sheet 41 in Appendix G shows the location of Area 41.
- Area 42: None of the single-family residences outdoor use areas within Area 42 would be impacted from traffic noise under Alternative 1. Sheets 41 and 42 in Appendix G show the location of Area 42.
- Area 43: Outdoor use areas for 18 single-family residences within Area 43 would be impacted from traffic noise under Alternative 1. Sheet 42 in Appendix G shows the location of Area 43.
- Area 44: None of the single-family residences outdoor use areas within Area 44 would be impacted from traffic noise under Alternative 1. Sheet 42 in Appendix G shows the location of Area 44.
- Area 45: A park within Area 45 would have 30 frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 42, 43, and 44 in Appendix G show the location of Area 45.
- Area 46: None of the single-family residences outdoor use areas within Area 46 would be impacted from traffic noise under Alternative 1. Sheet 44 in Appendix G shows the location of Area 46.
- Area 47: Outdoor use areas for 12 single-family residences within Area 47 would be impacted from traffic noise under Alternative 1. Sheet 46 in Appendix G shows the location of Area 47.
- Area 48: Outdoor use areas for seven single- and two multi-family residences within Area 48 would be impacted from traffic noise under Alternative 1. Sheet 48 in Appendix G shows the location of Area 48.
- Area 49: Outdoor use areas for 17 single- and four multi-family residences within Area 49 would be impacted from traffic noise under Alternative 1. Sheets 50 and 51 in Appendix G show the location of Area 49.
- Area 50: An outdoor sports complex within Area 50 would have nine frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. Sheets 50 and 51 in Appendix G show the location of Area 50.
- Area 51: None of the recreational outdoor use areas or indoor use areas for a school within Area 51 would be impacted from traffic noise under Alternative 1. Sheet 51 in Appendix G shows the location of Area 51.
- Area 52: Outdoor use areas for eight multi-family residences and a motel within Area 52 would be impacted from traffic noise under Alternative 1. Sheet 53 in Appendix G shows the location of Area 52.
- Area 53: Outdoor use areas for 10 multi-family residences within Area 53 would be impacted from traffic noise under Alternative 1. Sheet 53 in Appendix G shows the location of Area 53.
- Area 54: None of the multi-family residences outdoor use areas within Area 54 would be impacted from traffic noise under Alternative 1. Sheet 54 in Appendix G shows the location of Area 54.
- Area 55: Outdoor use area for one single-family residence within Area 55 would be impacted from traffic noise under Alternative 1. Sheet 56 in Appendix G shows the location of Area 55.

- Area 56: Outdoor use areas for nine single- and two multi-family residences within Area 56 would be impacted from traffic noise under Alternative 1. Sheets 57 and 58 in Appendix G show the location of Area 56.
- Area 57: Outdoor use areas for 10 single- and one multi-family residences within Area 57 would be impacted from traffic noise under Alternative 1. Sheets 59 and 60 in Appendix G show the location of Area 57.
- Area 58: None of the 28 frontage outdoor use areas for a military outdoor recreational area within Area 58 would be impacted from traffic noise under Alternative 1. Sheets 59 and 60 in Appendix G show the location of Area 58.
- Area 59: Outdoor use areas for six single-family residences within Area 59 would be impacted from traffic noise under Alternative 1. Sheet 62 in Appendix G shows the location of Area 59.
- Area 60: Outdoor use areas for three single-family residences within Area 60 would be impacted from traffic noise under Alternative 1. Sheet 63 in Appendix G shows the location of Area 60.
- Area 61: Outdoor use areas for five single- and two multi-family residences within Area 61 would be impacted from traffic noise under Alternative 1. Sheets 63 and 64 in Appendix G show the location of Area 61.
- Area 62: None of the multi-family residences outdoor use areas within Area 62 would be impacted from traffic noise under Alternative 1. Sheets 65 and 66 in Appendix G show the location of Area 62.
- Area 63: Outdoor use areas for 21 single- and two multi-family residences and a church within Area 63 would be impacted from traffic noise under Alternative 1. Sheets 67, 68, and 69 in Appendix G show the location of Area 63.
- Area 64: Outdoor use areas for 18 single- and four multi-family residences within Area 64 would be impacted from traffic noise under Alternative 1. Sheets 67, 68, and 69 in Appendix G show the location of Area 64.

Apra Harbor

No noise sensitive receptors are located within the proposed roadway improvement area in the Apra Harbor Region; therefore, no impacts from traffic noise under Alternative 1 would occur in this region.

South

While there are noise-sensitive land uses along the proposed roadway improvement routes in the South Region, noise from traffic would not impact the noise sensitive land uses as a result of Alternative 1 implementation.

Abatement Measures

North

Although many receptors within the North Region are expected to experience future traffic noise impacts under Alternative 1, noise abatement modeling was not performed for most of the impacted receptors because the locations where impacts would occur would require abatement measures that would not be feasible. Specifically, the land adjacent to Routes 1, 3, and 9 consists of several residential areas where many residences have driveways that provide direct access to the routes, resulting in issues of sound wall discontinuity. For a sound wall to provide sufficient noise reduction, it must be high enough and long enough to shield the receptor from the road. Access openings in the noise barrier for streets, driveways,

and maintenance severely reduce the effectiveness of the noise barrier to the point that it would not be feasible to construct a barrier. Furthermore, for most of the locations, there are not enough residences per area to allow a noise barrier to be reasonable due to the cost per benefitted receptor. Noise abatement analysis was not conducted for areas where there are no noise impacts due to traffic.

Noise abatement was analyzed for three locations within the North Region for Alternative 1 where predicted year 2030 noise levels would cause an impact and where existing topography conditions and future roadway alignment would not prevent the construction of continuous sound walls. The results of this noise abatement analysis are shown in Table 8.2–11 through Table 8.2–13. All of the barrier heights and locations are based on the latest available alignment information at the time of this study. These tables provide a summary of the barriers, the number of benefited residences, cost per benefited residence, and total cost per barrier. The three sound walls that were analyzed for noise impacts were for Areas 1, 6, and 8. Only the sound wall for Area 1 met both the feasible and reasonable requirements under the Traffic Noise Abatement Policy to be considered for construction.

- Area 1: Most of the Area 1 impacted residences have direct-access driveways to Route 3 that would prevent the construction of continuous sound walls required to provide feasible noise abatement; however, for the 11 single-family residences outdoor use areas between Lobo and Inda Roads, a sound wall 8 ft (2 m) in height and 775 ft (236 m) long located along the right-of-way of the northbound side of Route 3 would provide feasible noise abatement for the outdoor use areas for these residences. Furthermore, the cost per benefited receptor is $22,487, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–9, Sheet 2 in Appendix G shows the location of the recommended sound wall for Area 1.
- Area 3: Outdoor use areas for two single-family residences within Area 3 are impacted from traffic noise under Alternative 1; however, these residences have direct-access driveways to Route 3 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 3 and 4 in Appendix G show the location of Area 3.
- Area 4: Outdoor use areas for three single-family residences within Area 4 are impacted from traffic noise under Alternative 1; however, these residences have direct-access driveways to Route 3 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 4 and 5 in Appendix G show the location of Area 4.

Table 8.2–11. Predicted Future Noise and Barrier Analysis for Area 1

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 1																
R 1	SFR	68	68	71	B (67)	A/E	65 R	6	64	7	64	7	64	7	63	8
R 2	SFR	68	68	71	B (67)	A/E	62 R	9	60	11	59	12	58	13	57	14
R 3	SFR	68	68	71	B (67)	A/E	65 R	6	60	11	64	7	64	7	63	8
Number of benefited receptors							11		11		11		11		11	
Total barrier cost							$247,360		$309,200		$371,040		$432,880		$494,720	
Cost per benefited receptor							$22,487		$28,109		$33,731		$39,353		$44,975	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.

3 - A/E = Approach or exceed NAC.

4 - Traffic noise from Route 3; other local noise sources are not included.

R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.

Source: Parsons Transportation Group.

Table 8.2–12. Predicted Future Noise and Barrier Analysis for Area 6

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 6																
R 4	REC	59	60	68	B (67)	A/E	58 R	10	56	12	55	13	54	14	52	16
R 5	REC	59	60	68	B (67)	A/E	59 R	9	57	11	55	13	54	14	53	15
R 6	REC	59	60	68	B (67)	A/E	59 R	9	57	11	55	13	54	14	53	15
Number of benefited receptors							4		4		4		4		4	
Total barrier cost							$246,080		$307,600		$369,120		$430,640		$492,160	
Cost per benefited receptor							$61,520		$76,900		$92,280		$107,660		$123,040	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 3; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–13. Predicted Future Noise and Barrier Analysis for Area 8

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]													
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 8																
R 7	REC	59	60	68	B (67)	A/E	60 R	8	58	10	57	11	57	11	56	12
R 8	REC	59	60	68	B (67)	A/E	59 R	9	57	11	55	13	54	14	53	15
R 9	REC	59	60	68	B (67)	A/E	60 R	8	58	10	57	11	57	11	56	12
Number of benefited receptors							12		12		12		12		12	
Total barrier cost							$529,280		$661,600		$793,920		$926,240		$1,058,560	
Cost per benefited receptor							$44,107		$55,133		$66,160		$77,187		$88,213	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 3; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

- Area 6: A sound wall 8 ft (2 m) in height and 770 ft (235 m) long located along the shoulder of the southbound side of Route 3 would provide feasible noise abatement for four impacted frontage outdoor use areas for the military outdoor physical training area within Area 6 from traffic noise under Alternative 1. However, the cost per benefited receptor is $61,520, which is above the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Sheet 6 in Appendix G. Plus, Appendix G also shows the location of the sound wall for Area 6.
- Area 8: A sound wall 8 ft (2 m) in height and 1,655 ft (504 m) long located along the shoulder of the southbound side of Route 3 would provide feasible noise abatement for the 12 impacted frontage outdoor use areas for the military outdoor physical training area within Area 6 from traffic noise under Alternative 1. However, the cost per benefited receptor is $44,107, which is above the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–13. Sheets 7 and 8 in Appendix G show the location of the sound wall for Area 8.
- Area 10: Outdoor use area for one single-family residence within Area 10 would be impacted from traffic noise under Alternative 1. However, because there is only one impacted residence, a sound wall would have to be extended beyond the residence's property to provide feasible abatement. This solution is not possible because there are crossroads accessing Route 3 on the north and south side of this property. Sheets 11 and 12 in Appendix G show the location of Area 10.
- Area 11: Outdoor use areas for 10 single- and multi-family residences within Area 11 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 9 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these residences would not be reasonable because they are scattered along the alignment and would exceed the cost per benefited receptor requirement. Sheets 12, 13, and 14 in Appendix G show the location of Area 11.
- Area 12: Outdoor use areas for seven single-family residences within Area 12 would be impacted from traffic noise under Alternative 1. However, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 15 and 16 in Appendix G show the location of Area 12.
- Area 13: Outdoor use areas for eight single-family residences within Area 13 would be impacted from traffic noise under Alternative 1. However, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 15, 16, and 17 in Appendix G show the location of Area 13.
- Area 14: Outdoor use areas for 13 single- and multi-family residences within Area 14 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 17, 18, and 19 in Appendix G show the location of Area 14.

- Area 16: Outdoor use areas for nine single-family residences and one church within Area 16 would be impacted from traffic noise under Alternative 1. However, most of these residences, as well as the church, have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 19 in Appendix G shows the location of Area 16.

Central

Although many receptors within the Central Region are expected to experience future traffic noise impacts under Alternative 1, noise abatement modeling was not performed for most of the impacted receptors because the locations where impacts would occur would require abatement measures that would not be feasible. Specifically, the land adjacent to Routes 1, 8, 10, 16, and 27 consists of several residential areas where many residences have driveways that provide direct access to the routes, thereby resulting in issues of sound wall discontinuity.

Noise abatement was analyzed for nine locations within the Central Region for Alternative 1 where predicted year 2030 noise levels would cause an impact and existing topography conditions and future roadway alignment would not prevent the construction of continuous sound walls. The results of this noise abatement analysis are shown in Table 8.2–14 through Table 8.2–22. All barrier heights and locations are based on the latest available alignment information at the time of this study. These tables provide a summary of the barriers, the number of benefited residences, cost per benefited residence, and total cost per barrier. The 12 sound walls that were analyzed for noise impacts were for Areas 18, 23, 27, 34, 39, 43, 45, 49, and 53.

- Area 17: Outdoor use areas for 15 single- and multi-family residences within Area 17 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 20, 21, and 21 in Appendix G show the location of Area 17.
- Area 18: Outdoor use areas for seven single-family residences within Area 18 that are impacted have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. However, a sound wall 8 ft (2 m) in height and 1,060 ft (323 m) long located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for the 10 impacted frontage outdoor use areas for a park within Area 18 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $33,880, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–14. Sheet 21 in Appendix G shows the location of the sound wall for Area 18.
- Area 19: There are eight impacted frontage outdoor use areas for a park within Area 19 from traffic noise under Alternative 1. However, most of these outdoor use areas have parking lots with direct access to Route 1 next to them that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 22 and 23 in Appendix G show the location of Area 19.

Table 8.2–14. Predicted Future Noise and Barrier Analysis for Area 18

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 18																
R 10	REC	66	66	69	B (67)	A/E	62 R	7	61	8	61	8	60	9	60	9
R 11	REC	66	66	69	B (67)	A/E	61 R	8	60	9	58	11	58	11	57	12
R 12	REC	66	66	69	B (67)	A/E	64 R	5	63	6	63	6	63	6	63	6
Number of benefited receptors							10		10		10		10		10	
Total barrier cost							$338,880		$423,600		$508,320		$593,040		$677,760	
Cost per benefited receptor							$33,888		$42,360		$50,832		$59,304		$67,776	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–15. Predicted Future Noise and Barrier Analysis for Area 23

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 23																
R 13	REC	70	70	70	B (67)	A/E	60 R	10	58	12	57	13	56	14	55	15
R 14	REC	66	66	67	B (67)	A/E	59 R	8	58	9	56	11	56	11	55	12
R 15	REC	66	66	67	B (67)	A/E	61 R	6	60	7	60	7	60	7	59	8
Number of benefited receptors							8		8		8		8		8	
Total barrier cost							$267,200		$334,000		$400,800		$467,600		$534,400	
Cost per benefited receptor							$33,400		$41,750		$50,100		$58,450		$66,800	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–16. Predicted Future Noise and Barrier Analysis for Area 27

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 27																
R 16	REC	68	68	68	B (67)	A/E	61 R	7	59	9	59	9	58	10	57	11
R 17	REC	68	68	68	B (67)	A/E	60 R	8	58	10	57	11	55	13	55	13
R 18	REC	68	68	68	B (67)	A/E	62 R	6	61	7	61	7	60	8	60	8
Number of benefited receptors							12		12		12		12		12	
Total barrier cost							$404,160		$505,200		$606,240		$707,280		$808,320	
Cost per benefited receptor							$33,680		$42,100		$50,520		$58,940		$67,360	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–17. Predicted Future Noise and Barrier Analysis for Area 34

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, $L_{eq(h)}$, dBA[1,4]													
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 34																
R 19	REC	67	68	71	B (67)	A/E	64 R	7	63	8	63	8	62	9	62	9
R 20	REC	67	68	71	B (67)	A/E	62 R	9	61	10	60	11	59	12	58	13
R 21	REC	67	68	71	B (67)	A/E	63 R	8	61	10	60	11	59	12	59	12
Number of benefited receptors							8		8		8		8		8	
Total barrier cost							$267,840		$334,800		$401,760		$468,720		$535,680	
Cost per benefited receptor							$33,480		$41,850		$50,220		$58,590		$66,960	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.

Source: Parsons Transportation Group.

Table 8.2–18. Predicted Future Noise and Barrier Analysis for Area 39

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]													
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 39																
R 22	SFR	62	68	71	B (67)	A/E	62 R	9	60	11	59	12	58	13	57	14
R 23	SFR	61	67	70	B (67)	A/E	61 R	9	60	10	59	11	58	12	57	13
R 24	SFR	62	68	71	B (67)	A/E	62 R	9	61	10	59	12	58	13	57	14
R 25	SFR	62	68	71	B (67)	A/E	62 R	9	61	10	59	12	58	13	58	13
R 26	SFR	62	68	71	B (67)	A/E	64 R	7	63	8	62	9	62	9	62	9
Number of benefited receptors							33		33		33		33		33	
Total barrier cost							$631,680		$789,600		$947,520		$1,105,440		$1,263,360	
Cost per benefited receptor							$19,142		$23,927		$28,713		$33,498		$38,284	

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–19. Predicted Future Noise and Barrier Analysis for Area 43

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1, 4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 43																
R 27	SFR	63	65	66	B (67)	A/E	59	7	58	8	57 R	9	57	9	57	9
R 28	SFR	63	65	66	B (67)	A/E	58	8	56	10	55 R	11	54	12	53	13
R 29	SFR	63	65	66	B (67)	A/E	57	9	56	10	54 R	12	53	13	52	14
R 30	SFR	63	65	66	B (67)	A/E	57	9	56	10	54 R	12	53	13	52	14
R 31	SFR	61	63	64	B (67)	NONE	57	7	55	9	54 R	10	53	11	53	11
R 32	SFR	63	65	66	B (67)	A/E	60	6	59	7	59 R	7	59	7	59	7
Number of benefited receptors							18		22		29		29		29	
Total barrier cost							$447,040		$558,800		$670,560		$782,320		$894,080	
Cost per benefited receptor							$24,836		$25,400		$23,123		$26,977		$30,830	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–20. Predicted Future Noise and Barrier Analysis for Area 45

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]													
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 45																
R 33	REC	63	66	67	B (67)	A/E	59 [R]	8	57	10	56	11	55	12	54	13
R 34	REC	63	66	67	B (67)	A/E	59 [R]	8	57	10	56	11	55	12	54	13
R 35	REC	63	66	67	B (67)	A/E	58 [R]	9	57	10	55	12	54	13	54	13
R 36	REC	63	66	66	B (67)	A/E	58 [R]	8	56	10	55	11	54	12	53	13
R 37	REC	63	65	67	B (67)	A/E	59 [R]	8	57	10	56	11	55	12	54	13
R 38	REC	63	66	67	B (67)	A/E	59 [R]	8	57	10	56	11	56	11	55	12
Number of benefited receptors							28		28		28		28		28	
Total barrier cost							$932,160		$1,165,200		$1,398,240		$1,631,280		$1,864,320	
Cost per benefited receptor							$33,291		$41,614		$49,937		$58,260		$66,583	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 1; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–21. Predicted Future Noise and Barrier Analysis for Area 49

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]														
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (LL.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	LL.	Leq(h)	LL.	Leq(h)	LL.	Leq(h)	LL.	Leq(h)	LL.
Area 49																
R 39	SFR	63	65	66	B (67)	A/E	60	6	59	7	58 R	8	58	8	58	8
R 40	SFR	63	65	66	B (67)	A/E	59	7	58	8	57 R	9	56	10	56	10
R 41	SFR	63	65	66	B (67)	A/E	59	7	58	8	58 R	8	57	9	57	9
R 42	SFR	63	65	66	B (67)	A/E	59	7	58	8	57 R	9	57	9	57	9
R 43	SFR	63	65	66	B (67)	A/E	58	8	57	9	55 R	11	55	11	54	12
R 44	SFR	63	64	64	B (67)	NONE	57	7	56	8	55 R	9	54	10	54	10
Number of benefited receptors							10		10		15		15		16	
Total barrier cost							$338,240		$422,800		$507,360		$591,920		$676,480	
Cost per benefited receptor							$33,824		$42,280		$33,824		$39,461		$42,280	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 27; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

Table 8.2–22. Predicted Future Noise and Barrier Analysis for Area 53

REC. NO.	LAND USE[2]	FUTURE PEAK HOUR NOISE LEVELS, Leq(h), dBA[1,4]													
		EXISTING	PROJECT "NO BUILD" WITHOUT BARRIER	PROJECT "BUILD" WITHOUT BARRIER	ACTIVITY CATEGORY and NAC ( )	IMPACT TYPE (A/E or NONE)[3]	NOISE PREDICTION WITH BARRIER AND BARRIER INSERTION LOSS (I.L.)									
							8 ft		10 ft		12 ft		14 ft		16 ft	
							Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.	Leq(h)	I.L.
Area 53																
R 45	REC	69	69	71	B (67)	A/E	64 R	7	63	8	62	9	62	9	61	10
R 46	REC	69	69	71	B (67)	A/E	62 R	9	60	11	59	12	58	13	57	14
R 47	REC	64	64	65	B (67)	NONE	60 R	5	60	5	59	6	59	6	59	6
Number of benefited receptors							10		10		10		10		10	
Total barrier cost							$249,600		$312,000		$374,400		$436,800		$499,200	
Cost per benefited receptor							$24,960		$31,200		$37,440		$43,680		$49,920	

Notes:
1 - Leq(h) are A-weighted, peak hour noise levels in decibels.
2 - Land Use: SFR - single-family residence; MFR multi-family residences; REC - Outdoor recreational areas.
3 - A/E = Approach or exceed NAC.
4 - Traffic noise from Route 8; other local noise sources are not included.
R - Recommended height to meet feasibility requirements of the Guam Public Works Noise Abatement Policy.

Legend: dBA = A-weighted decibel; ft = feet; L_{eq} = equivalent sound level; NAC = Noise Abatement Criteria.
Source: Parsons Transportation Group.

- Area 20: Outdoor use areas for two single- and two multi-family residences within Area 20 would be impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 22 and 23 in Appendix G show the location of Area 20.
- Area 21: Outdoor use areas for three single-family residences and three frontage outdoor use areas for a park within Area 21 would be impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1, and the park's outdoor use areas have parking with direct access to Route 1 next to them that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 23 in Appendix G shows the location of Area 21.
- Area 22: Outdoor use areas for nine single- and multi-family residences and one frontage outdoor use area for a playground within Area 22 would be impacted from traffic noise under Alternative 1. However, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 23 and 24 in Appendix G show the location of Area 22.
- Area 23: A sound wall 8 ft (2 m) in height and 835 ft (255 m) long located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for seven impacted frontage outdoor use areas for a park within Area 23 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $33,400, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–15. Sheet 25 in Appendix G shows the location of the sound wall for Area 23.
- Area 24: Outdoor use areas for three of the multi-family residences within Area 24 are impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 25 in Appendix G show the location of Area 24.
- Area 25: Outdoor use areas for two single-family residences and four frontage outdoor use areas for a park within Area 25 would be impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1, and the park's outdoor use areas have parking lots with direct access to Route 1 between them and the alignment that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 25 and 26 in Appendix G show the location of Area 25.
- Area 26: There are six impacted frontage outdoor use areas for a cemetery within Area 26 from traffic noise under Alternative 1. However, most of these outdoor use areas have parking lots with direct access to Route 1 next to them that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 25 in Appendix G shows the location of Area 26.
- Area 27: A sound wall 8 ft (2 m) in height and 1,265 ft (386 m) long located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for 12 impacted frontage outdoor use areas for a park within Area 27 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $33,680, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–16. Sheet 27 in Appendix G shows the location of the sound wall for Area 27.

- Area 28: There are two impacted frontage outdoor use areas for a park within Area 28 from traffic noise under Alternative 1. However, because there are only two impacted areas, a sound wall would have to be extended beyond the park's property to provide feasible abatement, which would exceed the cost per benefited receptor requirement. Sheet 28 in Appendix G shows the location of Area 28.
- Area 29: There are four impacted frontage outdoor use areas for a park within Area 29 from traffic noise under Alternative 1. However, because there are only four impacted areas, a sound wall would have to be extended beyond the park's property to provide feasible abatement, which would exceed the cost per benefited receptor requirement. Sheets 28 and 29 in Appendix G show the location of Area 29.
- Area 30: There are nine impacted frontage outdoor use areas for a park within Area 30 from traffic noise under Alternative 1. However, building a sound wall for these scattered areas along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 29, 30, and 31 in Appendix G show the location of Area 30.
- Area 31: There are four impacted frontage outdoor use areas for a park within Area 31 from traffic noise under Alternative 1. However, because there are only four impacted areas, a sound wall would have to be extended beyond the park's property to provide feasible abatement, which would exceed the cost per benefited receptor requirement. Sheet 32 in Appendix G shows the location of Area 31.
- Area 32: Outdoor use areas for four of the multi-family residences within Area 32 are impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 33 in Appendix G show the location of Area 32.
- Area 34: A sound wall 8 ft (2 m) in height and 840 ft (256 m) long located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for eight impacted frontage outdoor use areas for a school within Area 34 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $33,480, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–17. Sheet 35 in Appendix G shows the location of the sound wall for Area 34.
- Area 35: Outdoor use areas for 11 multi-family residences and four frontage outdoor use areas for a park within Area 35 would be impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 1, and the park's outdoor use areas have parking lots with direct access to Route 1 next to them that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 35 and 36 in Appendix G show the location of Area 35.
- Area 36: A park with four frontage outdoor use areas and two churches within Area 36 would be impacted from traffic noise under Alternative 1. However, the churches have direct-access driveways to Route 1, and the park's outdoor use areas have parking lots between them and the alignment with direct access to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 36 and 37 in Appendix G show the location of Area 36.
- Area 38: There is one impacted frontage outdoor use areas for a church within Area 38 from traffic noise under Alternative 1. However, the church has a direct-access driveway to Route

1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 38 in Appendix G shows the location of Area 38.

- Area 39: A sound wall 8 ft (2 m) in height and 1,975 ft (602 m) long located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for 33 outdoor use areas for single-family residences within Area 39 from traffic noise under Alternative 1. Of the 33 benefited outdoor use areas, 20 are first-row residences that are impacted and 13 are second-row residences that are not impacted but are receiving a 5-dB noise reduction due to the recommended sound wall. Furthermore, the cost per benefited receptor is $19,142, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–18. Sheets 39 and 40 in Appendix G show the location of the sound wall for Area 39.
- Area 43: Two sound walls 12 ft (4 m) in height and 1,400 ft (427 m) in total length located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for 29 outdoor use areas for single-family residences within Area 43 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $23,123, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. Of the 29 benefited outdoor use areas, 18 are first-row residences that are impacted and 11 are second-row residences that are not impacted but are receiving a 5-dB noise reduction due to the recommended sound walls. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–19. Sheets 41 and 42 in Appendix G show the location of the sound wall for Area 43.
- Area 45: Two sound walls 8 ft (2 m) in height and 2,915 ft (888 m) in total length located along the shoulder of the southbound side of Route 1 would provide feasible noise abatement for 28 impacted frontage outdoor use areas for a park within Area 45 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $33,291, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–20. Sheets 42, 43, and 44 in Appendix G show the location of Area 45.
- Area 47: Outdoor use areas for 12 single-family residences within Area 47 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheet 46 in Appendix G shows the location of Area 47.
- Area 48: Outdoor use areas for nine single- and multi-family residences within Area 48 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 1 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 48 in Appendix G shows the location of Area 48.
- Area 49: Two sound walls 12 ft (4 m) in height and 1,060 ft (323 m) in total length located along the shoulder of the southbound side of Route 27 would provide feasible noise abatement for 15 outdoor use areas for single-family residences within Area 49 from traffic noise under Alternative 1. Of the 15 benefited outdoor use areas, 10 are first-row residences that are impacted and five are second-row residences that are not impacted but are receiving a

5-dB noise reduction due to the recommended sound walls. Furthermore, the cost per benefited receptor is $33,824, which is below the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–21. Sheets 50 and 51 in Appendix G show the location of Area 49.

- Area 50: An outdoor sports complex within Area 50 would have nine frontage outdoor use areas that would be impacted from traffic noise under Alternative 1. However, most of these areas have parking lots between them and the alignment with direct access to Route 27 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 50 and 51 in Appendix G show the location of Area 50.
- Area 52: Outdoor use areas for eight multi-family residences and a motel within Area 52 would be impacted from traffic noise under Alternative 1. However, most of these residences and motel have direct-access driveways to Route 8 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 53 in Appendix G shows the location of Area 52.
- Area 53: A sound wall 8 ft (2 m) in height and 780 ft (238 m) long located along the shoulder of the northbound side of Route 8 would provide feasible noise abatement for 10 outdoor use areas for multi-family residences within Area 53 from traffic noise under Alternative 1. Furthermore, the cost per benefited receptor is $24,960, which is above the GDPW $35,000 cost per benefited receptor requirement for a sound wall to be considered reasonable. The results of the noise abatement analysis for this sound wall are shown in Table 8.2–22. Sheet 53 in Appendix G shows the location of Area 53.
- Area 55: Outdoor use area for one single-family residence within Area 55 would be impacted from traffic noise under Alternative 1. However, because there is only one impacted residence, a sound wall would have to be extended beyond the residence's property to provide feasible abatement, which would exceed the cost per benefited receptor requirement. Sheet 56 in Appendix G shows the location of Area 55.
- Area 56: Outdoor use areas for 11 single- and multi-family residences within Area 56 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 8 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 57 and 58 in Appendix G show the location of Area 56.
- Area 57: Outdoor use areas for 11 single- and multi-family residences within Area 57 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 16 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 59 and 60 in Appendix G show the location of Area 57.
- Area 59: Outdoor use areas for six single-family residences within Area 59 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 16 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 62 in Appendix G shows the location of Area 59.

- Area 60: Outdoor use areas for three single-family residences within Area 60 would be impacted from traffic noise under Alternative 1. However, these residences have direct-access driveways to Route 8 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheet 63 in Appendix G show the location of Area 60.
- Area 61: A funeral home and the outdoor use areas for seven single- and multi-family residences within Area 61 would be impacted from traffic noise under Alternative 1. However, most of these residences, as well as the funeral home, have direct-access driveways to Route 16 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 63 and 64 in Appendix G show the location of Area 61.
- Area 63: Outdoor use areas for 23 single- and multi-family residences and a church within Area 63 would be impacted from traffic noise under Alternative 1. However, most of these residences, as well as the church, have direct-access driveways to Route 10 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. In addition, building a sound wall for these scattered residences along the alignment would not be reasonable because the sound wall cost would exceed the cost per benefited receptor requirement. Sheets 67, 68, and 69 in Appendix G show the location of Area 63.
- Area 64: Outdoor use areas for 18 single- and four multi-family residences within Area 64 would be impacted from traffic noise under Alternative 1. However, most of these residences have direct-access driveways to Route 10 that would prevent the construction of a continuous sound wall required to provide feasible noise abatement. Sheets 67, 68, and 69 in Appendix G show the location of Area 64.

Apra Harbor

Since there are no noise-sensitive receptors along the proposed roadway improvement projects within the Apra Harbor Region, no noise abatement modeling was performed for traffic noise under Alternative 1.

South

While there are noise-sensitive land uses along routes in the South Region, noise from traffic would not impact the noise-sensitive land uses under Alternative 1. Therefore, noise abatement modeling was not performed.

8.2.6.2 Alternative 2 (Preferred Alternative)

Year 2014 (Peak Construction and Peak Population)

Construction impacts and abatement measures of Alternative 2 are similar to those described under Alternative 1.

Year 2030

Results of the noise impact analysis indicate that under Alternative 2 noise impacts and abatement measures for each region is similar to those described under Alternative 1.

8.2.6.3 Alternative 3

Year 2014 (Peak Construction and Peak Population)

Construction impacts and abatement measures of Alternative 3 are similar to those described under Alternative 1.

Year 2030

North

Under Alternative 3, potential traffic noise impacts to noise-sensitive receptors would be the same as Alternative 1 for the North Region, even though there was a significant increase to the future traffic volume for GRN #8 and #9. There are 88 noise receptors that would experience sound levels approaching or exceeding the NAC of 67 dBA. The type and number of impacted noise-sensitive receptors are described in the North Region subsection of Alternative 1, except for the following noise sensitive sites that have updated sheets to show the change in the 66-dBA noise contour line due to the increased traffic volume for GRN #8 and #9:

- Area 1: Outdoor use areas for 16 single-family residences and one church within Area 1 would be impacted from traffic noise under Alternative 1. Sheets 1B and 2B in Appendix G show the location of Area 1.
- Area 2: None of the outdoor use areas for the multi-family residences within Area 2 would be impacted from traffic noise under Alternative 1. Sheet 4B in Appendix G shows the location of Area 2.
- Area 3: Outdoor use areas for two single-family residences within Area 3 would be impacted from traffic noise under Alternative 1. Sheets 3B and 4B in Appendix G show the location of Area 3.
- Area 4: Outdoor use areas for four single-family residences within Area 4 would be impacted from traffic noise under Alternative 1. Sheets 4B and 5B in Appendix G show the location of Area 4.

Central

Under Alternative 3, potential traffic noise impacts to noise-sensitive receptors for the Central Region would be the same as Alternative 1, even though there was a significant increase to the future traffic volume for GRN #18 and #19. There are 378 noise receptors that would experience sound levels approaching or exceeding the NAC of 67 dBA. The type and number of impacted noise sensitive receptors are described in the Central Region subsection of Alternative 1, except for the following noise-sensitive sites that have updated sheets to show the change in the 66-dBA noise contour line due to the increased traffic volume for GRN #18 and #19:

- Area 60: Outdoor use areas for three single-family residences within Area 60 would be impacted from traffic noise under Alternative 1. Sheet 63B in Appendix G shows the location of Area 60.
- Area 61: A funeral home and the outdoor use areas for seven single- and multi-family residences within Area 61 would be impacted from traffic noise under Alternative 1. Sheets 65B and 66B in Appendix G show the location of Area 61.
- Area 62: None of the multi-family residences outdoor use areas within Area 62 would be impacted from traffic noise under Alternative 1. Sheets 65B and 66B in Appendix G show the location of Area 62.

Apra Harbor

Since there are no noise-sensitive receptors along the proposed roadway improvement projects within the Apra Harbor Region, no impacts from traffic noise under Alternative 3 would occur.

South

While there are noise-sensitive land uses along routes in the South Region, noise from traffic would not impact the noise sensitive land uses under Alternative 3.

Abatement Measures

North

Noise abatement analysis results within the North Region for Alternative 3 are the same as Alternative 1.

Central

Noise abatement analysis results within the Central Region for Alternative 3 are the same as Alternative 1.

Apra Harbor

Since there are no noise-sensitive receptors along the proposed roadway improvement projects within the Apra Harbor Region, no noise abatement modeling was performed for traffic noise under Alternative 3.

South

While there are noise-sensitive land uses along routes in the South Region, noise from traffic would not impact the noise-sensitive land uses under Alternative 3; therefore, noise abatement modeling was not performed.

8.2.6.4 Alternative 8

Year 2014 (Peak Construction and Peak Population)

Construction impacts and abatement measures of Alternative 8 are similar to those described under Alternative 1.

Year 2030

Noise impacts and abatement measures under Alternative 8 for each region are similar to those described under Alternative 3.

8.2.6.5 No-Action Alternative

Year 2009

There would be no specific construction for this alternative besides regular scheduled roadway maintenance work. Traffic noise levels would be as measured and calculated for the existing conditions.

Year 2014

There would be no specific construction for this alternative besides regular scheduled roadway maintenance work. Traffic noise levels would be slightly higher than the measured and calculated for the existing conditions as a result of growth in traffic volumes.

Year 2030

North

Under the no-action alternative, potential traffic noise impacts to noise-sensitive receptors were assessed for 16 representative areas within the North Region, and the number of impacts per area is shown in Table 8.2–9. There are 49 noise-sensitive receptors that would experience sound levels approaching or

exceeding the NAC of 67 dBA. The type and number of impacted noise sensitive receptors for each area are described in the following text:

- Area 1: Outdoor use areas for 16 single-family residences and one church within Area 1 would be impacted from traffic noise under the no-action alternative. Sheets 1 and 2 in Appendix G show the location of Area 1.
- Area 2: None of the outdoor use areas for the multi-family residences within Area 2 would be impacted from traffic noise under the no-action alternative. Sheet 4 in Appendix G shows the location of Area 2.
- Area 3: None of the outdoor use areas for the single-family residences within Area 3 would be impacted from traffic noise under the no-action alternative. Sheets 3 and 4 in Appendix G show the location of Area 3.
- Area 4: None of the outdoor use areas for the single-family residences within Area 4 would be impacted from traffic noise under the no-action alternative. Sheets 4 and 5 in Appendix G show the location of Area 4.
- Area 5: None of the outdoor use areas for the single- and multi-family residences within Area 5 would be impacted from traffic noise under the no-action alternative. Sheets 5, 6, and 7 in Appendix G show the location of Area 5.
- Area 6: This area represents a military outdoor physical training site and has four frontage outdoor use areas. None of the military outdoor physical training areas within Area 6 would be impacted from traffic noise under the no-action alternative. Sheet 6 in Appendix G shows the location of Area 6.
- Area 7: None of the outdoor use areas for the single-family residences within Area 7 would be impacted from traffic noise under the no-action alternative. Sheets 7 and 8 in Appendix G show the location of Area 7.
- Area 8: This area represents a military outdoor recreational site and has 12 frontage outdoor use areas. None of the military outdoor recreational areas within Area 8 would be impacted from traffic noise under the no-action alternative. Sheets 7 and 8 in Appendix G show the location of Area 8.
- Area 9: None of the outdoor use areas for the single-family residences and the golf course within Area 9 would be impacted from traffic noise under the no-action alternative. Sheets 9, 10, and 11 in Appendix G show the location of Area 9.
- Area 10: None of the outdoor use areas for the single-family residences within Area 10 would be impacted from traffic noise under the no-action alternative. Sheets 11 and 12 in Appendix G show the location of Area 10.
- Area 11: None of the outdoor use areas for the single- and multi-family residences or the school within Area 11 would be impacted from traffic noise under the no-action alternative. Furthermore, none of the schools indoor use areas would be impacted from noise under the no-action alternative. Sheets 12, 13, and 14 in Appendix G show the location of Area 11.
- Area 12: Outdoor use areas for seven single-family residences within Area 12 would be impacted from traffic noise under the no-action alternative. Sheets 15 and 16 in Appendix G show the location of Area 12.
- Area 13: Outdoor use areas for four single-family residences within Area 13 would be impacted from traffic noise under the no-action alternative. Sheets 15, 16, and 17 in Appendix G show the location of Area 13.

- Area 14: Outdoor use areas for seven single- and four multi-family residences within Area 14 would be impacted from traffic noise under the no-action alternative. Sheets 17, 18, and 19 in Appendix G show the location of Area 14.
- Area 15: This area represents a school and has three frontage outdoor use receptors. None of the school's outdoor recreational areas or its indoor use areas within Area 15 would be impacted from traffic noise under the no-action alternative. Sheet 18 in Appendix G shows the location of Area 15.
- Area 16: Outdoor use areas for nine single-family residences and one church within Area 16 would be impacted from traffic noise under the no-action alternative. Sheet 19 in Appendix G shows the location of Area 16.

Central

Under the no-action alternative, potential traffic noise impacts to noise-sensitive receptors were assessed for 48 representative areas within the Central Region, and the number of impacts per area is shown in Table 8.2–10. There are 342 noise-sensitive receptors that would experience sound levels approaching or exceeding the NAC of 67 dBA. The type and number of impacted noise-sensitive receptors for each area are described in the following text:

- Area 17: Outdoor use areas for 13 single- and two multi-family residences within Area 17 would be impacted from traffic noise under the no-action alternative. Sheets 20, 21, and 22 in Appendix G show the location of Area 17.
- Area 18: Outdoor use areas for seven single-family residences and 10 frontage outdoor use areas for a park within Area 18 would be impacted from traffic noise under the no-action alternative. Sheets 20, 21, and 22 in Appendix G show the location of Area 18.
- Area 19: None of the frontage outdoor use areas for a park within Area 19 would be impacted from traffic noise under the no-action alternative. Sheets 22 and 23 in Appendix G show the location of Area 19.
- Area 20: Outdoor use areas for two single- and two multi-family residences within Area 20 would be impacted from traffic noise under the no-action alternative. Sheets 22 and 23 in Appendix G show the location of Area 20.
- Area 21: Outdoor use areas for one single- and two multi-family residences within Area 21 would be impacted from traffic noise under the no-action alternative. Sheet 23 in Appendix G shows the location of Area 21.
- Area 22: Outdoor use areas for seven single- and two multi-family residences, as well as one frontage outdoor use area for a playground, within Area 22 would be impacted from traffic noise under the no-action alternative. Sheets 23 and 24 in Appendix G show the location of Area 22.
- Area 23: Outdoor use area for one single-family residence and three frontage outdoor use areas for a park within Area 23 would be impacted from traffic noise under the no-action alternative. Sheets 24 and 25 in Appendix G show the location of Area 23.
- Area 24: Outdoor use areas for three multi-family residences within Area 24 would be impacted from traffic noise under the no-action alternative. Sheet 25 in Appendix G shows the location of Area 24.
- Area 25: Outdoor use areas for two single-family residences within Area 25 would be impacted from traffic noise under the no-action alternative. Sheets 25 and 26 in Appendix G show the location of Area 25.

- Area 26: None of the six frontage outdoor use areas for a cemetery within Area 26 would be impacted from traffic noise under the no-action alternative. Sheet 25 in Appendix G shows the location the location of Area 26.
- Area 27: A park within Area 27 would have 11 frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheets 27 and 28 in Appendix G show the location of Area 27.
- Area 28: A park within Area 28 would have two frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheet 28 in Appendix G shows the location of Area 28.
- Area 29: A park within Area 29 would have four frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheets 28 and 29 in Appendix G show the location of Area 29.
- Area 30: A park within Area 30 would have nine frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheets 29, 30, and 31 in Appendix G show the location of Area 30.
- Area 31: A park within Area 31 would have four frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheet 32 in Appendix G shows the location of Area 31.
- Area 32: Outdoor use areas for four multi-family residences within Area 32 would be impacted from traffic noise under the no-action alternative. Sheet 33 in Appendix G shows the location of Area 32.
- Area 33: None of the multi-family residences outdoor use areas within Area 33 would be impacted from traffic noise under the no-action alternative. Sheet 34 in Appendix G shows the location of Area 33.
- Area 34: A school within Area 34 would have eight frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative; however, none of the school's indoor use areas would be impacted from traffic noise under the no-action alternative. Sheets 34 and 35 in Appendix G show the location of Area 34.
- Area 35: Outdoor use areas for 11 multi-family residences and four frontage outdoor use areas for a park within Area 35 would be impacted from traffic noise under the no-action alternative. Sheets 35 and 36 in Appendix G show the location of Area 35.
- Area 36: A park with four frontage outdoor use areas and two churches within Area 36 would be impacted from traffic noise under the no-action alternative. Sheets 36 and 37 in Appendix G show the location of Area 36.
- Area 37: None of the multi-family residences outdoor use areas within Area 37 would be impacted from traffic noise under the no-action alternative. Sheets 37 and 38 in Appendix G show the location of Area 37.
- Area 38: None of the multi-family residences outdoor use areas and one frontage outdoor use areas for a church within Area 38 would be impacted from traffic noise under the no-action alternative. Sheet 38 in Appendix G shows the location of Area 38.
- Area 39: Outdoor use areas for 21 single-family residences within Area 39 would be impacted from traffic noise under the no-action alternative. Sheets 39 and 40 in Appendix G show the location of Area 39.

- Area 40: None of the multi-family residences outdoor use areas within Area 40 would be impacted from traffic noise under the no-action alternative. Sheet 41 in Appendix G shows the location of Area 40.
- Area 41: None of the single-family residences outdoor use areas within Area 41 would be impacted from traffic noise under the no-action alternative. Sheet 41 in Appendix G shows the location of Area 41.
- Area 42: None of the single-family residences outdoor use areas within Area 42 would be impacted from traffic noise under the no-action alternative. Sheets 41 and 42 in Appendix G show the location of Area 42.
- Area 43: Outdoor use areas for 18 single-family residences within Area 43 would be impacted from traffic noise under the no-action alternative. Sheet 42 in Appendix G shows the location of Area 43.
- Area 44: None of the single-family residences outdoor use areas within Area 44 would be impacted from traffic noise under the no-action alternative. Sheet 42 in Appendix G shows the location of Area 44.
- Area 45: A park within Area 45 would have 30 frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheets 42, 43, and 44 in Appendix G show the location of Area 45.
- Area 46: None of the single-family residences outdoor use areas within Area 46 would be impacted from traffic noise under the no-action alternative. Sheet 44 in Appendix G shows the location of Area 46.
- Area 47: Outdoor use areas for 12 single-family residences within Area 47 would be impacted from traffic noise under the no-action alternative. Sheet 46 in Appendix G shows the location of Area 47.
- Area 48: Outdoor use areas for seven single within Area 48 would be impacted from traffic noise under the no-action alternative. Sheet 48 in Appendix G shows the location of Area 48.
- Area 49: Outdoor use areas for 17 single- and four multi-family residences within Area 49 would be impacted from traffic noise under the no-action alternative. Sheets 50 and 51 in Appendix G show the location of Area 49.
- Area 50: An outdoor sports complex within Area 50 would have nine frontage outdoor use areas that would be impacted from traffic noise under the no-action alternative. Sheets 50 and 51 in Appendix G show the location of Area 50.
- Area 51: None of the recreational outdoor use areas or indoor use areas for a school within Area 51 would be impacted from traffic noise under the no-action alternative. Sheet 51 in Appendix G shows the location of Area 51.
- Area 52: Outdoor use areas for eight multi-family residences within Area 52 would be impacted from traffic noise under the no-action alternative. Sheet 53 in Appendix G shows the location of Area 52.
- Area 53: Outdoor use areas for 10 multi-family residences within Area 53 would be impacted from traffic noise under the no-action alternative. Sheet 53 in Appendix G shows the location of Area 53.
- Area 54: None of the multi-family residences outdoor use areas within Area 54 would be impacted from traffic noise under the no-action alternative. Sheet 54 in Appendix G shows the location of Area 54.

- Area 55: Outdoor use area for one single-family residence within Area 55 would be impacted from traffic noise under the no-action alternative. Sheet 56 in Appendix G shows the location of Area 55.
- Area 56: Outdoor use areas for nine single- and two multi-family residences within Area 56 would be impacted from traffic noise under the no-action alternative. Sheets 57 and 58 in Appendix G show the location of Area 56.
- Area 57: Outdoor use areas for 10 single- and one multi-family residence within Area 57 would be impacted from traffic noise under the no-action alternative. Sheets 59 and 60 in Appendix G show the location of Area 57.
- Area 58: None of the 28 frontage outdoor use areas for a military outdoor recreational area within Area 58 would be impacted from traffic noise under the no-action alternative. Sheets 59 and 60 in Appendix G show the location of Area 58.
- Area 59: Outdoor use areas for six single-family residences within Area 59 would be impacted from traffic noise under the no-action alternative. Sheet 62 in Appendix G shows the location of Area 59.
- Area 60: Outdoor use areas for three single-family residences within Area 60 would be impacted from traffic noise under the no-action alternative. Sheet 63 in Appendix G shows the location of Area 60.
- Area 61: Outdoor use areas for five single- and two multi-family residences within Area 61 would be impacted from traffic noise under the no-action alternative. Sheets 63 and 64 in Appendix G show the location of Area 61.
- Area 62: None of the multi-family residences outdoor use areas within Area 62 would be impacted from traffic noise under the no-action alternative. Sheets 65 and 66 in Appendix G show the location of Area 62.
- Area 63: Outdoor use areas for 21 single- and two multi-family residences within Area 63 would be impacted from traffic noise under the no-action alternative. Sheets 67, 68, and 69 in Appendix G show the location of Area 63.
- Area 64: Outdoor use areas for 18 single- and four multi-family residences within Area 64 would be impacted from traffic noise under the no-action alternative. Sheets 67, 68, and 69 in Appendix G show the location of Area 64.

Apra Harbor

Since there are no noise-sensitive receptors along the proposed roadway improvement projects within the Apra Harbor Region, no impacts from traffic noise under the no-action alternative would occur.

South

While there are noise-sensitive land uses along routes in the South Region, noise from traffic would not impact the noise sensitive land uses under the no-action alternative.

8.2.6.6 Summary of Impacts

During the construction period, some of the noise sensitive receptors that are close to the roadways may be exposed to noise levels greater than 80 dBA. A combination of noise mitigation techniques with equipment noise control and administrative measures may be selected to provide the most effective means to minimize effects of the construction activity noise as discussed below.

Table 8.2–23 summarizes the potential impacts of each action alternative and the no-action alternative.

Table 8.2–23. Summary of Potential Noise Impacts – Roadway Project

Potentially Impacted Resource	*Alternative 1*	*Alternative 2**	*Alternative 3*	*Alternative 8*	*No Action*
Construction Noise Impacts to Sensitive Receptors	LSI	LSI	LSI	LSI	NA
Traffic Noise Impact on North Region Sensitive Receptors	SI-M	SI-M	SI-M	SI-M	SI-M
Traffic Noise Impact on Central Region Sensitive Receptors	SI-M	SI-M	SI-M	SI-M	SI-M
Traffic Noise Impact on Apra Harbor Region Sensitive Receptors	NI	NI	NI	NI	NI
Traffic Noise Impact on South Region Sensitive Receptors	NI	NI	NI	NI	NI

Legend: LSI = Less than significant impact; NA = not applicable; NI = No impact; SI-M = Significant impact mitigable to less than significant. *Preferred Alternative.

A summary of noise-sensitive receptors that would be impacted is provided in Table 8.2–24 for the North Region and Table 8.2–25 for the Central Region, respectively.

Table 8.2–24. Summary of Potential Roadway Project Noise Impacts for the North Region

	Number of Predicted Impact Receptors				
Type of Noise Sensitive Receptors	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 1: Single Family Residences and a Church	17	17	17	17	17
Area 2: Multi-Family Residences	0	0	0	0	0
Area 3: Single Family Residences	2	2	2	2	0
Area 4: Single Family Residences	4	4	4	4	0
Area 5: Single and Multi-Family Residences	0	0	0	0	0
Area 6: Military Outdoor Physical Training Area	4	4	4	4	0
Area 7: Single Family Residences	0	0	0	0	0
Area 8: Military Outdoor Recreation Area	12	12	12	12	0
Area 9: Single Family Residences and a Golf Course	0	0	0	0	0
Area 10: Single Family Residences	1	1	1	1	0
Area 11: Single Family Residences, Multi-Family Residences, and a school	10	10	10	10	0
Area 12: Single Family Residences	7	7	7	7	7
Area 13: Single Family Residences	8	8	8	8	4
Area 14: Single and Multi-Family Residences	13	13	13	13	11
Area 15:School	0	0	0	0	0
Area 16: Single Family Residences and a Church	10	10	10	10	10
Total	**88**	**88**	**88**	**88**	**49**

Table 8.2–25. Summary of Potential Roadway Project Noise Impacts for the Central Region

Type of Noise Sensitive Receptors	*Number of Predicted Impact Receptors*				
	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 17: Single Family Residences and a Multi-Family Residence	15	15	15	15	15
Area 18: Single Family Residences and a Park	17	17	17	17	17
Area 19: Park	8	8	8	8	0
Area 20: Single Family Residences and a Multi-Family Residence	4	4	4	4	4
Area 21: Park, a Single Family Residence, and a Multi-Family Residence	6	6	6	6	3
Area 22: Playground, a Single Family Residence, and a Multi-Family Residence	10	10	10	10	10
Area 23: Park and a Single Family Residence	7	7	7	7	4
Area 24: Multi-Family Residences	3	3	3	3	3
Area 25: Park and Single Family Residences	6	6	6	6	2
Area 26: Cemetery	6	6	6	6	0
Area 27: Park	20	20	20	20	11
Area 28: Park	2	2	2	2	2
Area 29: Park	4	4	4	4	4
Area 30: Park	9	9	9	9	9
Area 31: Park	4	4	4	4	4
Area 32: Multi-Family Residences	4	4	4	4	4
Area 33: Multi-Family Residences	0	0	0	0	0
Area 34: School	8	8	8	8	8
Area 35: Park, a Single Family Residence, and Multi-Family Residences	15	15	15	15	15
Area 36: One School and Two Churches	6	6	6	6	6
Area 37: Multi-Family Residences	0	0	0	0	0
Area 38: Multi-Family Residences and a Church	1	1	1	1	1
Area 39: Single Family Residences	21	21	21	21	21
Area 40: Multi-Family Residences	0	0	0	0	0
Area 41: Single Family Residences	0	0	0	0	0
Area 42: Single Family Residences	0	0	0	0	0
Area 43: Single Family Residences	18	18	18	18	18
Area 44: Single Family Residences	0	0	0	0	0
Area 45: Park, Single Family Residences, and Multi-Family Residences	30	30	30	30	30
Area 46: Single Family Residences	0	0	0	0	0
Area 47: Single Family Residences	12	12	12	12	12
Area 48: Single Family Residences, and Multi-Family Residences	9	9	9	9	7
Area 49: Single Family Residences and Multi-Family Residences	21	21	21	21	21

Type of Noise Sensitive Receptors	*Number of Predicted Impact Receptors*				
	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 50: Outdoor Sports Complex	9	9	9	9	9
Area 51: School	0	0	0	0	0
Area 52: Multi-Family Residences and a Motel	9	9	9	9	8
Area 53: Multi-Family Residences	10	10	10	10	10
Area 54: Multi-Family Residences	0	0	0	0	0
Area 55: Single Family Residences and a Motel	1	1	1	1	1
Area 56: Single Family Residences and Multi-Family Residences	11	11	11	11	11
Area 57: Single Family Residences and Multi-Family Residences	11	11	11	11	11
Area 58: Military Outdoor Recreational Area	0	0	0	0	0
Area 59: Single Family Residences	6	6	6	6	6
Area 60: Single Family Residences	3	3	3	3	3
Area 61: Single Family Residences, Multi-Family Residences, and a Funeral Home	7	7	7	7	7
Area 62: Multi-Family Residences	0	0	0	0	0
Area 63: Single Family Residences, Multi-Family Residences, and a Church	23	23	23	23	23
Area 64: Single Family Residences, Multi-Family Residences, and a School	22	22	22	22	22
Total	**378**	**378**	**378**	**378**	**342**

Future noise impacts for each of the alternatives were predicted by projecting a 66-dBA traffic noise contour line modeled using Traffic Noise Model 2.5 onto aerial photographs of the project alignment. No impacts were predicted for the Apra Harbor Region or South Region. In addition, there are no beneficial impacts from any of the alignments.

8.2.6.7 Summary of Proposed Mitigation Measures

The sound walls discussed in Section 8.2.6.1, Alternative 1, Abatement Measures were designed to reduce traffic noise levels by at least the minimum requirement of 5 dB.

Fifteen sound walls were analyzed for 12 areas throughout the alignment in the North Region where sound walls were determined to be feasible. Twelve of these sound walls were determined to be both feasible and reasonable. In the Central Region, a total of 123 sound walls were analyzed. The location and dimension of sound walls as presented are preliminary. Views of the impacted residents or recreational areas would be a major consideration in reaching a final decision on the abatement measures to be provided. If pertinent parameters change substantially during the final project design, reanalysis of the traffic noise impact may become necessary, and the noise abatements may be changed. A final decision of the construction of the noise abatements would be made upon completion of the project design. These sound walls would reduce the number of predicted impacted receptors from 466 to 316 for Alternatives 1, 2, 3, and 8. Noise impacts for the North and Central Regions are shown in Table 8.2–26 and Table 8.2-27, respectively.

Table 8.2–26. Summary of Potential Roadway Project Noise Impacts with Proposed Abatement for the North Region

Type of Noise Sensitive Receptors	*Number of Predicted Impact Receptors*				
	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 1: Single Family Residences and a Church	6	6	6	6	17
Area 2: Multi-Family Residences	0	0	0	0	0
Area 3: Single Family Residences	2	2	2	2	0
Area 4: Single Family Residences	4	4	4	4	0
Area 5: Single and Multi-Family Residences	0	0	0	0	0
Area 6: Military Outdoor Physical Training Area	0	0	0	0	0
Area 7: Single Family Residences	0	0	0	0	0
Area 8: Military Outdoor Recreation Area	0	0	0	0	0
Area 9: Single Family Residences and a Golf Course	0	0	0	0	0
Area 10: Single Family Residences	1	1	1	1	0
Area 11: Single Family Residences, Multi-Family Residences, and a school	10	10	10	10	0
Area 12: Single Family Residences	7	7	7	7	7
Area 13: Single Family Residences	8	8	8	8	4
Area 14: Single and Multi-Family Residences	13	13	13	13	11
Area 15:School	0	0	0	0	0
Area 16: Single Family Residences and a Church	10	10	10	10	10
Total with Abatement	**61**	**61**	**61**	**61**	**-**
Total without Abatement (Table 8.2–9**)**	**88**	**88**	**88**	**88**	49

Not all of the impacted receptors could be abated. As stated in the abatement section, many of the receptors have direct access to the roadway that prevents the construction of a continuous sound wall required to provide feasible abatement. Furthermore, many of the impacted receptors are also scattered along different routes, preventing feasible abatement from being cost effective and, thus, not reasonable. Also of the 316 impacted receptors that could not be abated, 271 of them are impacted under the no-action alternative.

Table 8.2-27. Summary of Potential Roadway Project Noise Impacts with Proposed Abatement for the Central Region

Type of Noise Sensitive Receptors	*Number of Predicted Impact Receptors*				
	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 17: Single Family Residences and a Multi-Family Residence	15	15	15	15	15
Area 18: Single Family Residences and a Park	7	7	7	7	17
Area 19: Park	8	8	8	8	0
Area 20: Single Family Residences and a Multi-Family Residence	4	4	4	4	4
Area 21: Park, a Single Family Residence, and a Multi-Family Residence	6	6	6	6	3
Area 22: Playground, a Single Family Residence, and a Multi-Family Residence	10	10	10	10	10
Area 23: Park and a Single Family Residence	0	0	0	0	4
Area 24: Multi-Family Residences	3	3	3	3	3
Area 25: Park and Single Family Residences	6	6	6	6	2
Area 26: Cemetery	6	6	6	6	0
Area 27: Park	8	8	8	8	11
Area 28: Park	2	2	2	2	2
Area 29: Park	4	4	4	4	4
Area 30: Park	9	9	9	9	9
Area 31: Park	4	4	4	4	4
Area 32: Multi-Family Residences	4	4	4	4	4
Area 33: Multi-Family Residences	0	0	0	0	0
Area 34: School	0	0	0	0	8
Area 35: Park, a Single Family Residence, and Multi-Family Residences	15	15	15	15	15
Area 36: One School and Two Churches	6	6	6	6	6
Area 37: Multi-Family Residences	0	0	0	0	0
Area 38: Multi-Family Residences and a Church	1	1	1	1	1
Area 39: Single Family Residences	1	1	1	1	21
Area 40: Multi-Family Residences	0	0	0	0	0
Area 41: Single Family Residences	0	0	0	0	0
Area 42: Single Family Residences	0	0	0	0	0
Area 43: Single Family Residences	0	0	0	0	18
Area 44: Single Family Residences	0	0	0	0	0
Area 45: Park, Single Family Residences, and Multi-Family Residences	2	2	2	2	30
Area 46: Single Family Residences	0	0	0	0	0
Area 47: Single Family Residences	12	12	12	12	12
Area 48: Single Family Residences, and Multi-Family Residences	9	9	9	9	7
Area 49: Single Family Residences and Multi-Family Residences	11	11	11	11	21

Type of Noise Sensitive Receptors	*Number of Predicted Impact Receptors*				
	Alternative 1	*Alternative 2*	*Alternative 3*	*Alternative 8*	*No Action*
Area 50: Outdoor Sports Complex	9	9	9	9	9
Area 51: School	0	0	0	0	0
Area 52: Multi-Family Residences and a Motel	9	9	9	9	8
Area 53: Multi-Family Residences	0	0	0	0	10
Area 54: Multi-Family Residences	0	0	0	0	0
Area 55: Single Family Residences and a Motel	1	1	1	1	1
Area 56: Single Family Residences and Multi-Family Residences	11	11	11	11	11
Area 57: Single Family Residences and Multi-Family Residences	11	11	11	11	11
Area 58: Military Outdoor Recreational Area	0	0	0	0	0
Area 59: Single Family Residences	6	6	6	6	6
Area 60: Single Family Residences	3	3	3	3	3
Area 61: Single Family Residences, Multi-Family Residences, and a Funeral Home	7	7	7	7	7
Area 62: Multi-Family Residences	0	0	0	0	0
Area 63: Single Family Residences, Multi-Family Residences, and a Church	23	23	23	23	23
Area 64: Single Family Residences, Multi-Family Residences, and a School	22	22	22	22	22
Total with abatement	**255**	**255**	**255**	**255**	**-**
Total without abatement (Table 8.2–10)	**378**	**378**	**378**	**378**	**342**

8.3 NO-ACTION ALTERNATIVE

Under the no-action alternative, no utility or roadway upgrades or improvements associated with the proposed actions would occur and existing operations at the proposed project areas would continue. There would be limited localized noise impacts related to non-military individual project construction. There would not be a significant increase in military population. Anticipated beneficial effects and improved roadway capacity would not be realized.

8.4 SUMMARY OF IMPACTS

This section summarizes the potential noise impacts associated with the proposed action alternatives for each major component – power, potable water, wastewater, solid waste, and off base roadways.

Table 8.4–1 summarizes the potential noise impacts of utility and off base roadways. No difference was identified among alternatives. Construction impacts were associated with the noise generated by construction equipment at the project site. These impacts would be localized and short term.

Table 8.4–1. Summary of Impacts

	Power Alternatives	*Potable Water Alternatives*	*Wastewater Alternatives*	*Solid Waste Alternatives*	*Off Base Roadway Alternatives*
Construction	LSI	LSI	LSI	NI	LSI
Operations	NI	NI	NI	LSI	SI-M

Legend: LSI= Less than significant impact; NI= No impact; SI-M = Significant impact mitigable to less than significant.

8.5 SUMMARY OF PROPOSED MITIGATION MEASURES

Table 8.5–1 summarizes the proposed mitigation measures.

Table 8.5–1. Summary of Proposed Mitigation Measures

	Power Alternatives	*Potable Water Alternatives*	*Wastewater Alternatives*	*Solid Waste Alternatives*	*Off Base Roadway Alternatives*
Construction	None	None	None	None	None
Operations	None	None	None	None	Sound walls

During construction, the impacts are less than significant but equipment noise control Best Management Practices would be implemented, as follows:

- Ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators, intact and operational.
- Inspect all construction equipment at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
- Turn off idling equipment.

Other administrative mitigation/abatement measures could be applied, as follows:

- Implement a construction noise monitoring program to limit the impacts.
- Plan noisier operations during times least sensitive to receptors.
- Avoid scheduling construction during nighttime hours (10:00 p.m. to 7:00 a.m.) and on weekends.
- Keep noise levels relatively uniform and avoid impulsive noises.
- Maintain good public relations with the community to minimize objections to the unavoidable construction impacts. Provide frequent activity updates of all construction activities.

During operations, noise impacts due to roadway traffic noise could be abated through noise barriers where they are feasible and reasonable.