CHAPTER 6
ADDITIVE AND COLLECTIVE IMPACTS

This chapter presents two sections that evaluate the following additive and collective impacts of the Marine Corps relocation to Guam:

- Section 6.1 addresses additive impacts of the SEIS proposed action that would result specifically from the combination of a cantonment/family housing alternative with an LFTRC alternative. For example, traffic impacts associated with project-related vehicle trips between cantonment/family housing facilities and range facilities would depend on which pair of respective site alternatives is considered. Similarly, the routing of proposed new IT/COMM infrastructure to connect the ranges and the cantonment area (as described in Section 2.6 of this SEIS) would vary depending on the specific combination of cantonment and LFTRC alternatives. These project components were not addressed in Chapter 4 (cantonment impacts) or Chapter 5 (LFTRC impacts) because they would be a function of the combination of alternatives rather than any individual site alternative. Section 6.1 focuses only on those resources for which these types of additive impacts would be applicable.

- Section 6.2 addresses the “collective” impacts attributable to the overall Marine Corps relocation to Guam, which includes not only the re-analyzed actions in the 2012 Roadmap Adjustments (assessed in Chapters 4 and 5 and 6.1 of this SEIS), but also the Marine Corps relocation projects that were fully considered and analyzed in the 2010 Final EIS and remain final from the 2010 ROD, and thus do not require further analysis in this SEIS (hereinafter “2010 ROD-Related Actions”).

Unlike the preceding Chapters 4 and 5, this chapter does not contain a section pertaining to the No-Action Alternative. The No-Action Alternative for this SEIS (see Sections 2.1 and 4.5) already corresponds to the complete set of Marine Corps relocation projects that were selected for implementation in the 2010 ROD. Therefore, the collective impacts of implementing the No-Action Alternative were already analyzed in the 2010 Final EIS and summarized in the 2010 ROD.
6.1 ADDITIVE IMPACTS FROM COMBINED ALTERNATIVES

As explained above, this section focuses on the additive impacts of the SEIS proposed action that were not previously addressed in Chapters 4 and 5 because they are a product of the combination of cantonment/family housing and LFTRC site alternatives. These additive impacts may result from construction of the connecting IT/COMM infrastructure described in Section 2.6 of this SEIS, from an increase in traffic on roads connecting a cantonment/family housing area with an LFTRC, or from other characteristics of an alternative site combination.

The following nine resource areas would not be subject to additive impacts from IT/COMM installation, an increase in traffic, or any other factors associated solely with the combination of specific cantonment/family housing and LFTRC alternatives: airspace, recreation, marine biological resources, visual resources, marine transportation, utilities, land and submerged land use, socioeconomics and general services, and environmental justice. These resources are therefore not discussed further in this section.

Section 6.1.1 addresses short-term and less than significant additive impacts that would occur during construction of the IT/COMM links but would not vary appreciably with specific site combinations. Such impacts apply to geological and soil resources, water resources, noise, ground transportation, and hazardous materials and waste. Because the additive impacts described in Section 6.1.1 would be less than significant and would not vary by site combination, they are addressed qualitatively by resource area.

Section 6.1.2 addresses additive impacts (from construction and/or operations) that would vary appreciably for different site combinations (and may include some IT/COMM construction impacts). Such impacts apply to the following resource areas: air quality, terrestrial biological resources, cultural resources, and public health and safety. In addition, ground transportation is discussed in this section because traffic impacts would vary depending on the location of the cantonment/family housing and LFTRC alternatives. Section 6.1.2 describes these impacts for the various site combinations, which are grouped in some cases based on geographic proximity, due to the large number of possible site combinations.

6.1.1 Additive IT/COMM Construction Impacts That Do Not Vary by Alternative Combination

6.1.1.1 Geological and Soil Resources

The installation of IT/COMM links between any pair of cantonment/family housing and LFTRC site alternatives would result in direct, short-term impacts to geological and soil resources along the IT/COMM routes. Earthmoving activities would occur mostly within previously-disturbed roadways (the term “roadways” includes road surface plus adjacent shoulders) that do not contain important soil resources. Standard BMPs would be implemented to avoid and minimize typical construction-related impacts (e.g., erosion) and impacts would therefore be less than significant.

6.1.1.2 Water Resources

Construction associated with the IT/COMM lines would result in the potential for short-term increases in stormwater runoff and erosion. The characteristics of the potentially disturbed area would vary somewhat depending on the IT/COMM route (see Table 2.6-1 and Figure 2.6-1 in Chapter 2 for details of the specific routes for each cantonment/LFTRC combination) and, as shown in Table 6.1.1-1, some routes are closer to surface waters and wetlands than others. However, through compliance with the Construction General Permit and Program SWPPP, and implementation of site-specific SWPPPs, and associated erosion control, runoff reduction, and sediment removal BMPs (see Table 4.1.2-2 in Chapter 4 of this SEIS), these effects would be minimized and off-site transport of stormwater runoff would be unlikely.
except during extreme weather events (i.e., typhoons). In addition, roadway-specific BMPs, as identified in the most recent CNMI and Guam Stormwater Management Manual, would be implemented, as applicable. Specifically, the site-specific SWPPPs would identify appropriate BMPs for each route that would contain runoff and sediment on-site (by reducing the flow rate of runoff), thereby minimizing the suspension of sediments and promoting infiltration of runoff. These stormwater runoff protection measures would also serve to both protect surface water, groundwater, and wetlands from indirect impacts, as well as to prevent impacts to nearshore waters.

Table 6.1.1-1. Surface Waters in the Vicinity of IT/COMM Links between Alternatives

<table>
<thead>
<tr>
<th>Cantonment/Family Housing Alternatives</th>
<th>LFTRC Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Route 15 Alternative 1</td>
</tr>
<tr>
<td>Alternative A: Finegayan and Alternative B: Finegayan/South Finegayan</td>
<td>6 / 1</td>
</tr>
<tr>
<td>Alternative C: AAFB</td>
<td>6 / 1</td>
</tr>
<tr>
<td>Alternative D: Barrigada</td>
<td>6 / 1</td>
</tr>
</tbody>
</table>

Notes: * The number of wetlands and other waters of the U.S. were tabulated based on the occurrence of a distinct surface water feature within 100 feet (30 m) of the IT/COMM footprint. Any surface water feature occurring outside of this distance would be unlikely to be affected with implementation of construction BMPs.

Because the IT/COMM lines would primarily be located in existing roadways, no direct impacts to wetlands or other waters of the U.S. are anticipated. The potential exposure to direct or indirect impacts at any one location or resource would be short-term, given that construction would not occur simultaneously along the entire IT/COMM route at any one time, and construction at any one location would be of a relatively short duration. Based on these considerations, and given that construction would comply with Construction General Permit requirements and implementation of SWPPPs and BMPs, the proposed construction activities associated with IT/COMM lines would result in less than significant impacts to water resources on any of the routes.

6.1.1.3 Noise

Noise impacts from installation of the IT/COMM lines would only occur in close proximity to the construction activities and would primarily occur along existing roadways that have higher levels of ambient noise from road traffic and other sources. Installation of the IT/COMM lines would be very short-term, lasting only a few days near any given noise receptor before moving along the road easement. Therefore, the impacts would be less than significant.

6.1.1.4 Ground Transportation

Construction of the IT/COMM links between any given combination of cantonment/family housing and LFTRC alternatives would occur primarily along existing roadways, and would potentially include clearing and grubbing, demolition of existing road pavement, excavation, filling, paving, and landscaping. During the construction period in the immediate vicinity of any given construction area along an IT/COMM route, short-term, intermittent impacts to traffic flow would include additional traffic congestion, slower speeds in construction zones, and short detours that may be caused by truck and equipment movements, construction worker vehicles, the delivery of construction materials and equipment, and removal of construction debris. Potential direct and indirect impacts to ground transportation resources from IT/COMM construction would be minimized with implementation of appropriate work zone traffic management strategies and BMPs. Therefore, the installation of IT/COMM
infrastructure along any route would have less than significant direct and indirect short-term impacts to roadways.

6.1.1.5 Hazardous Materials and Wastes

Hazardous substances are not anticipated to be widely used or generated for the installation of IT/COMM lines at or between the cantonment, housing, or LFTRC sites. These materials would continue to be managed as described in this SEIS and the 2010 Final EIS (Volume 2, Chapter 17: Table 17.2-3: Summary of BMPs and SOPs, pages 17-42 to 17-43 and Volume 7, Chapter 2: Overview of Best Management Practices and Mitigation Measures, Table 2.1-1, Summary of Key Best Management Practices [Guam and Tinian], pages 2-4 to 2-23). With regard to previously contaminated sites, installation of IT/COMM links would avoid contaminated sites to the maximum extent practicable. If IT/COMM routes were unable to avoid areas where contamination and/or MEC has been identified, a site-specific health and safety plan would be used to ensure that the risk of human exposure to contaminated media is minimized through engineering and administrative controls and appropriate personal protective equipment. In addition, Phase I and II Environmental Site Assessments would be conducted in areas requiring new or additional IT/COMM right-of-way easements prior to construction activities to ensure that project plans consider and address contaminated sites. If installation of IT/COMM links require the demolition or renovation of structures constructed prior to 1978, these structures would be inspected for PCBs, ACM, and LBP. If these materials were identified, licensed contractors would properly remove and dispose of them in accordance with relevant local and federal regulations. Installation of IT/COMM lines would result in less than significant impacts with regard to hazardous materials and wastes.

6.1.2 Additive Impacts That Vary by Site Combination

6.1.2.1 Finegayan Cantonment/Family Housing Alternative A or B with Route 15 LFTRC Alternative 1

Air Quality

*Finegayan Cantonment/Family Housing Alternative A with Route 15 LFTRC Alternative 1*

As discussed in Section 3.3.3.1, this SEIS updated or amended the 2010 Final EIS for the following two analysis elements:

- Hot-spot concentration impacts for mobile source CO, PM, and MSATs under both construction and operation phases.
- Construction phase, island-wide annual emissions for criteria pollutants and CO₂.

As discussed in Sections 3.3.3.1, 4.1.3, and 5.1.3, the on-site and off-site hot-spot analyses were conducted based on the forecasts of location-specific traffic and construction activities under the preferred alternative and the alternative with the likely maximum potential adverse effect. The analysis results indicate that the predicted hot-spot impacts are well below the applicable standards for respective pollutants. Therefore, it can be concluded that the findings shown in Sections 4.1.3 and 5.1.3 would remain the same for each of the combined alternatives and would represent minimal localized hot-spot impacts.

Construction phase, island-wide annual emissions for criteria pollutants and CO₂ would have combined effects from any pair of cantonment/family housing and LFTRC alternatives. The additional combined island-wide construction emissions are considered in this chapter by combining annual emissions forecasted in Chapters 4 and 5 (see Tables 4.1.3-1 and 5.1.3-1) to determine the potential emissions...
impact significance using the 250 tpy threshold. Because all of the alternative LFTRC sites are located outside the two SO\textsubscript{2} nonattainment areas, there would be no additive impacts from any of the combined alternatives with respect to the CAA general conformity rule applicability requirement. Therefore, general conformity analysis would not be needed for any of the combined alternatives. Although there would be many IT/COMM line installation options along various routes, the longest route was used to conservatively estimate the emissions associated with IT/COMM line construction activities between 2018 and 2020. These scenarios with the maximum potential adverse effect of IT/COMM construction emissions were then considered for each combined alternative discussed in this Chapter.

The combined construction emissions are summarized in Table 6.1.2-1. Air quality impacts would be less than significant because construction emissions from the combined alternative would be below the significance criterion of 250 tpy for criteria pollutants. As described in Section 3.3, in contrast to criteria pollutants, there are no NAAQS significance thresholds for greenhouse gas emissions, including CO\textsubscript{2}. Nevertheless, the predicted greenhouse gas emissions levels for this combined alternative are still presented in Table 6.1.2-1.

Table 6.1.2-1. Finegayan Cantonment/Family Housing (Alternative A) with Route 15 LFTRC (Alternative 1) Annual Construction Emissions (2016-2022)

<table>
<thead>
<tr>
<th>Construction Year</th>
<th>SO\textsubscript{2}</th>
<th>CO</th>
<th>PM\textsubscript{10}</th>
<th>PM\textsubscript{2.5}</th>
<th>NO\textsubscript{x}</th>
<th>VOCs</th>
<th>CO\textsubscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
</tr>
<tr>
<td>2017</td>
<td>0.1</td>
<td>4.0</td>
<td>0.4</td>
<td>0.4</td>
<td>5.6</td>
<td>0.7</td>
<td>801.5</td>
</tr>
<tr>
<td>2018</td>
<td>0.5</td>
<td>32.8</td>
<td>2.1</td>
<td>1.9</td>
<td>24.7</td>
<td>4.4</td>
<td>5036.5</td>
</tr>
<tr>
<td>2019</td>
<td>0.7</td>
<td>45.7</td>
<td>2.7</td>
<td>2.4</td>
<td>32.2</td>
<td>5.4</td>
<td>7133.1</td>
</tr>
<tr>
<td>2020</td>
<td>0.2</td>
<td>18.7</td>
<td>1.1</td>
<td>1.0</td>
<td>11.3</td>
<td>2.6</td>
<td>2507.0</td>
</tr>
<tr>
<td>2021</td>
<td>0.8</td>
<td>45.9</td>
<td>2.8</td>
<td>2.5</td>
<td>35.5</td>
<td>4.7</td>
<td>7855.2</td>
</tr>
<tr>
<td>2022</td>
<td>0.2</td>
<td>13.6</td>
<td>0.8</td>
<td>0.7</td>
<td>10.5</td>
<td>1.4</td>
<td>2324.4</td>
</tr>
<tr>
<td>Significance Threshold</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>NA</td>
</tr>
</tbody>
</table>

Legend: neg = negligible; NA = not applicable.

Finegayan/South Finegayan Cantonment/Family Housing Alternative B with Route 15 LFTRC Alternative 1

The combined air quality impacts for this site combination would be similar to those described above for the combination with Alternative A. Because partial construction activities under this combined alternative would occur within the Tanguisson SO\textsubscript{2} nonattainment area, the CAA general conformity rule would apply to these activities. Based on the predicted annual island-wide combined SO\textsubscript{2} emissions, as shown in Table 6.1.2-2, the annual construction SO\textsubscript{2} emissions within the Tanguisson nonattainment areas would be well below the 100 tpy de minimis threshold. Therefore, the formal CAA general conformity rule determination is not required. The combined construction island-wide emissions impacts, summarized in Table 6.1.2-2, would be below the significance criterion of 250 tpy for criteria pollutants, and would therefore be less than significant for this site combination.
Table 6.1.2-2. Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with Route 15 LFTRC (Alternative 1) Annual Construction Emissions (2016-2022)

<table>
<thead>
<tr>
<th>Construction Year</th>
<th>SO₂</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>NOₓ</th>
<th>VOC</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
</tr>
<tr>
<td>2017</td>
<td>0.1</td>
<td>4.0</td>
<td>0.4</td>
<td>0.4</td>
<td>5.6</td>
<td>0.7</td>
<td>801.9</td>
</tr>
<tr>
<td>2018</td>
<td>0.5</td>
<td>32.8</td>
<td>2.1</td>
<td>1.9</td>
<td>24.8</td>
<td>4.4</td>
<td>5048.6</td>
</tr>
<tr>
<td>2019</td>
<td>0.7</td>
<td>45.7</td>
<td>2.7</td>
<td>2.4</td>
<td>32.3</td>
<td>5.4</td>
<td>7155.1</td>
</tr>
<tr>
<td>2020</td>
<td>0.2</td>
<td>18.7</td>
<td>1.1</td>
<td>1.0</td>
<td>11.3</td>
<td>2.6</td>
<td>2512.7</td>
</tr>
<tr>
<td>2021</td>
<td>0.8</td>
<td>45.9</td>
<td>2.8</td>
<td>2.5</td>
<td>35.6</td>
<td>4.7</td>
<td>7882.8</td>
</tr>
<tr>
<td>2022</td>
<td>0.2</td>
<td>13.6</td>
<td>0.8</td>
<td>0.7</td>
<td>10.6</td>
<td>1.4</td>
<td>2332.6</td>
</tr>
</tbody>
</table>

Significance Threshold: 250 250 250 250 250 250 250 NA

Legend: neg = negligible; NA = not applicable.

Terrestrial Biological Resources

Finegayan Cantonment/Family Housing (Alternative A) with Route 15 LFTRC (Alternative 1)

Table 6.1.2-3 combines the direct impacts from Cantonment/Family Housing Alternative A and LFTRC Alternative 1 with the additive impacts from installation of the associated IT/COMM infrastructure. Overall, approximately 1,303 acres (528 ha) of limestone forest would be disturbed, representing approximately 7% of the total limestone forest currently present on Guam. In addition, approximately 1,333 acres (540 ha) of Overlay Refuge lands, or approximately 6% of Overlay Refuge lands on Guam, would be disturbed. The vast majority (78%) of the impacts to limestone forest would result from implementation of Alternative A (see Section 4.1.8). Approximately 19% of the impacts would result from the implementation of Alternative 1 (see Section 5.1.8), and less than 2% of impacts would be due to the additive impact of the IT/COMM alignment. Because the IT/COMM route covers many areas across many miles, the area impacted by the proposed IT/COMM activities would generally be made up of smaller areas of limestone forest and would not be one contiguous area. As such, the proposed IT/COMM alignment contributes very little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-3. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan Cantonment/Family Housing (Alternative A), Route 15 LFTRC (Alternative 1), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A</td>
<td>2 (0.7)</td>
<td>1,018 (412)</td>
<td>1,250 (506)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 977 (395) MC: 978 (396) GR: 458 (185) GMK: 977 (395) Ser: 661 (268)</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>65 (26)</td>
<td>190 (77)</td>
<td>NA</td>
<td>GR</td>
<td>-</td>
<td>MFB: 81 (33) MC: 81 (33) GR: 283 (115) GMK: 81 (33) Ser: 67 (27)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>71 (29)</td>
<td>1,232 (499)</td>
<td>1,333 (539)</td>
<td>-</td>
<td>-</td>
<td>MFB: 1,094 (443) MC: 1,096 (444) GR: 878 (355) GMK: 1,094 (443) Ser: 758 (307)</td>
</tr>
</tbody>
</table>

Legend: NA = not applicable, GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes:
\(^{(1)}\) Direct impact - conversion to developed areas.
\(^{(2)}\) Only species for which there would be a significant impact.

Finegayan/South Finegayan Cantonment/Family Housing Alternative B with Route 15 LFTRC Alternative 1

Table 6.1.2-4 combines the direct impacts of implementing Cantonment/Housing Alternative B and LFTRC Alternative 1 with the additive impacts from installation of the corresponding IT/COMM infrastructure. Overall, approximately 1,133 acres (458 ha) of limestone forest would be disturbed, representing approximately 6% of the total limestone forest currently present on Guam. The majority (77%) of the impacts to terrestrial biological resources would result from Alternative B, with 848 acres (343 ha) of limestone forest disturbed. In addition, approximately 1,060 acres (429 ha) of Overlay Refuge lands, or approximately 5% of Overlay Refuge lands currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan/South Finegayan Cantonment/Family Housing (Alternative B), Route 15 LFTRC (Alternative 1), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (1)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative B</td>
<td>2 (0.8)</td>
<td>848 (343)</td>
<td>977 (395)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>PSTG, MS</td>
<td>MFB: 791 (320) MC: 791 (320) GR: 565 (229) GMK: 791 (320) Ser: 661 (268)</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>65 (26)</td>
<td>190 (77)</td>
<td>NA</td>
<td>GR</td>
<td>-</td>
<td>MFB: 81 (33) MC: 81 (33) GR: 283 (115) GMK: 81 (33) Ser: 67 (27)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>71 (29)</td>
<td>1,062 (430)</td>
<td>1,060 (429)</td>
<td>-</td>
<td>-</td>
<td>MFB: 908 (367) MC: 909 (368) GR: 985 (399) GMK: 908 (367) Ser: 758 (307)</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, NA = not applicable, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

Cultural Resources

Finegayan Cantonment/Family Housing Alternative A with Route 15 LFTRC Alternative 1

Adverse effects to historic properties and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives A and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines linking Alternative A and Alternative 1 would occur along Routes 1, 2A, 3, 3A, 4, 5, 9, 10, 15, and 17. In general, IT/COMM lines would follow existing roads; however; additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 48% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011b, 2014a, 2014b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014a). Within the PDIA for the IT/COMM lines, approximately 1% of Route 1, 5% of Route 2A, 100% of Route 3, 73% of Route 3A, 1% of Route 4, 40% of Route 5, 79% of Route 9, none of Route 10, 26% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-5 lists 12 known archaeological sites within the IT/COMM lines PDIA. Three of the sites, including one artifact scatter, one Japanese defensive complex, and portions of NWF, are eligible for
listing in the NRHP. Nine archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 3A, 4, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-5. Archaeological Sites within the IT/COMM Lines Potential Impacted area for Finegayan Cantonment/Family Housing (Alternative A) and Route 15 LFTRC (Alternative 1)

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII American Military</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
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<td>66-02-2644</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
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<td>NA</td>
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<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
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<td>66-07-2124</td>
<td>Bottle dump</td>
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<td>Welch 2010</td>
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<td>66-07-2321</td>
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<td>66-08-1065</td>
<td>Northwest Field</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
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<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
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<td>T-MSAU-1</td>
<td>Japanese dump and groundstone tool</td>
<td>Pre-Contact/WWII Japanese Military</td>
<td>Church et al. 2009</td>
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<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte; Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
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</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.
*Map Numbers from Welch (2009) and Welch (2010).
One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative A and the LFTRC Alternative 1 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-5), and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 3, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects are anticipated to occur due to operation of the IT/COMM utilities as these lines would be buried and there would be no change in use and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with Route 15 LFTRC Alternative 1**

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives A and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. The PDIA for the IT/COMM lines associated with this site combination would be similar to that described above for Alternative A and Alternative 1. The installation of IT/COMM links between Alternative B and the LFTRC Alternative 1 has the potential to cause adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-5) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 3A, 4, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects are anticipated to occur due to operation of the IT/COMM utilities as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of
these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Ground Transportation**

*Finegayan Cantonment/Family Housing Alternative A with Route 15 LFTRC Alternative 1*

The travel demand modeling methodology for the combination of alternatives was defined and directed by the DoD and the FHWA to provide detailed off-base (external) roadway and intersection analysis for one representative pairing (the modeled combination) of each cantonment/family housing alternative with one of the LFTRC site alternatives.

The modeled combination for Cantonment/Family Housing Alternative A included a pairing with LFTRC Alternative 5 (see Section 3.12). Although Alternative 5 was used for the modeled combination, the results allowed for a thorough qualitative assessment of impacts associated with the other cantonment/family housing and LFTRC alternative combinations as well. Modeling results for this scenario indicate that weekday a.m. peak hour vehicle traffic related to the proposed action is generated solely by operations at the cantonment/family housing area. LFTRC-related traffic would occur prior to the start of weekday a.m. peak hour (8:00 a.m.) and may coincide with the weekday p.m. peak hour (4:30 p.m. to 5:30 p.m.) (see Section 5.1.12). Operations of the LFTRC would increase traffic on the off-base (external) roadway segments and intersections that comprise the most direct route between the main cantonment gate and the LFTRC gates by approximately 38 vehicles (measured in passenger car equivalents) (see Table 5.1.12-2 in Chapter 5). LFTRC-related traffic represents an insubstantial amount of traffic (less than 5%) along the route. This minimal incremental increase in traffic volumes would not adversely affect level of service on roadways or at intersections along the route. The relative contribution from LFTRC traffic to the off-base (external) roadway segment and intersection impacts of each cantonment/family housing alternative would be minimal and would not vary appreciably with any LFTRC pairing (Alternative 1, 2, 3, 4, or 5). Therefore, the impacts to off-base (external) roadway segments and intersections would be essentially the same for Alternative A with Alternative 1, Alternative A with Alternative 2, 3, or 4, and Alternative A with Alternative 5. A qualitative discussion of the potential effects of LFTRC-related traffic is provided for each combination.

Pairing Alternative A with Alternative 1 may result in a slight increase in vehicles (less than 5%) on roadway segments and at intersections that comprise the most direct route between the Alternative A Main Gate and the Alternative 1 gate, and a slight decrease in vehicles compared to the modeled combination Alternative A Main Gate and the Alternative 5 gate (Figure 6.1.2-1). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.
Figure 6.1.2-1
Travel Routes from Finegayan Cantonment/Family Housing (Alternative A) to the LFTRC Alternatives

Legend

- NWF (4.4 mi/7.0 km)
- Route 15 (7.8 mi/12.6 km)
- NAVMAG East/West (27.9 mi/44.9 km)
- NAVMAG L-Shaped (27.9 mi/44.9 km)
- NAVMAG North/South (22.3 mi/35.9 km)
- Highways
- Airfields
- Finegayan Cantonment/Family Housing Alternative
- LFTRC Alternatives
- DoD Properties

Source: NAVFAC Pacific 2013
The impacts to off-base (external) roadway segments and intersections are summarized in Table 6.1.2-6.

Table 6.1.2-6. Summary of Additive Impacts to Ground Transportation Resources with the Finegayan Cantonment/Family Housing (Alternative A) and any LFTRC Alternative

<table>
<thead>
<tr>
<th>#</th>
<th>Roadway Segments*</th>
<th>Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route 1, from Route 3 to Route 34 (SI-M)</td>
<td>Route 3 / 9 / Chalan Santa Anita (SI-M)</td>
</tr>
<tr>
<td>2</td>
<td>Route 1, from Route 34 to Route 16 (SI-M)</td>
<td>Route 3 / Royal Palm Drive (SI-M)</td>
</tr>
<tr>
<td>3</td>
<td>Route 3, from Route 3A/9 to Finegayan Main Gate (SI-M)</td>
<td>Route 1 / Route 3 (SI-M)</td>
</tr>
<tr>
<td>4</td>
<td>Route 3, from Finegayan Main Gate To Finegayan Residential Gate (SI-M)</td>
<td>Route 1 / Route 27 (SI-M)</td>
</tr>
<tr>
<td>5</td>
<td>Route 3, from Finegayan Residential Gate To Route 28 (SI-M)</td>
<td>Route 1 / Route 26 (SI-M)</td>
</tr>
<tr>
<td>6</td>
<td>Route 3, from Route 28 To South Finegayan Main Gate (SI-M)</td>
<td>Route 16 / Route 27 (SI-M)</td>
</tr>
<tr>
<td>7</td>
<td>Route 3, from South Finegayan Main Gate To Route 1 (SI-M)</td>
<td>Route 16 / Route 10A (SI-M)</td>
</tr>
<tr>
<td>8</td>
<td>Route 28, from Chalan Balako to Route 3 (SI-M)</td>
<td>Route 1 / Route 14A (SI-M)</td>
</tr>
<tr>
<td>9</td>
<td>NA</td>
<td>Route 1 / Route 10A (SI-M)</td>
</tr>
<tr>
<td>Total</td>
<td>8, SI-M</td>
<td>9, SI-M</td>
</tr>
</tbody>
</table>

Legend: NA = not applicable, SI-M = significant but may be mitigated impact.

Notes:*Includes impacts to roadway segments in at least one direction during one (or both) weekday a.m. or p.m. peak hours.

**Roadway Segment Operations.** A capacity analysis was conducted to determine potential impacts to the off-base (external) roadway network during weekday a.m. and p.m. peak hours. The volume to capacity (v/c) ratio and LOS for each study roadway segment was compared to the baseline conditions to determine if any significant impacts would occur. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would result in a potentially significant impact on eight study roadway segments in at least one direction during the weekday a.m. and/or weekday p.m. peak hours:

**Route 1, from Route 3 to Route 34:** This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.99 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.01 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.08. The proposed action would increase traffic on this study roadway segment by approximately 180 vehicles during the weekday p.m. peak hour. This 6.9% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour.
• Route 1, from Route 34 to Route 16. This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.96 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.97 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.08. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour.

• Route 3, from Route 3A/9 to Finegayan Main Gate. This study roadway segment currently operates at acceptable LOS B with a v/c ratio of 0.64 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS C with a v/c ratio of 0.75 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.02. Therefore, the proposed action would result in a significant impact in this study roadway segment in the southbound/westbound during the weekday a.m. peak hour.

• Route 3, from Finegayan Main Gate to Finegayan Residential Gate. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.09 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.24 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.41. The proposed action would increase traffic on this study roadway segment by approximately 128 vehicles during the weekday p.m. peak hour. This 12.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound during the weekday a.m. peak hour.

• Route 3, from Finegayan Residential Gate to Route 28. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.23 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.36 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.61. The proposed action would increase the traffic on this study roadway segment by approximately 183 vehicles during the weekday a.m. peak hour. This 15.4% increase in traffic is greater than the 5.0% threshold of significance.

• During the weekday p.m. peak hour, this study roadway segment currently operates at acceptable LOS D with a v/c ratio 0.81 in the northbound/eastbound direction and acceptable LOS B with a v/c ratio of 0.67 and southbound/westbound directions hour under Existing conditions. This study roadway segment would continue to operate at acceptable LOS E with a v/c ratio of 0.91 and LOS C with a v/c ratio of 0.74 in the northbound/eastbound and southbound/westbound directions, respectively, during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.21 in the northbound/eastbound direction and 1.08 in the southbound/westbound direction during the weekday p.m. peak hour. Therefore, the
proposed action would result in a significant impact on this study roadway segment in the southbound/westbound directions during the weekday a.m. and p.m. peak hours, and in the northbound/eastbound direction during the weekday p.m. peak hour.

- **Route 3, from Route 28 to South Finegayan Main Gate.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.07 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.25 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.36. The proposed action would increase traffic on this study roadway segment by approximately 165 vehicles during the weekday p.m. peak hour. This 7.7% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour.

- **Route 3, from South Finegayan Main Gate to Route 1.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 2.11 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. Construction of roadway improvements (i.e., signalization of the intersections at Guam Regional Medical City and Okkodo High School and provision of an additional southbound through lane on Route 3) would increase the capacity of this roadway segment. However, despite the fact that these improvements would be constructed prior to Year 2030, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.35 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.45. The proposed action would increase traffic on this study roadway segment by approximately 161 vehicles during the weekday a.m. peak hour. This 7.0% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour.

- **Route 28, from Chalan Balako to Route 3.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.08 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at LOS F with a v/c ratio of 1.48 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.56 in the southbound/westbound direction during the weekday a.m. peak hour. The proposed action would increase the traffic on this study roadway segment by approximately 54 vehicles during the weekday a.m. peak hour. This 5.1% increase in traffic is greater than the 5.0% threshold of significance.

- **During the weekday p.m. peak hour,** this study roadway segment currently operates at acceptable LOS B with a v/c ratio of 0.68 in the northbound/eastbound direction under Existing Conditions. This study roadway segment would operate at acceptable LOS E in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.04 in the northbound/eastbound direction during the weekday p.m. peak hour. Therefore, the proposed action would result in a significant impact on
this study roadway segment in the southbound/westbound direction during the weekday a.m. peak hour and in the northbound/eastbound direction during the weekday p.m. peak hour.

To reduce impacts to less than significant levels on these study roadway segments, the following potential mitigation measures may be implemented:

- **Potential Mitigation Measure Fin-Roads-1**: Provide additional eastbound travel lane. Widening of the segment of Route 1, from Route 3 to Route 34, a distance of approximately 0.5 mile (1.0 km) would be required to provide one additional travel lane in the eastbound direction. With implementation of Potential Mitigation Measure Fin-Roads-1, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Roads-2**: Provide additional eastbound travel lane. Widening of the segment of Route 1, from Route 34 to Route 16, a distance of approximately 0.06 mile (0.10 km), would be required to provide one additional travel lane in the eastbound direction. With implementation of Potential Mitigation Measure Fin-Roads-2, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Roads-3**: Provide additional southbound travel lane. Widening of the segment of Route 3, from Route 3A/9 to Finegayan Main Gate, a distance of approximately 0.5 mile (0.8 km), would be required to provide one additional travel lane in the southbound direction. With implementation of Potential Mitigation Measure Fin-Roads-3, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Roads-4**: Provide additional southbound travel lane. Widening of the segment of Route 3, from Finegayan Main Gate to Finegayan Commercial Gate, a distance of approximately 1.75 miles (2.82 km), would be required to provide one additional travel lane in the southbound direction. With implementation of Potential Mitigation Measure Fin-Roads-4, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Roads-5**: Provide additional travel lanes in the northbound and southbound directions. Widening of the segment of Route 3, from Finegayan Commercial Gate to Route 28, a distance of approximately 0.5 mile (0.8 km), would be required to provide one additional travel lane in the northbound and southbound directions. With implementation of Potential Mitigation Measure Fin-Roads-5, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Roads-6**: Provide additional southbound travel lane. Widening of the segment of Route 3, from Route 28 to South Finegayan Main Gate, a distance of approximately 0.87 mile (1.40 km), would be required to provide one additional travel lane in the southbound direction. With implementation of Potential Mitigation Measure Fin-Roads-6, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)
• **Potential Mitigation Measure Fin-Roads-7: Provide additional southbound travel lane.** Widening of the segment of Route 3, from South Finegayan Main Gate to Route 1, a distance of approximately 1.67 miles (2.68 km), would be required to provide one additional travel lane in the southbound direction. With implementation of Potential Mitigation Measure Fin-Roads-7, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• **Potential Mitigation Measure Fin-Roads-8: Provide additional eastbound and westbound travel lanes.** Widening of the segment of Route 28, from Chalan Balako to Route 3, a distance of approximately 0.97 mile (1.56 km), would be required to provide one additional travel lane in the eastbound and westbound directions. With implementation of Potential Mitigation Measure Fin-Roads-8, level of service on this study roadway segment would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

The measures needed to mitigate the impacted roadway segments would be feasible at all eight locations. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Intersection Operations.** Intersection analysis was conducted to determine potential impacts to the off-base (external) intersections during weekday a.m. and p.m. peak hours. The LOS for each study intersection was compared to the baseline conditions to determine if any significant impacts would occur. An impact summary is provided in Table 6.1.2-6. The detailed results of the intersection analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would potentially result in a significant impact at nine study intersections during the weekday a.m. and/or weekday p.m. peak hours.

• **Route 3 / 9 / Chalan Santa Anita.** This two-way stop-controlled study intersection currently operates at acceptable LOS C with 21.9 seconds of delay and would continue to operate at acceptable LOS E with 37.7 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would degrade to unacceptable LOS F with greater than 180.0 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

• **Route 3 / Royal Palm Drive.** This two-way stop-controlled study intersection currently operates at acceptable LOS C with 16.3 seconds of delay and would operate at acceptable LOS E with 36.4 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would degrade to unacceptable LOS F with 57.8 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

• **Route 1 / Route 3.** This signalized study intersection currently operates at LOS F and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. During the weekday p.m. peak hour this study intersection currently operates at LOS
E with 70.8 seconds of delay and would continue to operate at LOS E with 63.4 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at LOS F with greater than 180.0 seconds of delay and the proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday a.m. peak hour. During the weekday p.m. peak hour the intersection would degrade to operate at unacceptable LOS F with 90.1 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 1 / Route 27.** This signalized study intersection currently operates at acceptable LOS E with 70.3 seconds of delay and would operate at unacceptable LOS F with 118.3 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with 118.5 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 1 / Route 26.** This signalized study intersection currently operates at acceptable LOS C with 27.9 seconds of delay and would operate at unacceptable LOS F with 87.6 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with 89.4 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- **Route 16 / Route 27.** This signalized study intersection currently operates at acceptable LOS D with 50.1 seconds of delay and acceptable LOS E with 71.2 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This signalized study intersection would operate at unacceptable LOS F with greater than 180.0 seconds of delay and 154.7 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay and 159.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The project would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 16 / Route 10A.** This signalized study intersection currently operates at unacceptable LOS F and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay. The project would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 1 / Route 14A.** This signalized study intersection currently operates at unacceptable LOS F with 156.1 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This
study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- **Route 1 / Route 10A.** This signalized study intersection currently operates at acceptable LOS E with 62.6 seconds of delay and would operate at unacceptable LOS F with 139.3 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with 144.7 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

To reduce impacts to less than significant levels on these study intersections, the following potential mitigation measures may be implemented:

- **Potential Mitigation Measure Fin-Int-1:** Combine Route 3, 3A and 9 into one signalized intersection. Combine Route 3, 3A and 9 into one signalized intersection with the following configuration:
  - Northbound (Chalan Santa Anita): one shared left/through/right-turn lane
  - Southbound (Route 3A): One right-turn lane with 150-foot (46-m) storage pocket
  - Eastbound (Route 3) and westbound (Route 8): one left-turn lane with 150-foot (46-m) storage pocket, one through lane, one shared through/right-turn lane

With implementation of Potential Mitigation Measure Fin-Int-1, level of service at this study intersection would improve and the significant impact would be mitigated to less than significant levels. The new intersection would operate at LOS A (7.6 seconds of delay) and LOS A (5.6 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-2:** Add exclusive eastbound right-turn lane on Royal Palm Drive. Provide an exclusive eastbound right-turn lane on Royal Palm Drive with 100-foot (30-m) storage pocket. With implementation of Potential Mitigation Measure Fin-Int-2, level of service at this study intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 3/Royal Palm Drive two-way stop-controlled intersection would operate at LOS E (48.0 seconds of delay) and LOS C (15.6 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-3:** Add second eastbound left-turn lane and exclusive westbound right-turn lane on Route 1. Provide a second eastbound right-turn lane and an exclusive westbound right-turn lane with 200 foot (61 m) storage pocket on Route 1. With implementation of Potential Mitigation Measure Fin-Int-3, operations at this signalized intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 1/Route 3 signalized intersection would operate at LOS F (127.8 seconds of delay) and LOS B (14.9 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Although the intersection would continue to operate at LOS F during the weekday
a.m. peak hour, average intersection delay under Year 2030 Alternative A with LFTRC at NWF (Alternative 5) Conditions would be less than the average intersection delay under Year 2030 Baseline Conditions. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-4:** Restripe southbound (Salisbury Street) approach and provide northbound right-turn overlap phase on Route 27. Restripe the southbound (Salisbury Street) approach to one left-turn lane with 80 feet (24 m) storage length, one through lane and one right-turn lane with 50 feet (15 m) storage length. Provide a right-turn overlap phase on the northbound (Route 27) approach. With implementation of Potential Mitigation Measure Fin-Int-4, level of service at this signalized intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 1/Route 27 signalized intersection would improve to operate at LOS F (81.7 seconds of delay) and LOS D (38.8 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Although the intersection would continue to operate at LOS F during the weekday a.m. peak hour, average intersection delay under Year 2030 Alternative A with LFTRC Alternative 5 Conditions would be less than the average intersection delay under Year 2030 Baseline Conditions. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-5:** Provide northbound right-turn overlap phase on Route 26. Provide a right-turn overlap phase on the northbound (Route 26) approach. With implementation of Potential Mitigation Measure Fin-Int-5, level of service at this signalized intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 1/Route 26 signalized intersection would operate at LOS D (37.2 seconds of delay) and LOS E (63.8 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-6:** Convert westbound right-turn lane to through lane and provide exclusive westbound and eastbound right-turn lanes on Route 27. Widen and reconfigure the westbound (Route 27) approach. Convert the existing right-turn lane to a westbound (Route 27) through lane and add an exclusive westbound (Route 27) right-turn lane with 150 feet (46 m) storage length. Provide an exclusive eastbound (Route 27) right-turn lane with 150 feet (46 m) storage length. With implementation of Potential Mitigation Measure Fin-Int-8, level of service at this signalized intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 16/Route 27 signalized intersection would operate at LOS F (116.0 seconds of delay) and LOS F (117.6 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Although the intersection would continue to operate at LOS F during the weekday a.m. and p.m. peak hours, average intersection delay under Year 2030 Alternative A with LFTRC Alternative 5 Conditions would be less than the average intersection delay under Year 2030 Baseline Conditions. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-Int-7:** Provide free southbound right-turn on Route 16. Provide a free right-turn on the southbound (Route 16) approach. With implementation of Potential Mitigation Measure Fin-Int-7, operations at intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 16/Route 10A signalized intersection would operate at LOS F (greater than 180.0 seconds of delay) during the weekday a.m. peak hour. Although the intersection would continue to operate at LOS F during the weekday a.m. peak hour, average intersection delay under Year 2030 Alternative A with LFTRC (Alternative 5 Conditions would be less than the average intersection delay under Year 2030 Baseline Conditions. Therefore, this impact is considered to be significant but mitigable. (SI-M)
• **Potential Mitigation Measure Fin-Int-8:** Provide exclusive eastbound right-turn lane on Route 1. Widen and reconfigure the eastbound (Route 1) approach. Provide an exclusive eastbound (Route 1) right-turn lane with 150 feet (46 m) storage length. With implementation of Potential Mitigation Measure Fin-Int-8, operations at this signalized intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 1/Route 14A signalized intersection would operate at LOS F (158.1 seconds of delay) during the weekday p.m. peak hour. Although the intersection would continue to operate at LOS F during the weekday p.m. peak hour, average intersection delay under Year 2030 Alternative A with LFTRC Alternative 5 Conditions would be less than the average intersection delay under Year 2030 Baseline Conditions. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• **Potential Mitigation Measure Fin-Int-9:** Provide exclusive northbound right-turn lane and overlap phase on Route 1. Provide an exclusive right-turn lane with 150 feet (46 m) storage length and provide an overlap phase on the northbound (Route 27) approach. With implementation of Potential Mitigation Measure Fin-Int-9, level of service at this intersection would improve and the significant impact would be mitigated to less than significant levels. The Route 1/Route 10A signalized intersection would operate at acceptable LOS C (25.8 seconds of delay) and acceptable LOS D (40.6 seconds of delay) during the weekday a.m. and p.m. peak hours, respectively. Therefore, this impact is considered to be significant but mitigable. (SI-M)

The measures needed to mitigate the impacted intersections would be feasible at all nine locations. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Transit Conditions.** While none of the proposed cantonment/family housing or LFTRC alternatives are directly served by fixed-route transit, the proposed action may have a minor impact on the operation of Grey Line #1 by increasing travel delay at the Route 1/Route 3 intersection and the Route 1/Route 26 intersection during the weekday a.m. and p.m. peak hours. However, the increase in travel time would not be substantial and would not be expected to negatively effect on-time performance (e.g., substantially increase transit headways or reduce frequency). Additionally, implementation of Potential Mitigation Measure Fin-Int-3 and Potential Mitigation Measure Fin-Int-5 would improve operations and reduce average delay at these locations compared to Year 2030 Baseline Conditions.

**Pedestrian and Bicycle Conditions.** The proposed action would result in a significant increase in vehicular traffic on Route 3, whose northern portions near the main cantonment lack shoulders or sidewalks. This increases the potential for collisions with bicyclists and pedestrians at the locations where they are likely to be present. Specifically, Artero Drive (Finegayan Elementary School and McDonald’s) and Okkodo High School.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with Route 15 LFTRC Alternative 1**

The travel demand modeling methodology for the combination of alternatives was defined and directed by the DoD and the FHWA to provide detailed off-base (external) roadway and intersection analysis for one representative pairing (the modeled combination) of each cantonment/family housing alternative with one of the LFTRC site alternatives. The modeled combination for Alternative B involved a pairing with LFTRC Alternative 2 or 4 (see Section 3.12 in Chapter 3). Modeling results for this scenario indicate that weekday a.m. peak hour vehicle traffic related to the proposed action is generated solely by operations at
the cantonment/family housing area. LFTRC-related traffic would occur prior to the start of weekday a.m. peak hour (8:00 a.m.) and may coincide with the weekday p.m. peak hour (4:30 p.m. to 5:30 p.m.) (see Section 5.1.12 in Chapter 5). Operations of the LFTRC would increase traffic on the off-base (external) roadway segments and intersections that comprise the most direct route between the main cantonment gate and the LFTRC gates, by approximately 38 vehicles (measured in passenger car equivalents) (see Table 5.1.12-2). LFTRC-related traffic represents an insubstantial amount of traffic (less than 5%) along the route. This minimal incremental increase in traffic volumes would not adversely affect level of service on roadways or at intersections along the route. The relative contribution from LFTRC traffic to the off-base (external) roadway segments and intersections of each cantonment/family housing alternative would be minimal and would not vary appreciably with any LFTRC pairing (Alternative 1, 2, 3, 4, or 5). Therefore, the impacts to off-base (external) roadway segments and intersections would be essentially the same for Alternative B with Alternative 1, Alternative B with Alternative 2, 3, or 4, and Alternative B with Alternative 5. A qualitative discussion of the potential effects of LFTRC-related traffic is provided for each combination.

Pairing Alternative B with Alternative 1 may result in a slight increase (less than 5%) in vehicles on roadway segments and at intersections along the most direct route between the Alternative B Main Gate and the Alternative 1 gate, and a slight decrease in vehicles compared to the modeled combination of Alternative B Main Gate and the Alternative 2 or 4 gate (Figure 6.1.2-2). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

The impacts to off-base (external) roadway segments and intersections are summarized in Table 6.1.2-7.

### Table 6.1.2-7. Summary of Additive Impacts to Ground Transportation Resources with the Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with any LFTRC

<table>
<thead>
<tr>
<th>#</th>
<th>Roadway Segments*</th>
<th>Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route 1, from Route 3 to Route 34 (SI-M)</td>
<td>Route 3 / 9 / Chalan Santa Anita (SI-M)</td>
</tr>
<tr>
<td>2</td>
<td>Route 1, from Route 34 to Route 16 (SI-M)</td>
<td>Route 3 / Royal Palm Drive (SI-M)</td>
</tr>
<tr>
<td>3</td>
<td>Route 3, from Route 3A/9 to Finegayan Main Gate (SI-M)</td>
<td>Route 15 / Chalan Lajuna (SI)**</td>
</tr>
<tr>
<td>4</td>
<td>Route 3, from Finegayan Main Gate To Finegayan Residential Gate (SI-M)</td>
<td>Route 1 / Route 3 (SI-M)</td>
</tr>
<tr>
<td>5</td>
<td>Route 3, from Finegayan Residential Gate To Route 28 (SI-M)</td>
<td>Route 1 / Route 27 (SI-M)</td>
</tr>
<tr>
<td>6</td>
<td>Route 3, from Route 28 To South Finegayan Main Gate (SI-M)</td>
<td>Route 1 / Route 26 (SI-M)</td>
</tr>
<tr>
<td>7</td>
<td>Route 3, from South Finegayan Main Gate To Route 1 (SI-M)</td>
<td>Route 16 / Route 27 (SI-M)</td>
</tr>
<tr>
<td>8</td>
<td>Route 16, from Route 27 to Route 10A (SI)**</td>
<td>Route 16 / Route 10A (SI-M)</td>
</tr>
<tr>
<td>9</td>
<td>Route 28, from Chalan Balako to Route 3 (SI-M)</td>
<td>Route 15 / Route 26 (SI-M)**</td>
</tr>
<tr>
<td>10</td>
<td>Route 16, from Route 10A To Barrigada Main Gate (SI)**</td>
<td>Route 1 / Route 14A (SI-M)</td>
</tr>
<tr>
<td>11</td>
<td>NA</td>
<td>Route 1 / Route 10A (SI-M)</td>
</tr>
</tbody>
</table>

**Total** | 10 (2 SI, 8 SI-M) | 11 (1 SI, 10 SI-M)

**Legend:** NA indicates not applicable. SI indicates significant impact. SI-M indicates significant but may be mitigated impact.

**Notes:** * Includes impacts to roadway segments in at least one direction during one (or both) weekday a.m. or p.m. peak hours.
** Indicates an impact that would not occur under Year 2030 Alternative A Conditions.
Figure 6.1.2-2
Travel Routes from Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) to the LFTRC Alternatives
Source: NAVFAC Pacific 2013
Roadway Segment Operations. A capacity analysis was conducted to determine potential impacts to the off-base (external) roadway network during weekday a.m. and p.m. peak hours. The LOS for each study roadway segment was compared to the baseline conditions to determine if any significant impacts would occur. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would potentially result in a significant impact on ten study roadway segments in at least one direction during the weekday a.m. and/or weekday p.m. peak hours.

- **Route 1, from Route 3 to Route 34.** This study roadway segment currently operates at LOS E with a v/c ratio of 0.99 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at LOS F with a v/c ratio of 1.01 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.11. The proposed action would increase traffic on this study roadway segment by approximately 250 vehicles during the weekday p.m. peak hour. This 9.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour. A similar impact was identified on this study roadway segment under Year 2030 Alternative A Conditions.

- **Route 1, from Route 34 to Route 16.** This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.96 in the in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.97 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.07. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour. A similar impact was identified on this study roadway segment under Year 2030 Alternative A Conditions.

- **Route 3, from Route 3A/9 to Finegayan Main Gate.** This study roadway segment currently operates at acceptable LOS B with a v/c ratio of 0.64 and acceptable LOS A with a v/c ratio of 0.42 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study roadway segment would operate at acceptable LOS C with a v/c ratio of 0.75 and LOS A with a v/c ratio of 0.52 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.05 and 1.04 during the weekday a.m. and p.m. peak hours, respectively. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound during the weekday a.m. and p.m. peak hours. A similar impact was identified on this study roadway segment during the weekday a.m. peak hour under Year 2030 Alternative A Conditions. An impact was not identified during the weekday p.m. peak hour Year 2030 Alternative A Conditions.

- **Route 3, from Finegayan Main Gate to Finegayan Residential Gate.** This study roadway segment currently operates at acceptable LOS A with a v/c ratio of 0.45 and 0.60 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would continue to operate at acceptable LOS A
with a v/c ratio of 0.49 during the weekday a.m. peak hour and would operate at acceptable LOS B with a v/c ratio of 0.68 during the weekday a.m. and p.m. peak hours, respectively, in the northbound/eastbound direction under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.15 and 1.10 during the weekday a.m. and p.m. peak hours, respectively.

This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.09 and acceptable LOS A with a v/c ratio of 0.51 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.24 in the northbound/eastbound direction during the weekday a.m. peak hour, and at acceptable LOS A in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would degrade to operate at LOS F with a v/c ratio of 1.13 and would operate at acceptable LOS A with a v/c ratio of 0.67 in the southbound/westbound direction during the weekday a.m. peak hour and at acceptable LOS A in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.41 and 1.29 during the weekday a.m. and p.m. peak hours, respectively.

This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.23 and acceptable LOS B with a v/c ratio of 0.67 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.36 and at acceptable LOS C with a v/c ratio of 0.74 during the weekday p.m. peak hour in the southbound/westbound direction during the weekday a.m. peak hour, and at acceptable LOS C with a v/c ratio of 0.74 during the weekday p.m. peak hour in the southbound/westbound direction under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.55 and would degrade to operate at LOS F with a v/c ratio of 1.44 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively.

The proposed action would increase traffic on this study roadway segment by approximately 148 vehicles during the weekday p.m. peak hour. This 13.9% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound and southbound/westbound directions during the weekday a.m. and p.m. peak hours.

A similar impact was identified in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour under Year 2030 Alternative A Conditions. An impact was not identified in the northbound/eastbound direction during either the weekday a.m. or p.m. peak hours, nor in the southbound/westbound direction during the weekday p.m. peak hour under Year 2030 Alternative A Conditions.

- Route 3, from Finegayan Residential Gate to Route 28. This study roadway segment currently operates at acceptable LOS B with a v/c ratio of 0.67 and LOS D with a v/c ratio of 0.81 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would operate at acceptable LOS B with a v/c ratio of 0.70 and LOS E with a v/c ratio of 0.90 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively, in the northbound/eastbound direction under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.41 and 1.29 during the weekday a.m. and p.m. peak hours, respectively.

This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.23 and acceptable LOS B with a v/c ratio of 0.67 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.36 during the weekday a.m. peak hour, and at acceptable LOS C with a v/c ratio of 0.74 during the weekday p.m. peak hour in the southbound/westbound direction under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.55 and would degrade to operate at LOS F with a v/c ratio of 1.44 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively.

The proposed action would increase traffic on this study roadway segment by approximately 143 vehicles during the weekday p.m. peak hour. This 12.5% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on
this study roadway segment in the northbound/eastbound and southbound/westbound directions during the weekday a.m. and p.m. peak hours.

A similar impact was identified in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour under Year 2030 Alternative A Conditions. An impact was not identified in the northbound/eastbound direction during either the weekday a.m. or p.m. peak hours, nor in the southbound/westbound direction during the weekday p.m. peak hour under Year 2030 Alternative A Conditions.

- **Route 3, from Route 28 to South Finegayan Main Gate.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.07 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.25 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.36 in the southbound/westbound direction. The proposed action would increase traffic on this study roadway segment by approximately 166 vehicles during the weekday p.m. peak hour. This 7.7% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour. A similar impact was identified on this study roadway segment under Year 2030 Alternative A Conditions.

- **Route 3, from South Finegayan Main Gate to Route 1.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 2.11 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. Construction of roadway improvements (i.e., signalization of the intersections at Guam Regional Medical City and Okkodo High School and provision of an additional southbound through lane on Route 3) would increase the capacity of this roadway segment. However, despite the fact that these improvements would be constructed prior to Year 2030, this study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.35 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.46. The proposed action would increase traffic on this study roadway segment by approximately 168 vehicles during the weekday a.m. peak hour. This 7.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the southbound/westbound direction on this study roadway segment during the weekday a.m. peak hour. A similar impact was identified on this study roadway segment under Year 2030 Alternative A Conditions.

- **Route 16, from Route 27 to Route 10A.** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.84 in the northbound/eastbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.98 in the northbound/eastbound during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would degrade to LOS F with a v/c ratio of 1.01. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday p.m. peak hour. No impacts were identified on this study roadway segment under Year 2030 Alternative A Conditions.
• **Route 28, from Chalan Balako to Route 3.** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.87 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.98 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would degrade to LOS F with a v/c ratio of 1.01. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday p.m. peak hour. A similar impact was identified on this study roadway segment under Year 2030 Alternative A Conditions. An additional impact in the southbound/westbound direction was identified during the weekday a.m. peak hour under Year 2030 Alternative A Conditions.

• **Route 16, from Route 10A to Barrigada Main Gate.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.09 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.05 in the northbound/eastbound during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.11. The proposed action would increase traffic on this study roadway segment by approximately 94 vehicles during the weekday a.m. peak hour. This 5.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour. No impacts were identified on this study roadway segment under Year 2030 Alternative A Conditions.

To reduce impacts to less than significant levels on these study roadway segments, the following potential mitigation measures may be implemented:

- **Potential Mitigation Measure Fin-S, Fin-Roads-1:** Implement Potential Mitigation Measure Fin-Roads-1. With implementation of Potential Mitigation Measure Fin-Roads-1, traffic operations on Route 1, from Route 3 to Route 34 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-S, Fin-Roads-2:** Implement Potential Mitigation Measure Fin-Roads-2. With implementation of Potential Mitigation Measure Fin-Roads-2, traffic operations on Route 1, from Route 34 to Route 16 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-S, Fin-Roads-3:** Implement Potential Mitigation Measure Fin-Roads-3. With implementation of Potential Mitigation Measure Fin-Roads-3, traffic operations on Route 3, from Route 3A/9 to Finegayan Main Gate would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- **Potential Mitigation Measure Fin-S, Fin-Roads-4:** Implement Potential Mitigation Measure Fin-Roads-4. With implementation of Potential Mitigation Measure Fin-Roads-4, traffic operations on Route 3, from Finegayan Main Gate to Finegayan Residential Gate would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)
• Potential Mitigation Measure Fin-S. Fin-Roads-5: Implement Potential Mitigation Measure Fin-Roads-5. With implementation of Potential Mitigation Measure Fin-Roads-5, traffic operations on Route 3, from Finegayan Residential Gate to Route 28 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• Potential Mitigation Measure Fin-S. Fin-Roads-6: Implement Potential Mitigation Measure Fin-Roads-6. With implementation of Potential Mitigation Measure Fin-Roads-6, traffic operations on Route 3, from Route 28 to South Finegayan Main Gate would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• Potential Mitigation Measure Fin-S. Fin-Roads-7: Implement Potential Mitigation Measure Fin-Roads-7. With implementation of Potential Mitigation Measure Fin-Roads-7, traffic operations on Route 3, from South Finegayan Main Gate to Route 1 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• Potential Mitigation Measure Fin-S. Fin-Roads-8: Implement Potential Mitigation Measure Fin-Roads-8. With implementation of Potential Mitigation Measure Fin-Roads-8, traffic operations on Route 28, from Chalan Balako to Route 3 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

Significant impacts would also occur at two locations and potential mitigation measures have not been identified:

• Route 16, from Route 27 to Route 10A (SI)
• Route 16, from Route 10A to Barrigada Main Gate (SI)

The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

Intersection Operations. Intersection analysis was conducted to determine potential impacts to the off-base (external) intersections during weekday a.m. and p.m. peak hours. The LOS for each study intersection is compared to the baseline conditions to determine if any significant impacts would occur. An impact summary is provided in Table 6.1.2-7. The detailed results of the intersection analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would potentially result in a significant impact at 11 study intersections during the weekday a.m. and/or weekday p.m. peak hours.

• Route 3 / 9 / Chalan Santa Anita. This two-way stop-controlled study intersection currently operates at acceptable LOS C with 21.9 seconds of delay and would operate at acceptable LOS E with 37.7 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would degrade to unacceptable LOS F with greater than 180.0 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.
• **Route 3 / Royal Palm Drive.** This two-way stop-controlled study intersection currently operates at acceptable LOS C with 16.3 seconds of delay and would operate at acceptable LOS E with 36.4 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would degrade to unacceptable LOS F with greater than 180.0 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.

• **Route 15 / Chalan Lajuna.** This two-way stop-controlled study intersection currently operates at LOS D with 30.7 seconds of delay and LOS C with 23.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study intersection would operate at unacceptable LOS F with 75.8 seconds of delay and 82.6 seconds of delay during the weekday a.m. and p.m. peak hours under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at LOS F with 98.0 seconds of delay and 96.1 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The proposed action would not add more than 50 vehicles to this poorly performing intersection during the weekday a.m. peak hour. However, the proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday p.m. peak hour. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour. No impacts were identified at this study intersection under Year 2030 Alternative A Conditions.

• **Route 1 / Route 3.** This signalized study intersection currently operates at LOS F and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. During the weekday p.m. peak hour this study intersection currently operates at LOS E with 70.8 seconds of delay and would continue to operate at acceptable LOS E with 63.4 seconds of delay under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at LOS F with greater than 180.0 seconds of delay and the proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday a.m. peak hour. During the weekday p.m. peak hour the intersection would degrade to operate at unacceptable LOS F with 99.8 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours. A similar impact was identified under Year 2030 Alternative A Conditions.

• **Route 1 / Route 27.** This signalized study intersection currently operates at acceptable LOS E with 70.3 seconds of delay and would operate at unacceptable LOS F with 118.3 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative A Conditions, this study intersection would continue to operate at unacceptable LOS F with 122.9 seconds of delay during the weekday p.m. peak hour. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.

• **Route 1 / Route 26.** This signalized study intersection currently operates at acceptable LOS C with 27.9 seconds of delay and would operate at unacceptable LOS F with 87.6 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline
Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with 88.1 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday p.m. peak hour. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.

- **Route 16 / Route 27.** This signalized study intersection currently operates at acceptable LOS D with 50.1 seconds of delay and LOS E with 71.2 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study intersection would operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours. A similar impact was identified under Year 2030 Alternative A Conditions.

- **Route 16 / Route 10A.** This signalized study intersection currently operates at unacceptable LOS F with 143.3 seconds of delay and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. The proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday a.m. peak hour. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.

- **Route 15 / Route 26.** This two-way stop-controlled intersection currently operates at unacceptable LOS F with 62.1 seconds of delay and 147.3 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study intersection would continue to operate at unacceptable LOS F with 145.2 seconds of delay during the weekday a.m. and p.m. peak hours during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. The proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday a.m. and p.m. peak hours. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours. No impacts were identified at this study intersection under Year 2030 Alternative A Conditions.

- **Route 1 / Route 14A.** This signalized study intersection currently operates at unacceptable LOS F with 156.1 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection during the weekday p.m. peak hour.
Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour. A similar impact was identified under Year 2030 Alternative A Conditions.

- Route 1 / Route 10A. This signalized study intersection currently operates at acceptable LOS E with 62.6 seconds of delay and would operate at unacceptable LOS F with 139.3 seconds of delay during the weekday p.m peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 Alternative B Conditions, this study intersection would continue to operate at unacceptable LOS F with 146.1 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- A similar impact was identified under Year 2030 Alternative A Conditions.

To reduce impacts to less than significant levels on these study intersections, the following potential mitigation measures may be implemented:

- Potential Mitigation Measure Fin-S, Fin-Int-1: Implement Potential Mitigation Measure Fin-Int-1. With implementation of Potential Mitigation Measure Fin-Int-1, traffic operations at Route 3 / 9Chalan Santa Anita would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-2: Implement Potential Mitigation Measure Fin-Int-2. With implementation of Potential Mitigation Measure Fin-Int-2, traffic operations at Route 3 / Royal Palm Drive would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-3: Implement Potential Mitigation Measure Fin-Int-3. With implementation of Potential Mitigation Measure Fin-Int-3, traffic operations at Route 1 / Route 3 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-4: Implement Potential Mitigation Measure Fin-Int-4. With implementation of Potential Mitigation Measure Fin-Int-4, traffic operations at Route 1 / Route 27 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-5: Implement Potential Mitigation Measure Fin-Int-5. With implementation of Potential Mitigation Measure Fin-Int-5, traffic operations at Route 1 / Route 26 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-6: Implement Potential Mitigation Measure Fin-Int-6. With implementation of Potential Mitigation Measure Fin-Int-6, traffic operations at Route 16 / Route 27 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

- Potential Mitigation Measure Fin-S, Fin-Int-7: Implement Potential Mitigation Measure Fin-Int-7. With implementation of Potential Mitigation Measure Fin-Int-7, traffic operations at Route 16 / Route 10A would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)
• Potential Mitigation Measure Fin-S, Fin-Int-8: Implement Potential Mitigation Measure Fin-Int-8. With implementation of Potential Mitigation Measure Fin-Int-8, traffic operations at Route 15 / Route 26 would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• Potential Mitigation Measure Fin-S, Fin-Int-9: Implement Potential Mitigation Measure Fin-Int-9. With implementation of Potential Mitigation Measure Fin-Int-9, traffic operations at Route 1 / Route 14A would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

• Potential Mitigation Measure Fin-S, Fin-Int-10: Implement Potential Mitigation Measure Fin-Int-10. With implementation of Potential Mitigation Measure Fin-Int-10, traffic operations at Route 1 / Route 10A would improve and the significant adverse impact would be mitigated to less than significant levels. Therefore, this impact is considered to be significant but mitigable. (SI-M)

Significant impacts would also occur at the Route 15/Chalan Lajuna location and potential mitigation measures have not been identified.

The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

Transit Conditions. Transit conditions under Alternative B with Alternative 1 would be the same as those described above for Alternative A with Alternative 1.

Pedestrian and Bicycle Conditions. Pedestrian and bicycle conditions under Alternative B with Alternative 1 would be the same as those described above for Alternative A with Alternative 1.

Public Health and Safety

The primary health and safety issue associated with the Alternative A and Alternative 1 combination is the potential for traffic incidents. The driving distance between the proposed Finegayan alternatives (Alternatives A or B) and the proposed Route 15 LFTRC alternative (Alternative 1) is approximately 7.8 miles (12.5 km). Vehicles would use Routes 3, 9, and 1 to commute between the Alternative A or Alternative B area and Alternative 1. No high-crash frequency intersections are situated along this travel route. Because the travel distance between Alternative A or Alternative B and Alternative 1 is relatively short and there are no high-frequency crash intersections situated along the travel route, no significant additive traffic impacts are expected to occur.

The proposed action would result in a substantial increase in vehicular traffic on Route 3, whose northern portions near the main cantonment lack shoulders or sidewalks. This would increase the potential for collisions with bicyclists and pedestrians at the locations where they are likely to be present, specifically, Artero Drive (Finegayan Elementary School and McDonald’s) and Okkodo High School. Based on the hours of operation of Okkodo High School (6:45 a.m. to 3:00 p.m.) and the Guam Department of Public Works 2012-2013 bus schedule, the peak hour of school traffic would occur between 6 a.m. and 7 a.m. and 2:30 p.m. and 3:30 p.m. The peak hour of school traffic would not coincide or overlap with overall weekday peak traffic hours, which occur between 8:00 a.m. and 9:00 a.m. and between 4:30 p.m. and 5:30 p.m. Because peak school traffic would not coincide with overall weekday peak traffic hours, the increase in potential for collisions with children that would be commuting to school via walking or bicycle would be less than significant.
6.1.2.2 Finegayan Cantonment/Family Housing Alternative A or B with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)

Air Quality

The combined air quality impacts would be similar to those described Section 6.1.2.1. The combined construction island-wide impacts, similar to the emissions summarized in Table 6.1.2-1, would be less than significant as a result of these combined alternatives.

Terrestrial Biological Resources

Finegayan Cantonment/Family Housing Alternative A with NAVMAG (East/West) LFTRC Alternative 2

The additive impacts of implementing Cantonment Housing Alternative A, LFTRC Alternative 2, and the IT/COMM infrastructure are provided in Table 6.1.2-8. Overall, approximately 1,067 acres (432 ha) of limestone forest, or 6% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,333 acres (475 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The majority (96%) of the impacts to terrestrial biological resources would occur under Alternative A, with over 1,020 acres (413 ha) of limestone forest disturbed. The proposed IT/COMM alignment contributes very little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest$^1$ (acres [ha])</th>
<th>Secondary Limestone Forest$^1$ (acres [ha])</th>
<th>Overlay Refuge$^1$ (acres [ha])</th>
<th>ESA-Listed Special-Status Species$^2$</th>
<th>Guam-Listed Special-Status Species$^2$</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
</table>
| Alternative A | 2 (0.7) | 1,018 (412) | 1,250 (506) | MFB, MC, GR, GMK, Ser | MS, PSTG | MFB: 977 (395)  
MC: 978 (396)  
GR: 458 (185)  
GMK: 977 (395)  
Ser: 661 (268) |
| Alternative 2 | 0 | 19 (8) | 0 | - | - | MFB: 43 (17)  
MC: 43 (17)  
GR: 49 (20)  
GMK: 43 (17)  
Ser: 18 (7) |
| IT/COMM | 4 (2) | 24 (10) | 83 (34) | - | - | MFB: 36 (15)  
MC: 37 (15)  
GR: 137 (55)  
GMK: 36 (15)  
Ser: 30 (12) |
| Total | 6 (3) | 1,061 (429) | 1,333 (539) | - | - | MFB: 1,056 (427)  
MC: 1,058 (428)  
GR: 644 (261)  
GMK: 1,056 (427)  
Ser: 709 (287) |

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes: $^1$ Direct impact - conversion to developed areas.

$^2$ Only species for which there would be a significant impact.
Finegayan Cantonment/Family Housing Alternative A with NAVMAG (North/South) LFTRC Alternative 3

The additive impacts of implementing Cantonment/Family Housing Alternative A, LFTRC Alternative 3, and the IT/COMM infrastructure are provided in Table 6.1.2-9. Overall, approximately 1,217 acres (493 ha) of limestone forest, or 6% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,608 acres (684 ha) of Overlay Refuge lands, or 8% of the total Overlay Refuge currently present on Guam, would be disturbed. The majority (84%) of the impacts to terrestrial biological resources would occur under Alternative A, with 1,020 acres (413 ha) of limestone forest disturbed. Approximately 105 acres (42 ha) of primary limestone forest would be impacted, primarily associated with Alternative 3. The proposed IT/COMM alignment contributes very little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

Table 6.1.2-9. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan Cantonment/Family Housing (Alternative A), NAVMAG (North/South) LFTRC (Alternative 3), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species</th>
<th>Guam-Listed Special-Status Species</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A</td>
<td>2 (0.7)</td>
<td>1,018 (412)</td>
<td>1,250 (506)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 977 (395) MC: 978 (396) GR: 458 (185) GMK: 977 (395) Ser: 661 (268)</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>105 (42)</td>
<td>64 (26)</td>
<td>275 (111)</td>
<td>MFB, MC, GMK, MCM</td>
<td>PSTG</td>
<td>MFB: 223 (90) MC: 230 (93) GR: 24 (10) GMK: 223 (90) Ser: 40 (16)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>111 (45)</td>
<td>1,106 (448)</td>
<td>1,608 (651)</td>
<td>-</td>
<td>-</td>
<td>MFB: 1,236 (500) MC: 1,245 (504) GR: 619 (250) GMK: 1,236 (500) Ser: 731 (296)</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MCM = Mariana common moorhen, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes: (1) Direct impact – conversion to developed areas.
(2) Only species for which there would be a significant impact.

Finegayan Cantonment/Family Housing Alternative A with NAVMAG (L-Shaped) LFTRC Alternative 4

The additive impacts of implementing Cantonment/Family Housing Alternative A, LFTRC Alternative 4, and the IT/COMM infrastructure are provided in Table 6.1.2-10. Overall, approximately 1,178 acres (476 ha) of limestone forest, or 6% of the total limestone forest currently present on Guam, would be disturbed. Approximately 1,552 acres (628 ha) of Overlay Refuge lands, or 7% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes very little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-10. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan Cantonment/Family Housing (Alternative A), NAVMAG (L-Shaped) LFTRC (Alternative 4), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest (^{(1)}) (acres [ha])</th>
<th>Overlay Refuge (^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species (^{(2)})</th>
<th>Guam-Listed Special-Status Species (^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
</table>
| Alternative A    | 2 (0.7)                                       | 1,018 (412)                                   | 1,250 (506)                        | MFB, MC, GR, GMK, Ser          | MS, PSTG                        | MFB: 977 (395)  
|                  |                                               |                                               |                                   | MC: 978 (396)                  | GR: 458 (185)                   | GMK: 977 (395)  
|                  |                                               |                                               |                                   | Ser: 661 (268)                 |                                 |                                   |
| Alternative 4    | 67 (27)                                       | 63 (26)                                       | 219 (88)                           | MFB, MC, GMK                  | PSTG                            | MFB: 161 (65)  
|                  |                                               |                                               |                                   | MC: 166 (67)                   | GR: 50 (20)                     | GMK: 161 (65)  
|                  |                                               |                                               |                                   | Ser: 19 (8)                    |                                 |                                   |
| IT/COMM          | 4 (2)                                         | 24 (10)                                       | 83 (34)                            | -                              | -                               | MFB: 36 (15)  
|                  |                                               |                                               |                                   | MC: 37 (15)                    | GR: 137 (55)                    | GMK: 36 (15)  
|                  |                                               |                                               |                                   | Ser: 30 (12)                   |                                 |                                   |
| Total            | 73 (29)                                       | 1,105 (447)                                   | 1,552 (628)                        | -                              | -                               | MFB: 1,174 (475)  
|                  |                                               |                                               |                                   | MC: 1,181 (478)                | GR: 645 (261)                   | GMK: 1,174 (475)  
|                  |                                               |                                               |                                   | Ser: 710 (287)                 |                                 |                                   |

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat,  
MS = moth skink, PSTG = Pacific slender-toed gecko; Ser = Serianthes.

Notes: \(^{(1)}\) Direct impact - conversion to developed areas.  
\(^{(2)}\) Only species for which there would be a significant impact.

Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NAVMAG (East/West) LFTRC Alternative 2

The additive impacts of implementing Cantonment/Family Housing Alternative B, LFTRC Alternative 2, and the IT/COMM infrastructure are provided in Table 6.1.2-11. Overall, approximately 897 acres (364 ha) of limestone forest, or 5% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,060 acres (429 ha) of Overlay Refuge lands, or 5% of the total Overlay Refuge currently present on Guam, would be disturbed. The vast majority (95%) of the impacts to terrestrial biological resources would occur under Alternative B, with 850 acres (344 ha) of limestone forest disturbed. The proposed IT/COMM alignment contributes very little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
### Table 6.1.2-11. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan/South Finegayan Cantonment/Family Housing (Alternative B), NAVMAG (East/West) LFTRC (Alternative 2), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative B</td>
<td>2 (0.8)</td>
<td>848 (343)</td>
<td>977 (395)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>PSTG, MS</td>
<td>MFB: 791 (320) MC: 791 (320) GR: 565 (229) GMK: 791 (320) Ser: 661 (268)</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>0</td>
<td>19 (8)</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>MFB: 43 (17) MC: 43 (17) GR: 49 (20) GMK: 43 (17) Ser: 18 (7)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (3)</td>
<td>891 (361)</td>
<td>1,060 (429)</td>
<td>-</td>
<td>-</td>
<td>MFB: 870 (352) MC: 871 (352) GR: 751 (304) GMK: 870 (352) Ser: 709 (287)</td>
</tr>
</tbody>
</table>

*Legend:* GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko; Ser = Serianthes.

*Notes:* \(^{(1)}\) Direct impact - conversion to developed areas. \(^{(2)}\) Only species for which there would be a significant impact.

Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NAVMAG (North/South) LFTRC Alternative 3

The additive impacts of implementing Cantonment/Family Housing Alternative B, LFTRC Alternative 3, and the IT/COMM infrastructure are provided in Table 6.1.2-12. Overall, approximately 1,047 acres (424 ha) of limestone forest, or 5% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,418 acres (574 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The majority (85%) of the impacts to vegetation communities would occur under Alternative B, with 850 acres (344 ha) of limestone forest disturbed. Approximately 105 acres (42 ha) of primary limestone forest would be impacted under Alternative 3. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
**Table 6.1.2-12. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan/South Finegayan Cantonment/Family Housing (Alternative B), NAVMAG (North/South) LFTRC (Alternative 3), and IT/COMM Infrastructure**

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(4)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative B</td>
<td>2 (0.8)</td>
<td>848 (343)</td>
<td>977 (395)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>PSTG, MS</td>
<td>MFB: 791 (320) MC: 791 (320) GR: 565 (229) GMK: 791 (320) Ser: 661 (268)</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>105 (42)</td>
<td>64 (26)</td>
<td>275 (111)</td>
<td>MFB, MC, GMK, MCM</td>
<td>PSTG</td>
<td>MFB: 223 (90) MC: 230 (93) GR: 24 (10) GMK: 223 (90) Ser: 40 (16)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>111 (45)</td>
<td>936 (379)</td>
<td>1,335 (540)</td>
<td></td>
<td></td>
<td>MFB: 1,050 (425) MC: 1,058 (428) GR: 726 (294) GMK: 1,050 (425) Ser: 731 (296)</td>
</tr>
</tbody>
</table>

_Legend:_ GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko; Ser = Serianthes.

_Notes:_

1. Direct impact - conversion to developed areas.
2. Only species for which there would be a significant impact.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NAVMAG (L-Shaped) LFTRC Alternative 4**

The additive impacts of implementing Cantonment/Family Housing Alternative B, LFTRC Alternative 4, and the IT/COMM infrastructure are provided in Table 6.1.2-13. Overall, approximately 1,008 acres (407 ha) of limestone forest, or 5% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,279 acres (518 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-13. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan/South Finegayan Cantonment/Family Housing (Alternative B), NAVMAG (L-Shaped) LFTRC (Alternative 4), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative B</td>
<td>2 (0.8)</td>
<td>848 (343)</td>
<td>977 (395)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>PSTG, MS</td>
<td>MFB: 791 (320) MC: 791 (320) GR: 565 (229) GMK: 791 (320) Ser: 661 (268)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>73 (29)</td>
<td>935 (378)</td>
<td>1,279 (518)</td>
<td>-</td>
<td>-</td>
<td>MFB: 988 (400) MC: 994 (402) GR: 752 (304) GMK: 988 (400) Ser: 710 (287)</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko; Ser = Serianthes.

Notes: 
\(^{(1)}\) Direct impact - conversion to developed areas.
\(^{(2)}\) Only species for which there would be a significant impact.

Cultural Resources

Finegayan Cantonment/Family Housing Alternative A with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternative A and Alternatives 2, 3, or 4 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative A and Alternatives 2, 3, or 4 would occur along Routes 1, 2A, 3, 3A, 4, 4A, 5, 9, 10, 15, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 45% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011a, 2011b, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, 19% of Route 1, 14% of Route 2A, 100% of Route 3, 73% of Route 3A, 5% of Route 4, 9% of Route 4A, 39% of Route 5, 79% of Route 9, none of Route 10, 36% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-14 lists 15 known archaeological sites within the IT/COMM lines PDIA for Alternatives 2, 3, and 4. Three of the sites, including an artifact scatter, a Japanese defensive complex, and portions of
NWF, are eligible for inclusion on the NRHP. Twelve archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15 and 17 within unsurveyed areas.

Table 6.1.2-14. Archaeological Sites within the IT/COMM Lines Potential Impacted area for Finegayan Cantonment/Family Housing (Alternative A) and LFTRC Alternatives 2, 3, or 4

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII American Military</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>235*</td>
<td>Barracks remains</td>
<td>Second American Administration Territorial</td>
<td>Welch et al. 2009</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>493* Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>T-AP-002 Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII/Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2321</td>
<td>Ceramic/artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-MSAU-1</td>
<td>Japanese dump and groundstone tool</td>
<td>Pre-Contact/WWII Japanese Military</td>
<td>Church et al. 2009</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-H-1</td>
<td>Artifact scatter and concrete foundation</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte; Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.
One structure eligible for listing in the NRHP, North Field, is also located within the potential impacted area for Alternatives 2, 3, and 4. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative A and the LFTRC Alternatives 2, 3, or 4 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-14) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, an 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects are anticipated to occur due to operation of the IT/COMM utilities as these lines would be buried and there would be no change in use and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)**

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternative B and Alternatives 2, 3 or 4 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. The PDIA for the IT/COMM lines for these site combinations would be similar to those described above for Alternative A and Alternatives 2, 3, or 4. The installation of IT/COMM links between the Alternative B and the LFTRC Alternatives 2, 3, or 4 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-14) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, 17. Based on an examination of previous investigations and predictive modelling, there is a low potential for NRHP-eligible sites in the remaining area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be
determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

Ground Transportation

**Finegayan Cantonment/Family Housing Alternative A with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)**

Alternative A was modeled with Alternative 5 (Section 3.12.1). Pairing Alternative A with Alternative 2, 3, or 4 may result in a slight increase in vehicles (less than 5%) on roadway segments and at intersections that comprise the most direct route between the Alternative A Main Gate and the Alternative 2, 3, or 4 gates, as well as a slight decrease in vehicles on roadway segments and at intersections that comprise the most direct route between the modeled combination Alternative A Main Gate and the Alternative 5 gate. This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

**Roadway Segment Operations.** Impacts and potential mitigation measures for all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-6). Significant impacts were identified on eight roadway segments. Potential mitigation measures would be feasible at all locations and could reduce the identified significant impacts to less than significant levels. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts and potential mitigation measures for all intersections would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-6). Significant impacts were identified at nine intersections. Potential mitigation measures would be feasible at all locations and could reduce the identified significant impacts to less than significant levels. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

**Transit Conditions.** Transit conditions under Alternative A with Alternative 2, 3, or 4, would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative A with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)**

Alternative B was modeled with Alternative 2 or 4 (see Section 3.12.1). Pairing Alternative B with Alternative 3 may result in a slight increase in vehicles (less than 5%) on roadway segments and at intersections along the most direct route between the Alternative B Main Gate and the Alternative 3 gate, and a slight decrease in vehicles on roadway segments and at intersections along the most direct route between the modeled combination of Alternative B Main Gate and the Alternative 2 or 4 gates (see Figure 6.1.2-1). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

**Roadway Segment Operations.** Impacts and potential mitigation measures for all off-base (external) roadway segments under Alternative B with Alternative 2, 3, or 4 would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-7 and Table 6.1.2-12) for Alternative B with Alternative 1. Significant impacts were identified on 10 roadway segments and potential mitigation measures were identified for 8 roadway segments. Potential mitigation measures have not been identified for these two locations. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.
Intersection Operations. Impacts and potential mitigation measures for all study intersections under Alternative B with Alternative 2, 3, or 4 would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-7) for Alternative B with Alternative 1. Significant impacts were identified at 11 intersections with potential mitigation measures identified for 9 intersections; potential mitigation measures have not been identified for the remaining 2 intersections. The detailed results of the intersection analysis are provided in their entirety in Appendix F.

Transit Conditions. Transit conditions under Alternative B with Alternative 2, 3, or 4 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

Pedestrian and Bicycle Conditions. Pedestrian and bicycle conditions under Alternative B with Alternative 2, 3, or 4 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for creating additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distances between the Alternative A area and the proposed NAVMAG LFTRC alternatives (Alternatives 2, 3, and 4) is approximately 22.3 miles (35.9 km) to Alternative 2, and 27.9 miles (44.9 km) to Alternatives 3 and 4. Vehicles would use Routes 1 and 3 to commute between the Alternative A or B areas and Alternative 1, while Routes 3, 4, 10, and 16, as well as a new roadway in Dandan, would be used to access Alternatives 3 and 4.

Five high-crash frequency intersections (intersections of Routes 1/3, Routes 1/14A, Routes 1/10A, Routes 1/14, and Routes 1/30) are situated along the travel route between the Alternative A and Alternative B area and Alternative 2. These intersections are primarily in the central portion of Guam in the highest developed area of the island, within the communities of Hagåtña and Tamuning. Two high-crash frequency intersections (intersection of Routes 1/3 and Routes 8/10/16) are situated along the travel route between the Alternative A and Alternative B area and the Alternatives 3 and 4. In an effort to improve vehicle safety at the intersection of Routes 8/10/16, traffic improvements were completed in 2012 that included the installation of a new traffic signal system that reduced congestion and channelized traffic. The travel distance between the Alternative A or Alternative B area and the NAVMAG alternatives is relatively long, and several high-frequency crash intersections are situated along the travel routes (resulting in a higher potential for being involved in a traffic incident or to be delayed because of traffic incidents). However, a less-than-significant additive impact on public health and safety is anticipated to occur since the additional vehicles traveling between the main cantonment and LFTRC would be an insignificant portion of total vehicles on these roadways.

Finegayan Cantonment/Family Housing Alternative A or B with NWF LFTRC Alternative 5

Air Quality

The combined air quality impacts would be the same as those described in Section 6.1.2.1. The combined construction island-wide emissions impacts, summarized in Table 6.1.2-1, would be less than significant as a result of this combined alternative.

Terrestrial Biological Resources

Finegayan Cantonment/Family Housing Alternative A with NWF LFTRC Alternative 5

The additive impacts of implementing Cantonment/Family Housing Alternative A, LFTRC Alternative 5, and the IT/COMM infrastructure are provided in Table 6.1.2-15. Overall, approximately 1,249 acres (507
ha) of limestone forest, or 7% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,587 acres (642 ha) of Overlay Refuge lands, or 7% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A</td>
<td>2 (0.7)</td>
<td>1,018 (412)</td>
<td>1,250 (506)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 977 (395) MC: 978 (396) GR: 458 (185) GMK: 977 (395) Ser: 661 (268)</td>
<td>NA</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td>-</td>
<td>-</td>
<td>MFB: 36 (15) MC: 37 (15) GR: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>96 (40)</td>
<td>1,153 (467)</td>
<td>1,587 (642)</td>
<td>-</td>
<td>-</td>
<td>MFB: 1,209 (489) MC: 1,211 (490) GR: 635 (257) GMK: 1,209 (489) Ser: 845 (342)</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko, Ser = Serianthes, NA = not applicable.

Notes: \(^{(1)}\) Direct impact - conversion to developed areas.
\(^{(2)}\) Only species for which there would be a significant impact.

Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NWF LFTRC Alternative 5

The additive impacts of implementing Cantonment/Family Housing Alternative B, LFTRC Alternative 5, and the IT/COMM infrastructure are provided in Table 6.1.2-16. Overall, approximately 1,079 acres (438 ha) of limestone forest, or 6% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,314 acres (532 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-16. Summary of Impacts to Terrestrial Biological Resources with Implementation of Finegayan/South Finegayan Cantonment/Family Housing (Alternative B), NWF LFTRC (Alternative 5), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (1)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative B</td>
<td>2 (0.8)</td>
<td>848 (343)</td>
<td>977 (395)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>PSTG, MS</td>
<td>MFB: 791 (320) M: 791 (320) GC: 565 (229) GMK: 791 (320) Ser: 661 (268)</td>
<td>NA</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>4 (2)</td>
<td>24 (10)</td>
<td>83 (34)</td>
<td></td>
<td></td>
<td>MFB: 36 (15) M: 37 (15) GC: 137 (55) GMK: 36 (15) Ser: 30 (12)</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>96 (40)</td>
<td>983 (398)</td>
<td>1,314 (532)</td>
<td></td>
<td></td>
<td>MFB: 1,023 (414) M: 1,024 (414) GC: 742 (300) GMK: 1,023 (414) Ser: 845 (342)</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, MS = moth skink, PSTG = Pacific slender-toed gecko; NA = not applicable, Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas. (2) Only species for which there would be a significant impact.

Cultural Resources

Finegayan Cantonment/Family Housing Alternative A with NWF LFTRC Alternative 5

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives A and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative A and Alternative 5 would occur along Routes 1, 2A, 3, 3A, 4, 5, 9, 10, 15, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 51% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Haun 1988; Liston 1996; Lauter-Reinman 1997; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011a, 2011b, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 1% of Route 1, 5% of Route 2A, 100% of Route 3, 60% of Route 3A, 1% of Route 4, 40% of Route 5, 79% of Route 9, none of Route 10, 36% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-17 lists 14 known archaeological sites within the IT/COMM lines PDIA. Three of the sites, an artifact scatter, a Japanese defensive complex, and portions of NWF, are eligible for inclusion on the
NRHP. Eleven archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-17. Archaeological Sites within the IT/COMM Utilities Potential Impacted area for Finegayan Cantonment/Family Housing Alternative A with NWF LFTRC (Alternative) 5

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina * et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen * et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon * et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII/Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2321</td>
<td>Ceramic/artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron * et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-MSAU-1</td>
<td>Japanese dump and groundstone tool</td>
<td>Pre-Contact/WWII Japanese Military</td>
<td>Church * et al. 2009</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-H20-1</td>
<td>Water catchment with pump generator &amp; fuel tank foundations</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Latte/Japanese Administration/Second American Administration Territorial</td>
<td>Dixon * et al. 2014</td>
<td>No</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.
One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative A and the LFTRC Alternative 5 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-17), and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NWF LFTRC Alternative 5**

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives B and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. The PDIA for the IT/COMM lines would be similar to those described for Alternative A and Alternative 5. The installation of IT/COMM links between Alternative B and the LFTRC Alternative 5 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-17) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with a likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of
these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Ground Transportation**

**Finegayan Cantonment/Family Housing Alternative A with NWF LFTRC Alternative 5**

Alternative A was modeled with Alternative 5 (Section 3.12.1).

**Roadway Segment Operations.** Impacts and potential mitigation measures for all off-base (external) roadway segments under Alternative A with Alternative 5 would be the same as those identified in Section 6.1.2.1 for Alternative A with Alternative 1. Potential mitigation measures were identified for all impacted roadway segments, and if implemented, could reduce the impacts to less than significant levels. Significant impacts were identified on eight roadway segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts and potential mitigation measures for all intersections under Alternative A with Alternative 5 would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-6) for Alternative A with Alternative 1. Potential mitigation measures were identified for all impacted intersections, and if implemented, could reduce the impacts to less than significant levels. Significant impacts were identified at nine intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

**Transit Conditions.** Transit conditions under Alternative A with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative A with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Finegayan/South Finegayan Cantonment/Family Housing Alternative B with NWF LFTRC Alternative 5**

Alternative B was modeled with Alternative 2 or 4 (Section 3.12.1). Pairing Alternative B with Alternative 5 may result in a slight increase (less than 5%) in vehicles on roadway segments and at intersections along the most direct route between the Alternative B Main Gate and the Alternative 5 gate, and a slight decrease in vehicles on roadway segments and at intersections along the most direct route between the modeled combination, Alternative B Main Gate and the Alternative 2 or 4 gate (see Figure 6.1.2-1). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

**Roadway Segment Operations.** Impacts and potential mitigation measures for all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.1. Significant impacts were identified on 10 roadway segments. Potential mitigation measures were identified for 8 roadway segments and were not identified for 2 segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts and potential mitigation measures for all intersections would be the same as those identified in Section 6.1.2.1 (see Table 6.1.2-7). Significant impacts were identified at 11 intersections. Potential mitigation measures were identified for 9 intersections and were not identified for 2 intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.
Transit Conditions. Transit conditions under Alternative B with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

Pedestrian and Bicycle Conditions. Pedestrian and bicycle conditions under Alternative B with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the Alternative A or Alternative B area and the proposed NWF LFTRC alternative (Alternative 5) is approximately 4.4 miles (7.1 km). Vehicles would use Routes 3 and 3A to commute between either of these cantonment/family housing areas and Alternative 5. No high-crash frequency intersections are situated along this travel route. The travel distance between Alternative A or B and Alternative 5 is relatively short, and no high-frequency crash intersections are situated along this travel route. Therefore, no significant additive traffic impacts are anticipated.

6.1.2.4 AAFB Cantonment/Family Housing Alternative C with Route 15 LFTRC Alternative 1

Air Quality

The combined air quality impacts would be similar to those described in Section 6.1.2.1.

The combined construction island-wide emissions, summarized in Table 6.1.2-18, would be below the significance criterion of 250 tpy for criteria pollutants resulting in less than significant as a result of this combined alternative.

<table>
<thead>
<tr>
<th>Construction Year</th>
<th>SO₂</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>NOₓ</th>
<th>VOC</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
</tr>
<tr>
<td>2017</td>
<td>0.1</td>
<td>3.5</td>
<td>0.3</td>
<td>0.3</td>
<td>5.3</td>
<td>0.7</td>
<td>724.7</td>
</tr>
<tr>
<td>2018</td>
<td>0.3</td>
<td>21.9</td>
<td>1.4</td>
<td>1.3</td>
<td>16.3</td>
<td>3.2</td>
<td>3176.9</td>
</tr>
<tr>
<td>2019</td>
<td>0.7</td>
<td>48.4</td>
<td>2.9</td>
<td>2.6</td>
<td>34.3</td>
<td>5.7</td>
<td>7625.4</td>
</tr>
<tr>
<td>2020</td>
<td>0.3</td>
<td>24.6</td>
<td>1.4</td>
<td>1.3</td>
<td>15.9</td>
<td>3.2</td>
<td>3540.8</td>
</tr>
<tr>
<td>2021</td>
<td>0.5</td>
<td>30.3</td>
<td>1.8</td>
<td>1.6</td>
<td>23.5</td>
<td>3.1</td>
<td>5219.8</td>
</tr>
<tr>
<td>2022</td>
<td>0.5</td>
<td>30.8</td>
<td>1.9</td>
<td>1.7</td>
<td>23.9</td>
<td>3.2</td>
<td>5309.9</td>
</tr>
<tr>
<td>Significance Threshold</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>NA</td>
</tr>
</tbody>
</table>

Legend: CO = Carbon Monoxide; CO₂ = Carbon Dioxide; NOₓ = Nitrogen Oxides; PM₁₀ = Particulate Matter (<10 microns); PM₂.₅ = Particulate Matter (<2.5 microns); SO₂ = Sulfur Dioxide; VOC = Volatile Organic Compounds; neg = negligible; NA = not available.

Terrestrial Biological Resources

The additive impacts of implementing Cantonment/Family Housing Alternative C, LFTRC Alternative 1, and the IT/COMM infrastructure are provided in Table 6.1.2-19. Overall, approximately 1,485 acres (601 ha) of limestone forest, or 8% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,002 acres (405 ha) of Overlay Refuge lands, or 5% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial
biological resources would be less than significant.

Table 6.1.2-19. Summary of Impacts to Terrestrial Biological Resources with Implementation of AAFB Cantonment/Family Housing (Alternative C), Route 15 LFTRC (Alternative 1), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^1) (acres [ha])</th>
<th>Secondary Limestone Forest(^1) (acres [ha])</th>
<th>Overlay Refuge(^1) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^2)</th>
<th>Guam-Listed Special-Status Species(^2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative C</td>
<td>138 (56)</td>
<td>1,066 (431)</td>
<td>924 (374)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>-</td>
<td>MFB: 1,197 (484) GR: 221 (89) GMK: 1,197 (484) Ser: 1,139 (461)</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>65 (26)</td>
<td>190 (77)</td>
<td>NA</td>
<td>GR</td>
<td>-</td>
<td>MFB: 81 (33) GR: 283 (115) GMK: 81 (33) Ser: 67 (27)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>5 (2)</td>
<td>21 (8)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 30 (12) GR: 140 (57) GMK: 30 (12) Ser: 22 (9)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>208 (84)</strong></td>
<td><strong>1,277 (517)</strong></td>
<td><strong>1,002 (405)</strong></td>
<td>-</td>
<td>-</td>
<td>MFB: 1,308 (529) GR: 644 (261) GMK: 1,308 (529) Ser: 1,228 (497)</td>
</tr>
</tbody>
</table>

*Legend:* GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, Ser = *Serianthes.*

*Notes:* \(^1\) Direct impact - conversion to developed areas.
\(^2\) Only species for which there would be a significant impact.

Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives C and 1 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative C and Alternative 1 would occur along Routes 1, 2A, 3, 3A, 4, 5, 9, 10, 15, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 47% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011b, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 1% of Route 1, 5% of Route 2A, 100% of Route 3, 94% of Route 3A, 1% of Route 4, 39% of Route 5, 89% of Route 9, none of Route 10, 26% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-20 lists 13 known archaeological sites within the IT/COMM lines PDIA. Three of the sites, including remnants of an encampment, a Latte Period artifact scatter, and portions NWF, are eligible to
the NRHP. Ten archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-20. Archaeological Sites within IT/COMM Lines Potential Impacted area for AAFB Cantonment/Family Housing (Alternative C) and Route 15 LFTRC (Alternative 1)

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Flagpole</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377</td>
<td>Ceramic Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>T-AP-002</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII, Second American Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte; Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.
*From Welch 2009 (Map no. 36, 377) and Welch 2010 (Map no. 1066).

One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative C and the LFTRC Alternative 1 has the potential to result in adverse effects from excavation and soil removal to four historic properties--three NRHP-eligible archaeological sites (see Table 6.1.2-20) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, 17. Based on an examination of previous investigations and predictive modeling, there is a low potential...
for NRHP-eligible sites in the remaining areas. No TCPs would be affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

Ground Transportation

The travel demand modeling methodology for the combination of alternatives was defined and directed by the DoD and the FHWA to provide detailed off-base (external) roadway and intersection analysis for one representative pairing (the modeled combination) for a cantonment/family housing alternative and LFTRC site alternative. The modeled combination for Alternative C involved a pairing with Alternative 2 or 4 (see Section 3.12.1). Modeling results for this scenario indicate that weekday a.m. peak hour vehicle traffic related to the proposed action is generated solely by operations at the cantonment/family housing area. LFTRC-related traffic would occur prior to the weekday a.m. peak hour (8:00 a.m.) and may coincide with the weekday p.m. peak hour (4:30 p.m. to 5:30 p.m.) (see Section 5.1.12).

Operations of the LFTRC would increase traffic on the off-base (external) roadway segments and intersections that comprise the most direct route between the main cantonment gate and the LFTRC gates by approximately 38 vehicles (measured in passenger car equivalents) (see Table 5.1.12-2). LFTRC-related traffic represents an insubstantial amount of traffic (less than 5%) along the route. This minimal incremental increase in traffic volumes would not adversely affect level of service on roadways or at intersections along the route. The relative contribution from LFTRC traffic to the off-base (external) roadway segment and intersection impacts of each cantonment/family housing alternative would be minimal and would not vary appreciably with any LFTRC alternative (Alternative 1, 2, 3, 4, and 5). Therefore, the impacts to the off-base (external) roadway segments and intersections would be essentially the same for Alternative C with Alternative 1, Alternative C with Alternative 2, 3, or 4, and Alternative C with Alternative 5. A qualitative discussion of the potential effects of LFTRC-related traffic is provided for each combination.

Pairing Alternative C with Alternative 1 may result in a slight increase in vehicles (less than 5%) on roadway segments and at intersections that comprise the most direct route between the Alternative C Main Gate and the Alternative 1 gate, and a slight decrease in vehicles compared to the modeled combination, Alternative C Main Gate and the Alternative 2 or 4 gates (Figure 6.1.2-3). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.
Figure 6.1.2-3
Travel Routes from AAFB Cantonment/Family Housing (Alternative C) to the LFTRC Alternatives

Source: NAVFAC Pacific 2013
The impacts to off-base (external) roadway segments and intersections are summarized in Table 6.1.2-21.

Table 6.1.2-21. Summary of Additive Impacts to Ground Transportation Resources with the Andersen Air Force Base Cantonment/Family Housing (Alternative C) and any LFTRC

<table>
<thead>
<tr>
<th>#</th>
<th>Roadway Segments*</th>
<th>Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route 1, from Route 29 to Chalan Lajuna (SI)**</td>
<td>Route 3 / 9 / Chalan Santa Anita (SI)</td>
</tr>
<tr>
<td>2</td>
<td>Route 1, from Route 34 to Route 16 (SI)</td>
<td>Route 3 / Royal Palm Drive (SI)</td>
</tr>
<tr>
<td>3</td>
<td>Route 3, from Finegayan Main Gate to Finegayan Residential Gate (SI)</td>
<td>Route 15 / Chalan Lajuna (SI)**</td>
</tr>
<tr>
<td>4</td>
<td>Route 3, from Finegayan Residential Gate to Route 28 (SI)</td>
<td>Route 1 / Route 3 (SI)</td>
</tr>
<tr>
<td>5</td>
<td>Route 15, from Route 26 to Barrigada South Gate (SI)**</td>
<td>Route 1 / Route 27 (SI)</td>
</tr>
<tr>
<td>6</td>
<td>Route 15, from Barrigada South Gate to Route 10 (SI)**</td>
<td>Route 1 / Route 26 (SI)</td>
</tr>
<tr>
<td>7</td>
<td>NA</td>
<td>Route 16 / Route 27 (SI)</td>
</tr>
<tr>
<td>8</td>
<td>NA</td>
<td>Route 16 / Route 10A (SI)</td>
</tr>
<tr>
<td>9</td>
<td>NA</td>
<td>Route 15 / Route 26 (SI)</td>
</tr>
<tr>
<td>10</td>
<td>NA</td>
<td>Route 1 / Route 14A (SI)</td>
</tr>
<tr>
<td>11</td>
<td>NA</td>
<td>Route 1 / Route 10A (SI)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (SI)</td>
<td>11 (SI)</td>
</tr>
</tbody>
</table>

Legend: NA indicates not applicable. SI indicates significant impact. SI-M indicates significant but may be mitigated impact.

Note: * Includes impacts to roadway segments in at least one direction during one (or both) weekday a.m. or p.m. peak hours.
** Indicates an impact that would not occur under Year 2030 Alternative A Conditions.

Roadway Segment Operations. A capacity analysis was conducted to determine potential impacts to the off-base (external) roadway network during weekday a.m. and p.m. peak hours. The v/c ratio and LOS for each study roadway segment was compared to the baseline conditions to determine if any significant impacts would occur. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F. The addition of traffic generated by the proposed action may result in a potentially significant impact on six study roadway segments in at least one direction during the weekday a.m. and/or weekday p.m. peak hours.

- **Route 1, from Route 29 to Chalan Lajuna.** This study roadway segment currently operates at acceptable LOS C with a v/c ratio of 0.78 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS D with a v/c ratio of 0.86 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.02. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday p.m. peak hour.

- **Route 1, from Route 34 to Route 16.** This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.96 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.97 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.01. Therefore, the proposed action would result in a significant impact
• **Route 3, from Finegayan Main Gate to Finegayan Residential Gate.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.09 in the southbound/westbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.24 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.33. The proposed action would increase traffic on this study roadway segment by approximately 70 vehicles during the weekday p.m. peak hour. This 7.1% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound direction during the weekday a.m. peak hour.

• **Route 3, from Finegayan Residential Gate to Route 28.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.23 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at LOS F with a v/c ratio of 1.36 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.45. The proposed action would increase the traffic on this study roadway segment by approximately 67 vehicles during the weekday a.m. peak hour. This 6.3% increase in traffic is greater than the 5.0% threshold of significance. During the weekday p.m. peak hour this study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.81 in the northbound/eastbound direction. This study roadway segment would operate at acceptable LOS E in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would degrade to unacceptable LOS F with a v/c ratio of 1.04. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound directions during the weekday a.m. peak hour and in the northbound/eastbound direction during the weekday p.m. peak hour.

• **Route 15, from Route 26 to Barrigada South Gate.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.05 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.06 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.04. The proposed action would increase traffic on this study roadway segment by approximately 90 vehicles during the weekday p.m. peak hour. This 10.6% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday a.m. peak hour.

• **Route 15, from Barrigada South Gate to Route 10.** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.90 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.06 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.04. The proposed action would increase traffic on this study roadway segment by approximately 90 vehicles during the weekday p.m. peak hour. This 10.6% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday a.m. peak hour.
during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.02 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.14. The proposed action would increase traffic on this study roadway segment by approximately 88 vehicles during the weekday a.m. peak hour. This 10.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday a.m. peak hour.

Significant impacts were identified for all impacted roadway segments. Potential mitigation measures for the impacted roadway segments would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives, and based on project-level technical studies to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Intersection Operations.** Intersection analysis was conducted to determine potential impacts to the off-base (external) intersections during weekday a.m. and p.m. peak hours. The LOS for each study intersection is compared to the baseline conditions to determine if any significant impacts would occur. An impact summary is provided in Table 6.1.2-21. The detailed results of the intersection analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would potentially result in a significant impact at 11 study intersections during the weekday a.m. and/or weekday p.m. peak hours.

- **Route 3 / 9 / Chalan Santa Anita.** This two-way stop-controlled study intersection currently operates at acceptable LOS C with 21.9 seconds of delay and would operate at acceptable LOS E with 37.7 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would degrade to unacceptable LOS F with 134.6 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 3 / Royal Palm Drive.** This two-way stop-controlled study intersection currently operates at acceptable LOS C with 16.3 seconds of delay and would operate at acceptable LOS E with 36.4 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would degrade to unacceptable LOS F with 50.6 seconds of delay. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 15 / Chalan Lajuna.** This two-way stop-controlled study intersection currently operates at acceptable LOS D with 30.7 seconds of delay and LOS C with 23.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This intersection would operate at unacceptable LOS F with 75.8 and 82.6 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030
AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with 119.9 and 166.3 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- Route 1 / Route 3. This signalized study intersection currently operates at LOS F and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay and the proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- Route 1 / Route 27. This signalized study intersection currently operates at acceptable LOS E with 70.3 seconds of delay and would operate at unacceptable LOS F with 118.3 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with 123.6 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- Route 1 / Route 26. This signalized study intersection currently operates at acceptable LOS C with 27.9 seconds of delay and would operate at unacceptable LOS F with 87.6 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with 95.7 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- Route 16 / Route 27. This signalized study intersection currently operates at acceptable LOS D with 50.1 seconds of delay and acceptable LOS E with 71.2 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This signalized study intersection would operate at unacceptable LOS F with greater than 180.0 seconds of delay and 154.7 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay and 161.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- Route 16 / Route 10A. This signalized study intersection currently operates at unacceptable LOS F and would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay. The proposed action would add more than 50 vehicles to this poorly
performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 15 / Route 26.** This two-way stop-controlled study intersection currently operates at unacceptable LOS F with 62.1 seconds of delay and 147.3 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This intersection would continue to operate at unacceptable LOS F with greater than 145.2 seconds of delay and greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 1 / Route 14A.** This signalized study intersection currently operates at unacceptable LOS F with 156.1 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 1 / Route 10A.** This signalized study intersection currently operates at acceptable LOS E with 62.6 seconds of delay and would operate at unacceptable LOS F with 139.3 seconds of delay during the weekday p.m. peak hour under Existing Conditions and Year 2030 Baseline Conditions, respectively. Under Year 2030 AAFB Cantonment/Family Housing (Alternative C) Conditions, this study intersection would continue to operate at unacceptable LOS F with 141.6 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

Although significant impacts would occur at all intersections, potential mitigation measures have not been identified. Potential mitigation measures for the impacted intersections would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Transit Conditions.** Transit conditions under Alternative C with Alternative 1 would be similar to those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative C with Alternative 1 would be similar to those described in Section 6.1.2.1 for Alternative A with Alternative 1.
Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for creating additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the proposed AAFB Cantonment/Family Housing (Alternative C) area and Alternative 1 is approximately 5.5 miles (8.8 km). Vehicles would use Route 9 to commute between the Alternative C area and Alternative 1. The travel distance between the Alternative C area and Alternative 1 is relatively short, and no high-frequency crash intersections are situated along the travel route. Therefore, no significant additive traffic impacts are anticipated.

6.1.2.5 AAFB Cantonment/Family Housing Alternative C with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)

Air Quality

The combined air quality impacts would be the same as those described in Section 6.1.2.4. The combined construction island-wide emissions, summarized in Table 6.1.2-18, would be less than significant as a result of these combined alternatives.

Terrestrial Biological Resources

AAFB Cantonment/Family Housing (Alternative C) with NAVMAG (North/South) LFTRC (Alternative 2)

The additive impacts of implementing Cantonment/Family Housing Alternative C, LFTRC Alternative 2, and the IT/COMM infrastructure are provided in Table 6.1.2-22. Overall, approximately 1,249 acres (506 ha) of limestone forest, or 9% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,002 acres (405 ha) of Overlay Refuge lands, or 4% of the total Overlay Refuge currently present on Guam, would be disturbed. The majority (98%) of the impacts to terrestrial biological resources would occur under Alternative C, with 1,204 acres (487 ha) of limestone forest disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources under this scenario relative to the other two components. Additive impacts to terrestrial biological resources would be less than significant.

Table 6.1.2-22. Summary of Impacts to Terrestrial Biological Resources with Implementation of AAFB Cantonment/Family Housing (Alternative C), NAVMAG (East/West) LFTRC (Alternative 2), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (1) (acres [ha])</th>
<th>Secondary Limestone Forest (1) (acres [ha])</th>
<th>Overlay Refuge (1) (acres [ha])</th>
<th>ESA-Listed Special-Status Species (2)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative C</td>
<td>138 (56)</td>
<td>1,066 (431)</td>
<td>924 (374)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>-</td>
<td>MFB: 1,197 (484) MC: 1,201 (486) GR: 221 (89) GMK: 1,197 (484) Ser: 1,139 (461)</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>0</td>
<td>19 (8)</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>MFB: 43 (17) MC: 43 (17) GR: 49 (20) GMK: 43 (17) Ser: 18 (7)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>5 (2)</td>
<td>21 (8)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 30 (12) MC: 29 (12) GR: 140 (57) GMK: 30 (12) Ser: 22 (9)</td>
</tr>
</tbody>
</table>
Guam and CNMI Military Relocation
(2012 Roadmap Adjustments) SEIS
Draft
April 2014

Component | Primary Limestone Forest(1) (acres [ha]) | Secondary Limestone Forest(1) (acres [ha]) | Overlay Refuge(1) (acres [ha]) | ESA-Listed Special-Status Species(2) | Guam-Listed Special-Status Species(2) | Recovery Habitat (acres [ha])
---|---|---|---|---|---|---
Total | 143 (58) | 1,106 (448) | 1,002 (405) | - | - | MFB: 1,270 (514) MC: 1,273 (515) GR: 410 (166) GMK: 1,270 (514) Ser: 1,179 (477)

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, Ser = Serianthes.
Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

AAFB Cantonment/Family Housing Alternative C with NAVMAG (North/South) LFTRC Alternative 3

The additive impacts of implementing Cantonment/Family Housing Alternative C, LFTRC Alternative 3, and the IT/COMM infrastructure are provided in Table 6.1.2-23. Overall, approximately 1,399 acres (566 ha) of limestone forest, or 7% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,277 acres (517 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The majority of the impacts to terrestrial biological resources would occur under Alternative C, with 1,204 acres (487 ha) of limestone forest disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources relative to the other components under this scenario. Additive impacts to terrestrial biological resources would be less than significant.

Table 6.1.2-23. Summary of Impacts to Terrestrial Biological Resources with Implementation of AAFB Cantonment/Family Housing (Alternative C), NAVMAG (North/South) LFTRC (Alternative 3), and IT/COMM Infrastructure

| Component | Primary Limestone Forest(1) (acres [ha]) | Secondary Limestone Forest(1) (acres [ha]) | Overlay Refuge(1) (acres [ha]) | ESA-Listed Special-Status Species(2) | Guam-Listed Special-Status Species(2) | Recovery Habitat (acres [ha])
---|---|---|---|---|---|---
Alternative C | 138 (56) | 1,066 (431) | 924 (374) | MFB, MC, GR, GMK, Ser | - | MFB: 1,197 (484) MC: 1,201 (486) GR: 221 (89) GMK: 1,197 (484) Ser: 1,139 (461)
Alternative 3 | 105 (42) | 64 (26) | 275 (111) | MFB, MC, GMK, MCM | PSTG | MFB: 223 (90) MC: 230 (93) GR: 24 (10) GMK: 223 (90) Ser: 40 (16)
IT/COMM | 5 (2) | 21 (8) | 78 (32) | - | - | MFB: 30 (12) MC: 29 (12) GR: 140 (57) GMK: 30 (12) Ser: 22 (9)
Total | 248 (100) | 1,151 (466) | 1,277 (517) | - | - | MFB: 1,450 (587) MC: 1,460 (591) GR: 385 (156) GMK: 1,450 (587) Ser: 1,201 (486)

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MCM = Mariana common moorhen, MFB = Mariana fruit bat, PSTG = Pacific slender-toed gecko, Ser = Serianthes.
Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.
AAFB Cantonment/Family Housing Alternative C with NAVMAG (L-Shaped) LFTRC Alternative 4

The additive impacts of implementing Cantonment/Housing Alternative C, LFTRC Alternative 4, and the IT/COMM infrastructure are provided in Table 6.1.2-24. Overall, approximately 1,360 acres (550 ha) of limestone forest, or 7% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,221 acres (494 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

Table 6.1.2-24. Summary of Impacts to Terrestrial Biological Resources with Implementation of AAFB Cantonment/Family Housing (Alternative C), NAVMAG (L-Shaped) LFTRC (Alternative 4), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species</th>
<th>Guam-Listed Special-Status Species</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative C</td>
<td>138 (56)</td>
<td>1,066 (431)</td>
<td>924 (374)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>-</td>
<td>MFB: 1,197 (484) MC: 1,201 (486) GR: 221 (89) GMK: 1,197 (484) Ser: 1,139 (461)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>5 (2)</td>
<td>21 (8)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 30 (12) MC: 29 (12) GR: 140 (57) GMK: 30 (12) Ser: 22 (9)</td>
</tr>
<tr>
<td>Total</td>
<td>210 (85)</td>
<td>1,150 (465)</td>
<td>1,221 (494)</td>
<td>-</td>
<td>-</td>
<td>MFB: 1,388 (562) MC: 1,396 (565) GR: 411 (166) GMK: 1,388 (562) Ser: 1,180 (477)</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternative C and 2, 3, or 4 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative C and Alternatives 2, 3, or 4 would occur along Routes 1, 2A, 3, 3A, 4, 4A, 5, 9, 10, 15, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 48% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Henry et al. 1999; Allen et al. 2002; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011b, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of
the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 19% of Route 1, 14% of Route 2A, 100% of Route 3, 94% of Route 3A, 5% of Route 4, 9% of Route 4A, 39% of Route 5, 90% of Route 9, none of Route 10, 36% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-25 lists 16 known archaeological sites within the IT/COMM lines PDIA for Alternatives 2, 3, and 4. Four of the sites, including a Japanese defensive complex, remnants of an historic encampment, a Latte Period artifact scatter, and portions NWF, are eligible for listing in the NRHP. Twelve archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-25. Archaeological Sites within IT/COMM Lines Potential Impacted area for the AAFB Cantonment/Family Housing (Alternative C) and LFTRC Alternatives 2, 3, or 4

<table>
<thead>
<tr>
<th>GHPI Number</th>
<th>Temporary Site Number/Map Number</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>235*</td>
<td>Barracks remains</td>
<td>Second American Administration Territorial</td>
<td>Welch et al. 2009</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>493* Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>T-AP-002 Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII/Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact scatter</td>
<td>Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.1.2-25. Archaeological Sites within IT/COMM Lines Potential Impacted area for the AAFB Cantonment/Family Housing (Alternative C) and LFTRC Alternatives 2, 3, or 4

<table>
<thead>
<tr>
<th>GHPI Number*</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-H-1</td>
<td></td>
<td>Artifact scatter &amp; concrete foundations</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>T-WAW-016</td>
<td></td>
<td>Bottle scatter</td>
<td>Latte/Japanese Administration/Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
</tr>
</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.

One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area for Alternatives 2, 3, and 4. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative C and the LFTRC Alternatives 2, 3, or 4 has the potential to result in adverse effects from excavation and soil removal to five historic properties--four known NRHP-eligible archaeological sites (see Table 6.1.2-25) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Ground Transportation**

Alternative C was modeled with Alternative 2 or 4 (Section 3.12.1). Pairing Alternative C with Alternative 3 may result in a slight increase (less than 5%) in vehicles on roadway segments and at intersections that comprise the most direct route between the Alternative C Main Gate and the Alternative 3 gate, and a slight decrease in vehicles on roadway segments and at intersections that comprise the most direct route between the modeled combination, Alternative C Main Gate and the Alternative 2 or 4 gates (see Figure 6.1.2-1). This minimal incremental increase or decrease in traffic volumes would not
adversely affect level of service on roadways or at intersections along the route.

Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments or intersections. Potential mitigation measures for would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Roadway Segment Operations.** Impacts to all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.4. Significant impacts were identified on six roadway segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts to all intersections would be the same as those identified in Section 6.1.2.4 (see Table 6.1.2-21). Significant impacts were identified at 11 intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

**Transit Conditions.** Transit conditions under Alternative C with Alternative 2, 3, or 4 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative C with Alternative 2, 3, or 4 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Public Health and Safety**

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the Alternative C area and Alternatives 2, 3, and 4 is approximately 24.6 miles (39.6 km) to Alternative 2, and 30.2 miles (48.6 km) to Alternatives 3 and 4. Vehicles would use Routes 1 and 3 to commute between the Alternative C area and Alternative 2, while Routes 3, 4, 10, and 16, as well as a new roadway in Dandan, would be used to access Alternatives 3 and 4.

Five high-crash frequency intersections (intersections of Routes 1/3, Routes 1/14A, Routes 1/10A, Routes 1/14, and Routes 1/30) are situated along the travel route between the Alternative C area and Alternative 2. These intersections are primarily in the central portion of Guam in the most highly developed area of the island, within the communities of Hagåtña and Tamuning. Two high-crash frequency intersections (intersection of Routes 1/3 and Routes 8/10/16) are situated along the travel route between the Alternative C area and Alternatives 3 and 4. The travel distance between the Alternative C area and Alternatives 2, 3, and 4 is relatively long, and several high-frequency crash intersections are situated along the travel routes (resulting in a higher potential for being involved in a traffic incident or to be delayed because of traffic incidents). However, a less-than-significant additive impact on public health and safety would occur since the additional vehicles traveling between the main cantonment and LFTRC would be an insignificant portion of total vehicles on these roadways.
6.1.2.6  AAFB Cantonment/Family Housing Alternative C with NWF LFTRC Alternative 5

Air Quality

The combined air quality impacts would be the same as those described in Section 6.1.2.4. The combined construction island-wide emissions, summarized in Table 6.1.2-18, would be less than significant as a result of these combined alternatives.

Terrestrial Biological Resources

The additive impacts of implementing Cantonment/Family Housing Alternative C, LFTRC Alternative 5, and the IT/COMM infrastructure are provided in Table 6.1.2-26. Overall, approximately 1,431 acres (579 ha) of limestone forest, or 8% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 1,256 acres (508 ha) of Overlay Refuge lands, or 6% of the total Overlay Refuge currently present on Guam, would be disturbed. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

Table 6.1.2-26. Summary of Impacts to Terrestrial Biological Resources with Implementation of AAFB Cantonment/Family Housing (Alternative C), NWF LFTRC (Alternative 5), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species</th>
<th>Guam-Listed Special-Status Species</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative C</td>
<td>138 (56)</td>
<td>1,066 (431)</td>
<td>924 (374)</td>
<td>MFB, MC, GR, GMK, Ser</td>
<td>-</td>
<td>MFB: 1,197 (484) MC: 1,201 (486) GR: 221 (89) GMK: 1,197 (484) Ser: 1,139 (461)</td>
<td>NA</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>5 (2)</td>
<td>21 (8)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 30 (12) MC: 29 (12) GR: 140 (57) GMK: 30 (12) Ser: 22 (9)</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>233 (94)</td>
<td>1,198 (485)</td>
<td>1,256 (508)</td>
<td>-</td>
<td>-</td>
<td>MFB: 1,423 (576) MC: 1,426 (577) GR: 401 (162) GMK: 1,423 (576) Ser: 1,315 (532)</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, NA = not applicable; Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives C and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM
In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 50% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Haun 1988; Liston 1996; Lauter-Reinman 1997; Henry et al. 1999; Allen et al. 2002; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011b, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 1% of Route 1, 5% of Route 2A, 100% of Route 3, 57% of Route 3A, 1% of Route 4, 39% of Route 5, 89% of Route 9, none of Route 10, 36% of Route 15, and 1% of Route 17 have been surveyed.

Table 6.1.2-27 lists 15 known archaeological sites within the IT/COMM lines PDIA. Four of the sites, including remnants of an historic encampment, a WWII Japanese defensive complex, a Latte Period artifact scatter, and portions of NWF, are eligible to the NRHP. Eleven archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-27. Archaeological Sites within IT/COMM Lines Potential Impacted area for AAFB Cantonment/Family Housing (Alternative C) and NWF LFTRC (Alternative 5)

<table>
<thead>
<tr>
<th>GHPI Number</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII, Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>
### GHPI Number

<table>
<thead>
<tr>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-H20-1 Water catchment with pump generator and fuel tank foundations</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5 Concrete pads</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016 Bottle scatter</td>
<td>Pre-Contact/Latte; Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:** GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

**Notes:** †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys. *From Welch (2009) (Map no. 36, 377, 493) and Welch (2010) (Map no. 1066).

One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative C and the LFTRC Alternative 5 has the potential to result in adverse effects from excavation and soil removal to five historic properties—four NRHP-eligible archaeological sites (see Table 6.1.2-27) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Ground Transportation**

Alternative C was modeled with Alternative 2 or 4 (Section 3.12.1). Pairing Alternative C with Alternative 5 may result in a slight increase (less than 5%) in vehicles on roadway segments and at intersections that comprise the most direct route between the Alternative C Main Gate and the Alternative 5 gate and a slight decrease in vehicles on roadway segments and at intersections that comprise the most direct route between the modeled combination, Alternative C Main Gate and the Alternative 2 or 4 gate.
(see Figure 6.1.2-3). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments or intersections. Potential mitigation measures would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Roadway Segment Operations.** Impacts to all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.4. Significant impacts were identified on six roadway segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts to all intersections would be the same as those identified in Section 6.1.2.4 (Table 6.1.2-21). Significant impacts were identified at 11 intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

**Transit Conditions.** Transit conditions under Alternative C with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative C with Alternative 5 would be the same as those described in Section 6.1.2.1 for Alternative A with Alternative 1.

**Public Health and Safety**

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the Alternative C area and Alternative 5 is approximately 6.5 miles. Vehicles would use Routes 9 and 3A to commute between the Alternative C area and Alternative 5. No high-crash frequency intersections are situated along this travel route. Because the travel distance between the Alternative C area and Alternative 5 is relatively short and there are no high-frequency crash intersections situated along the travel route, no significant additive traffic impacts would occur.

6.1.2.7 **Barrigada Cantonment/Family Housing Alternative D with Route 15 LFTRC Alternative 1**

**Air Quality**

The combined air quality impacts would be similar to those described in Section 6.1.2.1.

The combined construction island-wide emissions impacts, summarized in Table 6.1.2-28, would be below the significance criterion of 250 tpy for criteria pollutants resulting in less than significant as a result of this combined alternative.
**Table 6.1.2-28. Barrigada Cantonment/Family Housing (Alternative D) with Route 15 LFTRC (Alternative 1, 2, 3, 4 or 5) Annual Construction Emissions (2016-2022)**

<table>
<thead>
<tr>
<th>Construction Year</th>
<th>Pollutant (tpy)</th>
<th>SO₂</th>
<th>CO</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
<th>NOₓ</th>
<th>VOC</th>
<th>CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td></td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
<td>neg</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td>0.1</td>
<td>4.8</td>
<td>0.4</td>
<td>0.4</td>
<td>6.2</td>
<td>0.8</td>
<td>933.6</td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td>0.5</td>
<td>31.3</td>
<td>2.0</td>
<td>1.8</td>
<td>23.6</td>
<td>4.2</td>
<td>4784.0</td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td>0.6</td>
<td>43.9</td>
<td>2.6</td>
<td>2.3</td>
<td>30.8</td>
<td>5.2</td>
<td>6825.0</td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td>0.3</td>
<td>20.3</td>
<td>1.2</td>
<td>1.0</td>
<td>12.5</td>
<td>2.8</td>
<td>2779.4</td>
</tr>
<tr>
<td>2021</td>
<td></td>
<td>0.7</td>
<td>41.4</td>
<td>2.5</td>
<td>2.2</td>
<td>32.1</td>
<td>4.3</td>
<td>7096.1</td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td>0.3</td>
<td>19.0</td>
<td>1.2</td>
<td>1.0</td>
<td>14.7</td>
<td>2.0</td>
<td>3256.4</td>
</tr>
</tbody>
</table>

**Significance Threshold**

- CO = Carbon Monoxide
- CO₂ = Carbon Dioxide
- NOₓ = Nitrogen Oxides
- PM₁₀ = Particulate Matter (<10 microns)
- PM₂.₅ = Particulate Matter (<2.5 microns)
- SO₂ = Sulfur Dioxide
- VOC = Volatile Organic Compounds
- neg = negligible
- NA = not available

**Terrestrial Biological Resources**

The additive impacts of implementing Cantonment Housing Alternative D, LFTRC Alternative 1, and the IT/COMM infrastructure are provided in Table 6.1.2-29. Overall, approximately 552 acres (224 ha) of limestone forest, or 3% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 153 acres (62 ha) of Overlay Refuge lands, or <1% of the total Overlay Refuge currently present on Guam, would be disturbed. In regards to recovery habitat for ESA-listed species, the greatest impact would be to Guam rail recovery habitat with 1,276 acres (516 ha) developed, mostly associated with Alternative D. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.

**Table 6.1.2-29. Summary of Impacts to Terrestrial Biological Resources with Implementation of Barrigada Cantonment/Family Housing (Alternative D), Route 15 LFTRC (Alternative 1), and IT/COMM Infrastructure**

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (2)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative D</td>
<td>99 (40)</td>
<td>167 (68)</td>
<td>75 (30)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 83 (34) MC: 83 (34) GR: 849 (344) GMK: 83 (34) Ser: 81 (3)</td>
</tr>
<tr>
<td>Alternative I</td>
<td>65 (26)</td>
<td>190 (77)</td>
<td>NA</td>
<td>GR</td>
<td>-</td>
<td>MFB: 81 (33) MC: 81 (33) GR: 283 (115) GMK: 81 (33) Ser: 67 (27)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>6 (2)</td>
<td>25 (10)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 50 (20) MC: 50 (20) GR: 144 (58) GMK: 50 (20) Ser: 42 (17)</td>
</tr>
<tr>
<td>Total</td>
<td>170 (69)</td>
<td>382 (155)</td>
<td>153 (62)</td>
<td>-</td>
<td>-</td>
<td>MFB: 214 (87) MC: 214 (87) GR: 1,276 (516) GMK: 214 (87) Ser: 190 (77)</td>
</tr>
</tbody>
</table>

**Legend:**

- GMK = Guam Micronesian kingfisher
- GR = Guam rail
- MC = Mariana crow
- MFB = Mariana fruit bat
- Ser = Serianthes

**Notes:**

1. Direct impact - conversion to developed areas.
2. Only species for which there would be a significant impact.
Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives D and 1 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative D and Alternative 1 would occur along Routes 1, 2A, 3, 3A, 4, 5, 8, 9, 10, 15, 16, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 45% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Olmo et al. 2002; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011a, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Athens, 2009; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 14% of Route 1, 4% of Route 2A, 100% of Route 3, 94% of Route 3A, 1% of Route 4, 39% of Route 5, 5% of Route 8, 87% of Route 9, none of Route 10, 57% of Route 15, 61% of Route 16, and 1% of Route 17 have been surveyed.

Table 6.1.2-30 lists 16 known archaeological sites within the IT/COMM lines PDIA. Five of the sites, including remnants of an historic encampment, a WWII Japanese defensive complex, two Latte Period artifact scatters, and portions of NWF, are eligible to the NRHP. Eleven archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

Table 6.1.2-30. Archaeological Sites within the IT/COMM Lines Potential Impacted Area for Barrigada Cantonment/Family Housing (Alternative D) and the Route 15 LFTRC (Alternative 1)

<table>
<thead>
<tr>
<th>GHPI Number</th>
<th>Temporary Site Number/ Map Number</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII/Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.1.2-30. Archaeological Sites within the IT/COMM Lines Potential Impacted Area for Barrigada Cantonment/Family Housing (Alternative D) and the Route 15 LFTRC (Alternative 1)

<table>
<thead>
<tr>
<th>GHPI Number ³</th>
<th>Temporary Site Number/Map Number ²</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2321</td>
<td>Ceramic/artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>T-H-1</td>
<td>Artifact scatter &amp; concrete foundations</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII/Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte: Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Legend: GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA = not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

Notes: ¹Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.

One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative D and the LFTRC Alternative 1 has the potential to result in adverse effects from excavation and soil removal to six historic properties—five NRHP-eligible archaeological sites (see Table 6.1.2-30) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.
Ground Transportation

The travel demand modeling methodology for the combination of alternatives was defined and directed by the DoD and the FHWA to provide detailed off-base (external) roadway and intersection analysis for one representative pairing (the modeled combination) for a cantonment/family housing alternative and LFTRC site alternative. The modeled combination for Alternative D involved a pairing with Alternative 5 (see Section 3.12.1). Modeling results for this scenario indicate that weekday a.m. peak hour vehicle traffic related to the proposed action is generated solely by operations at the cantonment/family housing area. LFTRC-related traffic would occur prior to the start weekday a.m. peak hour (8:00 a.m.) and may coincide with the weekday p.m. peak hour (4:30 p.m. to 5:30 p.m.) (see Section 5.1.12).

Operations of the LFTRC would increase traffic on the off-base (external) roadway segments and intersections that comprise the most direct route between the main cantonment gate and the LFTRC gates by approximately 38 vehicles (measured in passenger car equivalents) (see Table 5.1.12-2). LFTRC-related traffic represents an insubstantial amount of traffic (less than 5%) along the route. This minimal incremental increase in traffic volumes would not adversely affect level of service on roadways or at intersections along the route. The relative contribution from LFTRC traffic to the off-base (external) roadway segments and intersections under each cantonment/family housing alternative would be minimal and would not vary appreciably with any LFTRC alternative (Alternative 1, 2, 3, 4, and 5). Therefore, the impacts to the off-base (external) roadway segments and intersections would be essentially the same for Alternative D with Alternative 1, Alternative D with Alternative 2, 3, or 4, and Alternative D with Alternative 5. A qualitative discussion of the potential effects of LFTRC-related traffic is provided for each combination.

Pairing Alternative D with Alternative 1 may result in a slight increase in vehicles (less than 5%) on roadway segments and at intersections that comprise the most direct route between the Alternative D Main Gate and the Alternative 1 gate, and a slight decrease in vehicles compared to the modeled combination of Alternative D Main Gate and the Alternative 5 gate (Figure 6.1.2-4). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route. The impacts to off-base (external) roadway segments and intersections are summarized in Table 6.1.2-31.

Table 6.1.2-31. Summary of Additive Impacts to Ground Transportation Resources with the Barrigada Cantonment/Family Housing (Alternative D) and any LFTRC

<table>
<thead>
<tr>
<th>#</th>
<th>Roadway Segments*</th>
<th>Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route 15, from Route 29 to Route 26 (SI)</td>
<td>Route 15 / Chalan Lajuna (SI)</td>
</tr>
<tr>
<td>2</td>
<td>Route 1, from Route 30 to Route 8 (SI)</td>
<td>Route 1 / Route 27 (SI)**</td>
</tr>
<tr>
<td>3</td>
<td>Route 1, from Route 6 (N) to Route 11 (SI)</td>
<td>Route 1 / Route 26 (SI)**</td>
</tr>
<tr>
<td>4</td>
<td>Route 8, from Route 10 to Route 33 (E) (SI)</td>
<td>Route 16 / Route 27 (SI)**</td>
</tr>
<tr>
<td>5</td>
<td>Route 8, from Route 33 (E) to Route 33 (W) (SI)</td>
<td>Route 15 / Route 26 (SI)</td>
</tr>
<tr>
<td>6</td>
<td>Route 8, from Route 33 (W) to Route 1 (SI)</td>
<td>Route 1 / Route 10A (SI)**</td>
</tr>
<tr>
<td>7</td>
<td>Route 10, from Route 8 to Route 15 (SI)</td>
<td>Route 8 / Chalan Santo Papa (SI)</td>
</tr>
<tr>
<td>8</td>
<td>Route 10, from Route 15 to Route 32 (SI)</td>
<td>Route 4 / Route 7B (SI)</td>
</tr>
<tr>
<td>9</td>
<td>Route 15, from Route 26 to Barrigada South Gate (SI)</td>
<td>NA</td>
</tr>
<tr>
<td>10</td>
<td>Route 15, from Barrigada South Gate to Route 10 (SI)</td>
<td>NA</td>
</tr>
<tr>
<td>11</td>
<td>Route 16, from Route 10A to Barrigada Main Gate (SI)</td>
<td>NA</td>
</tr>
<tr>
<td>12</td>
<td>Route 26, from Route 25 to Route 15 (SI)</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>12, SI</td>
<td>8, SI</td>
</tr>
</tbody>
</table>

Legend: NA indicates Not Applicable. SI indicates significant impact.

Notes: *Includes impacts to roadway segments in at least one direction during one (or both) weekday a.m. or p.m. peak hours. ** Indicates a significant but mitigable impact has been identified at this location under Year 2030 Alternative A.
Figure 6.1.2-4
Travel Routes from Barrigada Cantonment/Family Housing (Alternative D) to the LFTRC Alternatives

Legend
Travel Routes from Barrigada Cantonment/Family Housing (Alternative D) to the LFTRC Alternatives
- NWF (16.9 mi/27.2 km)
- Route 15 (5.8 mi/9.3 km)
- NAVMAG East-West (17 mi/27.4 km)
- NAVMAG L-Shaped (17 mi/27.4 km)
- NAVMAG North-South (17.7 mi/28.5 km)
- Highways
- Airfields
- Barrigada Cantonment/Family Housing Alternative (Alt. D)
- LFTRC Alternatives
- DoD Properties

Source: NAVFAC Pacific 2013
**Roadway Segment Operations.** A capacity analysis was conducted to determine potential impacts to the off-base (external) roadway network during weekday a.m. and p.m. peak hours. The volume-to-capacity ratio and LOS for each study roadway segment is compared to the baseline conditions to determine if any significant impacts would occur. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would result in a potentially significant impact on 12 study roadway segments in at least one direction during the weekday a.m. and/or weekday p.m. peak hours.

- **Route 15, from Route 26 to Route 29.** This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.96 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.08 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.17. The proposed action would increase traffic on this study roadway segment by approximately 63 vehicles during the weekday a.m. peak hour. This 7.5% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the southbound/westbound direction on this study roadway segment during the weekday p.m. peak hour.

- **Route 1, from Route 30 to Route 8.** This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.91 in the northbound/eastbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.01. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday a.m. peak hour.

- **Route 1, from Route 6 (N) to Route 11.** This study roadway segment currently operates at LOS E with a v/c ratio of 0.99 in the southbound/westbound direction during the weekday a.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.05 in the southbound/westbound direction during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.11 in the southbound/westbound direction. The proposed action would increase traffic on this study roadway segment by approximately 95 vehicles during the weekday a.m. peak hour. This 5.4% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound direction during the weekday a.m. peak hour.

- **Route 8, from Route 10 to Route 33 (E).** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.13 in the southbound/westbound direction under Existing Conditions. Traffic volumes would decrease and this study roadway segment would improve to operate at acceptable LOS E with a v/c ratio of 0.95 in the southbound/westbound during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030
Guam and CNMI Military Relocation
(2012 Roadmap Adjustments) SEIS
Draft
April 2014

Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would degrade to operate at LOS F with a v/c ratio of 1.07. Therefore, the proposed action would result in a significant impact on this study roadway segment in the southbound/westbound directions during the weekday a.m. peak hour.

- **Route 8, from Route 33 (E) to Route 33 (W).** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.89 and unacceptable LOS F with a v/c ratio of 1.14 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively. This study roadway segment would operate at acceptable LOS E with a v/c ratio of 0.98 and would continue to operate at unacceptable LOS F with a v/c ratio of 1.29 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would degrade to operate at unacceptable LOS F with a v/c ratio of 1.03 and would continue to operate at unacceptable LOS F with a v/c ratio of 1.38 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively. The proposed action would increase traffic on this study roadway segment by approximately 148 vehicles during the weekday p.m. peak hour. This 6.7% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact in the northbound/eastbound direction on this study roadway segment during the weekday a.m. and p.m. peak hours. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.13 and acceptable LOS C with a v/c ratio of 0.78 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.16 and 1.03 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) this roadway segment would continue to operate at LOS F with a v/c ratio of 1.26 and 1.10 during the weekday a.m. and p.m. peak hours, respectively. The proposed action would increase traffic on this study roadway segment by approximately 162 and 114 vehicles during the weekday a.m. and p.m. peak hours, respectively. This 8.0% and 6.5% increase in traffic exceeds the 5.0% threshold of significance during the weekday a.m. and p.m. peak hours. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound and southbound/westbound directions during the weekday a.m. peak hour and p.m. peak hours.

- **Route 10, from Route 33 (W) to Route 15.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.14 in the northbound/eastbound direction during the weekday a.m. peak hour and operates at acceptable LOS D with a v/c ratio of 0.89 in the southbound/westbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.26 in the
northbound/eastbound direction during the weekday a.m. peak hour and a v/c ratio of 1.00 in the southbound/westbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.36 in the northbound/eastbound direction during the weekday a.m. peak hour and a v/c ratio of 1.13 in the southbound/westbound direction during the weekday p.m. peak hour. The proposed action would increase traffic on this study roadway segment by approximately 156 vehicles in the northbound/eastbound direction during the weekday a.m. peak hour and by 207 vehicles in the southbound/westbound direction during the weekday p.m. peak hour. This 7.2% increase in traffic in the northbound/eastbound during the weekday a.m. peak hour and 11.5% increase in traffic in the southbound/westbound directions during the weekday p.m. peak hour exceed the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday a.m. peak hour and in the southbound/westbound direction during the weekday p.m. peak hour.

- **Route 10, from Route 15 to Route 32.** This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.05 in the northbound/eastbound direction during the weekday a.m. peak hour and operates at acceptable LOS D with a v/c ratio of 0.85 in the southbound/westbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.17 in the northbound/eastbound direction during the weekday a.m. peak hour and at acceptable LOS E with a v/c ratio of 0.96 in the southbound/westbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.23 in the northbound/eastbound direction during the weekday a.m. peak hour and would degrade to operate at unacceptable LOS F with a v/c ratio of 1.01 in the southbound/westbound direction during the weekday p.m. peak hour. The proposed action would increase traffic on this study roadway segment by approximately 97 vehicles in the northbound/eastbound direction during the weekday a.m. peak hour. This 5.1% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday a.m. peak hour and in the southbound/westbound direction during the weekday p.m. peak hour.

- **Route 15, from Route 26 to Barrigada South Gate.** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.90 in the northbound/eastbound direction during the weekday p.m. peak hour under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.06 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.24 in the northbound/eastbound direction during the weekday a.m. peak hour. The proposed action would increase traffic on this study roadway segment by approximately 131 vehicles in the northbound/eastbound direction during the weekday a.m. peak hour. This 14.7% increase in traffic exceeds the 5.0% threshold of significance. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.05 and acceptable LOS C with a v/c ratio of 0.76 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study roadway segment would continue to operate at
unacceptable LOS F with a v/c ratio of 1.11 and would operate at acceptable LOS D with a v/c ratio of 0.84 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.28 and would degrade to operate at unacceptable LOS F during the weekday a.m. and p.m. peak hours, respectively, in the southbound/westbound direction. The proposed action would increase traffic on this study roadway segment by approximately 125 vehicles in the southbound/westbound direction during the weekday a.m. peak hour. This 13.5% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours.

- **Route 15**, from Barrigada South Gate to Route 10. This study roadway segment currently operates at acceptable LOS A with a v/c ratio of 0.46 and acceptable LOS D with a v/c ratio of 0.90 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study roadway segment would continue to operate at acceptable LOS A with a v/c ratio of 0.60 and would operate at unacceptable LOS F with a v/c ratio of 1.02 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would degrade to operate at LOS F with a v/c ratio of 1.06 during the weekday a.m. peak hour and would continue to operate at unacceptable LOS F with a v/c ratio of 1.38 during the weekday p.m. peak hour in the northbound/eastbound direction. The proposed action would increase traffic on this study roadway segment by approximately 274 vehicles in the northbound/eastbound direction during the weekday p.m. peak hour. This 26.2% increase in traffic exceeds the 5.0% threshold of significance. This study roadway segment currently operates at acceptable LOS E with a v/c ratio of 0.93 and LOS B with a v/c ratio of 0.62 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.00 and at acceptable LOS C with a v/c ratio of 0.74 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.25 and would degrade to operate at unacceptable LOS F with a v/c ratio of 1.22 during the weekday a.m. and p.m. peak hours, respectively, in the southbound/westbound direction. The proposed action would increase traffic on this study roadway segment by approximately 361 vehicles in the southbound/westbound direction during the weekday p.m. peak hour. This 39.2% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in both directions during the weekday a.m. and p.m. peak hours.

- **Route 16**, from Route 10A to Barrigada Main Gate. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.03 and 1.09 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.07 and 1.05 in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada
Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at LOS F with a v/c ratio of 1.16 and 1.10 during the weekday a.m. and p.m. peak hours. The proposed action would increase traffic on this study roadway segment by approximately 138 and 90 vehicles in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours, respectively. This 7.4% and 5.1% increase in traffic exceeds the 5.0% threshold of significance. This study roadway segment currently operates at unacceptable LOS F with a v/c ratio of 1.01 and 1.09 in the southbound/westbound direction during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.13 in the southbound/westbound direction during the weekday p.m. peak hour, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.24 during the weekday a.m. peak hour, in the southbound/westbound direction. The proposed action would increase traffic on this study roadway segment by approximately 165 vehicles in the southbound/westbound direction during the weekday p.m. peak hour. This 8.3% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday a.m. and p.m. peak hours and in the southbound/westbound direction during the weekday p.m. peak hour.

- **Route 26, from Route 25 to Route 15.** This study roadway segment currently operates at acceptable LOS D with a v/c ratio of 0.84 in the northbound/eastbound direction during the weekday p.m. peak hour, under Existing Conditions. This study roadway segment would operate at unacceptable LOS F with a v/c ratio of 1.01 in the northbound/eastbound direction during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study roadway segment would continue to operate at unacceptable LOS F with a v/c ratio of 1.08. The proposed action would increase traffic on this study roadway segment by approximately 47 vehicles in the northbound/eastbound direction during the weekday a.m. peak hour. This 6.1% increase in traffic exceeds the 5.0% threshold of significance. Therefore, the proposed action would result in a significant impact on this study roadway segment in the northbound/eastbound direction during the weekday a.m. peak hour.

Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments. Potential mitigation measures would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Intersection Operations.** Intersection analysis was conducted to determine potential impacts to the off-base (external) intersections during weekday a.m. and p.m. peak hours. The LOS for each study intersection is compared to the baseline conditions to determine if any significant impacts would occur. An impact summary is provided in Table 6.1.2-31. The detailed results of the intersection analysis are provided in their entirety in Appendix F.

The addition of traffic generated by the proposed action would potentially result in a significant impact at eight study intersections during the weekday a.m. and/or weekday p.m. peak hours.
- **Route 15 / Chalan Lajuna.** This two-way stop-controlled study intersection currently operates at acceptable LOS D with 30.7 seconds of delay and acceptable LOS C with 23.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study intersection would operate at unacceptable LOS F with 75.8 and 82.6 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 1 / Route 27.** This signalized study intersection currently operates at acceptable LOS E with 70.3 seconds of delay during the weekday a.m. peak hour under Existing Conditions. This study intersection would operate at unacceptable LOS F with 118.3 seconds of delay during the weekday a.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with 134.1 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. peak hour.

- **Route 1 / Route 26.** This signalized study intersection currently operates at acceptable LOS C with 27.9 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This intersection would operate at unacceptable LOS F with 87.6 seconds of delay during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with 94.9 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- **Route 16 / Route 27.** This signalized study intersection currently operates at acceptable LOS C with 50.1 seconds of delay and acceptable LOS E with 71.2 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This intersection would operate at unacceptable LOS F with greater than 180.0 seconds of delay and 154.7 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay and unacceptable LOS F with 165.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- **Route 15 / Route 26.** This two-way stop-controlled study intersection currently operates at unacceptable LOS F with 32.1 seconds of delay and 147.3 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study intersection would operate at unacceptable LOS F with 145.2 seconds of delay and greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action
would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 1 / Route 10A.** This signalized study intersection currently operates at acceptable LOS E with 62.6 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This study intersection would operate at unacceptable LOS F with 139.3 seconds of delay during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with 143.2 seconds of delay. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

- **Route 8 / Chalan Santo Papa.** This two-way stop-controlled study intersection currently operates at unacceptable LOS F with 55.1 second delay and 53.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively, under Existing Conditions. This study intersection would continue to operate at unacceptable LOS F with 86.5 seconds of delay and 158.9 seconds of delay during the weekday a.m. and p.m. peak hours, respectively under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with 127.7 seconds of delay and greater than 180.0 seconds of delay during the weekday a.m. and p.m. peak hours, respectively. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday a.m. and p.m. peak hours.

- **Route 4 / Route 7B.** This signalized study intersection currently operates at acceptable LOS E with 45.7 seconds of delay during the weekday p.m. peak hour under Existing Conditions. This study intersection would operate at unacceptable LOS F with 161.3 seconds of delay during the weekday p.m. peak hour under Year 2030 Baseline Conditions. Under Year 2030 Barrigada Cantonment/Family Housing (Alternative D) Conditions, this study intersection would continue to operate at unacceptable LOS F with 171.6 seconds of delay during the weekday p.m. peak hour. The proposed action would add more than 50 vehicles to this poorly performing intersection. Therefore, the proposed action would result in a significant impact on this study intersection during the weekday p.m. peak hour.

Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments or intersections. Potential mitigation measures would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. Potential. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Transit Conditions.** There would be no impacts to transit conditions under Alternative D with Alternative 1.

**Pedestrian and Bicycle Conditions.** There would be no impacts to pedestrian and bicycle conditions under Alternative D with Alternative 1.
Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the proposed Barrigada Cantonment/Family Housing (Alternative D) area and Alternative 1 is approximately 5.8 miles. Vehicles would use Routes 8, 10 and 15 to commute between the Alternative D area and Alternative 1.

One high-crash frequency intersection (intersection of Routes 8/10/16) is situated along the travel route between the Alternative D area and Alternative 1. This intersection is in the central portion of Guam and must be driven through when arriving/leaving the Barrigada Main Gate because Route 8 provides direct access to the Alternative D area. The travel distance between the Alternative D area and Alternative 1 is relatively short however, with this one high-frequency crash intersection situated along the travel route resulting in a higher potential for being involved in a traffic incident or to be delayed because of traffic incidents. Because the travel distance is short, a less-than-significant additive impact on traffic would occur.

6.1.2.8 Barrigada Cantonment/Family Housing Alternative D with any NAVMAG LFTRC Alternative (Alternatives 2, 3, or 4)

Air Quality

The combined air quality impacts would be similar to those described in Section 6.1.2.1. The combined construction island-wide emissions, summarized in Section 6.1.2.7 and Table 6.1.2-28, would be less than significant as a result of these combined alternatives.

Terrestrial Biological Resources

Barrigada Cantonment/Family Housing Alternative D with NAVMAG (East/West) LFTRC Alternative 2

The additive impacts of implementing Cantonment/Family Housing Alternative D, LFTRC Alternative 2, and the IT/COMM infrastructure are provided in Table 6.1.2-32. Overall, approximately 316 acres (128 ha) of limestone forest, or 1% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 153 acres (62 ha) of Overlay Refuge lands, or 1% of the total Overlay Refuge currently present on Guam, would be disturbed. In regards to recovery habitat for ESA-listed species, the greatest impact would be to Guam rail recovery habitat with 1,042 acres (422 ha) developed, mostly associated with Alternative D. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-32. Summary of Impacts to Terrestrial Biological Resources with Implementation of Barrigada Cantonment/Family Housing (Alternative D), NAVMAG (East/West) LFTRC (Alternative 2), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (2)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
</table>
| Alternative D | 99 (40) | 167 (68) | 75 (30) | GR | - | MFB: 83 (34)  
MC: 83 (34)  
GR: 849 (344)  
GMK: 83 (34)  
Ser: 81 (3) |
| Alternative 2 | 0 | 19 (8) | 0 | - | - | MFB: 43 (17)  
MC: 43 (17)  
GR: 49 (20)  
GMK: 43 (17)  
Ser: 18 (7) |
| IT/COMM | 6 (2) | 25 (10) | 78 (32) | - | - | MFB: 50 (20)  
MC: 50 (20)  
GR: 144 (58)  
GMK: 50 (20)  
Ser: 42 (17) |
| Total | 105 (42) | 211 (86) | 153 (62) | - | - | MFB: 176 (71)  
MC: 176 (71)  
GR: 1,042 (422)  
GMK: 176 (71)  
Ser: 141 (57) |

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas.  
(2) Only species for which there would be a significant impact.

Barrigada Cantonment/Family Housing Alternative D with NAVMAG (North/South) LFTRC Alternative 3

The additive impacts of implementing Cantonment/Family Housing Alternative D, LFTRC Alternative 3, and the IT/COMM infrastructure are provided in Table 6.1.2-33. Overall, approximately 466 acres (189 ha) of limestone forest, or 2% of the total limestone forest currently present on Guam, would be disturbed. In addition, approximately 428 acres (173 ha) of Overlay Refuge lands, or 2% of the total Overlay Refuge currently present on Guam, would be disturbed. In regards to recovery habitat for ESA-listed species, the greatest impact would be to Guam rail recovery habitat with 1,017 acres (412 ha) developed, mostly associated with Alternative D. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
Table 6.1.2-33. Summary of Impacts to Terrestrial Biological Resources with Implementation of Barrigada Cantonment/Family Housing (Alternative D), NAVMAG (North/South) LFTRC (Alternative 3), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(1)}) (acres [ha])</th>
<th>ESA-Listed Special-Status Species(^{(2)})</th>
<th>Guam-Listed Special-Status Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative D</td>
<td>99 (40)</td>
<td>167 (68)</td>
<td>75 (30)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 83 (34)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MC: 83 (34)</td>
<td></td>
<td>GR: 849 (344)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GMK: 83 (34)</td>
<td></td>
<td>Ser: 81 (3)</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>105 (42)</td>
<td>64 (26)</td>
<td>275 (111)</td>
<td>MFB, MC, GMK, MCM</td>
<td>PSTG</td>
<td>MFB: 223 (90)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MC: 230 (93)</td>
<td></td>
<td>GR: 24 (10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GMK: 223 (90)</td>
<td></td>
<td>Ser: 40 (16)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>6 (2)</td>
<td>25 (10)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 50 (20)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MC: 50 (20)</td>
<td></td>
<td>GR: 144 (58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GMK: 50 (20)</td>
<td></td>
<td>Ser: 42 (17)</td>
</tr>
<tr>
<td>Total</td>
<td>210 (85)</td>
<td>256 (104)</td>
<td>428 (173)</td>
<td>-</td>
<td>-</td>
<td>MFB: 356 (144)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MC: 363 (147)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>GR: 1,017 (412)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>GMK: 356 (144)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ser: 163 (66)</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MFB = Mariana fruit bat, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

Notes: \(^{(1)}\) Direct impact - conversion to developed areas.
\(^{(2)}\) Only species for which there would be a significant impact.

Barrigada Cantonment/Family Housing Alternative D with NAVMAG (L-Shaped) LFTRC Alternative 4

The additive impacts of implementing Cantonment/Family Housing Alternative D, LFTRC Alternative 4, and the IT/COMM infrastructure are provided in Table 6.1.2-34. Overall, 427 acres (173 ha) of limestone forest, or 2% of the total limestone forest currently present on Guam, would be disturbed. In addition, 372 acres (150 ha) of Overlay Refuge lands, or 1% of the total Overlay Refuge currently present on Guam, would be disturbed. In regards to recovery habitat for ESA-listed species, the greatest impact would be to Guam rail recovery habitat with 1,043 acres (422 ha) developed, mostly associated with Alternative D. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
### Table 6.1.2-34. Summary of Impacts to Terrestrial Biological Resources with Implementation of Barrigada Cantonment/Family Housing (Alternative D), NAVMAG (L-Shaped) LFTRC (Alternative 4), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (2)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative D</td>
<td>99 (40)</td>
<td>167 (68)</td>
<td>75 (30)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 83 (34), MC: 83 (34), GR: 849 (344), GMK: 83 (34), Ser: 81 (3)</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>67 (27)</td>
<td>63 (26)</td>
<td>219 (88)</td>
<td>MFB, MC, GMK</td>
<td>PSTG</td>
<td>MFB: 161 (65), MC: 166 (67), GR: 50 (20), GMK: 161 (65), Ser: 19 (8)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>6 (2)</td>
<td>25 (10)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 50 (20), MC: 50 (20), GR: 144 (58), GMK: 50 (20), Ser: 42 (17)</td>
</tr>
<tr>
<td>Total</td>
<td>172 (70)</td>
<td>255 (103)</td>
<td>372 (150)</td>
<td>-</td>
<td>-</td>
<td>MFB: 294 (119), MC: 299 (121), GR: 1.043 (422), GMK: 294 (119), Ser: 142 (57)</td>
</tr>
</tbody>
</table>

**Legend:** GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crown, MFB = Mariana fruit bat, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

**Notes:**
(1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

### Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternative D and Alternatives 2, 3, or 4 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative D and Alternatives 2, 3, or 4 would occur along Routes 1, 2A, 3, 3A, 4, 4A, 5, 8, 9, 10, 15, 16, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 56% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Henry et al. 1999; Allen et al. 2002; Olmo et al. 2002; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011a, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Athens, 2009; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 28% of Route 1, 13% of Route 2A, 100% of Route 3, 94% of Route 3A, 5% of Route 4, 9% of Route 4A, 39% of Route 5, 20% of Route 8, 87% of Route 9, none of Route 10, 69% of Route 15, 61% of Route 16, and 1% of Route 17 have been surveyed.

Table 6.1.2-35 lists 17 known archaeological sites within the IT/COMM lines PDIA for Alternatives 2, 3, and 4. Five of the sites, including remnants of an historic encampment, a WWII Japanese defensive complex, two Latte Period artifact scatters, and portions of NWF, are eligible for listing in the NRHP.
Twelve archaeological sites are not eligible for listing in the NRHP. There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

### Table 6.1.2-35. Archaeological Sites within IT/COMM Lines Potential Impacted area for Barrigada Cantonment/Family Housing (Alternative D) and LFTRC Alternatives 2, 3, or 4

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number*</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>235*</td>
<td>Barracks remnants</td>
<td>Second American Administration Territorial</td>
<td>Welch et al. 2009</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>Marianas-Bonins base command area</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>493*</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-02-2644</td>
<td>T-AP-002</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle Dump</td>
<td>WWII, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2321</td>
<td>Ceramic/Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete Pads</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-H-1</td>
<td>Artifact Scatter &amp; Concrete Foundations</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte; Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:** GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history, criterion D = eligible for potential to yield information important in prehistory or history.

**Notes:** †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.

One structure eligible for listing in the NRHP, North Field, is located within the potential impacted area for Alternatives 2, 3, and 4. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative D and the LFTRC Alternatives 2, 3, or 4 has the potential to result in adverse effects from excavation and soil removal to six historic properties—five NRHP-eligible archaeological sites (see Table 6.1.2-35) and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

Ground Transportation

Alternative D was modeled with Alternative 5 (Section 3.12.1). Pairing alternative D with Alternative 2, 3, or 4 may result in a slight increase (less than 5%) in vehicles on roadway segments and at intersections that comprise the most direct route between the Alternative D Main Gate and the Alternative 2, 3, or 4 gates, as well as a slight decrease in vehicles on roadway segments and at intersections that comprise the most direct route between the modeled combination Alternative D Main Gate and the Alternative 5 gate (see Figure 6.1.2-4). This minimal incremental increase or decrease in traffic volumes would not adversely affect level of service on roadways or at intersections along the route.

Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments or intersections. Potential mitigation measures would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative, or combination of alternatives and based on project-level technical studies to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

Roadway Segment Operations. Impacts to all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.7. Significant impacts were identified on twelve roadway segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.
Intersection Operations. Impacts to all intersections would be the same as those identified in Section 6.1.2.7 (see Table 6.1.2-31). Significant impacts were identified at eight intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

Transit Conditions. Transit conditions under Alternative D with Alternative 2, 3, or 4 would be similar to those described in Section 6.1.2.7 for Alternative D with Alternative 1.

Pedestrian and Bicycle Conditions. Pedestrian and bicycle conditions under Alternative D with Alternative 2, 3, or 4 would be similar to those described in Section 6.1.2.7 for Alternative D with Alternative 1.

Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the Alternative D area and Alternatives 2, 3, and 4 is approximately 17.7 miles to Alternative 2, and approximately 17.0 miles to Alternatives 3 and 4. Vehicles would use Routes 1, 8, and 10 to commute between the Alternative D area and Alternative 2, while Routes 4, 8, and 10, as well as a new roadway in Dandan, would be used to access Alternatives 3 and 4.

One high-crash frequency intersection (intersection of Routes 8/10/16) is situated along the travel route between the Alternative D area and Alternatives 2, 3, and 4. This intersection is in the central portion of Guam, and because Route 8 provides direct access to the Alternative D area, this intersection must be driven through when arriving/leaving the Barrigada Main Gate. The travel distance between the Alternative D area and Alternatives 2, 3, and 4 is relatively long, with one high-frequency crash intersection situated along the travel route, resulting in a higher potential for being involved in a traffic incident or to be delayed because of traffic incidents. However, a less-than-significant additive impact on traffic would occur.

6.1.2.9 Barrigada Cantonment/Family Housing Alternative D with NWF LFTRC Alternative 5

Air Quality

The combined air quality impacts would be similar to those described in Section 6.1.2.1.

The combined construction island-wide emissions, summarized in Section 6.1.2.7 and Table 6.1.2-28, would be less than significant as a result of these combined alternatives.

Terrestrial Biological Resources

The additive impacts of implementing Cantonment/Family Housing Alternative D, LFTRC Alternative 5, and the IT/COMM infrastructure are provided in Table 6.1.2-36. Overall, 498 acres (202 ha) of limestone forest, or 2% of the total limestone forest currently present on Guam, would be disturbed. In addition, 407 acres (165 ha) of Overlay Refuge lands, or 2% of the total Overlay Refuge currently present on Guam, would be disturbed. In regards to recovery habitat for ESA-listed species, the greatest impact would be to Guam rail recovery habitat with 1,033 acres (418 ha) developed, mostly associated with Alternative D. The proposed IT/COMM alignment contributes little to the overall potential impact to terrestrial biological resources. Additive impacts to terrestrial biological resources would be less than significant.
### Table 6.1-36. Summary of Impacts to Terrestrial Biological Resources with Implementation of Barrigada Cantonment/Family Housing (Alternative D), NWF LFTRC (Alternative 5), and IT/COMM Infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Primary Limestone Forest (acres [ha])</th>
<th>Secondary Limestone Forest (acres [ha])</th>
<th>Overlay Refuge (acres [ha])</th>
<th>ESA-Listed Special-Status Species (2)</th>
<th>Guam-Listed Special-Status Species (2)</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative D</td>
<td>99 (40)</td>
<td>167 (68)</td>
<td>75 (30)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 83 (34)</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>90 (37)</td>
<td>111 (45)</td>
<td>254 (103)</td>
<td>MFB, MC, GMK, Ser</td>
<td>-</td>
<td>MFB: 196 (79)</td>
<td>MFB, MC, GMK: 12 (5)</td>
</tr>
<tr>
<td>IT/COMM</td>
<td>6 (2)</td>
<td>25 (10)</td>
<td>78 (32)</td>
<td>-</td>
<td>-</td>
<td>MFB: 50 (20)</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>195 (79)</td>
<td>303 (123)</td>
<td>407 (165)</td>
<td></td>
<td></td>
<td>MFB: 329 (133)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Legend: GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crown, MFB = Mariana fruit bat, Ser = Serianthes.

Notes: (1) Direct impact - conversion to developed areas.
(2) Only species for which there would be a significant impact.

### Cultural Resources

Adverse effects to historic properties under NHPA and impacts to other cultural resources of cultural importance resulting from the implementation of Alternatives D and 5 would be equal to the combined effects and impacts of each as discussed in Chapters 4 and 5. Additional effects and impacts could also result from the construction of the IT/COMM links for these alternatives. Construction for the IT/COMM lines for Alternative D and Alternative 5 would occur along Routes 1, 3, 3A, 4, 5, 8, 9, 10, 15, 16, and 17. In general, IT/COMM lines would follow existing roads; however, additional lines would be constructed at AAFB and from AAFB to Finegayan. Approximately 56% of these areas have been previously surveyed (Reinman 1967; Kurashina et al. 1987; Liston 1996; Lauter-Reinman 1997; Hunter-Anderson and Moore 2003; Dixon et al. 2004, 2011a, 2013a, 2013b; Aaron et al. 2007; Grant et al. 2007; Athens, 2009; Welch 2010; Dixon and Walker 2011). As not all of the routes have been surveyed, a literature review of previous surveys and sites located within the construction corridor was undertaken and the likelihood of finding buried cultural resources within PDIA for the IT/COMM lines corridor was assessed (Dixon et al. 2014). Within the PDIA for the IT/COMM lines, approximately 15% of Route 1, 100% of Route 3, 62% of Route 3A, 1% of Route 4, 39% of Route 5, 5% of Route 8, 87% of Route 9, none of Route 10, 69% of Route 15, 61% of Route 16, and 1% of Route 17 have been surveyed.

Table 6.1.2-37 lists 17 known archaeological sites within the IT/COMM lines PDIA. Five of the sites, including two Latte Period artifact scatters, an historic encampment, a WWII Japanese defensive complex, and portions of NWF, are eligible to the NRHP. Twelve archaeological sites are not eligible for
There is also a potential for buried cultural resources along Routes 1, 5, 15, and 17 within unsurveyed areas.

### Table 6.1.2-37. Archaeological Sites within the IT/COMM Lines Potential Impacted Area for Barrigada Cantonment Housing (Alternative D) and the NWF LFTRC (Alternative 5)

<table>
<thead>
<tr>
<th>GHPI Number</th>
<th>Temporary Site Number/Map Number</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>36*</td>
<td>Flagpole stand</td>
<td>WWII/Second American Administration Territorial</td>
<td>Lauter-Reinman 1997</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>377*</td>
<td>Ceramic Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Kurashina et al. 1987</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>1066*</td>
<td>MARBO base command area remnants – concrete pads, roads, other remains</td>
<td>WWII American Military, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-02-1657</td>
<td>Japanese defensive complex</td>
<td>WWII Japanese Military</td>
<td>Allen et al. 2002</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-02-2644</td>
<td>Remains of medical supply storehouse no. 13</td>
<td>Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-07-2119</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2124</td>
<td>Bottle dump</td>
<td>WWII, Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2127</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td>Concrete pad</td>
<td>WWII, Second American Administration Territorial</td>
<td>Grant et al. 2007</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>66-07-2321</td>
<td>Ceramic/artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-1065</td>
<td>NWF</td>
<td>Second American Administration Territorial</td>
<td>Aaron et al. 2007</td>
<td>Yes</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>66-08-2305</td>
<td>Encampment</td>
<td>Second American Administration Territorial</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>66-08-2308</td>
<td>Artifact Scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>T-A4S-5</td>
<td>Concrete pads</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-H-1</td>
<td>Artifact scatter &amp; concrete foundations</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-H20-1</td>
<td>Water catchment with pump generator &amp; fuel tank foundations</td>
<td>WWII, Second American Administration Territorial</td>
<td>Dixon and Walker 2011</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>T-WAW-016</td>
<td>Bottle scatter</td>
<td>Pre-Contact/Latte, Japanese Administration, Second American Administration Territorial</td>
<td>Dixon et al. 2014</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:** GHPI = Guam Historic Properties Inventory; NRHP = National Register of Historic Places; NA=not applicable; NRHP criterion A = eligible because they are associated with events that have made a significant contribution to the broad pattern of history.

**Notes:**
†Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.
One structure eligible for listing on the NRHP, North Field, is located within the potential impacted area. No TCPs have been identified in the potential impacted areas for the IT/COMM lines.

The installation of IT/COMM links between Alternative D and the LFTRC Alternative 5 has the potential to result in adverse effects from excavation and soil removal to six historic properties—five NRHP-eligible archaeological sites (see Table 6.1.2-37), and one NRHP-eligible structure (North Field), as well as undetermined effects to possible buried cultural resources in unsurveyed areas along Routes 1, 5, 15, and 17. Based on an examination of previous investigations and predictive modeling, there is a low potential for NRHP-eligible sites in the remaining areas. No TCPs would be directly affected by the construction of the IT/COMM links.

No direct or indirect adverse effects due to operation of the IT/COMM utilities would occur as these lines would be buried and there would be no change in use, and no effects to the setting.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. To the degree possible, impacts to historic properties and other resources of cultural importance would be avoided during the planning process. Consultation under the 2011 PA will address potential adverse effects and alternatives to avoid adverse effects. If avoidance is not possible, potential minimization and mitigation measures may include data recovery and monitoring during construction in areas with likelihood for buried cultural resources. However, final mitigation will be determined after completion of the consultation process outlined in the PA. With the implementation of these measures and processes as outlined in the 2011 PA, additive impacts associated with IT/COMM would be reduced to a level below significance.

**Ground Transportation**

Alternative D was modeled with Alternative 5 (Section 3.12.1). Although significant impacts would occur at all locations, potential mitigation measures have not been identified for any of the impacted roadway segments or intersections. Potential mitigation measures would be similar in scope and scale to those identified in Section 6.1.2.1. However, the exact details of the improvements would require further evaluations and technical studies to determine their feasibility. The final list of implementable mitigation measures will be dependent on the selected alternative or combination of alternatives and based on project-level technical studies, to be conducted after the alternative or combination of alternatives is selected. FHWA will conduct all NEPA documentation efforts and any associated resource consultations as specific mitigation measures are proposed.

**Roadway Segment Operations.** Impacts to all off-base (external) roadway segments would be the same as those identified in Section 6.1.2.7. Significant impacts were identified on twelve roadway segments. The detailed results of the roadway segment analysis are provided in their entirety in Appendix F.

**Intersection Operations.** Impacts to all intersections would be the same as those identified in Section 6.1.2.7 (Table 6.1.2-31). Significant impacts were identified at eight intersections. The detailed results of the intersection analysis are provided in its entirety in Appendix F.

**Transit Conditions.** Transit conditions under Alternative D with Alternative 5 would be similar to those described in Section 6.1.2.7 for Alternative D with Alternative 1.

**Pedestrian and Bicycle Conditions.** Pedestrian and bicycle conditions under Alternative D with Alternative 5 would be similar to those described in Section 6.1.2.7 for Alternative D with Alternative 1.
Public Health and Safety

The potential for traffic incidents is the primary health and safety issue with potential for having additive impacts from implementing a specific cantonment/family housing alternative with a specific LFTRC alternative. The driving distance between the Alternative D area and Alternative 5 is approximately 16.9 miles. Vehicles would use Routes 1, 3, 3A, 8, and 16 to commute between the Alternative D area and Alternative 5.

Two high-crash frequency intersections (intersection of Routes 8/10/16 and Routes 1/3) are situated along the travel route between the Alternative D area and Alternative 5. In an effort to improve vehicle safety at the intersection of Routes 8/10/16, traffic improvements were completed in 2012 that includes the installation of a new traffic signal system that reduced congestion and channelized traffic. These intersections are in the central portion of Guam and because Route 8 provides direct access to the Alternative D area, that intersection must be driven through when arriving/leaving the Barrigada Main Gate. The travel distance between the Alternative D area and Alternative 5 is relatively long, with the two high-frequency crash intersections situated along the travel route resulting in a higher potential for being involved in a traffic incident or to be delayed because of traffic incidents. However, a less-than-significant additive impact on traffic would occur.

6.1.3 Summary of Additive Impacts

Table 6.1.3-1 summarizes the additive impacts to the resources that would be impacted by unique site combinations, as discussed in Section 6.1.2.
Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures

<table>
<thead>
<tr>
<th>Finegayan Alternative A or B with Route 15 LFTRC Alternative 1</th>
<th>Finegayan Alternative A or B with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with Route 15 LFTRC Alternative 1</th>
<th>AAFB Alternative C with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with NWF LFTRC Alternative 5</th>
<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
<th>Barrigada Alternative D with Route 15 LFTRC Alternative 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GEOLOGICAL AND SOIL RESOURCES</strong></td>
<td></td>
<td></td>
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<tr>
<td>LSI</td>
<td>Direct, short-term construction impacts along any of the IT/COMM routes. Earthmoving activities would occur mostly in roadways or other previously disturbed areas. BMPs would be utilized to minimize erosion.</td>
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<tr>
<td><strong>WATER RESOURCES</strong></td>
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<tr>
<td>LSI</td>
<td>IT/COMM construction would increase potential for short-term increases in stormwater runoff and erosion. The size and nature of the potentially disturbed area would vary marginally depending on the IT/COMM route, and some routes are closer to surface waters and wetlands than others. However, through compliance with the Construction General Permit and Program SWPPP and implementation of a site-specific SWPPPs, and associated erosion control, runoff reduction, and sediment removal BMPs, impacts to surface water resources would be minimized and off-site transport of stormwater runoff would be unlikely except during extreme weather events (i.e., typhoons). These stormwater runoff protection measures would also serve to protect surface water, groundwater, and wetlands from indirect impacts and prevent impacts to nearshore waters. Because the IT/COMM lines would primarily be located in existing roadways, no direct impacts to wetlands or other waters of the U.S. are anticipated. The potential exposure to direct or indirect impacts at any one location or resource would be short-term, given that construction would not occur simultaneously along the entire IT/COMM route at any one time and construction at any one location would be of relatively short duration. Based on these considerations, the additive impacts of IT/COMM construction activities would be less than significant.</td>
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<tr>
<td><strong>AIR QUALITY</strong></td>
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<tr>
<td>LSI</td>
<td>Hot-spot concentrations for mobile source CO, PM, and MSATs would be below standards. Construction emissions would be below the significance criterion for all combinations. Alternative A combination would be outside SO2 nonattainment areas, so no additive impacts with respect to LSI Impacts would be the same as described for Alternatives A or B with Alternative 1. LSI Impacts would be the same as described for Alternatives A or B with Alternative 1. LSI Impacts would be the same as described for Alternative C with Alternative 1. LSI Impacts would be the same as described for Alternative C with Alternative 1. LSI Impacts would be the same as described for Alternative D with Alternative 1. LSI Impacts would be the same as described for Alternative D with Alternative 1.</td>
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</tbody>
</table>

Legend: **SI** = significant impact; **SI-M** = significant impact-mitigable; **LSI** = less than significant; **NI** = no impact; **BI** = beneficial impact.
### Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures

<table>
<thead>
<tr>
<th>Finegayan Alternative A or B with Route 15 LFTRC Alternative 1</th>
<th>Finegayan Alternative A or B with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Finegayan Alternative A or B with NWF LFTRC Alternative 5</th>
<th>AAFB Alternative C with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with NWF LFTRC Alternative 5</th>
<th>Barrigada Alternative D with Route 15 LFTRC Alternative 1</th>
<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>the CAA general conformity requirement. Portions of the Alternative B combination would occur in Tanguisson SO₂ area but emissions would be below de minimis, so formal CAA conformity determination not required.</td>
<td>would be outside SO₂ nonattainment areas, so no additive impacts with respect to the CAA general conformity requirement.</td>
<td></td>
<td>combination would be outside SO₂ nonattainment areas, so no additive impacts with respect to the CAA general conformity requirement.</td>
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</tbody>
</table>

**Noise**

<table>
<thead>
<tr>
<th>LSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additive noise impacts from IT/COMM construction would only occur in close proximity to the construction activities and would primarily occur along existing roadways that have higher levels of ambient noise from road traffic and other sources. Installation of the IT/COMM lines would be very short-term, lasting only a few days near any given noise receptor before moving along the road easement. Accordingly, the impacts would be less than significant.</td>
</tr>
</tbody>
</table>

**Airspace**

<table>
<thead>
<tr>
<th>AIRSPACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No additive airspace impacts under any combination of alternatives.</td>
</tr>
</tbody>
</table>

**Land and Submerged Land Use**

<table>
<thead>
<tr>
<th>LAND AND SUBMERGED LAND USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No additive land and submerged land use impacts under any combination of alternatives.</td>
</tr>
</tbody>
</table>

**Recreational Resources**

<table>
<thead>
<tr>
<th>RECREATIONAL RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>No additive recreational resources impacts under any combination of alternatives.</td>
</tr>
</tbody>
</table>

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Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures

<table>
<thead>
<tr>
<th>TERRESTRIAL BIOLOGICAL RESOURCES (acres [ha])</th>
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<tbody>
<tr>
<td>Both Combinations</td>
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<td>LF – 28 (11)</td>
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<td>OR – 83 (34)</td>
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<td>Recovery Habitat</td>
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<td>MFB-36 (15)</td>
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<td>MC-37 (15)</td>
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<td>GR-137 (55)</td>
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<td>GMK-36 (15)</td>
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<td>Ser-30 (12)</td>
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<td>All Combinations</td>
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<td>LF – 26 (10)</td>
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<td>OR – 78 (32)</td>
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<td>MC-29 (12)</td>
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<td>GR-140 (57)</td>
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<td>Ser-22 (9)</td>
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<td>LF – 31 (13)</td>
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<td>OR – 78 (32)</td>
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<td>MFB-50 (20)</td>
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<td>MC-50 (20)</td>
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<td>GR-144 (58)</td>
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<td>Ser-42 (17)</td>
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</tbody>
</table>

Legend: GR = Guam rail, KF = Guam Micronesian kingfisher, LF = limestone forest, MC = Mariana crow, MFB = Mariana fruit bat, OR = Overlay Refuge, Ser = Serianthes.

MARINE BIOLOGICAL RESOURCES

No additive marine biological impacts under any combination of alternatives.

CULTURAL RESOURCES

SI-M Potential adverse effects to 4 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 4 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 4 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 5 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 5 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 6 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

SI-M Potential adverse effects to 6 historic properties and undetermined effects to possible buried cultural resources in unsurveyed areas. No adverse effects from operation of IT/COMM. Measures outlined in the 2011 PA would reduce impacts to a level below.

Legend: SI = significant impact; SI-M = significant impact-mitigable; LSI = less than significant; NI = no impact; BI = beneficial impact.
### Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures

<table>
<thead>
<tr>
<th>Location</th>
<th>Alternative A or B with Route 15 LFTRC Alternative 1</th>
<th>Finegayan Alternative A or B with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Finegayan Alternative A or B with NWF LFTRC Alternative 5</th>
<th>AAFB Alternative C with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with NWF LFTRC Alternative 5</th>
<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SI-M Alternative A/Alternative 1</td>
<td>SI-M Alternative A/Alternative 2, 3, or 4</td>
<td>SI-M Alternative B/Alternative 5</td>
<td>SI Same as Alternative C/Alternative 1</td>
<td>SI Same as Alternative C/Alternative 1</td>
<td>SI Same as Alternative D/Alternative 1</td>
<td>SI Same as Alternative D/Alternative 1</td>
</tr>
<tr>
<td></td>
<td>Slight increase in traffic on segments and intersections between cantonment/family housing and LFTRC. Significant impacts on 8 segments in at least 1 direction and 9 intersections for weekday a.m. and/or p.m. peak hours. Implementation of potential mitigation measures listed in Section 6.1.2.1 would reduce impacts to less than significant at all locations.</td>
<td>Same as Alternative A/Alternative 1.</td>
<td>Same as Alternative A/Alternative 1.</td>
<td>Slight increase in traffic on segments and intersections between cantonment/family housing and LFTRC. Potentially significant impact on 6 segments in at least one direction and at 11 intersections during weekday a.m. and/or weekday p.m. peak hours. Potential mitigation measures have not been identified at these locations.</td>
<td>Same as Alternative A/Alternative 1.</td>
<td>Slight increase in traffic on segments and intersections between cantonment/family housing and LFTRC. Potentially significant impact on 12 segments in at least 1 direction and at 8 study intersections during the weekday a.m. and/or weekday p.m. peak hours. Potential mitigation measures have not been identified at these locations.</td>
<td>Same as Alternative D/Alternative 1.</td>
</tr>
</tbody>
</table>

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### Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures

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<tr>
<th>Finegayan Alternative A or B with Route 15 LFTRC Alternative 1</th>
<th>Finegayan Alternative A or B with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with Route 15 LFTRC Alternative 1</th>
<th>AAFB Alternative C with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>AAFB Alternative C with NWF LFTRC Alternative 5</th>
<th>Barrigada Alternative D with Route 15 LFTRC Alternative 1</th>
<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SI/SI-M</strong> Alternative B/Alternative 1</td>
<td>Slight increase in traffic on segments and intersections between cantonment/family housing and LFTRC. Significant impact on 10 segments in at least one direction and 11 intersections for weekday a.m. and/or p.m. peak hours. Potential mitigation measures have been identified for 8 segments and 10 intersections. Implementation of potential mitigation measures listed in Section 6.1.2.1 would reduce impacts to less than significant at these locations. Impacts would be</td>
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</tbody>
</table>

Legend: **SI** = significant impact; **SI-M** = significant impact-mitigable; **LSI** = less than significant; **NI** = no impact; **BI** = beneficial impact.
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<tr>
<th>Location</th>
<th>Alternative A or B with Route 15 LFTRC Alternative 1</th>
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<th>AAFB Alternative C with Route 15 LFTRC Alternative 1</th>
<th>AAFB Alternative C with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finegayan</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
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<tr>
<td>Barrigada</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
</tr>
<tr>
<td>Both</td>
<td>Both Combinations</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
<td>LSI Transit conditions and increased potential for collisions with bicyclists and pedestrians.</td>
</tr>
</tbody>
</table>

**Marine Transportation**

- No additive marine transportation impacts under any combination of alternatives.

**Utilities**

- No additive utilities impacts under any combination of alternatives.

**Socioeconomic and General Services**

<table>
<thead>
<tr>
<th>LSI</th>
<th>IT/COMM utility easement would be required for Alternatives 2 and 4.</th>
<th>LSI</th>
<th>IT/COMM utility easement would be required for Alternatives 2 and 4.</th>
<th>LSI</th>
<th>IT/COMM utility easement would be required for Alternatives 2 and 4.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LSI</td>
<td>IT/COMM utility easement would be required for Alternatives 2 and 4.</td>
<td>LSI</td>
<td>IT/COMM utility easement would be required for Alternatives 2 and 4.</td>
<td>LSI</td>
</tr>
</tbody>
</table>

**Legend:**  
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<th>AAFB Alternative C with NWF LFTRC Alternative 5</th>
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<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSI Added traffic in areas with no sidewalks would increase the potential that bikers and pedestrians may be involved in a collision.</td>
<td>LSI Added traffic in areas with no sidewalks would increase the potential that bikers and pedestrians may be involved in a collision.</td>
<td>LSI Added traffic in areas with no sidewalks would increase the potential that bikers and pedestrians may be involved in a collision.</td>
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<td>LSI Added traffic in areas with no sidewalks would increase the potential that bikers and pedestrians may be involved in a collision.</td>
</tr>
<tr>
<td>NI Travel distance between sites is short. There are no high-frequency crash intersections along the route.</td>
<td>NI Travel distance between sites is short. There are no high-frequency crash intersections between the Alternative A and B area and Alternative 2. 2 high-crash frequency intersections between the Alternative A and B area and Alternatives 3</td>
<td>NI Travel distance between sites is short. There are no high-frequency crash intersections along the route.</td>
<td>NI Travel distance between sites is short. There are no high-frequency crash intersections between Alternative C area and Alternative 2 and 3 between Alternative C area and Alternatives 3 and 4. The added vehicles traveling</td>
<td>NI Travel distance between sites is short. There are no high-frequency crash intersections between Alternative C area and Alternative 2 and 3 between Alternative C area and Alternatives 3 and 4. The added vehicles traveling</td>
<td>NI Travel distance between sites is relatively short. 1 high-crash frequency intersections between Alternative D area and Alternatives 2, 3 and 4.</td>
<td>NI Travel distance between sites is relatively short. 1 high-crash frequency intersections between Alternative D area and Alternatives 2, 3 and 4.</td>
</tr>
</tbody>
</table>

**Legend:**  **SI** = significant impact;  **SI-M** = significant impact-mitigable;  **LSI** = less than significant;  **NI** = no impact;  **BI** = beneficial impact.
**Table 6.1.3-1. Summary of Additive Impacts and Potential Mitigation Measures**

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<th>Barrigada Alternative D with NAVMAG LFTRC Alternatives 2, 3, or 4</th>
<th>Barrigada Alternative D with Route 15 LFTRC Alternative 1</th>
<th>Barrigada Alternative D with NWF LFTRC Alternative 5</th>
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<tbody>
<tr>
<td>and 4. Traffic improvements completed in 2012. Added vehicles would be minimal portion of total vehicles on roadways.</td>
<td></td>
<td>between the main cantonment and LFTRC would be a minimal portion of total vehicles on these roadways.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN**

No additive Environmental Justice impacts under any combination of alternatives.

*Legend: SI = significant impact; SI-M = significant impact-mitigable; LSI = less than significant; NI = no impact; BI = beneficial impact.*
6.2 **COLLECTIVE IMPACTS INCLUDING 2010 ROD-RELATED ACTIONS**

Collective impacts refer to the impacts of the entire Marine Corps relocation to Guam, and comprise those impacts resulting from implementation of the proposed action combined with the 2010 ROD-Related Actions not affected by the 2012 Roadmap Adjustments. Such collective impacts would customarily be presented as part of a traditional cumulative impacts analysis, which considers the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable projects. This SEIS, however, presents these impacts in this manner to further the public’s understanding of the total direct, indirect, and cumulative impacts resulting from the proposed relocation. This collective impacts analysis facilitates both the analysis of the mitigation associated with the overall relocation effort and the development of associated environmental compliance documentation and consultations, such as those required under Section 7 of the ESA. While this presentation of collective impacts represents a departure from the customary organization of an EIS, procedurally it represents the first step in the required cumulative impacts analysis for this SEIS (Chapter 7).

### 6.2.1 2010 ROD-Related Actions

The 2010 ROD-Related Actions that were not affected by the 2012 Roadmap Adjustments were discussed in detail in the 2010 Final EIS (Volume 1, Chapter 2: Overview of Proposed Actions and Alternatives, Section 2.2: Marine Corps Relocation – Guam, pages 2-7 through 2-17), and are summarized below in Table 6.2.1-1.

<table>
<thead>
<tr>
<th>Location</th>
<th>Action</th>
<th>Description</th>
<th>Area (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAFB</td>
<td>Beddown of the Marine Corps ACE and construction of associated facilities at AAFB North Ramp</td>
<td>Will accommodate helicopter and other vertical lift aviation assets, operations, maintenance, and related training and support functions.</td>
<td>69.0 acres (27.9 ha)</td>
</tr>
<tr>
<td></td>
<td>Construction of air embarkation facilities at AAFB South Ramp</td>
<td>Will include the Air Mobility Campus, Organic Marine Corps Cargo, Air Freight Terminal Complex, and New Passenger Terminal.</td>
<td>28.0 acres (11.3 ha)</td>
</tr>
<tr>
<td></td>
<td>Construction of the North Gate and access road at AAFB, including a new Entry Control Point facility</td>
<td>Will improve traffic flow and physical security of vehicles entering and exiting the air base.</td>
<td>1.8 acres (0.7 ha)</td>
</tr>
</tbody>
</table>
Table 6.2.1. 2010 ROD-Related Actions

<table>
<thead>
<tr>
<th>Location</th>
<th>Action Description</th>
<th>Area (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersen South</td>
<td>Development of a non-firing training range complex to include maneuver training and landing zones</td>
<td>2,000.0 acres (809.4 ha)</td>
</tr>
<tr>
<td></td>
<td>Will include facilities for Military Operations on Urban Terrain and maneuver training, including a Breacher House. Will also include landing zones to support training in Confined Area Landing, External Loads, and Helicopter Insertion/Extraction.</td>
<td>155.7 acres (63.0 ha) of clearing/grading</td>
</tr>
<tr>
<td>Apra Harbor</td>
<td>Waterfront functions at Apra Harbor to support embarkation, including wharf and utility upgrades, and associated dredging and dredge disposal management</td>
<td>268.9 acres (108.8 ha)</td>
</tr>
<tr>
<td></td>
<td>Berths and adjacent support structures and lay-down areas will be upgraded to accommodate increased usage and to meet the new and emerging requirements in support of the Marine Corps relocation. Requirements include embarkation operations, support vessel transport berthing, escort ship berthing, and an amphibious vehicle laydown area. Dredging will be required to accommodate some of the escort ships.</td>
<td>172.2 acres (69.7 ha) currently developed (will be upgraded)</td>
</tr>
<tr>
<td>Relocation of Military Working Dog Kennel</td>
<td>Existing dog kennel and administration spaces will be relocated because noise of embarkation will be incompatible with the existing uses as a military working dog kennel and training location.</td>
<td>2.0 acres (0.8 ha)</td>
</tr>
<tr>
<td>Relocation of U.S. Coast Guard</td>
<td>Ship berthing and crew support buildings will be relocated to the former Ship Repair Facility because ships carrying amphibious vessels will require the full length of Victor Wharf.</td>
<td>11.0 acres (4.5 ha)</td>
</tr>
<tr>
<td>New Medical Clinic</td>
<td>A new medical/dental clinic will accommodate, in part, the increase in on-island military population.</td>
<td>7.8 acres (3.1 ha)</td>
</tr>
<tr>
<td>NAVMAG</td>
<td>Training activities, including aviation training and non-firing operations training</td>
<td>3,253.1 acres (1,316.5 ha)</td>
</tr>
<tr>
<td></td>
<td>Will include maneuver training areas and landing zones to support training in Confined Area Landing, External Loads, and Helicopter Insertion Extraction.</td>
<td>13.6 acre (5.5 ha) clearing/grading</td>
</tr>
<tr>
<td>Access to the NAVMAG area using the existing hiking trail as the access road</td>
<td>The existing hiking trail will be used to access NAVMAG. The trail will not be improved and will be used by foot traffic only.</td>
<td>0.0 acres (0.0 ha)</td>
</tr>
<tr>
<td>Use of Parsons Road area for the location of additional ammunition storage at NAVMAG</td>
<td>Earth-covered magazines will be located at the existing munitions storage area.</td>
<td>8.8 acres (3.6 ha)</td>
</tr>
<tr>
<td>Roadway Projects</td>
<td>Route 1 and Route 8 intersection and improvement ( Hagåtña ) (GRN1)</td>
<td>Intersection improvements (0.24 mile [0.24 km]) on Route 1 and (0.09 mile [0.14 km] on Route 8) to provide two left-turn lanes and two right-turn lanes for northbound Route 8 approaching Route 1.</td>
</tr>
<tr>
<td></td>
<td>Route 1 and Route 3 intersection and roadway improvements (Dededo) (GRN2)</td>
<td>Intersection improvements (0.15 mile [0.39 km]) on Route 1 and (0.04 mile [0.06 km] on Route 3) to provide southbound left, combined left/right, and free right with acceleration lane; east to north double left-turn lane.</td>
</tr>
</tbody>
</table>
Table 6.2.1-1. 2010 ROD-Related Actions

<table>
<thead>
<tr>
<th>Location</th>
<th>Action</th>
<th>Description</th>
<th>Area (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Replacement of Hagåtña (Agana) Bridge #1 with reinforced concrete (GRN3)</td>
<td>Agana Bridge replacement.</td>
<td>0.2 acre (0.06 ha)</td>
</tr>
<tr>
<td></td>
<td>Route 11 roadway improvements from the port to Route 1, including pavement strengthening (GRN4)</td>
<td>Pavement strengthening of two lanes.</td>
<td>0.0 acre (0.0 ha)</td>
</tr>
<tr>
<td></td>
<td>Widening of the Route 1 and Route 11 intersection, adding a second left turn lane and pavement strengthening (GRN5)</td>
<td>Intersection improvements (0.12 mile [0.19 km]) on Route 1.</td>
<td>0.0 acre (0.0 ha)</td>
</tr>
</tbody>
</table>

The following sections summarize the impacts to each resource from the 2010 ROD-Related Actions listed above and discussed in Volume 2 of the 2010 Final EIS. Impacts in the following sections are discussed in the future tense although it should be noted that some impacts resulting from construction and operations are occurring, or may have already occurred.

6.2.1.1 Geological and Soil Resources

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 3: Geological and Soil Resources, Section 3.2.2: Alternative 1, pages 3-34 to 3-49; Volume 6: Related Actions, Chapter 5: Geological and Soil Resources, Section 5.2.6.2: Alternative 2, pages 5-19 to 5-20), construction activities will include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and landscaping on a total of approximately 383.6 acres (155.2 ha). Cut soil will be used as fill material whenever possible to minimize impacts to soil. Soil types that will be disturbed are not agriculturally productive, and BMPs will be utilized to minimize soil erosion. Proposed developments are located on relatively flat areas that are not subject to slope instability. There will be no adverse impacts to the sinkhole at North Ramp. Established procedures will be implemented to minimize topsoil loss, compaction, and erosion from training activities.

6.2.1.2 Water Resources

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 4: Water Resources, Section 4.2.2: Alternative 1, pages 4-84 to 4-118) there will be no direct impacts to surface waters or wetlands. Construction activities will result in the potential for an increase in stormwater runoff, erosion, and sedimentation, and the increase in impervious area will result in a minor increase in stormwater intensities and volume. LID measures and BMPs will be implemented to protect surface water and groundwater quality. There will be direct impacts to nearshore waters from the wharf improvement projects at Apra Harbor, and nearshore water quality will be temporarily impacted during the dredging process in Inner Apra Harbor. In addition, construction activities at Apra Harbor could result in runoff that could be transported to or directly released to nearshore waters. Strict adherence to all applicable legal requirements will reduce potential impacts to surface waters, groundwater, nearshore waters, and wetlands.

As discussed in the 2010 Final EIS (Volume 6: Related Actions, Chapter 6: Water Resources, Section 6.2.6.2: Alternative 2, page 6-34), construction activities associated with the Hagåtña (Agana) Bridge #1 replacement will cause an unavoidable loss of 0.2 acre (0.06 ha) of waters of the U.S. However, this impact will be minimized through (1) use of construction and source control BMPs cooperatively developed by FHWA and GEPA, and (2) improved hydraulic conveyance under the proposed bridge/box.
culvert replacement, which will serve to reduce erosion and sedimentation downstream. Through the development and implementation of site-specific construction BMPs, coordination with regulatory agencies, and adherence to applicable orders, laws, and regulations relating to water quality, construction activities will result in less than significant impacts to surface water, groundwater, and nearshore waters. In the operational phase, no impacts to floodplains are anticipated. Diversion of drainage from one watershed to another will be avoided. Roadway-specific BMPs will be included in the project planning, design, and construction. All operations will be implemented in accordance with all applicable federal, local, and military orders, laws, and regulations. Therefore, impacts to surface water, groundwater, and nearshore waters from the 2010 ROD-Related Actions will be less than significant.

6.2.1.3 Air Quality

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 5: Air Quality, Section 5.2.2: Alternative 1, pages 5-18 to 5-29; Volume 6: Related Actions, Chapter 7: Air Quality, Section 7.2.6.3: Alternative 2, pages 7-48 to 7-54), construction and operation of the facilities will result in air emissions. Construction emissions will include SO₂, CO, PM₁₀, PM₂.₅, NOₓ, VOC, and CO₂; however, construction will be short-term and localized. Aircraft and helicopter engines emit criteria pollutants during all phases of operation. There will also be vehicle emissions during training exercises. Air emissions associated with both construction and operation of the 2010 ROD-Related Actions will be well below the significance criteria of 250 tpy for all criteria air pollutants.

6.2.1.4 Noise

The 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 6: Noise, Section 6.2.2: Alternative 1, pages 6-23 to 6-42; Volume 6: Related Actions, Chapter 8: Noise, Section 8.2.6.1: Alternative 1, pages 8-12 to 8-40) discusses noise impacts from construction and operation of the 2010 ROD-Related Actions. Construction noise will be temporary, and heavy equipment that will generate the highest noise levels will not be used consistently enough to exceed the USEPA guidance level of 75 dBA for more than one hour beyond DoD installation boundaries. Additionally, terrain and distance from construction activities will lessen noise impacts to sensitive receptors outside of the construction areas. There may be localized noise for brief periods from temporary increases in truck traffic, but there will not be an adverse noise impact to human health, neighboring communities, or within installations. Airfield operations will increase noise for some additive residences within the 60-70 dBA DNL zones, but there will not be a significant impact to human health or hearing. Non-firing training will include new sources of ground-based noise from vehicle use on existing roads, the convoy course, and the Advanced Motor Vehicle Operator’s Course in the maneuver training area, but these noise characteristics are similar to standard commercial vehicles. Most maneuver training will occur within the core of the maneuver training area, and noise setbacks will be established along the boundaries with the urban interface. Abatement measures for noise impacts associated with roadway projects are included as part of the project, where feasible.

6.2.1.5 Airspace

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 7: Airspace, Section 7.2.2: Alternative 1, pages 7-13 to 7-15), there will be an increase in total aircraft based at AAFB as well as associated aircraft operations. However, there will be no change to any of the approach and departure patterns associated with the airports/airfields at AAFB. The existing SUA will be used to conduct aircrew flight training, and low level training routes and landing zones will be established over Guam following VFR rules and procedures, and will not impact established flight paths. There will be no restrictions on access to, and no effect on, the use of Guam International Airport. In addition, there will be no effect on airport or airfield arrival and departure traffic flows due to the increase in military aircraft.
6.2.1.6 Land and Submerged Land Use

All of the non-roadway 2010 ROD-Related Actions will be constructed and operated at existing DoD facilities (2010 Final EIS, Volume 2: Marine Corps - Guam, Chapter 8: Land and Submerged Land Use, Section 8.2.3: Alternative 1, pages 8-59 to 8-75). There will be no change in land or submerged land use, no new public access restrictions, and all activities are consistent with land and submerged land use plans. Impacts from construction of the roadway projects, as discussed in the 2010 Final EIS (Volume 6: Related Actions, Chapter 10: Land and Submerged Land Use, Section 10.2.6.1: Alternative 1, page 10-12) will be typical of a public works maintenance project, with occasional disruption to business/commercial and tourist facilities. A Traffic Management Plan will be developed for implementation during construction activities.

6.2.1.7 Recreational Resources

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 9: Recreational Resources, Section 9.2.2: Alternative 1, pages 9-19 to 9-26; Volume 6: Related Actions, Chapter 11: Recreational Resources, Section 11.2.6.2, pages 11-9 to 11-10), construction of the 2010 ROD-Related Actions will result in an increase in construction-related vehicles on the roadways. This increase may cause delay for persons attempting to gain access to recreational resources. Construction activities will be short-term and localized. A Traffic Management Plan will be developed for implementation during roadway construction activities. All airfield and training operations will occur on DoD property. The training area at Andersen South will result in the loss of use of the Andersen South roads by joggers and walkers by fencing off the property and the addition of gates, however this resource is not unique to the region and there are comparable resources available in the adjoining properties.

6.2.1.8 Terrestrial Biological Resources

As discussed in the 2010 Final EIS (Volume 2: Marine Corps – Guam, Chapter 10: Terrestrial Biological Resources, Section 10.2.2: Alternative 1, pages 10-90 to 10-169), a total of 7.5 acres (3 ha) of primary limestone forest and 131 acres (53 ha) of secondary or disturbed limestone forest at AAFB will be removed. However, much of this forest area is not contiguous (i.e., the sum of the impacted forested area is from a number of different projects that are not collocated) or is adjacent to developed and previously disturbed areas.

As discussed in the 2010 Final EIS (Volume 6: Related Actions, Chapter 12: Terrestrial Biological Resources, Section 12.2.6.1: Alternative 1, pages 12-36 to 12-42), negligible direct impacts to aquatic habitats (approximately 0.15 acres [0.06 ha]) would occur from the replacement of Hagåtña Bridge #1 with reinforced concrete. Indirect impacts to aquatic habitats would be limited to potential sedimentation along the 260 feet (79 m) between the bridge and the river’s terminus. Impacts to potential habitat for special-status species from the 2010 ROD-Related Actions are not significant.

Construction activities will displace wildlife from potentially suitable habitat in the project areas; however, construction activities are short-term and localized, and displaced species are abundant and are expected to repopulate suitable portions of the project areas upon completion of construction.

No vegetation will be cleared during training operations. In addition, with implementation of established BMPs and mitigation measures identified in the 2010 Final EIS, the introduction or spread of invasive species is not anticipated.
6.2.1.9 Marine Biological Resources

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 11: Marine Biological Resources, Section 11.2.2: Alternative 1, pages 11-73 to 11-113) and as covered in the Marine Biological Opinion (USFWS 2010), the only direct impacts to marine biological resources would be associated with wharf improvement construction activities at Apra Harbor. Marine flora, invertebrates, and associated EFH will not be appreciably modified from existing conditions, and impacts will be short-term and minor. Increases of construction-related vessel movements could result in localized disturbance and displacement of fish species as a result of the potential for increased turbidity, increased benthic sedimentation, impacts to eggs and larvae in the upper water column, and seasonal disturbances to spawning coral reef and pupping scalloped hammerhead sharks. These impacts will be short-term, periodic, and localized. Green sea turtles will be protected by postponing in-water construction activities when green sea turtles are detected in the area. Additionally, green sea turtles are highly mobile and it is expected that dredging and pile driving activities will deter green sea turtles from closely approaching work areas.

Impacts to marine biological resources from roadway projects, as summarized in Table 13.2-8 of the 2010 Final EIS (Volume 6: Related Actions, Chapter 13: Marine Biological Resources, page 13-39), would include indirect impacts during construction and operation from increased runoff and potential for sedimentation of marine waters.

6.2.1.10 Cultural Resources

The 2010 ROD-Related Actions consist of construction at North Ramp, South Ramp, and a North Gate on AAFB, development of the non-firing training range complex at Andersen South, wharf upgrades and construction at Naval Base Guam, and construction of ammunition magazines and aviation training at the NAVMAG. These specific project areas were intensively investigated as described in the 2010 Final EIS (Volume 2: Marine Corps – Guam, Chapter 12: Cultural Resources, Section 12.1, pages 12-1 to 12-38. The 2010 ROD-Related Actions, as discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 12: Cultural Resources, Section 12.2.2: Alternative 1, pages 12-41 to 12-54; Volume 6), would potentially affect 11 historic properties, including seven within the airfield and training areas at AAFB, two within NAVMAG, and two within the training areas at Andersen South (Table 6.2.1-2). No adverse effects would occur to historic properties at Apra Harbor or Naval Base Guam. No historic architectural properties eligible for the NRHP would be adversely affected. Less than significant impacts would occur due to the use of the existing foot trail at NAVMAG. There would be no impacts to TCPs or resources of cultural importance from the implementation of these actions.

Additional 2010 ROD-Related Actions include the five roadway projects along Route 1, which are discussed in Volume 6 of the 2010 Final EIS (Volume 6: Related Actions, Chapter 14: Cultural Resources, Section 14.2.6.1: Alternative 1, page 14-19). The intersection improvement and pavement strengthening projects would not impact cultural resources. Hagåtña (Agana) Bridge is a historic property. However, the bridge will be reconstructed in its historic location, and mitigation will preserve the only remaining historic attributes and features contributing to the bridge’s NRHP eligibility; therefore, FHWA found that, with mitigation, the project will have no adverse effect on Hagåtña (Agana) Bridge.
Table 6.2.1-2. Historic Properties Potentially Affected by the 2010 ROD-Related Actions

<table>
<thead>
<tr>
<th>GHPI Number†</th>
<th>Temporary Site Number/Map Number</th>
<th>Site Type</th>
<th>Period</th>
<th>Reference</th>
<th>NRHP Eligible?</th>
<th>NRHP Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>66-07-1064</td>
<td></td>
<td>North Field</td>
<td>WWII/Second American Administration</td>
<td>Liston 1996</td>
<td>Yes</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Territorial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66-07-2128</td>
<td></td>
<td>Concrete pads</td>
<td>WWII/Second American Administration</td>
<td>Grant et al. 2007</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Territorial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66-07-2319</td>
<td>T-9/1044*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-07-2320</td>
<td>T-10/1045*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-07-2321</td>
<td>T-11/1046*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-07-2322</td>
<td>T-14/1049*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-07-2323</td>
<td>T-NW-1/1050*</td>
<td>Ceramic scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-04-2324</td>
<td>AS-2007-T-7/1063*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td>66-04-2325</td>
<td>AS-2007-T-20/1065*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Welch 2010</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Site 43/80*</td>
<td>Habitation with latte</td>
<td>Pre-Contact/Pre-Latte/Latte</td>
<td>Henry et al. 1998</td>
<td>Yes</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Site 83/113*</td>
<td>Artifact scatter</td>
<td>Pre-Contact/Latte</td>
<td>Henry et al. 1998</td>
<td>Yes</td>
<td>D</td>
</tr>
</tbody>
</table>

Notes: †Not all sites recorded within the project areas have received official GHPI numbers, although they have been documented as part of previous surveys.


The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. Broadly, the 2011 PA includes processes to share information, consider views of the public, and develop mitigation measures when historic properties may be adversely affected. The 2011 PA provides measures for mitigating adverse effects to NRHP-eligible or listed archaeological sites, consulting on new projects and initiating additional identification efforts, and resolving impacts due to loss of access to areas of cultural significance or culturally important natural resources. To the degree possible, impacts to historic properties and other significant cultural resources would be avoided or minimized during the planning process. If avoidance is not possible, anticipated mitigation measures to resolve adverse effects to historic properties and reduce adverse impacts to cultural resources resulting from the implementation of the 2010 ROD-Related Actions include the following: (1) identifying and evaluating other properties as applicable, (2) mitigation plan, (3) consulting with PA Signatories and Concurring Parties if requested, (4) conducting data recovery or other appropriate mitigation, (5) submitting data recovery or similar mitigation reports to SHPO for review before finalizing, (6) preparing public educational materials in English and Chamarro, and (7) enforcing construction contractor measures.

6.2.1.11 Visual Resources

The 2010 ROD-Related Actions will occur at existing DoD facilities and will not represent a major visual change from existing conditions (2010 Final EIS, Volume 2: Marine Corps - Guam, Chapter 13: Visual Resources, Section 13.2.2: Alternative 1, pages 13-62 to 13-69). Publicly accessible views into these areas are limited due to distance or dense vegetation.
Roadway projects, as discussed in the 2010 Final EIS (Volume 6: Related Actions, Chapter 15: Visual Resources, Section 15.2.6.1: Alternative 1, pages 15-8 to 15-26) will not have an adverse impact on the existing visual environment. Replacement of the Hagåtña (Agana) Bridge will include mitigation measures that address the aesthetics of the bridge, which will increase the visual quality.

6.2.1.12 Ground Transportation

Impacts to ground transportation from implementation of the 2010 ROD-Related Actions will be limited to the construction period. There may be potential temporary congestion associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers. Construction will be short-term, temporary, and localized. A Traffic Management Plan will be developed for implementation during roadway construction activities.

6.2.1.13 Marine Transportation

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 14: Marine Transportation, Section 14.2.2: Alternative 1, pages 14-10 to 14-15) additional container and break-bulk cargo ships will be required to transport equipment and supplies necessary for the construction of the 2010 ROD-Related Actions. Additionally, the dredging of Sierra Wharf will require transportation of dredged material over a period of six to nine months. There has been a steady and substantial decline in the number of commercial vessels visiting the Port of Guam from 1995 through 2012. The number of vessels associated with the 2010 ROD-Related Actions is well below the total number of vessels visiting the Port of Guam in 1995, which had the highest number of vessel visits between 1995 through 2012. As the additional number of vessels is much less than the difference between the number of current (2012) vessel visits and the number of vessel visits in 1995, there will be no impacts to marine transportation from construction of the 2010 ROD-Related Actions.

6.2.1.14 Utilities

As discussed in the 2010 Final EIS (Volume 1: Overview of Proposed Actions and Alternatives, Chapter 2: Overview of Proposed Actions, Section 2.2: Marine Corps Relocation – Guam, pages 2-7 to 2-17), the 2010 ROD-related actions not affected by the 2012 Roadmap Adjustments will require localized and relatively small increased demand for utilities. Primary utility needs will be local to Apra Harbor. The total utility requirements for the 2012 Roadmap Adjustments Proposed Action, including those from the 2010 ROD-related actions, have been included in the SEIS utilities assessments. Utilities will be installed at facilities using BMPs and standard construction and operation procedures and requirements to minimize impacts to existing utilities. The existing utilities can accommodate the additional usage at the new facilities.

6.2.1.15 Socioeconomics and General Services

The 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 16: Socioeconomics and General Services, Section 16.2.2: Proposed Action and Section 16.2.3: Land Acquisition Impacts, pages 16-73 to 16-147) assesses impacts based on an increase in population and land acquisition. There will be no increase in population attributable specifically to construction and operation of the 2010 ROD-Related Actions. Additionally, the 2010 ROD-Related Actions will not require land acquisition.

6.2.1.16 Hazardous Materials and Wastes

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 17: Hazardous Materials and Waste, Section 17.2.2: Alternative 1, pages 17-38 to 17-55), construction of the 2010 ROD-Related Actions will result in the use and disposal of more hazardous materials. There is the potential for an
inadvertent spill, release, or leak of hazardous materials. Hazardous materials will be handled and disposed of per applicable BMPs and SOPs.

6.2.1.17 Public Health and Safety

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 18: Public Health and Safety, Section 18.2.2: Alternative 1, pages 18-13 to 18-23; Volume 6: Related Actions, Chapter 19: Public Health and Safety, Section 19.2.9.1: Alternative 1, pages 19-17 to 19-18), there may be impacts associated with UXO and traffic accidents, as well as impacts to noise, water quality, and air quality. These impacts will be minimal and will be limited primarily to the construction period, which will be short-term and localized. UXO may be encountered during construction or during operations.

Training activities associated with the 2010 ROD-Related Actions have minimal potential to impact public health and safety. The public will be notified prior to training activities, and all training activities will occur within established on-base training areas. Specific and documented procedures will be implemented to reduce the potential for interaction between the public and training personnel and to ensure that the public is not endangered by training activities.

6.2.1.18 Environmental Justice and the Protection of Children

As discussed in the 2010 Final EIS (Volume 2: Marine Corps - Guam, Chapter 19: Environmental Justice and the Protection of Children, Section 19.2.2: Alternative 1, pages 19-11 to 19-18; Volume 6: Related Actions, Chapter 20: Environmental Justice and the Protection of Children, Section 20.2.8: Summary of Impacts, page 20-20), there will be an increase in construction-related noise, traffic, and safety concerns during construction of the 2010 ROD-Related Actions. These impacts will be short-term, temporary, and localized, and will not disproportionately impact minority or low-income populations or children. A Traffic Management Plan will be prepared and implemented during roadway construction. Completion of the roadway projects will have a beneficial impact due to improved and safer roadway infrastructure.

6.2.1.19 Summary of Impacts Associated with the 2010-Related Actions

Table 6.2.1-3 summarizes the potential impacts to each resource from the 2010 ROD-Related Actions.

Table 6.2.1-3. Summary of Potential Impacts from Implementation of the 2010 ROD-Related Actions

<table>
<thead>
<tr>
<th>Resource</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geological and Soil Resources</td>
<td>Total disturbed acreage from construction is approximately 383.6 acres (155.2 ha). There is one sinkhole in the vicinity of the North Ramp that will not be adversely impacted.</td>
</tr>
<tr>
<td>Water Resources</td>
<td>BMPs will be utilized to minimize the indirect impacts to groundwater and surface water. There will be no loss of wetlands. There will be direct but temporary impacts to nearshore waters from dredging at Inner Apra Harbor.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Increase in emissions, including SO2 and hot spot PM, CO, and MSATs concentrations, will be below applicable impact significance thresholds.</td>
</tr>
<tr>
<td>Noise</td>
<td>Construction noise will be temporary and will be within existing DoD property boundaries. Noise from airfield operations and training functions will not have a significant or adverse impact to human health or hearing.</td>
</tr>
<tr>
<td>Airspace</td>
<td>There will be an increase in total aircraft based at AAFB and associated aircraft operations; however, there will be no change to any of the approach and departure patterns associated with the airports/airfields at AAFB and there will be no restrictions on access to, and no effect on the use of Guam International Airport Route. There will be no measurable change in airspace requirements or management procedures.</td>
</tr>
</tbody>
</table>
### Table 6.2.1-3. Summary of Potential Impacts from Implementation of the 2010 ROD-Related Actions

<table>
<thead>
<tr>
<th>Resource</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land and Submerged Land Use</td>
<td>Activities are compatible with existing land uses. No significant impacts identified for airfield activities, non-firing training, or waterfront activities.</td>
</tr>
<tr>
<td>Recreational Resources</td>
<td>During construction, there may be increased traffic congestion due to the presence of construction vehicles. Noise generated from proposed training activities will be consistent with noise from existing operations and will not diminish user experience at recreational areas.</td>
</tr>
<tr>
<td>Terrestrial Biological</td>
<td>Clearing of a total of 384 acres (155 ha) of vegetation, 7.5 acres (3 ha) of which is primary limestone forest at AAFB. Disturbance to and loss of habitat for special-status species. With implementation of established BMPs and mitigation measures identified in the 2010 Final EIS, the introduction or spread of invasive species is not anticipated.</td>
</tr>
<tr>
<td>Marine Biological Resources</td>
<td>No direct impacts to special-status species will occur, although indirect impacts could occur because of increased marine traffic associated with delivery of construction materials and equipment. Impacts to EFH would be short-term and localized.</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>Direct adverse effects to 11 historic properties.</td>
</tr>
<tr>
<td>Visual Resources</td>
<td>Facilities will be within existing DoD properties and will not represent a major change over the existing visual conditions.</td>
</tr>
<tr>
<td>Ground Transportation</td>
<td>Potential temporary congestion associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers.</td>
</tr>
<tr>
<td>Marine Transportation</td>
<td>The number of vessels associated with the 2010 ROD-Related Actions is well below the total number of vessels visiting the Port of Guam in 1995.</td>
</tr>
<tr>
<td>Utilities</td>
<td>The 2010 ROD-related actions not affected by the 2012 Roadmap Adjustments will require localized and relatively small increased demand for utilities. Primary utility needs will be local to Apra Harbor. During construction, BMPs and standard construction and operation procedures and requirements will minimize impacts of utilities installation.</td>
</tr>
<tr>
<td>Socioeconomic and General Services</td>
<td>There will be no population increase.</td>
</tr>
<tr>
<td>Hazardous Materials and Waste</td>
<td>The use of hazardous materials will be handled and disposed per applicable BMPs and SOPs.</td>
</tr>
<tr>
<td>Public Health and Safety</td>
<td>There will be minimal impacts from UXO and traffic accidents, and to noise, water quality, and air quality during construction. There will be no public health and safety impacts from training and airfield operations.</td>
</tr>
<tr>
<td>Environmental Justice and the Protection of Children</td>
<td>Increased construction noise, traffic, and associated safety concerns will not disproportionately impact minority, low-income, or children populations.</td>
</tr>
</tbody>
</table>

#### 6.2.2 Resources with No Additional Collective Impact from the 2010 ROD-Related Actions

The 2010 Final EIS identified no impacts to the following resources from the 2010 ROD-Related Actions:

- Airspace
- Land and Submerged Land Use
- Visual Resources
- Socioeconomics and General Services

Therefore, the impacts of the proposed action (as described in Chapters 4 and 5 and Section 6.1) represent the total collective impacts of the Marine Corps relocation for these resources, and they are not discussed further in this section.

#### 6.2.3 Resources with Collective Impacts Common to All Alternative Site Combinations

Several additional resources would be subject to collective impacts associated with the proposed action and the 2010 ROD-Related Actions, but the impacts would not be uniquely related to alternative site combinations. Many of these collective impacts are associated with the construction phase, which would result in short-term, localized impacts. An analysis of the collective impacts associated with implementation of the proposed action (regardless of selected alternative site combinations) and the 2010 ROD-Related Actions is presented below.
6.2.3.1 Geological and Soil Resources

Collective impacts to soil resources would result from the increased acreage of disturbance, including clearing, grading and grubbing, earthwork, and landscaping. BMPs would be utilized to minimize soil erosion. Therefore, the collective impact to soil resources would be less than significant.

There are numerous sinkholes and depressions identified, as well as the potential for sinkholes and depressions at several of the proposed alternative locations. There is one sinkhole identified at North Ramp. For any sinkholes discovered before or during construction, BMPs would include compliance with the requirements of 22 GAR Chapter 10, Section 10106. With implementation of these BMPs, no adverse impacts from sinkholes would occur due to construction. Therefore, the collective impact associated with sinkholes and depressions would be less than significant.

There would not be a collective impact on topography. Although the 2010 ROD-Related Actions include clearing, grading and grubbing, demolition of existing road pavement, earthwork, and landscaping on a total of approximately 383.6 acres (155.2 ha), there would not be a significant amount of cut and fill that would permanently alter the topography of the area. Although there is not a collective impact to topography, impacts to topography remain significant due to the amount of cut and fill at the LFTRC alternatives.

6.2.3.2 Water Resources

The 2010 ROD-Related Actions would have no direct impacts on surface waters or wetlands, therefore, there would not be a collective direct impact to surface waters or wetlands. Additionally, although there would be direct impacts to nearshore waters for the 2010 ROD-Related Actions, there would be no direct impacts to nearshore waters from construction or operation of the proposed action, thus, there would not be a collective direct impact to nearshore waters.

Stormwater runoff protection measures, including compliance with Construction General Permit requirements and other regulations and implementation of BMPs, LID, and a Program SWPPP and site-specific SWPPP, would minimize the collective indirect impacts. Groundwater demand from the NGLA would be substantially less than the sustainable yield, but there would be localized significant impacts to the NGLA that would be mitigated, as well as less than significant impacts to the overall NGLA. Localized impacts to the NGLA would be managed through the numerical groundwater model and an updated and expanded network of wells to monitor groundwater level and quality. Therefore, construction and operations would result in less than significant collective indirect impacts to water resources.

6.2.3.3 Air Quality

Since the analysis described in Chapters 4 and 5 was performed for the maximum potential adverse effect, the forecasts of location-specific traffic and construction activities impacts would remain representative under this and other combined alternatives. Therefore, the localized mobile source concentration collective impacts would be less than significant.

6.2.3.4 Recreational Resources

Collective impacts to recreational resources from implementation of the proposed actions and the 2010 ROD-Related Actions could result from both the increase in the workforce and associated increased use of recreational resources during the construction phase. During construction there may be increased traffic congestion that delays access to recreational resources due to the presence of construction vehicles. However, there are no additional operational impacts beyond those discussed in Chapter 4. Any hindrance...
of access caused by construction activities would be short-term and localized, and the collective impacts to recreational resources would be less than significant.

6.2.3.5 Marine Biological Resources

Although there are direct impacts related to construction in Inner Apra Harbor for the 2010 ROD-Related Actions, the proposed action would not create any additional collective impact.

Total vessel traffic is not anticipated to exceed historical maximum levels, and BMPs would be implemented to minimize impacts to water quality from vessel operations. Therefore, the collective impacts to marine biological resources would be less than significant.

6.2.3.6 Ground Transportation

As discussed in Section 6.2.1.12, impacts to ground transportation from implementation of the 2010 ROD-Related Actions will be limited to the construction period. During the construction period, temporary and intermittent transportation impacts would result from truck movements, as well as construction worker vehicles traveling to and from the site. Construction-related impacts generally would not be considered significant due to their temporary nature and limited, finite duration. Therefore, any collective impact to ground transportation from implementation of the proposed action and the 2010 ROD-Related Actions would be less than significant.

6.2.3.7 Marine Transportation

Implementation of the Proposed Action and the 2010 ROD-Related Actions concurrently would increase the amount of vessel traffic in Apra Harbor during construction. The combined total number of predicted vessel visits to Apra Harbor during construction is 514 vessel visits (127 barges of dredge spoils + 387 cargo ships [242 breakbulk +145 containers]). This, combined with the predicted number of background vessel visits within the range of analysis shown in Section 4.1.13, would not exceed the recent maximum number of annual vessel visits (in FY1995). Because the annual number of vessels visiting the Port of Guam has decreased by 2,289 vessels over the period of FY1995 to FY2012, it is expected that the additional predicted annual number of vessels visiting the Port of Guam would result in a less than significant impact on marine transportation. Therefore, the collective impact from construction of the proposed action and the 2010 ROD-Related Actions would be less than significant.

6.2.3.8 Utilities

Utility demands associated with the proposed action are primarily associated with the main cantonment/family housing alternatives. To meet these demands, the proposed action included development of a well field and upgrades to electrical lines, as discussed in Section 2.2.3. Utility demands resulting from implementation of the 2010 ROD-Related Actions, LFTRC alternatives, and main cantonment/family housing alternatives are of the same magnitude regardless of alternative, and would be met by the existing utility infrastructure and utility upgrades associated with the proposed action. Therefore, the collective impact to utilities from implementation of the proposed action and the 2010 ROD-Related Actions would be less than significant.

6.2.3.9 Hazardous Materials and Wastes

As discussed in Section 6.2.1.16, construction of the 2010 ROD-Related Actions will result in an increase in the use of hazardous materials and disposal of hazardous waste. To avoid inadvertent hazardous substance spills, releases, or leaks, hazardous materials will be used and disposed of in accordance with applicable SOPs and BMPs. The proposed action would also result in an increase in the use of hazardous materials.
materials and disposal of hazardous waste regardless of location. With implementation of BMPs and SOPs, the collective impact associated with the use, storage, and disposal of hazardous materials and waste would be less than significant.

6.2.3.10 Public Health and Safety

Collective impacts associated with construction of the proposed action and the 2010 ROD-Related Actions could occur during periods when there would be overlap in construction. The increase of the civilian workforce that would potentially occur regardless of action alternative may create a collective impact to health care services, as well as impacts associated with UXO, traffic accidents, noise, water quality, and air quality. This collective impact would be limited to the construction period, which would be short-term and localized. Therefore, the collective impact to public health and safety during construction would be less than significant.

6.2.3.11 Environmental Justice

Collective impacts associated with construction of the proposed action and the 2010 ROD-Related Actions could occur during periods when there would be overlap in construction. As discussed above in Public Health and Safety, the increase of the civilian workforce may create a collective impact to health care services, which would disproportionately impact low-income populations. Construction would be short-term and localized, therefore, the collective impacts would be less than significant.

6.2.4 Collective Impacts Associated with Unique Site Combinations

Collective impacts include the combination of the impacts discussed for each of the cantonment/family housing alternatives (Chapter 4), the LFTRC alternatives (Chapter 5), and the impacts associated with the 2010 ROD-Related Actions (see Section 6.2.1). This section provides an analysis of potential collective impacts of different combinations of site alternatives (i.e., Alternatives A through D for main cantonment/family housing and Alternatives 1 through 5 for the LFTRC) and the impacts of the 2010 ROD-Related Actions. The resource areas that would be affected by collective actions associated with unique site combinations are Noise, Terrestrial Biological Resources, and Cultural Resources. The subsections below provide a comparison of the collective impacts to Noise, Terrestrial Biological Resources, and Cultural Resources associated with the unique site combinations and the 2010 ROD-Related Actions.

6.2.4.1 Noise

Collective noise impacts would be limited to those associated with the LFTRC. Alternative 1 is located in the same geographic region as Andersen South. Noise-producing activities at Andersen South include aviation training, military operations on urban Terrain training, breacher house training, use of the hand grenade range, and convoy training. However, the noise contours generated by the 2010 ROD-Related Actions do not overlap with the LFTRC contours. Therefore, the collective noise impact associated with the 2010 ROD-Related Actions and the combination of any of the cantonment/family housing alternatives with Alternative 1 would be less than significant.

Collective impacts would also occur from implementation of any of the three NAVMAG LFTRC alternatives (Alternative 2, 3, or 4) due to the noise-generating activities of the 2010 ROD-Related Actions occurring at NAMAG, coupled with the LFTRC noise from Alternatives 2, 3, or 4. Noise producing activities include aviation and ground-based training. However, the noise contours generated by the 2010 ROD-Related Actions do not overlap with the LFTRC contours. Therefore, the collective noise impact associated with the 2010 ROD-Related Actions and the combination of any of the
cantonment/family housing alternatives with any of the NAVMAG LFTRC alternatives would be less than significant.

Collective impacts would also occur due to the noise generating activities of the 2010 ROD-Related Actions occurring at NWF (aircraft operations) coupled with the LFTRC noise from Alternative 5. In addition, ground-based training at NWF (use of the demolition range where Marine Corps and Air Force units detonate cratering charges) would also contribute to collective noise impacts. Figure 6.2.4-1 shows noise contours for aviation training, the demolition range, and the LFTRC. The aviation and LFTRC noise would not overlap at any location off-base. The demolition noise contours and the LFTRC noise contours overlap, but the “average busy day” noise generated by the demolition range contours only occurs twice per year. Therefore, the collective impact associated with the 2010 ROD-Related Actions and the combination of any of the cantonment/family housing alternatives with Alternative 5 would be less than significant.

6.2.4.2 Terrestrial Biological Resources

The collective impacts due to implementation of the cantonment/family housing alternatives, LFTRC alternatives, IT/COMM lines, and the 2010 ROD-Related Actions would be equal to the combined effects and impacts of each. Terrestrial biological resources investigations for these actions are discussed in Sections 6.1, 6.2.1.8, and Chapters 4 and 5. A summary of the collective impact to terrestrial biological resources is provided in Table 6.2.4-1. Comparisons of the potential alternative combinations are discussed below.

Alternative C and Alternative 1 would have the greatest total impacts to limestone forest (primary and secondary combined): 1,485 acres (601 ha). This would be approximately 8% of the limestone forest found on federal lands on Guam. Similarly, Alternative C, combined with Alternatives 5, 3, and 4 would have the next greatest impacts to limestone forest, at 1,431 acres (579 ha), 1,399 acres (566 ha), and 1,360 acres (550 ha), respectively. Any combination of alternatives that include Alternative D would have the lowest total impact to limestone forest, and Alternative D combined with Alternative 2 would have the lowest impact: 316 acres (128 ha). This would be approximately 1.7% of the limestone forest found on federal lands on Guam. No significant impacts to limestone forest would occur with implementation of the ITT/COMM infrastructure portion of any alternative combination.
Figure 6.2.4-1
Collective Noise Contours at NWF

Legend
- LFTRC Alternative 5 Impacted Area
- DoD Property
- Transfer Custody and Control Land
- Live-Fire Range Area

Proposed ADNL:
- Noise Zone 1 (55-64 ADNL)
- Noise Zone 2 (65-69 ADNL)
- Noise Zone 2 (70-74 ADNL)
- Noise Zone 3 (75-79 ADNL)
- Noise Zone 3 (80-84 ADNL)
- Noise Zone 3 (>85 ADNL)

2010 Final EIS Noise Contours Aircraft Noise Contours dB ADNL:
- 60
- 65
- 70

Demolition Range dB CDNL:
- 57
- 62
- 70

Source: NAVFAC Pacific 2013
### Table 6.2.4-1. Summary of Collective Impacts to Terrestrial Biological Resources by Alternative

<table>
<thead>
<tr>
<th>Combination of Alternatives</th>
<th>Primary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Secondary Limestone Forest(^{(1)}) (acres [ha])</th>
<th>Overlay Refuge(^{(2)}) (acres [ha])</th>
<th>ESA-Listed Species(^{(2)})</th>
<th>Guam-Listed Species(^{(2)})</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finegayan Cantonment/Family Housing (Alternative A) with Route 15 LFTRC (Alternative 1)</td>
<td>71 (29)</td>
<td>1,232 (499)</td>
<td>1,333 (539)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 1,094 (443) MC: 1,096 (444) GR: 878 (355) GMK: 1,094 (443) Ser: 758 (307)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>6 (3)</td>
<td>1,061 (429)</td>
<td>1,333 (539)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 1,056 (427) MC: 1,058 (428) GR: 644 (261) GMK: 1,056 (427) Ser: 709 (287)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>111 (45)</td>
<td>1,106 (448)</td>
<td>1,608 (651)</td>
<td>GMK, GR, MC, MCM, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 1,236 (500) MC: 1,245 (504) GR: 619 (250) GMK: 1,236 (500) Ser: 731 (296)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>73 (29)</td>
<td>1,105 (447)</td>
<td>1,552 (628)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 1,174 (475) MC: 1,181 (478) GR: 645 (261) GMK: 1,174 (475) Ser: 710 (287)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan Cantonment/Family Housing (Alternative A) with NWF LFTRC (Alternative 5)</td>
<td>96 (40)</td>
<td>1,153 (467)</td>
<td>1,587 (642)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 1,209 (489) MC: 1,211 (490) GR: 635 (257) GMK: 1,209 (489) Ser: 845 (342) MFB, MC, GMK: 12 (5)</td>
<td></td>
</tr>
<tr>
<td>Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with Route 15 LFTRC (Alternative 1)</td>
<td>71 (29)</td>
<td>1,062 (430)</td>
<td>1,060 (429)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 908 (367) MC: 909 (368) GR: 985 (399) GMK: 908 (367) Ser: 758 (307)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>6 (3)</td>
<td>891 (361)</td>
<td>1,060 (429)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>MFB: 870 (352) MC: 871 (352) GR: 751 (304) GMK: 870 (352) Ser: 709 (287)</td>
<td>NA</td>
</tr>
</tbody>
</table>
Table 6.2.4-1. Summary of Collective Impacts to Terrestrial Biological Resources by Alternative

<table>
<thead>
<tr>
<th>Combination of Alternatives</th>
<th>Primary Limestone Forest&lt;sup&gt;(1)&lt;/sup&gt; (acres [ha])</th>
<th>Secondary Limestone Forest&lt;sup&gt;(1)&lt;/sup&gt; (acres [ha])</th>
<th>Overlay Refuge&lt;sup&gt;(2)&lt;/sup&gt; (acres [ha])</th>
<th>ESA-Listed Species&lt;sup&gt;(2)&lt;/sup&gt;</th>
<th>Guam-Listed Species&lt;sup&gt;(2)&lt;/sup&gt;</th>
<th>Recovery Habitat (acres [ha])</th>
<th>Critical Habitat (acres [ha])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>111 (45)</td>
<td>936 (379)</td>
<td>1,335 (540)</td>
<td>GMK, GR, MC, MCM, MFB, Ser</td>
<td>MS, PSTG</td>
<td>GMK: 1,050 (425)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>73 (29)</td>
<td>935 (378)</td>
<td>1,279 (518)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>GMK: 988 (400)</td>
<td>NA</td>
</tr>
<tr>
<td>Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NWF LFTRC (Alternative 5)</td>
<td>96 (40)</td>
<td>983 (398)</td>
<td>1,314 (532)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>MS, PSTG</td>
<td>GMK: 1,023 (414)</td>
<td>MFB, MC, GMK: 12 (5)</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with Route 15 LFTRC (Alternative 1)</td>
<td>208 (84)</td>
<td>1,277 (517)</td>
<td>1,002 (405)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>-</td>
<td>GMK: 1,308 (529)</td>
<td>NA</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>143 (58)</td>
<td>1,106 (448)</td>
<td>1,002 (405)</td>
<td>GMK, GR, MC, MCM, MFB, Ser</td>
<td>PSTCG</td>
<td>GMK: 1,270 (514)</td>
<td>NA</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>248 (100)</td>
<td>1,151 (466)</td>
<td>1,277 (517)</td>
<td>GMK, GR, MC, MCM, MFB, Ser</td>
<td>PSTG</td>
<td>GMK: 1,450 (587)</td>
<td>NA</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>210 (85)</td>
<td>1,150 (465)</td>
<td>1,221 (494)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>PSTG</td>
<td>GMK: 1,388 (562)</td>
<td>NA</td>
</tr>
<tr>
<td>Combination of Alternatives</td>
<td>Primary Limestone Forest (acres [ha])</td>
<td>Secondary Limestone Forest (acres [ha])</td>
<td>Overlay Refuge (acres [ha])</td>
<td>ESA-Listed Species (2)</td>
<td>Guam-Listed Species (2)</td>
<td>Recovery Habitat (acres [ha])</td>
<td>Critical Habitat (acres [ha])</td>
</tr>
<tr>
<td>----------------------------------------------------------------</td>
<td>--------------------------------------</td>
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<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NWF LFTRC (Alternative 5)</td>
<td>233 (94)</td>
<td>1,198 (485)</td>
<td>1,256 (508)</td>
<td>GMK, GR, MC, MFB, Ser</td>
<td>-</td>
<td>MFB: 1,423 (576) MC: 1,426 (577) GR: 401 (162) GMK: 1,423 (576) Ser: 1,315 (532)</td>
<td>MFB, MC, GMK: 12 (5)</td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with Route 15 LFTRC (Alternative 1)</td>
<td>170 (69)</td>
<td>382 (155)</td>
<td>153 (62)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 214 (87) MC: 214 (87) GR: 1,276 (516) GMK: 214 (87) Ser: 190 (77)</td>
<td>NA</td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>105 (42)</td>
<td>211 (86)</td>
<td>153 (62)</td>
<td>GR</td>
<td>-</td>
<td>MFB: 176 (71) MC: 176 (71) GR: 1,042 (422) GMK: 176 (71) Ser: 141 (57)</td>
<td>NA</td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>210 (85)</td>
<td>256 (104)</td>
<td>428 (173)</td>
<td>MCM, MFB, GR GMK, MCM</td>
<td>PSTG</td>
<td>MFB: 356 (144) MC: 363 (147) GR: 1,017 (412) GMK: 356 (144) Ser: 163 (66)</td>
<td>NA</td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>172 (70)</td>
<td>255 (103)</td>
<td>372 (150)</td>
<td>MC, MFB, GR GMK</td>
<td>PSTG</td>
<td>MFB: 294 (119) MC: 299 (121) GR: 1,043 (422) GMK: 294 (119) Ser: 142 (57)</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Legend:** GMK = Guam Micronesian kingfisher, GR = Guam rail, MC = Mariana crow, MCM = Mariana common moorhen, MFB = Mariana fruit bat, MS = moth skink, NA = not applicable, PSTG = Pacific slender-toed gecko, Ser = Serianthes.

**Notes:** (1)Direct impact - conversion to developed areas. (2)Only species for which there would be a significant impact.
With respect to Overlay Refuge lands, any combination of alternatives that include Alternative A would have the greatest potential impact. Specifically, Alternative A with Alternative 3 would have the greatest total impact to Overlay Refuge lands at 1,608 acres (651 ha), or 7% of the lands. Similar to impacts to limestone forest, any combination of alternatives that include Alternative D would also have the lowest total impact to limestone forest. Specifically, Alternative D with Alternatives 1 or 2 would have the lowest impact at 153 acres (62 ha) or <1% of the lands.

All alternative combinations would have significant impacts to ESA-listed special-status species, and only six alternative combinations would not have significant impacts to Guam-listed special-status species: Alternatives C or D when combined with Alternatives 1, 2, or 5.

6.2.4.3 Cultural Resources

The collective effects and impacts due to the implementation of the cantonment/family housing alternatives, LFTRC alternatives, IT/COMM lines, and the 2010 ROD-Related Actions would be equal to the combined effects and impacts of each. Cultural resources investigations for these actions are discussed in Sections 6.1, 6.2.1.10, and Chapters 4 and 5. A summary of the collective impact to cultural resources is provided in Table 6.2.4-2.

The 2011 PA, as discussed in Section 3.10.2, establishes a program alternative for complying with NHPA Section 106 requirements. For a description of the program alternative for NHPA Section 106 compliance refer to Section 6.2.1.10 of this chapter.

<table>
<thead>
<tr>
<th>Alternative Combination</th>
<th>Construction Impacts</th>
<th>Operation Impacts</th>
</tr>
</thead>
</table>
| Finegayan Cantonment/Family Housing (Alternative A) with Route 15 LFTRC (Alternative 1) | • Potential direct adverse effects to 31 historic properties.  
• Undetermined effects to 10 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity.  
• Potential indirect adverse effects to 1 historic property/potential TCP from recreational use. |
| Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG East/West LFTRC (Alternative 2) | • Potential direct adverse effects to 37 historic properties.  
• Undetermined effects to 10 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity and 1 historic property/potential TCP from recreational use.  
• Undetermined effects to 3 unevaluated archaeological sites from changes in use that degrade site integrity and 1 potential TCP from additional reduction in accessibility. |
<table>
<thead>
<tr>
<th>Alternative Combination</th>
<th>Construction Impacts</th>
<th>Operation Impacts</th>
</tr>
</thead>
</table>
| Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG North/South LFTRC (Alternative 3) | • Potential direct adverse effects to 39 historic properties.  
• Undetermined effects to 10 unevaluated buildings, 2 unevaluated archaeological sites, and 1 potential TCP.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 1 historic property/potential TCP (Haputo) from recreational use.  
• Potential indirect adverse effects to 25 historic properties from changes in use that degrade site integrity.  
• Undetermined effects to 5 potential TCPs from additional reduction in accessibility and 1 potential TCP from changes in use that could degrade site integrity. |
| Finegayan Cantonment/Family Housing (Alternative A) with NAVMAG L-Shaped LFTRC (Alternative 4) | • Potential direct adverse effects to 39 historic properties.  
• Undetermined effects to 10 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 1 historic property/potential TCP (Haputo) from recreational use.  
• Potential indirect adverse effects to 24 historic properties from changes in use that degrade site integrity.  
• Undetermined effects to 5 unevaluated archaeological sites and 2 potential TCPs from changes in use that degrade site integrity and 4 potential TCPs from additional reduction in accessibility. |
| Finegayan Cantonment/Family Housing (Alternative A) with NWF LFTRC (Alternative 5) | • Potential direct adverse effects to 48 historic properties.  
• Undetermined effects to 10 unevaluated buildings and 1 unevaluated archaeological site.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse impacts under NEPA to 2 historic properties from restricted access.  
• Potential indirect adverse effects to 3 historic properties from changes in use that degrade site integrity.  
• Potential indirect adverse effect to 1 historic property/potential TCP (Haputo) from recreational use. |
| Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with Route 15 LFTRC (Alternative 1) | • Potential direct adverse effects to 28 historic properties.  
• Undetermined effects to 10 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 3 historic properties/potential TCPs (Haputo, Latte Stone Park, and Pågat site) from recreational use.  
• Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity. |
| Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NAVMAG East/West LFTRC (Alternative 2) | • Potential direct adverse effects to 34 historic properties.  
• Undetermined effects to 10 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 2 historic properties/potential TCPs (Haputo and Latte Stone Park) due to recreational use and 1 historic property from use that degrades site integrity.  
• Undetermined effects to 3 unevaluated archaeological sites from changes in use that degrade site integrity and 1 potential TCP from restricted access. |
| Finegayan/South Finegayan Cantonment/Family Housing (Alternative B) with NAVMAG North/South LFTRC (Alternative 3) | • Potential direct adverse effects to 36 historic properties.  
• Undetermined effects to 10 unevaluated buildings, 2 unevaluated archaeological sites, and 1 potential TCP.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse effects to 25 historic properties from changes in use that degrade site integrity.  
• Potential indirect adverse effects to 2 historic properties/potential TCPs (Haputo and Latte Stone Park) from recreational use.  
• Undetermined adverse effects to one potential TCP for changes in use that degrades site integrity. |
### Table 6.2.4-2. Summary of Cultural Resources Collective Impacts

<table>
<thead>
<tr>
<th>Alternative Combination</th>
<th>Construction Impacts</th>
<th>Operation Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cantonment/Family Housing (Alternative B) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>natural resources from vegetation removal.</td>
<td>degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>• Potential direct adverse effects to 36 historic properties.</td>
<td>• Undetermined effects to 5 potential TCPs from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 10 unevaluated buildings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td>Cantonment/Family Housing (Alternative B) with NWF LFTRC (Alternative 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Potential direct adverse effects to 45 historic properties.</td>
<td>• Potential indirect adverse effects to 2 historic properties/potential TCPs (Haputo and Latte Stone Park) from recreational use.</td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 10 unevaluated buildings and 1 unevaluated archaeological site.</td>
<td>• Potential indirect adverse effects to 2 historic properties/potential TCPs (Haputo and Latte Stone Park) from recreational use.</td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td>• Undetermined effects to 4 potential TCPs from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td>• Potential impacts to culturally important natural resources from vegetation removal.</td>
<td>• Undetermined effects to 5 unevaluated archaeological sites and 2 potential TCPs from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with Route 15 LFTRC (Alternative 1)</td>
<td>• Potential direct adverse effects to 27 historic properties.</td>
<td>Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>• Potential impacts to culturally important natural resources from vegetation removal.</td>
<td>• Potential indirect adverse effects to 1 historic property/potential TCP (Pågat site) from recreational use.</td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 15 unevaluated buildings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>• Potential direct adverse effects to 34 historic properties.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 15 unevaluated buildings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 3 unevaluated archaeological sites from changes in use that degrade site integrity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effect to 1 potential TCP from additional reduction in accessibility.</td>
<td></td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>• Potential direct adverse effects to 36 historic properties.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 15 unevaluated buildings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 2 unevaluated archaeological sites, and 1 potential TCP.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Potential indirect adverse effects to 25 historic properties from changes in use that degrade site integrity.</td>
<td></td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NAVMAG L-Shaped</td>
<td>• Potential direct adverse effects to 36 historic properties.</td>
<td>• Undetermined effects to 1 potential TCP from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>• Undetermined effects to 15 unevaluated</td>
<td>• Undetermined effects to 5 potential TCPs from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Table 6.2.4-2. Summary of Cultural Resources Collective Impacts

<table>
<thead>
<tr>
<th>Alternative Combination</th>
<th>Construction Impacts</th>
<th>Operation Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFTRC (Alternative 4)</td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td>- Undetermined effects to 4 potential TCPs from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td>- Undetermined effects to 5 unevaulated archeological sites and 2 potential TCPs from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td>AAFB Cantonment/Family Housing (Alternative C) with NWF LFTRC (Alternative 5)</td>
<td>- Potential direct adverse effects to 45 historic properties.</td>
<td>- Potential indirect adverse impacts under NEPA to 2 historic properties from restricted access.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to 15 unevaulated buildings and 1 unevaulated archeological site.</td>
<td>- Potential indirect adverse effects to 3 historic properties from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with Route 15 LFTRC (Alternative 1)</td>
<td>- Potential direct adverse effects to 22 historic properties.</td>
<td>- Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to 13 unevaulated archeological sites and 11 unevaulated buildings.</td>
<td>- Potential indirect adverse effects to 1 historic property/potential TCP (Pågat site) from recreational use.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG East/West LFTRC (Alternative 2)</td>
<td>- Potential direct adverse effects to 28 historic properties.</td>
<td>- Potential indirect adverse effects to 1 historic property from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to 13 unevaulated archeological sites and 11 unevaulated buildings.</td>
<td>- Undetermined effects to 3 unevaulated archeological sites from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td>- Undetermined effects to 1 potential TCP from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG North/South LFTRC (Alternative 3)</td>
<td>- Potential direct adverse effects to 30 historic properties.</td>
<td>- Potential indirect adverse effects to 25 historic properties from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to 15 unevaulated archeological sites, 11 unevaulated buildings, and 1 potential TCP.</td>
<td>- Undetermined effects to 1 potential TCP from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td>- Undetermined effects to 5 potential TCPs from additional reduction in accessibility.</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
<tr>
<td>Barrigada Cantonment/Family Housing (Alternative D) with NAVMAG L-Shaped LFTRC (Alternative 4)</td>
<td>- Potential direct adverse effects to 30 historic properties.</td>
<td>- Potential indirect adverse effects to 24 historic properties from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Undetermined effects to 13 unevaulated archeological sites and 11 unevaulated buildings.</td>
<td>- Undetermined effects to 4 potential TCPs from additional reduction in accessibility.</td>
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<tr>
<td></td>
<td>- Undetermined effects to possible buried cultural resources in unsurveyed areas.</td>
<td>- Undetermined effects to 5 unevaulated archeological sites and 2 potential TCPs from changes in use that degrade site integrity.</td>
</tr>
<tr>
<td></td>
<td>- Potential impacts to culturally important natural resources from vegetation removal.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 6.2.4-2. Summary of Cultural Resources Collective Impacts

<table>
<thead>
<tr>
<th>Alternative Combination</th>
<th>Construction Impacts</th>
<th>Operation Impacts</th>
</tr>
</thead>
</table>
| Barrigada Cantonment/Family Housing (Alternative D) with NWF LFTRC (Alternative 5)      | • Potential direct adverse effects to 39 historic properties.  
• Undetermined effects to 14 unevaluated archaeological sites and 11 unevaluated buildings.  
• Undetermined effects to possible buried cultural resources in unsurveyed areas.  
• Potential impacts to culturally important natural resources from vegetation removal. | • Potential indirect adverse impacts under NEPA to 2 historic properties from restricted access.  
• Potential indirect adverse effects to 3 historic properties from changes in use that degrade site integrity.                                                                                                     |
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