CHAPTER 4
ENVIRONMENTAL CONSEQUENCES – FORT LEWIS

This chapter describes both direct and indirect impacts, as well as cumulative impacts, that would result at Fort Lewis from implementation of the action alternatives described in **Chapter 2**. This chapter is organized by resource area to describe the impacts. Impacts that would result from the No Action Alternative (Alternative 1) are also identified to provide a comparative basis for the three action alternatives. The details of each of the alternatives, including the number of Soldiers and Family members stationed and/or training at the installation, the types of new construction anticipated to support the new Soldiers, the types of live-fire and maneuver training anticipated for each unit, and the number of maneuver training miles anticipated for each alternative, are provided in **Chapter 2**. These details are also summarized by alternative on the foldout table inside the front cover of Volume 2 of this document.

The overall methodology used to analyze the potential impacts (environmental consequences) on the affected environment that would result from implementation of the alternatives is described in **Appendix B**. Any additional resource-specific methodology for evaluating the potential impacts is discussed with the individual resources below.

Table 4–1 provides a comparative summary of the potential direct and indirect effects of the alternatives. **Table 4–2** provides a comparative summary of the potential cumulative effects of the alternative. The tables exhibit the composite impact for each Valued Environmental Component (VEC) resulting from implementation of each alternative.

Table 4–1 Summary of Direct and Indirect Effects at Fort Lewis by Alternative

	Alternative			
VEC	**1**	**2**	**3**	**4**
Soil Erosion	€	€	€	€
Water Resources	W	W	W	W
Biological Resources	€	U	U	U
Wetlands	€	€	€	€
Wildfire Management	€	€	€	€
Cultural Resources	W	W	W	W
Air Quality	€	€	€	€
Noise	€	U	U	U
Land Use Conflict/Compatibility	€	€	€	€
Traffic and Transportation	€	W	W	U
Socioeconomics	€	U	U	U
Hazardous Materials and Wastes	€	€	€	€
Airspace	€	€	€	€
Facilities	W	W	W	W
Energy Demand/Generation	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
• = No Effects
+ = Beneficial Effect
N/A = Not Applicable

Table 4–2 Summary of Cumulative Effects at Fort Lewis by Alternative

	Alternative			
VEC	**1**	**2**	**3**	**4**
Soil Erosion	€	€	€	€
Water Resources	W	W	W	W
Biological Resources	€	U	U	U
Wetlands	€	€	€	€
Wildfire Management	€	€	€	€
Cultural Resources	W	W	W	W
Air Quality	€	€	€	€
Noise	€	U	U	U
Land Use Conflict/Compatibility	€	€	€	€
Traffic and Transportation	€	€	€	€
Socioeconomics	€	U	U	U
Hazardous Materials and Wastes	€	€	€	€
Airspace	€	€	€	€
Facilities	€	€	€	€
Energy Demand/Generation	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
• = No Effects
+ = Beneficial Effect
N/A = Not Applicable

4.1 SOIL EROSION

Soil erosion is a natural process that is frequently accelerated by human activities. For example, construction activities remove vegetation and disturb soils, which exposes them to erosion by wind and water. For each alternative, impacts from cantonment area and range construction and live-fire and maneuver training were evaluated for their potential to affect soil erosion adversely.

4.1.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact on soil erosion were evaluated and distinguished by the degree to which the impact would:

- Impair the ability of the Army to sustain land resources to maintain effective training grounds and ranges;
- Result in loss of soil (through increased erosion) that exceeds the amount of soil loss at which the quality of a soil as a medium for plant growth can be maintained;
- Conflict with existing federal, state, or local statutes or regulations.

4.1.2 Overview of Impacts to Soil Erosion by Alternative

Table 4–3 summarizes the impacts to soil erosion that would occur under each of the four alternatives.

Table 4–3 Summary of Potential Effects to Soil Erosion at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
\+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.1.3 Alternative 1 — No Action Alternative

4.1.3.1 Construction Direct and Indirect Effects

4.1.3.1.1 Less Than Significant Effects

Construction of cantonment area facilities would cause direct, short-term, localized effects to soil erosion. Because of the number of projects and the amount of soil potentially exposed during excavation, erosion would increase over the short term. Infrastructure improvements, such as widening existing streets, also would disturb soils. Long-term impacts to soil erosion in the cantonment area would be minimized because the area is essentially urbanized with substantial portions covered by impervious surfaces, which eliminates the exposure of soils to erosion.

The combination of generally flat slopes, erosion-resistant nature of Fort Lewis's soils, implementation of standard construction best management practices (BMPs), and urbanization would result in no conflicts with statutes or regulations or a rate of erosion that would adversely affect the soils as a medium for plant growth. Therefore, the effects of construction on soil erosion would be less than significant.

4.1.3.2 Live-fire Training Direct and Indirect Effects

4.1.3.2.1 Less than Significant Effects

Live-fire training would occur with frequency, intensity, and type similar to that under the current training regimen. The firing of weapons and impacts of munitions can ignite wildfires in live-fire training areas that can remove vegetative cover and disturb soil cohesion, which could result in areas of bare ground that are subject to increased rates of erosion. Because there would be no changes in frequency or intensity of live-fire training, there would be no increase in the potential for erosion because of wildfires (**Section 4.5**). In addition, these effects would not impair the effective maintenance of TAs or conflict with statutes or regulations. Consequently, the effects would be less than significant.

4.1.3.3 Maneuver Training Direct and Indirect Effects

4.1.3.3.1 Less than Significant Effects

Maneuver training would occur with frequency, intensity, and type similar to current levels (2,710,000 miles). Current maneuver training may involve driving more miles on Military Class (MIL-CLASS) 4 and 5 roads (197,000 miles) and in off-road areas (156,000 miles) than previously anticipated (**Section 4.3.1**). Continued maneuver training activities are expected to cause substantial disturbance to soils and vegetation. The current Fort Lewis INRMP, however, contains numerous

management policies and practices that have been successful in minimizing impacts of maneuver training to soil erosion. The INRMP could be modified in the future as more information concerning long-term effects of SBCT training becomes available. Because no changes to SBCT maneuver training or management are anticipated under this alternative, there would be no increase in soil erosion rates, and overall impacts to soil erosion management would continue to be less than significant.

4.1.4 Alternative 2 — GTA Actions

4.1.4.1 Construction Direct and Indirect Effects

4.1.4.1.1 Less than Significant Effects

Similar to Alternative 1, new construction would occur extensively in existing disturbance footprints, which would limit exposure of native soils to erosion. This limited exposure in combination with generally flat slopes, erosion-resistant nature of the soils, and implementation of standard BMPs would result in no conflicts with statutes or regulations or a rate of erosion that would adversely affect the soils as a medium for plant growth. Therefore, the effects of construction on soil erosion would be less than significant.

Construction of new training ranges and facilities also would not significantly affect soil erosion at Fort Lewis. Upgrades to existing facilities and construction of new facilities (i.e., instruction, ammunition breakdown, range operations, and storage buildings) would disturb soils in limited areas. These activities are not expected to have adverse long-term effects on soil erosion because the disturbed soils would be covered by the new or improved facilities or reclaimed.

4.1.4.2 Live-fire Training Direct and Indirect Effects

4.1.4.2.1 Less than Significant Effects

The simultaneous training of three SBCTs would directly affect soil erosion through increased projectile impacts and indirectly by increasing the potential for wildfires, which typically make soils more susceptible to erosion (Army 2004b). Although gunnery training and explosive ordinance training would increase proportionally (**Table 2–7**), the area over which munitions and ordinance impacts are dispersed is large and the likelihood of disturbing continuous tracts of land, and thus, increasing the potential for rill and inter-rill erosion, is small. Therefore, the proposed increase of live-fire training is not expected to affect soil erosion significantly.

4.1.4.3 Maneuver Training Direct and Indirect Effects

4.1.4.3.1 Less than Significant Effects

Under this alternative, increased mounted and unmounted training using Stryker vehicles, including off-road travel, would be expected to damage or remove vegetation and disturb soils. The SBCTs would drive approximately 4,060,000 miles (6,500,000 km) annually during training and about 234,000 of these miles (377,000 km) or 6 percent would be off road and directly affecting soils. Total annual travel would increase 1,440,000 miles from Alternative 1 to 4,150,000 miles (**Appendix B**).

During Stryker off-road maneuver training, high-velocity (~33 feet/second [10 m/second]), sharp turns (radius less than 66 feet [20 m]) cause the most severe damage to vegetation. These turn types create surfaces that are scraped clear of vegetation and upper soil units. Low-velocity (~16 feet/second 5 m/second) sharp turns, moderate turns (radius 66 to 131 feet [20 to 40 m]) and straight

tracking maneuvers typically result in flattening (imprinting) of vegetation, but not scraping and piling (Foster et al. 2006). Impacts from maneuver training would be limited to maneuver areas and would likely affect approximately 15,700 to 23,500 acres (6,350 to 9,510 ha) per year (**Appendix C, Table C–1**). However, because of the resilience of soils at Fort Lewis with respect to erosion (as noted in Chapter 3), the increase in maneuver training would not impair the effective maintenance of TAs or conflict with statutes or regulations. Consequently, the effects would be less than significant.

4.1.5 Alternative 3 — GTA Actions + CSS Soldiers

4.1.5.1 Construction Direct and Indirect Effects

4.1.5.1.1 Less than Significant Effects

Construction in the 60-acre (20-ha) CSS area would remove vegetative cover and disturb native soils through excavations and other ground-disturbing activities, increasing the potential for soil erosion. Although up to 50 additional acres would become urbanized, the combination of generally flat slopes, erosion-resistant nature of the soils, and implementation of standard BMPs would result in no conflicts with statutes or regulations or a rate of erosion that would adversely affect the soils as a medium for plant growth. Therefore, the effects of construction on soil erosion would be less than significant.

Construction of new training ranges and facilities would not significantly affect soil erosion at Fort Lewis. Upgrades to existing facilities and construction of new facilities (i.e., instruction, ammunition breakdown, range operations, and storage buildings) would disturb soils in limited areas. These activities are not expected to have adverse long-term effects on soil erosion because the disturbed soils would be covered by the new or improved facilities or reclaimed.

4.1.5.2 Live-fire Training Direct and Indirect Effects

4.1.5.2.1 Less than Significant Effects

The simultaneous training of three SBCTs and the convoy and urban operations training of CSS units would directly affect soil erosion through increased projectile impacts and indirectly by increasing the potential soil erosion associated with wildfires. The increase in gunnery training and heavy ordnance training would occur over a relatively large area. With this level of dispersion, the likelihood of continuous tracts of land being disturbed coupled with the associated potential increases in the rill and inter-rill erosion, is small. The effects of live-fire training would not impair the effective maintenance of TAs or conflict with statutes or regulations. Therefore, the effects would be less than significant.

4.1.5.3 Maneuver Training Direct and Indirect Effects

4.1.5.3.1 Less than Significant Effects

All impacts to soil erosion anticipated under Alternative 2 would occur. In addition, maneuver training by CSS units would involve use of HMMWVs, HET trucks, cargo trucks, fuels trucks, and other vehicles. The CSS units are expected to add approximately 330,000 miles (530,000 km) annually to maneuver training on Fort Lewis that would be conducted by the three SBCTs. Of this total, about 4,000 miles (6,000 km) or less than 1 percent would be off-road. Total annual travel would increase 330,000 miles from Alternative 2 to 4,480,000 miles (**Appendix B**).

Although training could occur on unimproved or limited off-road areas, most maneuver training would occur on existing roads, which would limit the amount of soils exposed to disturbances from

maneuver training. When considered in combination with the resilience of soils at Fort Lewis with respect to erosion and the concentration of training on existing roads, the increase in maneuver training would not impair the effective maintenance of TAs or conflict with statutes or regulations. Consequently, the effects would be less than significant.

4.1.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.1.6.1 Construction Direct and Indirect Effects

4.1.6.1.1 Less than Significant Effects

All cantonment area facilities for the medium CAB would be located in areas of existing soil disturbance on or near GAAF and the East Division Area. Although construction activities would expose materials to erosion, no native soils would be disturbed. This limited exposure in combination with generally flat slopes, erosion-resistant nature of the soils, and implementation of standard BMPs would result in no conflicts with statutes or regulations or a rate of erosion that would adversely affect the soils as a medium for plant growth. Consequently, the effects of construction on soil erosion would be less than significant.

4.1.6.2 Live-fire Training Direct and Indirect Effects

4.1.6.2.1 Less than Significant Effects

All impacts to soil erosion because of increased live-fire training anticipated under Alternative 3 would also occur under Alternative 4. No additional live-fire training areas would be constructed for the medium CAB. Personal weapons training would occur on ranges already present at Fort Lewis or on ranges constructed under actions identified in Alternatives 1 and 2. Direct and indirect impacts to soil erosion from live-fire training munitions impacts and potential wildfires are expected to increase; however, the increase in training would not impair the effective maintenance of TAs or conflict with statutes or regulations. Consequently, the effects would be less than significant.

4.1.6.3 Maneuver Training Direct and Indirect Effects

4.1.6.3.1 Less than Significant Effects

The medium CAB would affect soils directly and indirectly through the activities of the helicopters and support vehicles. Rotor wash from helicopters as they land and take off in maneuver areas would disturb topsoil if it were dry with limited vegetative cover, especially with the larger cargo helicopters. Because of the generally damp nature of Fort Lewis soils, the general presence of ground cover, and the short-term exposure of soils to rotor wash, maneuver training by helicopters would not impair the effective maintenance of TAs or conflict with statutes or regulations. Consequently, the effects would be less than significant.

The medium CAB's support vehicles also would conduct maneuver training. Although these support vehicles would drive approximately 270,000 miles (430,000 km) annually during training, only about 14,000 of these miles (23,000 km) would be off road and directly affecting soils. Maneuver training by the medium CAB's support vehicles is not expected to contribute measurably to the effects to soil erosion because they would account for about 1 percent of the annual maneuver training miles, which would increase to 4,750,000 miles (**Appendix B**). Because the effects that would occur with the training of the three SBCTs was determined to be less than significant, the additive effects of the medium CAB's support vehicles also would be less than significant.

4.1.7 Cumulative Effects

4.1.7.1 Less than Significant Effects

Although direct and indirect impacts to soils from construction and training on Fort Lewis are expected to increase under all the alternatives, cumulative effects on soil erosion are not expected to increase substantially beyond current levels. At Fort Lewis, low slope gradients, climatic conditions, and soil textures have produced a pedogenic environment that is naturally resistant to erosion. This natural resiliency, combined with current successful Fort Lewis soil management policies and practices, suggests that cumulative effects on soil erosion under this alternative are not expected to exceed any of the resource-specific significance criteria.

4.1.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on soil erosion and these are considered part of the proposed action. These BMPs include repairing areas damaged by maneuvers, deterring vehicles from creating new trails, implementing various plans, such as Environmental Protection Plans (EPPs), and rotating training among the TAs (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to implement ITAM program maintenance of training lands to minimize effects to soils (**Table 4–42**).

4.2 WATER RESOURCES

Public concerns related to water resources at Fort Lewis identified during the scoping process include:

- The effects of Army Growth and Force Structure Realignment on surface water resources at Fort Lewis.
- The effects of construction and demolition activities and long-term operations on surface and groundwater quality, including drinking water sources, and hydrology.

Potential impacts to water resources were identified based on regulatory standards, scientific judgment, and public concerns expressed during the scoping process. Regulatory standards considered during the impact analysis included, but were not limited to, the following:

- Federal and state primary and secondary drinking water standards under the Safe Drinking Water Act;
- State and local plans and policies protecting surface water and groundwater resources;
- Limits on development of available surface and groundwater resources;
- Compliance with the Clean Water Act;
- Source water protection program requirements;
- Floodplain Management regulations; and
- State water code regulations.

4.2.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact on water resources include the extent or degree to which its implementation would:

- Degrade surface or groundwater quality in a manner that would reduce the existing or potential beneficial uses of the water;

- Reduce the availability of, or accessibility to, one or more of the beneficial uses of a water resource;
- Alter the existing pattern of surface or groundwater flow or drainage in a manner that would adversely affect the uses of the water within or outside the project region;
- Be out of compliance with existing or proposed water quality standards or with other regulatory requirements related to protecting or managing water resources;
- Be out of compliance with the Clean Water Act; or
- Increase the hazard of flooding or the amount of damage that could result from flooding.

4.2.2 Overview of Impacts to Water Resources by Alternative

Table 4–4 summarizes the effects to water resources that would occur under the four alternatives. Less than significant effects are expected from construction, live-fire training, and maneuver training. Cumulative effects also would be less than significant.

Table 4–4 Summary of Potential Effects to Water Resources at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	W	W	W	W
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	W	W	W	W

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.2.3 Alternative 1 — No Action Alternative

4.2.3.1 Construction Direct and Indirect Effects

4.2.3.1.1 Less than Significant Effects

4.2.3.1.1.1 Surface Water Quantity and Quality

Generally, construction activities can result in short-term, localized increases in runoff and sedimentation. Because the construction would occur primarily on previously disturbed portions of the cantonment area, the potential impacts from sedimentation are expected to be minimal. Additionally, engineering controls and BMPs, including the Stormwater Pollution Prevention Plan (SWPPP), would be used to minimize the potential for construction-generated runoff and sedimentation.

Potential impacts may also occur because of the insufficient capacity of the stormwater conveyance system that could result in flooding. However, because construction under this alternative would occur primarily on previously disturbed and paved areas, there would be no noticeable increase in impervious surface that would result in an increase in stormwater runoff. Therefore, the existing stormwater conveyance system, utilities, and ditches within the cantonment area would handle the same loading as under the existing conditions.

Construction activities would temporarily increase the use of fuels, solvents, and other hazardous and toxic substances, which could result in indirect impacts to surface water if any are accidentally

released into the environment. Standard procedures, including training personnel in spill prevention and control techniques and requirements; maintaining appropriate spill control equipment in areas where refueling may occur; implementing safe driving practices, ensuring the proper transport of hazardous materials in compliance with Army, state, and federal regulations; and complying with all hazardous materials management regulations would minimize the potential for an accidental release. If a spill were to occur, it typically would be relatively small in magnitude and localized. Impacts from localized spills would be addressed effectively through the SPCCP. With full implementation of these established measures, beneficial uses of the water would not be affected and no compliance-related effects would occur. Consequently, impacts are expected to be less than significant.

4.2.3.1.1.2 Groundwater Quantity and Quality

Accidental spills of fuels, solvents, and other hazardous and toxic substances that would be used during construction could indirectly affect groundwater resources, such as the shallow Vashon aquifer. This aquifer underlies Fort Lewis and ranges in depth from 10 to 30 feet (3 to 9 m) below ground surface. With implementation of the procedures described above, impacts to groundwater are also expected to be less than significant.

Under this alternative, force structure and assigned personnel would remain the same as under existing conditions. Therefore, no increase in water use and no impacts to groundwater quantity are expected beyond those already occurring under existing conditions.

4.2.3.1.2 Significant, but Mitigable to Less than Significant Effects

4.2.3.1.2.1 Surface Water Quantity and Quality

Although the Solo Point WWTP is currently well below its hydraulic design capacity, it is expected that discharges will violate permit treatment requirements more frequently in the future as demand increases under this alternative. The Army attempts to comply with the conditions of the current EPA wastewater discharge permit for the Solo Point WWTP and will continue to attempt to comply with permit conditions in the future. Over the 2004-to-2009 period of the previous permit, the Army exceeded the permit treatment requirements six times. Given the past performance of the facility, however, it is expected that increased demand combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.2.3.2 Live-fire Training Direct and Indirect Effects

4.2.3.2.1 Less than Significant Effects

4.2.3.2.1.1 Surface Water Quantity and Quality

Under this alternative, training would continue as it has been since the SBCTs were developed. Individual weapons qualification would continue to occur at existing live-fire ranges at Fort Lewis. Live-fire training involves both munitions and explosives that would be used in combat and non-explosive training rounds designed to meet Soldiers' training needs. Live-fire training could result in impacts to surface water quality from the introduction of munitions chemical residues. No impacts from munitions chemical residues, however, have been observed to date at Fort Lewis. In addition, the munitions constituents would be identical to those currently in use and the level of live-fire training would remain the same. Therefore, less than significant effects would result from implementation of this alternative.

Impacts to surface water quality could also result from contamination of surface water from spills during training activities. BMPs, including the SPCCP, would minimize any potential affects.

Live-fire training could also increase sedimentation of local creeks through erosion following soil disturbances from projectile impacts and from induced fires, which make soils more susceptible to erosion. Projectile impacts directly disturb soils through cratering, which could increase erosion rates and create areas of bare ground that are more susceptible to erosion. Soils remaining in craters may be compacted and heated, reducing their ability to produce vegetation and altering their water storage and runoff characteristics. Although gunnery training and explosive ordinance training would increase proportionally, the area over which munitions and ordinance impacts are dispersed is large and the likelihood of disturbing continuous tracts of land, and thus, increasing the potential for sedimentation, is small. Therefore, the proposed increase of live-fire training is not expected to affect surface water quality significantly.

4.2.3.2.1.2 Groundwater Quantity and Quality

Impacts to shallow groundwater resources from live-fire training could occur from the introduction of chemical constituents through leaching and percolation. Fort Lewis, however, has not observed any such impacts to date in the TAs. Future levels of live-fire training would remain similar to current levels, and the munitions constituents would be identical to those currently in use. Therefore, no additional impacts would result from implementation of this alternative. Impacts to groundwater quality could also result from spills occurring during training activities. BMPs, including the SPCCP, would minimize any potential effects.

4.2.3.3 Maneuver Training Direct and Indirect Effects

4.2.3.3.1 Less Than Significant Effects

4.2.3.3.1.1 Surface Water Quantity and Quality

The primary impacts would be related to sedimentation and erosion from off-road vehicle maneuvering, specifically those involving stream crossings. However, SBCTs account for most of the maneuver training conducted at Fort Lewis, and only about 156,000 miles (6 percent) would involve cross-country or off-road travel. The intensity of the impact also depends on the type of vehicle and frequency of training. For example, tracked vehicles are inherently more damaging to land and ecology of an area, thus lending to greater soil instability and loss of vegetation and creating more runoff from water erosion. SBCTs do not employ any tracked vehicles, resulting in less soil disturbance and lower impacts from sedimentation. Mitigation measures, including the SPCCP and exclusion of training activities from sensitive areas, would further minimize these impacts. Frequency of maneuver training would also remain the same as under the existing conditions; therefore, no additional impacts beyond those currently occurring would result from implementation of this alternative.

4.2.3.3.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater could result from compaction of soils during maneuver training and subsequent decreased percolation to groundwater and impacts to water quality related to spills. However, because of limited off-road maneuvering, the impacts are expected to be negligible. Fort Lewis would implement BMPs and mitigation measures, including the SPCCP, to address any potential impacts. No impacts beyond those currently occurring would result from implementation of Alternative 1.

4.2.4 Alternative 2 —GTA Actions

4.2.4.1 Construction Direct and Indirect Effects

4.2.4.1.1 Less than Significant Effects

4.2.4.1.1.1 Surface Water Quantity and Quality

Potential impacts to surface water under this alternative would be related to limited temporary sedimentation resulting from construction activities and potential for spills and leaks. These impacts would be the same in nature as those described under Alternative 1; however, they would occur over a larger area including areas outside the cantonment area. Because there would be no additional impervious surfaces, the stormwater conveyance system would handle the same loadings as under existing conditions. Consequently, potential impacts to surface water under this alternative are expected to be less than significant. Engineering controls and BMPs, including the SPCCP and SWPPP, would be used to minimize any potential impacts further during construction.

4.2.4.1.1.2 Groundwater Quantity and Quality

Impacts to groundwater quantity and quality would be related to potential spills during construction and an increase in water use resulting from population increases. As under Alternative 1, construction activities would temporarily increase the use of fuels, solvents, and other hazardous and toxic substances, which, if spilled, could also result in indirect impacts to the shallow Vashon aquifer that underlies Fort Lewis. Fort Lewis would implement BMPs, including the SPCCP, to address potential leaks or spills of hazardous materials. With these established measures, impacts are expected to be less than significant.

The projected increase in the number of Soldiers and Family members would result in an increase in the demand for potable water. Based on 2008 data, the average per capita water use is approximately 81 gallons per person per day (g/p/d) (307 L per person per day [L/p/d]), and the maximum water use is approximately 120 g/p/d (454 L/p/d). This translates to an average daily water use increase of about 382,700 gallons (1.4 million L) and a maximum daily increase in water use by 564,000 gallons (2.1 million L), which represents an increase of approximately 10 percent over current average water use of 3.8 mgd (14 million L per day) and maximum daily water use of 5.6 mgd (21 million L per day). The Fort Lewis water system has the capacity to provide approximately 19 mgd (72 million L per day) and would therefore be able to meet the projected water demand. This projected increase in water use falls within the current variation for groundwater pumping. Compared to the overall sustainable yield of the aquifer, this is a relatively small change and it would be unlikely to stress existing water supplies or to lower groundwater levels appreciably.

The Solo Point WWTP has sufficient capacity to handle the demand under this alternative. Over the 2004-to-2009 period of the previous NPDES discharge permit, the Army exceeded the permit treatment requirements six times (EPA 2009c). Given the past performance of the facility, however, it is expected that discharges will violate permit treatment requirements more frequently in the future as demand increases. Increased demand combined with more stringent requirements for discharges under future NPDES permits will render the Solo Point WWTP insufficiently protective of Puget Sound water quality. The Army will continue to comply with the current and future conditions of the Solo Point WWTP's wastewater discharge permit.

4.2.4.1.2 Significant, but Mitigable to Less than Significant Effects

4.2.4.1.2.1 Surface Water Quantity and Quality

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under

Alternative 1. The Army attempts to comply with the conditions of the current EPA wastewater discharge permit for the Solo Point WWTP and will continue to attempt to comply with permit conditions in the future. It is expected, however, that the greater increase in demand under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.2.4.2 Live-fire Training Direct and Indirect Effects

4.2.4.2.1 Less than Significant Effects

4.2.4.2.1.1 Surface Water Quantity and Quality

Potential impacts related to live-fire training would be the same in nature as those described under Alternative 1 and would include introduction of munitions chemical residues and the potential contamination of surface water from spills. Although the live-fire training would increase by about 50 percent under this alternative, the munitions constituents would remain identical to those currently in use. Because no impacts to surface water from munitions residues have been observed at Fort Lewis in the past, no additional impacts would be anticipated under this alternative.

As discussed in **Section 4.1.4.2,** the overall increase in soil erosion from live-fire training would be less than significant. Although some portion of this eroded soil could end up as sediment in local surface water bodies, the effects would be less than significant because the erosion of soils would be less than significant and because BMPs, including the SPCCP, would minimize any potential effects.

4.2.4.2.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater resources from live-fire training would be the same as those described under the Alternative 1. Even though live-fire training would increase by about 50 percent under this alternative, the munitions constituents would be identical to those in use currently, and no impacts to groundwater quality would be anticipated.

4.2.4.3 Maneuver Training Direct and Indirect Effects

4.2.4.3.1 Less than Significant Effects

4.2.4.3.1.1 Surface Water Quantity and Quality

Potential impacts related to maneuver training would be the same in nature as those described under Alternative 1 and would include potential impacts to surface water quality from nonpoint source sediment loading and impacts from accidental spills. Alternative 2 would result in an approximate 50 percent increase in the amount of maneuver training conducted at Fort Lewis compared to Alternative 1. However, because of limited off-road maneuvering and the subsequent less than significant increase in soil erosion, the increased maneuver training with Strykers would lead to a minimal increase in maneuver impacts to surface water.

4.2.4.3.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater would be the same in nature as those described under Alternative 1 and would include potential decreased percolation to groundwater due to compaction of soils during maneuver training and impacts related to spills. The potential for these impacts would increase due to increased maneuver training under this alternative. With implementation of existing mitigation measures, impacts to groundwater are expected to be minimal.

4.2.5 Alternative 3 — GTA Actions + CSS Soldiers

4.2.5.1 Construction Direct and Indirect Effects

4.2.5.1.1 Less than Significant Effects

4.2.5.1.1.1 Surface Water Quantity and Quality

Construction of the facilities for the CSS Soldiers and their families in Training Area A East would result in short-term, localized increases in erosion and long-term increases in runoff. Use of heavy construction equipment would compact near-surface soils, which could result in increased runoff and increased sedimentation. Clearing and grading during construction would temporarily expose the soils to erosion by water. Because the addition of impervious surfaces would result in increased runoff, the existing stormwater system would have to handle increased loading during storm events. If the current capacity is ultimately not sufficient for the new facilities, additional stormwater facilities would need to be constructed to handle the runoff from the impervious area added by construction of the new facilities. These impacts are expected to be low and confined to Training Area A East. Potential impacts resulting from accidental spills and leaks would be the same as those discussed under the previous alternatives. Engineering controls and BMPs, including the SWPPP, would be used to minimize these potential impacts to less than significant levels. Effects to Puget Sound from the Solo Point WWTP's permitted discharges would be similar to those discussed for Alternative 2.

4.2.5.1.1.2 Groundwater Quantity and Quality

Construction in the previously undisturbed area could result in short-term, localized effects that would include increased overland flow and runoff and consequently decreased percolation to shallow groundwater. These impacts are expected to be minimal. Potential impacts resulting from spills and leaks would be the same as under Alternative 1. Engineering controls and BMPs, including the SWPPP, would be used to minimize these potential impacts to less than significant level.

The increase in population under this alternative would increase daily water use by about 586,400 gallons (2.22 million L), and the maximum daily water use could increase by 864,000 gallons (3.27 million L) compared to Alternative 1. This represents an increase of approximately 15 percent over current water use. Total average water use under this alternative would be approximately 4.4 mgd (17 million L per day), and the maximum water use would be about 6.5 mgd (25 million L per day). The Fort Lewis water system can supply approximately 19 mgd (72 million L per day); therefore, the available water supply would be sufficient to meet needs associated with this alternative, and groundwater withdrawals would not be expected to affect other area groundwater users adversely.

4.2.5.1.2 Significant, but Mitigable to Less than Significant Effects

4.2.5.1.2.1 Surface Water Quantity and Quality

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under Alternatives 1 and 2. Thus, the Army expects that the greater increase in demand that would occur under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.2.5.2 Live-fire Training Direct and Indirect Effects

4.2.5.2.1 Less than Significant Effects

4.2.5.2.1.1 Surface Water Quantity and Quality

Potential impacts related to live-fire training would be the same in nature as those described under Alternative 2. Although the live-fire training would increase slightly under this alternative, the munitions constituents would remain identical to those currently in use, and therefore no additional perceptible impacts are anticipated under this alternative.

Potential impacts from sedimentation and erosion would increase by only a small amount over Alternative 2; however, because the additional live-fire training would occur on fixed ranges that represent a small portion of the overall land area. The overall increase in soil disturbance from live-fire training would be negligible and these impacts are expected to be less than significant.

4.2.5.2.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater resources from live-fire training would be about the same as those described under Alternative 2. Even though live-fire training would increase slightly relative to Alternative 2, the munitions constituents would be identical to those currently in use, and no additional impacts to groundwater quality are anticipated.

4.2.5.3 Maneuver Training Direct and Indirect Effects

4.2.5.3.1 Less than Significant Effects

4.2.5.3.1.1 Surface Water Quantity and Quality

Potential impacts related to maneuver training would be the same in nature as those described under Alternative 2. Alternative 3 would result in an additional increase in the amount of maneuver training conducted at Fort Lewis compared to Alternative 2. However, due to very limited off-road maneuvering (**Appendix B**) and lack of tracked vehicle use, the increased maneuver training associated with the CSS units would lead to a minimal increase in maneuver impacts.

4.2.5.3.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater would be the same in nature as those described under Alternative 2. The potential for these impacts would increase slightly due to increased maneuver training under this alternative associated with the CSS units. With implementation of previously identified mitigation measures, however, additional impacts to groundwater are expected to be minimal.

4.2.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.2.6.1 Construction Direct and Indirect Effects

4.2.6.1.1 Less than Significant Effects

4.2.6.1.1.1 Surface Water Quantity and Quality

Construction for the medium CAB would occur on previously disturbed areas, so there would be no new surface disturbance for the medium CAB. Potential impacts to surface water under this alternative would be the same in nature as those discussed under Alternative 3 and would be related to limited temporary sedimentation resulting from construction activities and potential for accidental spills and leaks. These impacts, however, would occur over larger areas, such as GAAF and the East Division. Because there would be no major addition of impervious surfaces, the stormwater

conveyance system would handle the loadings as under existing conditions. Overall, potential impacts to surface water would be similar to those for Alternative 3. With implementation of engineering controls and BMPs, including the SPCCP and SWPPP, effects would be less than significant. Effects to Puget Sound from the Solo Point WWTP's permitted discharges would be similar to those discussed for Alternative 2.

4.2.6.1.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater quality and quantity from construction would be the same in nature as Alternative 3 and would be related to potential spills occurring during construction and an increase in water use resulting from the increase in population. As under the other alternatives, construction activities would temporarily increase the use of fuels, solvents, and other hazardous and toxic substances, which could result in indirect impacts to the shallow Vashon aquifer that underlies Fort Lewis. Fort Lewis would implement BMPs, including the SPCCP, to address potential leaks or spills of hazardous materials. With these established measures, impacts are expected to be less than significant.

The increase of about 7,060 Soldiers and Family members would be on top of the population increase under Alternative 3. The average daily water use would increase by about 1.2 million gallons (4.5 million L), and the maximum daily water use could increase by 1.7 million gallons (6.4 million L) compared to Alternative 1. This represents an increase of approximately 30 percent over current water use. Total average water use under this alternative would be approximately 5.0 mgd (19 million L per day), and the maximum water use would be about 7.3 mgd (28 million L per day), which is substantially less than what the Fort Lewis water system can supply. Therefore, the available water supply would be sufficient to meet needs associated with this alternative, and groundwater withdrawals would not be expected to affect other area groundwater users adversely.

4.2.6.1.2 Significant, but Mitigable to Less than Significant Effects

4.2.6.1.2.1 Surface Water Quantity and Quality

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under the other alternatives. Thus, the Army expects that the greater increase in demand that would occur under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.2.6.2 Live-fire Training Direct and Indirect Effects

4.2.6.2.1 Less than Significant Effects

4.2.6.2.1.1 Surface Water Quantity and Quality

In addition to impacts discussed under the previous alternatives, this alternative would result in additional impacts related to aerial gunnery training. The medium CAB would conduct aerial gunnery at the ranges, which would result in increased soils disturbance, and therefore, increased erosion and potential for sedimentation. Even though this alternative would involve increased amounts of ammunition expended, the constituents are expected to be similar to those currently in use. Since no impacts to surface water from munitions residues have been observed in the area to date, these impacts are expected to be less than significant. Potential impacts related to sedimentation from induced fires, and spills from established refueling points would increase under this alternative.

However, most live-fire training would occur on fixed ranges that represent a small portion of the overall land area. BMPs would further minimize any potential impacts to surface water quality on the installation. Therefore, the impacts are expected to be less than significant.

4.2.6.2.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater resources from live-fire training would be similar to those described under Alternative 3. Even though live-fire training would increase under this alternative, the munitions constituents would be similar to those currently in use, and potential impacts to groundwater quality would involve increased amounts of ammunition expended by the Soldiers of the medium CAB. Since no impacts from munitions residues have been observed in groundwater to date, these impacts are expected to be less than significant. Potential impacts of spills at established refueling points would also increase under this alternative. However, implementing BMPs, including the SPCCP, would minimize potential impacts resulting from leaks or spills of hazardous materials.

4.2.6.3 Maneuver Training Direct and Indirect Effects

4.2.6.3.1 Less than Significant Effects

4.2.6.3.1.1 Surface Water Quantity and Quality

Maneuver training associated with the medium CAB would involve limited off-road maneuvering by support vehicles (**Appendix B**). This relatively small increase in maneuver training would lead to an imperceptible increase in maneuver impacts relative to Alternatives 2 and 3. In addition, Fort Lewis would continue to use BMPs to protect its water quality. Consequently, effects to surface water quantity and quality would not exceed significance criteria thresholds.

4.2.6.3.1.2 Groundwater Quantity and Quality

Potential impacts to groundwater would be the same in nature as those described under Alternative 3 and could result from compaction of soils during maneuver training and subsequent decreased percolation to groundwater. Because of the limited off-road activities associated with medium CAB training, these impacts are not expected to increase measurably beyond those discussed under previous alternatives. The potential for impacts from accidental spills, however, would increase slightly because of medium CAB training. With implementation of previously mentioned mitigation measures, however, impacts to groundwater are expected to be minimal and would not exceed significance criteria thresholds.

4.2.7 Cumulative Effects

4.2.7.1.1 Less than Significant Effects

4.2.7.1.1.1 Surface Water Quantity and Quality

Cumulative effects to surface water could occur under all four alternatives in conjunction with surface disturbances resulting from the construction of other RFFAs. This disturbance, which would include vegetation removal and soil disturbance, would contribute to erosion and sedimentation. Cumulative effects on surface water resources would be highest shortly after construction begins and would decrease over time in response to site reclamation. BMPs to control erosion would be implemented to ensure that surface-disturbing activities have minimal effect on surface water resources and do not exceed significance criteria thresholds.

4.2.7.1.1.2 Groundwater Quantity and Quality

Potential cumulative effects to groundwater quality and quantity under all four alternatives include the impacts of increased demand for potable water in combination with increased population growth

and increased potential for spills and leaks related to construction and training activities. Future population growth and related water consumption, as combined with the four alternatives at Fort Lewis, could cumulatively affect water resources. These increases, however, are not expected to be substantive because the amounts of water that would be pumped from the hydrologic units are not likely to reduce available water supplies appreciably. In addition, BMPs to control the adverse effects of potential spills and leaks would be implemented to ensure that construction and training activities have minimal effect on groundwater resources and do not exceed significance criteria thresholds.

4.2.7.1.2 Significant, but Mitigable to Less than Significant Effects

4.2.7.1.2.1 Surface Water Quantity and Quality

Cumulative effects to the quality of water in Puget Sound would be significant under all four alternatives if the current Solo Point WWTP is left in place. Discharges from the Solo Point WWTP that violate permit treatment requirements in the future could combine with the cumulative discharges from other facilities. Thus, the greater increase in demand that would occur under all four alternatives combined with more stringent requirements for discharges under future NPDES permits for all WWTPs discharging into Puget Sound would be insufficiently protective of Puget Sound water quality. With replacement of the Solo Point WWTP, the cumulative effects from the four alternatives would be significant, but mitigable to less than significant effects.

4.2.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on water resources. These BMPs include repairing areas damaged by maneuvers; deterring vehicles from creating new trails; implementing various plans, such as EPPs and SWPPPs; and following resource protection practices required by Fort Lewis Regulation 200–1 (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to implement ITAM program maintenance of training lands to minimize effects to soils (and subsequently water resources) and construct a new WWTP to meet the more stringent limits for effluent discharges (**Table 4–42**). The Army will comply with 42 USC § 17094, which requires planning and design to maintain the hydrology of the site.

4.3 BIOLOGICAL RESOURCES

4.3.1 Vegetation

Three issues pertaining to vegetation were identified during scoping: 1) the effects of increased training activities on rare species and habitats; 2) the potential spread of noxious weed species as a result of Army actions; and 3) the potential for increased fire danger resulting from increased live-fire training.

4.3.1.1 Resource-specific Significance Criteria

Impacts to vegetation would be considered significant if Army actions resulted in:

- a long-term loss or degradation of unique or high-quality plant communities;
- a measurable reduction in diversity within high-quality plant communities;
- take of federally listed species or increased mortality of proposed or candidate plant species; or
- local extirpation of rare or sensitive species not currently listed under the Endangered Species Act.

The potential for impacts to be significant depends on the importance of the community or species (ecologically, sociologically, or legally), the magnitude of the impact in relation to the size of the population or community, and the resilience of the plant or community after a disturbance.

In addition to this EIS, a Biological Assessment (BA) was prepared that addresses federally listed threatened and endangered plant species, or species proposed for listing, that could be impacted by the action alternatives. It is included as **Appendix F**.

4.3.1.2 Overview of Impacts to Vegetation by Alternative

Table 4–5 summarizes the impacts to vegetation that would occur under the four alternatives.

Table 4–5 Summary of Potential Effects to Vegetation at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	U	U	U
Cumulative Effects	€	U	U	U

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
\+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.3.1.3 Alternative 1 — No Action Alternative

4.3.1.3.1 Construction Direct and Indirect Effects

4.3.1.3.1.1 Less than Significant Effects

The potential impacts to plant communities associated with construction projects under Alternative 1 were analyzed in the previous Environmental Assessments (EAs) prepared for the SBCTs, stationing of other units at Fort Lewis, and housing (Army 2001a, b; 2004a, b). Previous evaluations of these actions found them to have minor impacts on vegetation. Construction and associated demolition would be restricted to the cantonment area, where the existing plant communities are highly fragmented, and consist of a mixture of native and introduced species. Most of these plant communities are already subject to regular vegetation management. Listed and rare species, priority habitats, and unique and high quality plant communities do not occur in the cantonment area and would not be affected. Impacts to vegetation would be minor.

4.3.1.3.2 Live-fire Training Direct and Indirect Effects

4.3.1.3.2.1 Less than Significant Effects

Fires can impact vegetation by killing the aboveground portions of plants. Fires would continue to burn vegetation on several thousand acres of the AIA and other impact areas annually as a result of gunnery training. In addition, training lands outside of impact areas may burn because of smoke grenades, aerial flares, and other approved incendiary equipment. Fires can negatively impact prairie and woodland communities, particularly if they burn areas with high fuel loads and occur prior to mid-August or burn too frequently (Tveten and Fonda 1999, Foster 2001). Fire can alter the species composition of these communities, and some non-native species may increase in cover after fires (The Nature Conservancy 1998). However, fires can also provide an important benefit by preventing the encroachment of Douglas-fir and Scotch broom onto these open habitats. Therefore, it is

expected that the continuation of artillery training under Alternative 1 could provide some level of benefit to prairie and woodland communities, particularly as a result of low-intensity fires occurring in late summer or early fall. Effects to high-quality prairie communities could therefore be beneficial under certain circumstances.

4.3.1.3.3 Maneuver Training Direct and Indirect Effects

4.3.1.3.3.1 Less than Significant Effects

The potential impacts to plant communities from training activities under Alternative 1 were analyzed in the previous EAs prepared for the SBCTs and for stationing of other units at Fort Lewis (Army 2001a, b; 2004a, b), which predicted no significant impacts to plant communities under the existing management policies and with additional mitigation measures in place. However, continuation of the current levels of training would still result in the degradation of prairies from the baseline conditions reported in Chapter 3, and would require a continuation of current prairie management and monitoring programs to prevent significant impacts. Annual off-road mileage by SBCTs is estimated at 156,000 miles under Alternative 1.

The greatest potential for impacts would result from off-road vehicle maneuvers by Stryker vehicles, which can cause injury and mortality to vegetation and lead to changes in plant cover, species composition, and structure. **Table 4–6** shows the estimated annual impacts to vegetation from vehicle maneuvers under Alternative 1, as compared to the action alternatives. This table considers overall impacts to vegetation, but does not consider how disturbance to vegetation from training activities impacts the quality of native plant communities (particularly prairies), which is difficult to quantify.

Table 4–6 Annual Impacts of Training on Vegetation at Fort Lewis

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres impacted annually by maneuver activities[1]	10,400 to 15,600	15,670 to 23,500	15,930 to 23,920	16,870 to 25,300
Percent of training lands[2]	19 to 28	28 to 42	28 to 43	30 to 45
Acres impacted annually by digging	~ 5 acres	~ 7 acres	~ 7 acres	~ 7 acres

Notes:
1 Number of acres that could experience a 10 to 15 percent reduction in total plant cover.
2 Acres impacted as a percentage of acres available for vehicle training.
See **Appendix C** for calculations and assumptions.

Under Alternative 1, there would not be an increase in the amount of digging occurring on Fort Lewis. Digging activities would continue to affect approximately 5 acres (2 ha) of land on Fort Lewis annually. The majority of digging would continue to occur in prairie habitats, although oak and pine woodlands with open understories could also be affected. Digging would result in a short-term loss of vegetation in small, localized areas, and could potentially result in a long-term loss in native vegetation, as soil structure would be degraded and colonization of the site by non-native species would be likely. Fort Lewis's dig permit program requires trainers to consult maps prior to dig exercises in order to avoid areas with high quality prairie habitat and sensitive species. Therefore, long-term effects to high quality plant communities should not occur.

Special Status Species. Few impacts to special status plant species would be expected to occur under Alternative 1. Existing management plans and protective actions, including wetland buffers and

Seibert-staked (Siber-staked) areas, would continue to protect sensitive plant species from most disturbances by training activities.

Small-flowered trillium occurs in riparian areas and oak woodland habitats, and most of the populations are located in areas that are Seibert staked and protected from off-road vehicle travel. Water howellia, which is found in Fort Lewis wetlands, is protected by wetland buffers that prohibit off-road vehicle travel. Texas toadflax and Hall's aster are very rare on Fort Lewis. Texas toadflax occurs in riparian prairie habitat and the AIA, where it would continue to be protected from destructive forms of training such as off-road vehicle travel. Populations of Hall's aster on Lower Weir Prairie and Johnson Prairie are protected by Seibert staking. For all of these species, the existing protections should be sufficient to prevent take of listed species (water howellia) and local extirpation of sensitive species. However, populations outside of protection areas would continue to be at risk for training-related damage, and all species could potentially be impacted by unauthorized or inadvertent off-road travel into Seibert-staked areas and wetland buffers.

White-top aster, which occurs on all prairies on Fort Lewis, would continue to be protected to some degree by Controlled Use Area (CUA) designations and Seibert staking. Some populations, however, occur in areas where they may be readily exposed to maneuver training, and would continue to be under Alternative 1. Fort Lewis has closely monitored this species on its prairies, and has attempted to predict the probability of future change to this species under current conditions using a demographic model. Early predictions of the model, however, have suggested that white-top aster populations on Fort Lewis are shrinking at a much greater rate than can be supported by field observations (Chramiec 2003). The current population appears to be stable. However, because white-top aster cannot colonize new sites, and because repeated vehicular disturbance can have a minor adverse impact on populations, it is likely that species populations will continue to decline in areas where maneuver training is heaviest under Alternative 1. Local extirpation of the species, however, should not occur.

4.3.1.4 Alternative 2 — GTA Actions

4.3.1.4.1 Construction Direct and Indirect Effects

4.3.1.4.1.1 Less than Significant Effects

Under Alternative 2, proposed construction would affect up to 75 acres (31 ha) more than would be impacted under Alternative 1. Construction of support facilities, new training ranges, and housing would require some clearing of vegetation in the Main Post and North Fort cantonment areas and on training ranges. Most of this land has been developed or has undergone previous disturbance. The undeveloped portions of the proposed construction areas have been cleared previously and do not represent intact native communities. Vegetation in these areas predominantly consists of mowed grass and second-growth Douglas-fir trees. Construction activities would result in a long-term loss of plant resources, but would not constitute a loss of unique or high-quality plant communities or rare plant species. Additionally, since it would occur in areas where noxious weeds are already present, it would not result in an introduction of noxious weed species into intact native plant communities. Therefore, effects to vegetation would not be significant.

4.3.1.4.2 Live-fire Training Direct and Indirect Effects

4.3.1.4.2.1 Less than Significant Effects

The additional fires resulting from increased live-fire training under Alternative 2 would primarily be low-intensity burns that would effect vegetation in much the same way as at present. Frequent fires could alter plant species composition, but would also continue to prevent the encroachment of scotch

broom and Douglas-fir into impact area grasslands. Although the risk of a larger, more damaging fire would potentially be greater under this alternative that under Alternative 1, existing fire management practices are adequate to prevent damaging fires from burning through sensitive habitats with heavy fuel loads. Effects to vegetation would not be significant.

4.3.1.4.3 Maneuver Training Direct and Indirect Effects

4.3.1.4.3.1 Significant Effects

Under Alternative 2, digging would impact an estimated 7 acres (3 ha) of land, as compared to 5 acres (2 ha) under Alternative 1 (40-percent increase). The additional affected acreage would be predominantly in prairie areas, but could affect woodlands with open understories as well. The existing dig permit process would continue to be in place under this alternative, and would require the trainers to avoid high-quality prairie areas and other environmentally sensitive areas. Therefore, degradation of unique and/or high quality plant communities, and impacts to populations of sensitive plant species should not occur. Impacts would be less than significant.

A BA developed in conjunction with this EIS determined that the proposed actions would be unlikely to adversely affect federally listed threatened and/or endangered plant species that occur on or near Fort Lewis (**Appendix F**).

Many populations of other special status plant species would continue to be protected from training-related damage by buffers, CUA designations, Seibert staking, and other ongoing management actions. However, given the magnitude of the proposed increase in maneuver training under Alternative 2, the risk of harm to populations of sensitive plant species would be greater than under Alternative 1. Populations outside of protected areas are more likely to be impacted by vehicles, particularly if lesser-used training areas that support these populations are used more frequently for maneuver training. Additionally, there would be more opportunities for Soldiers to enter protected areas inadvertently and impact populations of sensitive plant species. Populations of white-top aster, in particular, are more likely to sustain repeated disturbance under this alternative and could suffer a reduction in vigor or death. However, because several large populations of this species are protected on Fort Lewis, the proposed training would be unlikely to cause a local extirpation of the species. Though some plant mortality is likely, overall impacts would be minor to moderate.

Under Alternative 2, impacts to native plant communities from vehicle maneuvers would be greater than those under Alternative 1 because of the increased amount of off-road travel by SBCTs, as well as additional off-road mileage by GTA support vehicles. Under this alternative, annual off-road vehicle mileage would increase to approximately 235,000 miles. Assuming an equal use of all available maneuver areas, Alternative 2 would likely impact between 15,670 and 23,500 acres (6,341 to 9,510 ha) annually (**Table 4–6**), with all available maneuver land potentially being disturbed by Stryker vehicles each year. Vegetation would be unlikely to recover completely between disturbance events, although rehabilitation efforts in training lands would help speed up recovery. Additionally, it is expected that the prevalence of non-native species would increase in many of the areas used for maneuver training. Given the increase in off-road miles, the potential for degradation of high-quality native plant communities would be very high, and a measurable reduction in diversity within high-quality plant communities relative to baseline levels would be likely. Therefore, effects to vegetation would be significant under Alternative 2.

4.3.1.5 Alternative 3 — GTA Actions + CSS Soldiers

4.3.1.5.1 Construction Direct and Indirect Effects

4.3.1.5.1.1 Less than Significant Effects

Under Alternative 3, approximately 60 acres (15 ha) of vegetation in Training Area A East in the North Fort would be lost to CSS construction and related activities associated with the CSS. When added to construction-related disturbance associated with Alternative 2, construction activities under this alternative would result in a long-term loss of plant resources on about 110 acres (45 ha). The proposed construction footprint area for CSS facilities is adjacent to existing developed areas in the North Fort, has been used intensively for training, and has burned in the last ten years. Although the area has a large component of Scotch broom and non-native grasses, it also includes more than 120 Oregon white oaks, including three larger clusters of oaks, which would be considered Priority Habitats by WDFW. All of the oaks in the construction area have been identified by the Army so the facilities can be designed around as many oaks as possible and then avoided during construction activities. It is estimated that 12 Oregon white oaks would need to be removed from the area, with an average size of 10 inches diameter at breast height. The construction area is not considered high quality oak habitat, and the degraded community type is not considered a rare or high-quality plant community by the WNHP. While removal of oaks and development in the area would constitute a moderate effect to vegetation, impacts would not be significant because it would not constitute a loss of unique or high-quality plant communities or rare plant species.

4.3.1.5.2 Live-fire Training Direct and Indirect Effects

4.3.1.5.2.1 Less than Significant Effects

Under Alternative 3, the slightly more potential ignition sources would be utilized in the ranges and impact areas on Fort Lewis than under Alternative 2. Consequently, the risk of fire could also be slightly greater, but existing fire management practices would keep impacts less than significant.

4.3.1.5.3 Maneuver Training Direct and Indirect Effects

4.3.1.5.3.1 Significant Effects

The number of digging events and impacts associated with digging occurring on Fort Lewis annually would remain near levels identified under Alternative 2. Therefore, associated effects to vegetation would be similar to those described for Alternative 2.

A BA developed in conjunction with this EIS determined that the proposed actions under Alternative 3 would be unlikely to adversely affect federally listed threatened and/or endangered plant species that occur on or near Fort Lewis (**Appendix F**).

The annual amount of off-road travel would increase to approximately 239,000 miles. Therefore, the risk for impacts to sensitive plant species would be slightly greater than under Alternative 2. However, the existing protection measures would be adequate to prevent local extirpations of these species, and effects would not be significant.

Under Alternative 3, the increase in off-road travel would result in a slightly greater annual loss of plant cover in maneuver areas than under Alternative 2. Assuming equal use of all available maneuver areas, SBCT, GTA, and CSS vehicles would likely impact between 15,930 and 23,900 acres (6,447 to 9,670 ha) annually. The spread of non-native species by vehicles could also be slightly greater than under Alternative 2. The potential for degradation of high-quality native plant communities would be similar to that under Alternative 2, and would constitute a significant effect to vegetation.

4.3.1.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.3.1.6.1 Construction Direct and Indirect Effects

4.3.1.6.1.1 Less than Significant Effects

Proposed construction would affect approximately 110 more acres (45 ha) of vegetation than would be impacted under Alternative 3, 170 more acres (68 ha) than under Alternative 2, and 245 more acres (99 ha) than under Alternative 1. Construction of support facilities and housing for the medium CAB would require clearing of approximately 110 acres (45 ha) of vegetation in the Main Post and North Fort. Most of this area has been developed and disturbed in the past and supports predominantly grasses, forbs, and second-growth Douglas-fir trees. Because the proposed construction activities would occur on previously disturbed areas or areas with limited native vegetation, a loss of unique or high-quality plant communities or rare plant species would be unlikely. Additionally, since the construction would occur in areas where non-native species are already present, it would not result in an introduction of noxious weed species into intact native plant communities.

Effects to oaks associated with construction of CSS facilities would be the same as those discussed under Alternative 3. Proposed construction in Training Area A East would result in removal of approximately 12 oaks, with the remainder of the oaks on the site being preserved and incorporated into the design of the facility. Given the degraded nature of the area, these impacts would not be significant.

4.3.1.6.2 Live-fire Training Direct and Indirect Effects

4.3.1.6.2.1 Less than Significant Effects

The additional gunnery training conducted by the medium CAB at Fort Lewis would likely increase the risk of fire the number of fires occurring on Fort Lewis. The risk of fire would be greater than the risk under Alternatives 1, 2, and 3. However, existing fire management practices would minimize the risk of large, destructive fires, and would keep impacts less than significant.

4.3.1.6.3 Maneuver Training Direct and Indirect Effects

4.3.1.6.3.1 Significant Effects

Helicopter-based activities by the medium CAB would occur in the Fort Lewis airspace, and therefore most flight activities would have minimal, if any, impacts on vegetation. However, helicopter flight very close to the ground surface, as in the nap-of-the-earth flight mode, could affect vegetation through rotor wash (downward wind generated by the rotors). Although there is limited available information about the effects of rotor wash on vegetation, it is likely that the high-speed winds generated by helicopters during training could potentially interfere with the flight paths of pollinators, and could influence seed dispersal. Because the direction of rotor wash is downward, it is not expected that that seeds of non-native species would be dispersed substantially greater distances than under normal dispersal scenarios.

It is not anticipated that medium CAB units would conduct extensive digging activities. Ground activities would typically occur at bivouac sites, in landing strips, and in previously dug areas, where impacts to vegetation have recurred in the past and high-quality plant communities do not occur.

The BA for this action determined that proposed Army activities under Alternative 4 would be unlikely to adversely affect federally listed plant species (**Appendix F**). The annual amount of off-road travel would increase to approximately 253,000 miles. Therefore, the risk for impacts to

sensitive plant species would be substantially greater than under Alternative 1, and also greater than under the other two action alternatives. However, the existing protection measures would be adequate to prevent local extirpations of these species, and effects would not be significant.

The increase in off-road travel would result in a greater annual loss of plant cover in maneuver areas than under Alternatives 1, 2, and 3. Assuming equal use of all available maneuver areas, Medium CAB vehicles, SBCTs, and CSS units would likely impact about 14,300 to 21,300 acres (6,830 to 10,240 ha) annually. The spread of non-native species by vehicles could also be greater than under Alternatives 1, 2, and 3. Overall, the potential for degradation of high-quality native plant communities would be greater under this alternative than under any of the other alternatives. Effects to vegetation would be significant.

4.3.1.7 Cumulative Effects

4.3.1.7.1 Significant Effects

Cumulative effects for Alternative 1 would be less than significant. Moderate, adverse cumulative impacts to vegetation in the South Puget Sound region and on Fort Lewis would be expected from this alternative. Vegetation on Fort Lewis has been degraded by past and present construction and military training activities. Proposed increases in training would likely further impact vegetation. Implementation of sustainability and regional efforts to protect remaining prairie, forest, and vegetation would help ensure that vegetation on Fort Lewis and other suitable habitat off the installation would be protected for future generations.

Cumulative effects for Alternatives 2, 3, and 4 would be significant under this alternative. Significant adverse impacts to vegetation on Fort Lewis, and adverse cumulative impacts to vegetation in the South Puget Sound region, would be expected from the action alternatives and other activities in the region. Vegetation on Fort Lewis has been degraded by past and present construction and military training activities. Proposed SBCT and GTA units training would likely further impact vegetation. Activities associated with the construction and renovation of family housing and barracks, would lead to loss of vegetation (including oak woodlands) and plant productivity over several hundred acres of the installation. These losses would be cumulative to losses that have occurred in the past, and loss of oak habitat under alternatives 3 and 4 would be cumulative to other past, present, and future oak losses in the region.

Other past, present, and future activities that could contribute to loss of vegetation include residential and commercial development and construction of supporting infrastructure, agricultural activities (including farming and timber harvest), recreational activities (golf courses, all-terrain vehicle use, and other recreation facilities), and construction of highway infrastructure. Use of BMPs, including revegetation of disturbed sites with native vegetation, would reduce erosion rates and encourage the regrowth of vegetation on disturbed sites.

Fort Lewis actively manages its prairies and oak woodlands, and has set aside areas on its prairies for protection of white-top aster. Off Post, the WDNR (Mima Mounds and Rocky Prairie Natural Area Preserves), WDFW (Scatter Creek Wildlife Area and West Rocky Prairie Wildlife Area), and Thurston County (Glacial Heritage Reserve) have protected tracts of high-quality prairie lands. The Nature Conservancy assists in the management and restoration of several of these areas. Additionally, through its participation in the ACUB program, Fort Lewis is underwriting native prairie restoration at all of these off-Post sites. Both Thurston County and Pierce County have critical areas regulations in place to protect oak woodlands. These actions should slow, but not stop, the rate of loss of prairies and oak woodlands in the South Puget Sound region.

Army actions to minimize impacts to Fort Lewis prairies include reducing the amount of training allowed in highest quality prairies, implementing BMPs, and restoring degraded lands. Additional mitigation is presented in Section **4.3.1.8**.

4.3.1.8 Mitigation

4.3.1.8.1 Best Management Practices

As shown on **Table 4–41**, the Army currently implements numerous management activities and other resource protection strategies to minimize impacts to vegetation on Fort Lewis. These activities would continue to occur, regardless of the EIS alternative selected. These ongoing activities would help to mitigate for some of the impacts associated with the proposed activities under Alternatives 2 through 4. A list of some of the ongoing measures that would help mitigate for impacts to vegetation, including sensitive prairie communities and special status species is presented below. Proposed new mitigation is presented in Section **4.3.3.8.2**.

- Continue to implement management practices in line with goals and objectives identified in the ITAM program. These measures include, but are not limited to: deterring vehicle traffic from new trails and recently established roads; repairing (reseeding) maneuver damaged areas; use of existing hardened crossings in areas of riparian and wetland soils; and use of land condition maps when planning training that may impact soils or vegetation.
- Continue to implement the ITAM program of maintaining sustainable training lands. Actions will include rehabilitating vegetation impacted by wildfires, vehicle maneuvers, and other training activities, and conducting increased soil condition monitoring frequency and reporting.
- Continue to balance training area use with area rotation schedules in accordance with ITAM goals for sustainable training lands.
- Continue to follow resource protection measures required by Fort Lewis Regulation 200–1 during field training, such as: avoiding maneuver, digging, or establishing assembly areas or bivouac sites in Seibert staked areas; using only established roads and trails during movement to and from maneuver areas and firing ranges; staying at least 160 feet (50 m) from wetlands and other water bodies unless a maintained road or designated crossing exists for traversing the restricted area; obtaining a permit for digging, and digging only in the area specified by the permit; locating assembly areas, bivouac sites, field refueling sites, field maintenance sites, field kitchens, field showers, field latrines, and hazardous material storage sites at least 330 feet (100 m) away from any wetland or water body; and conducting vehicle washing only at installation designated wash facilities.
- Continue procedures for educating land users in minimizing adverse impacts to training land as part of the ITAM Environmental Awareness program.
- Continue to concentrate the most intense forms of training in the most degraded areas to minimize impacts to higher quality prairies.
- Continue to implement the requirements of Fort Lewis Regulation 420–5, including wetland protection measures from Fort Lewis Regulation 200–1 (see above) for water howellia, and for white-topped aster prohibiting training activities involving digging or other ground disturbance in Johnson and Weir prairies.

Fort Lewis also participates in the ACUB program, which entails funding mitigation at off-site locations to compensate for impacts on post. However, since this program is relatively new, the Army is currently testing the value of this approach to mitigation before making a decision to increase its level of participation.

4.3.1.8.2 Proposed New Mitigation

No mitigation measures would be required to address impacts from Alternative 1 on plant resources.

Long-term loss or degradation of unique or high-quality plant communities, and a measurable reduction in diversity within high-quality plant communities, would be likely under Alternatives 2, 3 and 4. The following mitigation measures are proposed for implementation under Alternatives 2, 3 and 4 to reduce the impacts of Army actions on vegetation:

- Implement ITAM program maintenance of sustainable training lands. Actions will include rehabilitating vegetation impacted by vehicle maneuvers, bivouac, digging, and other training activities. Conduct increased frequency of soil condition monitoring and reporting.
- Increase the environmental staff to address additional program requirements from more intensive use of training lands and increased impacts to natural resources. The requirements include surveying and monitoring of listed and candidate species and monitoring of military activities for their effect on species; management actions to address training impacts, including the increase in infestations of non-native species; and project review and input.
- Conduct additional noxious weed monitoring and control.
- Conduct increased cleaning of vehicles of noxious weed components from off-post training sites (YTC, etc.) or from deployment prior to returning to Fort Lewis.
- Create and maintain suitable habitat for candidate species on Fort Lewis (Mardon skipper, Taylor's checkerspot, streaked horned lark, and Mazama pocket gopher). Actions will include site preparation, planting of native vegetation, and maintenance of habitat vegetation.
- Conduct additional monitoring and recording of the frequency, intensity, and location of wildfires on Fort Lewis, and as necessary, implement additional fire prevention and control measures, including firebreak maintenance, prescribed burning, and fire suppression activities.

4.3.2 Fish and Aquatic Resources

4.3.2.1 Resource-specific Significance Criteria

Effects to fish and other aquatic resources were not identified as an issue of concern during scoping. For the purposes of this analysis, impacts to fish resources on Fort Lewis would be considered significant if Army actions resulted in:

- a take of a federally listed species or a species proposed for listing;
- a loss of designated critical habitat;
- a long-term (> 2-year) impact on populations and/or habitat of federal or state species of concern that would result in a trend toward endangerment or the need for federal listing;
- a long-term loss of habitat for single or multiple common fish species; or
- a creation of a fish barrier.

In addition to this EIS, a BA and Essential Fish Habitat (EFH) assessment have been prepared that address federally listed threatened and endangered species or species proposed for listing that could be impacted by the action alternatives, and impacts that could occur to EFH (**Appendix F**).

4.3.2.2 Overview of Impacts to Fish and Aquatic Resources by Alternative

Table 4–7 summarizes the impacts associated with fish and aquatic resources that would occur under the four alternatives.

Table 4–7 Summary of Potential Effects to Fish and Aquatic Resources at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	W	W	W
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	W	W	W

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.3.2.3 Alternative 1 — No Action Alternative

4.3.2.3.1 Construction Direct and Indirect Effects

4.3.2.3.1.1 Less than Significant Effects

Potential impacts to fish resources associated with construction projects under Alternative 1 have been analyzed in previous EAs prepared for the SBCTs, stationing of other units at Fort Lewis, and housing (Army 2001a, b; 2004a, b). Previous evaluations of these actions found that they would have minor impacts on fish resources. Construction and renovation projects that are currently underway or planned would add about 75 acres (30 ha) to the total impervious surface area in the cantonment area. Additionally some clearing of vegetation and disturbance of soil would be required.

The potential impacts of construction on fish resources are generally indirect impacts stemming from potential water quality degradation, which are discussed in **Section 4.2**. Sedimentation originating at construction and demolition sites can affect the spawning success of salmonids and other fish species by clogging spawning substrates with fine sediments, making them less suitable for spawning. Sublethal effects to aquatic species may also occur including avoidance behavior, reduced feeding and growth, and physiological stress (Waters 1995). In addition, the siltation of water can indirectly affect some species of fish by impacting their food sources. Siltation may reduce the diversity of aquatic insects and other aquatic invertebrates by filling their microhabitat with sediments (Spence et al. 1996).

Increased impervious surface at construction sites could contribute to overland flow of water into aquatic habitats. The resulting reduced infiltration may decrease the recharge of groundwater, which is a source of water for streams during base flow, and increase peak flow discharge. Fuels, lubricants, and other toxic substances used at construction sites or released at demolition sites can also harm fish if they enter water bodies. Other activities that may result in increased sedimentation and overland flow are training activities that disturb and compact the soil, primarily vehicle maneuver training and mechanical digging.

Nearly all of the construction projects considered under Alternative 1 are located away from substantial water bodies. Construction activities will occur within about 1,000 feet (304 m) of Sequalitchew Lake, but non-developed, vegetated land serves as a buffer between the proposed construction area and lake. Thus, there would be a low potential for aquatic species to be affected by impacts associated with erosion/sedimentation and hazardous spills. Use of stormwater infiltration or detention ponds would help mitigate the impacts of the increased acreage of impervious surface on Fort Lewis.

Effects to fish could occur as a result of the family housing units being constructed on Fort Lewis under BRAC and other previous decisions. The associated increase in on-Post residents would result in an increase in the amount of wastewater requiring treatment at Solo Point WWTP. Therefore, effluent discharge into Puget Sound from the WWTP would increase, although by a small amount, given that the population increases would be small. Habitat for listed fish species in the vicinity of the outfall (bull trout, Chinook salmon, and listed rockfish) could be modified, although it is not expected that effects would be significant. The associated increase in on-Post residents could also result in an increase in recreational fishing by military personnel, which would have a minor effect on fish resources. It is expected that incidences of poaching and violations of harvest regulations would continue to be very low.

4.3.2.3.2 Live-fire Training Direct and Indirect Effects

4.3.2.3.2.1 Less than Significant Effects

Potential impacts to fish resources associated with live-fire training under Alternative 1 have been analyzed in previous EAs prepared for the SBCTs and stationing of other units at Fort Lewis (Army 2001a, b; 2004a, b). Previous evaluations of these actions found that they would have minor impacts on fish resources. Gunnery training may have an indirect impact on fish by causing fires, which have the potential to spread from impact areas to riparian habitats, particularly during the dry season. Fires are only likely to impact fish if vegetation is burned in the buffer zone adjacent to aquatic bodies. Possible impacts to aquatic habitats are sedimentation resulting from the removal of vegetation and organic material in riparian zones, and short-term temperature increases, which can be harmful to fish.

Many of the munitions used by Fort Lewis during training contain explosive constituents and metals that are toxic to fish (Army 2003b). Unexploded ordnance in impact areas may have the potential to leach into and contaminate groundwater resources both on and off the installation. Fort Lewis monitors water quality in wells and springs near the impact areas, but has only detected explosive compounds in concentrations much lower than levels harmful to humans or fish (Anteon Corporation 2003). Accidental spills of oils, lubricants, and other chemicals associated with the upkeep of equipment could contaminate water resources, although these activities would take place at least 164 feet (50 m) from aquatic bodies, and refueling is not allowed within 328 feet (100 m) of water bodies.

4.3.2.3.3 Maneuver Training Direct and Indirect Effects

4.3.2.3.3.1 Less than Significant Effects

Under Alternative 1, there would not be any major changes in the types and amounts of training occurring on Fort Lewis. Therefore, the potential for impacts to fish species would not increase from those identified in previous EAs (Army 2001a, b; 2004a, b). Annual off-road mileage by SBCTs would be approximately 156,000 miles. The current risks to fish from sedimentation, fuel leaks, fire, and the toxic components of munitions would remain near the current levels. Training activities would continue to use ten hardened stream-fording sites and two lake crossing locations. The overall impacts to fish resources would, therefore, be minor. Although there would be risks for contamination of aquatic habitats through sedimentation (or through spills during refueling activities), these risks would be minimized by 164-foot (vehicular traffic) to 328-foot (refueling operations) (50 to 100 m) buffers adjacent to aquatic areas and installation Pollution Prevention and Spill Contingency plans.

On Fort Lewis, Chinook salmon, steelhead, and bull trout are listed as threatened under the ESA. These species occur in Muck Creek and the Nisqually River, and are at risk from activities that

destroy or degrade in-stream or riparian habitat. Therefore, training activities occurring near these water bodies have the highest potential to impact these listed species. A limited amount of training activity would occur near water bodies, as most training activity would occur on prairies and in forests. The Puget Sound adjacent to Fort Lewis is critical habitat for bull trout and Chinook salmon, and is utilized by three listed rockfish species (bocaccio, yelloweye rockfish, and canary rockfish). These species would potentially be affected by amphibious operations at Solo Point, which would continue at current levels under Alternative 1.

Under Alternative 1, impacts to fish would be minor, as Fort Lewis would continue to protect fish resources using aquatic buffers and other measures found in regulations and management plans (such as fire prevention and control, erosion control and wetlands protection, restrictions on timing and length of amphibious exercises at Solo Point, sensitive species management, and aquatic weed management).

4.3.2.4 Alternative 2 — GTA Actions

4.3.2.4.1 Construction Direct and Indirect Effects

4.3.2.4.1.1 Significant but Mitigable to Less than Significant Effects

Under Alternative 2, construction would occur on up to 75 acres (31 ha), predominantly in areas that are already developed or that have already been cleared and/or disturbed in association with firing ranges. Nearly all construction projects would be located away from any substantial water bodies. Some construction would occur within about 1,000 feet (304 m) of Sequalitchew Lake, but non-developed, vegetated land between the proposed construction areas and lake would provide an adequate buffer from impacts. The closest construction site to a water body with a listed fish species is Range 92, which is approximately 1,300 feet (396 meters) south of Muck Creek at its closest point. Muck Creek is used by steelhead trout for spawning and rearing, and is used by Chinook salmon for spawning during high water years.

Construction projects require the use of engineering controls and BMPS, including a SWPPP to minimize the potential for construction-generated runoff and sedimentation. Additionally, an SPCCP would be in place to help prevent and respond to any spills at construction sites. These procedures would help prevent loss of soil and other materials from construction sites, in order to prevent sedimentation and release of pollutants into water bodies. At the Range 92 site, the 1,300 feet between the construction area and the stream, including a riparian buffer along the stream, would help prevent release of materials into Muck Creek. Additionally, the site has very level topography, and runoff from the area into Muck Creek is very unlikely. Thus, minimal effects to fish habitat are anticipated, and the potential for aquatic species to be affected by erosion/sedimentation and hazardous spills would remain low. Under construction requirements, all stormwater on new construction sites must be treated on site either through bioswales or injection wells. Therefore, there would be no increase in overland flow as a result of the increased impervious surface, and effects to fish habitat are not anticipated.

With the increase in military strength under Alternative 2, there would be an increase in the amount of wastewater requiring treatment at the Solo Point WWTP. Additionally, there would be a small increase associated in wastewater associated with the 500 associated Family Members that would live on post (the majority of Family Members accompanying Soldiers would live off-post). Although the WWTP is currently well below its hydraulic design capacity, there is evidence that it is already near its biological oxygen demand (BOD) design capacity, and therefore would not be able to meet the more restrictive permit limits that will be required by the new NPDES permit. Although the reduction in dissolved oxygen associated with the increased effluent from the WWTP would be

unlikely to have significant impacts on aquatic species with secure populations, impacts to listed fish species that occur in the Puget Sound in the vicinity of the WWTP outfall could potentially be significant. Three listed rockfish species that occur in the Puget Sound (bocaccio, yelloweye rockfish, and canary rockfish) are already threatened by low dissolved oxygen in the region. Additionally, critical habitat for both bull trout and Chinook salmon occurs in the area affected by the WWTP outfall. Failure to meet permit-required BOD levels within this critical habitat would constitute a significant adverse effect. However, impacts would be mitigable to less than significant through construction of a new WWTP.

The amount of recreational fishing by military personnel would likely be greater than under Alternative 1. However, it is expected that incidences of illegal fishing and violations of harvest regulations would remain low. Most recreational fishing would continue to occur at American and Sequalitchew Lakes.

4.3.2.4.2 Live-fire Training Direct and Indirect Effects

4.3.2.4.2.1 Less than Significant Effects

The amount of live-fire training at Fort Lewis would be approximately 50 percent greater than under Alternative 1. As discussed in **Section 4.2**, increases in ignition sources resulting from an increase in gunnery training and the heightened risk of leaks or spills during fueling or training would have a less than significant effects on water quality on Fort Lewis. The amount of explosive constituents and metals that are toxic to fish (Army 2003b) would increase under this alternative as compared to current amounts, but explosive compounds should continue to be found in concentrations much lower than levels harmful to humans or fish. Therefore, indirect effects to aquatic species resulting from these factors would be insignificant as well.

4.3.2.4.3 Maneuver Training Direct and Indirect Effects

4.3.2.4.3.1 Less than Significant Effects

Under Alternative 2, annual off-road vehicle mileage would increase to approximately 253,000 miles (a 62 percent increase). As a result, there would be a greater risk of degradation of aquatic habitats by sedimentation, reduced infiltration, and stormwater flow. Additionally, overall vehicle mileage (on and off road) would increase from approximately 2,710,000 to approximately 4,150,000 miles annually (a 53 percent increase), resulting in an increase in the use of designated stream crossings in fish-bearing streams, and an increased risk to fish resources associated with sediments and automotive wastes from vehicles in streams. The greatest risk area would continue to be in 13th Division Prairie, where Muck Creek runs in an area heavily used for maneuver training. Given the increase in training requirements, it would take longer for vegetation and degraded soils to recover after a disturbance than under Alternative 1, so any impacts would last for a longer duration. Even with these increased risks, however, the low erodability of soils, the protection afforded aquatic habitats under Fort Lewis Regulation 200–1, and the 164-foot (50-meter) buffers required adjacent to aquatic bodies would likely prevent significant impacts to aquatic habitats, and any adverse impacts to fish resources would be minor. No barriers to fish migration would be created as a result of training activities by the SBCTs.

Special Status Fish Species. Chinook salmon, steelhead, and bull trout are federally listed species that may utilize the aquatic resources of Fort Lewis and the surrounding area. Additionally, bocaccio, yelloweye rockfish, and canary rockfish are federally listed species that utilize marine habitats in the Puget Sound adjacent to Fort Lewis. Activities most likely to directly impact listed fish involve stream and river fording activities at Muck Creek and the Nisqually River. Maneuvers involving Strykers and other vehicles would occur primarily at vehicle fords hardened with concrete to

minimize the likelihood of salmon loitering in the area and exposing themselves to potential harm. These activities would occur at greater levels than those presently occurring on the installation. A BA and EFH assessment developed in conjunction with this EIS determined that proposed maneuver training would be unlikely to adversely affect listed and proposed fish species or their critical habitat or essential fish habitat (**Appendix F**).

4.3.2.5 Alternative 3 — GTA Actions + CSS Soldiers

4.3.2.5.1 Construction Direct and Indirect Effects

4.3.2.5.1.1 Significant but Mitigable to Less than Significant Effects

Under Alternative 3, proposed construction would impact 60 acres (24 ha) more than would be impacted under Alternative 2, and 135 acres (55 ha) more than under Alternative 1. In addition to construction-related disturbance associated with GTA activities, vegetation would be disturbed and soil would be cleared in Training Area A East, North Fort. This area is not located near any substantial water bodies. Thus, although there would be more construction projects than under Alternatives 1 and 2, the potential for aquatic species to be affected by impacts associated with erosion/sedimentation and hazardous spills would still be low. Use of stormwater infiltration or detention ponds and use of BMPs during construction to prevent sediments from entering the stormwater system would help mitigate the impacts associated with increased impervious surface.

The number of personnel stationed at Fort Lewis would increase by about 2,900 under Alternative 3 as compared to Alternative 1, and would be approximately 1,000 people greater than under Alternative 2. The increase in the population of on-Post Family members would be the same as under Alternative 2 (500 people). The amount of wastewater requiring treatment at the Solo Point WWTP would be greater than under Alternative 2. Similar to Alternative 2, effluent discharges would not meet the limits required under the new permit for BOD, potentially resulting in a significant impact to listed rockfish species and salmonid critical habitat. Impacts would be mitigable to less than significant through construction of a new WWTP.

Although the amount of recreational fishing on Fort Lewis would likely be greater under Alternative 3 than under Alternatives 1 and 2, it is expected that incidents of illegal fishing and violations of harvest regulations would continue to be low.

4.3.2.5.2 Live-fire Training Direct and Indirect Effects

4.3.2.5.2.1 Less than Significant Effects

There would be only a slight increase in ignition sources resulting from an increase in live-fire training compared to Alternative 2, but there would be heightened risk of leaks or spills during fueling or training. Although the risks of spills and leaks would be greater than those Alternatives 1 and 2, impacts on water quality on Fort Lewis would remain less than significant as CSS vehicles would spend little time fording water bodies and refueling operations would occur away from water bodies. Therefore, indirect effects to aquatic species resulting from these factors would be insignificant as well.

4.3.2.5.3 Maneuver Training Direct and Indirect Effects

4.3.2.5.3.1 Less than Significant Effects

Under Alternative 3, annual off-road travel by vehicles would increase to approximately 239,000 miles, and would be associated with a greater risk of aquatic habitat degradation than under Alternatives 1 and 2. If CSS units cross streams during training, there would be an increased risk to

fish resources associated with influx of sediments or automotive wastes. The increased risks under this alternative would be minor, and not much greater than under Alternative 2. The low erodability of soils, aquatic buffers, and other protection measures would be adequate to prevent significant impacts to aquatic habitats, and any adverse impacts to fish resources would be minor. No barriers to fish migration would be created as a result of training activities under this alternative.

Special Status Fish Species. Under Alternative 3, training by CSS units would likely lead to more stream and river fording activities at Fort Lewis than under Alternatives 1 and 2. These maneuvers would continue to occur primarily at vehicle fords hardened with concrete to minimize risks to salmon. A BA and EFH assessment developed in conjunction with the EIS determined that the proposed maneuver training would be unlikely to adversely affect listed or proposed fish species, their critical habitat, or essential fish habitat in the region.

4.3.2.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.3.2.6.1 Construction Direct and Indirect Effects

4.3.2.6.1.1 Significant but Mitigable to Less than Significant Effects

Construction of support facilities and housing associated with the medium CAB would occur under this alternative, resulting in a disturbance of approximately 110 acres (45 ha) in and around GAAF in the cantonment area. This construction would be in addition to construction for GTA and CSS facilities, as discussed under Alternatives 2 and 3. The closest water body to proposed CAB construction areas is approximately 3,000 feet (914 meters) away, with substantial forested and developed areas located in between. Therefore, potential for aquatic species to be affected by impacts associated with erosion/sedimentation and hazardous spills would remain low under this alternative. Use of stormwater infiltration or detention ponds and BMPs during construction to prevent sediments from entering the stormwater system would help mitigate the impacts of the increased acreage of impervious surface on Fort Lewis.

The number of personnel stationed at Fort Lewis would increase by about 5,700 under Alternative 4 compared to Alternative 1, and would be approximately 2,800 people greater than under Alternative 3 and approximately 3,800 people greater than under Alternative 2. The increase in the population of on-Post Family members would be the same as under Alternatives 2 and 3 (500 people). The amount of wastewater requiring treatment would be greater than under Alternatives 1 and 2. Effluent discharges would not meet permit-required limits for BOD, potentially resulting in a significant impact to listed rockfish species and salmonid critical habitat. Impacts would be mitigable to less than significant through construction of a new WWTP.

Recreational fishing attributable to military personnel would potentially increase about 20 percent compared to current levels, which could put pressure on fish populations in more popular fishing lakes including American and Sequalitchew Lakes. These effects would be less than significant.

4.3.2.6.2 Live-fire Training Direct and Indirect Effects

4.3.2.6.2.1 Less than Significant Effects

Under Alternative 4, potential impacts to fish associated with live fire training would be similar to those discussed for the other alternatives but the associated risks would be greatest under this alternative because the amount of live-fire training would be greatest. As discussed in **Section 4.2.6.2.1.1**, effects to surface water quality would be less than significant. Therefore, indirect effects to aquatic species resulting from this type of training would be less than significant as well.

The risk of fire associated with gunnery training would be greatest under this alternative, although it is expected that most fires would originate in the AIA, and would be low-intensity burns in fire-adapted systems. These fires would not be expected to have lasting direct effects on soil and vegetation, or indirectly affect fish or other aquatic resources, and would be insignificant. Current fire management practices would keep impacts associated with fire less than significant.

4.3.2.6.3 Maneuver Training Direct and Indirect Effects

4.3.2.6.3.1 Less than Significant Effects

Under Alternative 4, annual off-road travel by vehicles would increase to approximately 253,000 miles, and would be associated with a greater risk of aquatic habitat degradation (and therefore indirect effects to fish) than under Alternatives 1, 2, and 3. Impacts associated with vehicle maneuver would be similar to those discussed under Alternative 1, but the associated risk would be greater.

Because the medium CAB units would not normally take part in extensive digging exercises, and vehicles would not typically cross water bodies, risks to fish and aquatic habitats associated with these activities would be the same as under Alternative 3. However, there would be some additional risks associated with rotor wash by helicopters.

Overall, the low erodability of soils, spill control plans, aquatic buffers, and other protection measures would be adequate to prevent significant impacts to aquatic habitats, and any adverse impacts to fish resources would be minor.

Special Status Fish Species. Under Alternative 4, training by a medium CAB would potentially result in more risks to special status fish species than under the other alternatives. A BA and EFH developed in conjunction with the EIS determined that the proposed maneuver training under Alternative 4 would be unlikely to adversely affect federally listed or proposed fish species or their habitat (**Appendix F**).

4.3.2.7 Cumulative Effects

4.3.2.7.1 Significant but Mitigable to Less than Significant Effects

Cumulative effects would be less than significant under Alternative 1. Under the other alternatives, increased effluents from the Solo Point WWTP with high BOD would contribute to low oxygen levels in the Puget Sound. This would be cumulative to increased effluent from other WWTPs in the region as a result of off-post population increases under the action alternatives. Nitrogen discharges from WWTPs and other point and nonpoint sources is thought to be the primary cause of low dissolved oxygen levels in the South Puget Sound (EPA 2009a).

Short- and long-term minor adverse cumulative impacts to fish would be expected from past, present, and future actions on Fort Lewis and within the South Puget Sound region. SBCT and GTA unit training have the potential to degrade vegetation and soils and cause sedimentation of streams and rivers, although risks of habitat degradation would be low. Future training by other Army units, including SBCTs, would disturb soils and vegetation and could impact stream quality. Reduced water flows in Murray and Muck creeks in recent years have limited salmonid access to these creeks. Erosion, sedimentation, and pollution associated with construction and training can adversely impact fish habitat. Clearing of pipeline and transmission line rights-of-way, housing renovation and construction, and military training activities conducted by other units on Fort Lewis would cumulatively impact water quality.

Residential and commercial development, road construction, and agricultural practices have impacted water quality and flows within the South Puget Sound region. Since the early 1900s, many wetlands have been drained or diked, and streams have been channelized to promote conversion of these lands to agricultural or other uses. Although laws exist to protect wetlands and streams, loss of these habitats continues in the region.

Although these impacts to fish can be substantial, impacts have been mitigated by aggressive efforts in recent years by the Army, government agencies, Trout Unlimited and other conservation groups, and citizens to protect and enhance fish habitat on and near Fort Lewis. The Army has taken the following steps to support these efforts:

- hardened stream crossings,
- removed invasive vegetation,
- constructed dikes and dams to create open water habitat,
- removed stream sediments and placed gravel in stream channels for spawning habitat,
- replaced deteriorated pipe culverts with box culverts in Muck Creek, and
- used plantings to restore riparian and wetland vegetation in several creeks, including Muck Creek, Murray Creek, Cabin Creek, Clear Creek, and Exeter Springs.

In addition, the Army restricts off-road vehicle activity within 164 feet (50 m) of water bodies. Because of these efforts, the chum, Chinook, and coho salmon escapement, or number of migratory fish, has increased steadily over the years on Fort Lewis.

Off-Post restoration work has been conducted on Sequalitchew Creek, the Nisqually River, and other aquatic bodies in the region. Beaver removal has helped to keep waterways free flowing. Sediment and water retention ponds are routinely constructed in new developments to trap pollutants while allowing stormwater to recharge the groundwater. The Nisqually National Wildlife Refuge is removing dikes and restoring estuarine wetlands at the mouth of the Nisqually River. These wetlands serve as important nursery, feeding, and resting grounds for an abundance of freshwater, estuarine, and marine fish including those that migrate to and from Fort Lewis. Efforts by Fort Lewis and regionally to protect and enhance fish habitat would help to prevent significant cumulative impacts to fish from ongoing and proposed training actions on Fort Lewis and in the region. Implementation of sustainability and regional efforts to protect remaining aquatic habitat would help protect habitat on Fort Lewis and other suitable habitat off the installation for future generations.

4.3.2.7.2 Mitigation

Existing protection measures (BMPs) for water resources would be sufficient for minimizing impacts to aquatic species from the proposed training activities under all alternatives. These ongoing mitigation measures, which are summarized on **Table 4–41**, include crossing rivers/streams only at designated hardened crossing sites, and protective buffers between water bodies and activities such as off-road travel, digging, bivouacking and vehicle assembly, refueling, maintenance, storage of hazardous materials, and use of field kitchens, showers, and latrines.

The analysis of the direct, indirect, and cumulative effects for the four alternatives concludes that with these measures in place the effects of training are less than significant. However, the EIS has indicated that inadequacies with the existing WWTP would potentially lead to significant effects to aquatic resources. The Army is proposing mitigation to compensate for these impacts (**Table 4–42**). Additionally, the Army is proposing further new mitigation for less-than-significant adverse effects to aquatic species and their habitats from proposed training increases.

- Construct a WWTP to mitigate the significant impact of the Proposed Action. The 2010 permit to be issued by EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of BOD and TSS from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels, and with the increased population from implementation of the Proposed Action, will not be able to meet the more restrictive permit limits.
- Increase the environmental staff to address additional program requirements from more intensive use of training lands and increased impacts to natural resources. The requirements include surveying and monitoring of listed and candidate species and monitoring of military activities for their effect on species; management actions to address training impacts, including the increase in infestations of non-native species; and project review and input.
- Repair and maintain maneuver trails on Fort Lewis impacted by significantly increased travel related to maneuver training.
- Conduct additional monitoring of all hardened crossings, and perform any required repairs, such as re-graveling the approaches and extending the hardened approaches to crossings.
- Implement ITAM program maintenance of sustainable training lands. Actions will include rehabilitating vegetation impacted by vehicle maneuvers, bivouac, digging, and other training activities. Conduct increased frequency of soil condition monitoring and reporting.
- Conduct additional noxious weed monitoring and control.
- Conduct increased cleaning of vehicles of noxious weed components from off-post training sites (YTC, etc.) or from deployment prior to returning to Fort Lewis.
- Conduct additional monitoring and recording of the frequency, intensity, and location of wildfires on Fort Lewis, and as necessary, implement additional fire prevention and control measures, including firebreak maintenance, prescribed burning, and fire suppression activities.

4.3.3 Wildlife Resources

During scoping, the public expressed concern about the potential impacts to wildlife from increased hunting pressure, especially on deer and elk; the effects of increased training activities at Fort Lewis on rare species and habitats on the installation; and the potential for increased fire danger resulting from increased live-fire training.

4.3.3.1 Resource-specific Significance Criteria

Impacts to wildlife would be considered significant if Army actions resulted in:

- a substantial, long-term (> 2 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species;
- injury or mortality to common wildlife species, such that species populations would not recover within 2 years;
- a reduction in the population, habitat, or viability of a species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing;
- any loss of critical habitat, or nesting habitat critical to birds under the Migratory Bird Treaty Act, in the project area; or
- mortality to a listed species or species proposed for listing that could result in a “take” under the Endangered Species Act.

4.3.3.2 Overview of Impacts to Wildlife Resources by Alternative

Table 4–8 summarizes the impacts to wildlife resources that would occur under the four alternatives.

Table 4–8 Summary of Potential Effects to Wildlife Resources at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	U	U	U
Cumulative Effects	€	U	U	U

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

In addition to this EIS, a BA has been prepared that addresses federally listed threatened and endangered species, or species proposed for listing, that could be impacted by the action alternatives (**Appendix F**).

Activities most likely to adversely impact wildlife are construction and training. Construction involves the clearing of vegetation from a site, which results in the permanent loss of wildlife habitat. Removal of key habitat features, such as snags, can also impact wildlife. In addition, animals can be directly harmed by construction equipment. Noise associated with construction and demolition can also disturb wildlife, potentially altering behavior and interfering with life requisite activities such as foraging and nesting.

Training activities, such as foot maneuvers and use of vehicles can have both direct and indirect impacts to wildlife. The use of heavy vehicles during off-road maneuver activities can cause injury and mortality to animal species. In addition, disturbance of vegetation through digging and vehicle maneuvers would impact habitat. An increase in non-native plant species as a result of soil disturbances can lead to a long-term structural alteration of wildlife habitat, or reduce the prevalence of native plant species that are important dietary components of certain omnivores and herbivores. Compaction of soil may also affect burrowing animals by collapsing tunnel systems and making it harder to dig new burrows (ENSR 2001). Fires caused by gunnery training can cause mortality to sedentary species (such as butterfly larvae), and can indirectly affect a greater number of species through the loss of vegetative forage and cover. Species that occur in fire-adapted habitats may also benefit from periodic low-intensity fires, which maintain prairie structure and associated wildlife habitat by deterring the encroachment of Scotch broom and Douglas-fir.

Because most of the off-road vehicle maneuvering, digging, and gunnery training on Fort Lewis occurs in open habitats, animal species that dwell in or use prairie habitats would experience the highest risk of impact by Army activities associated with training. Species that utilize oak and pine woodlands could also be affected, as these habitats provide open understories that can be used for training. Although forested habitats on Fort Lewis provide important wildlife habitat, the focus of this analysis will be on those wildlife habitats that are most likely to be impacted by the proposed Army activities—prairies and oak woodlands—and the species found therein.

Special status species that dwell in prairies and oak woodlands and are, therefore, likely to be affected by the proposed Army actions include several butterflies (mardon skipper, Taylor's checkerspot, valley silverspot [also known as zerene frittillary], and Puget blue), Mazama pocket

gopher, streaked horned lark, Oregon vesper sparrow, and western gray squirrel. These species were identified as key components of prairies and oak woodlands in *Key Attributes of South Puget Sound Prairies and Recommendations for Their Management* (ENSR 2001). Therefore, impacts to these species are of particular importance.

4.3.3.3 Alternative 1 — No Action Alternative

4.3.3.3.1 Construction Direct and Indirect Effects

4.3.3.3.1.1 Less than Significant Effects

Impacts to wildlife from construction activities under Alternative 1 were identified in the previous EAs prepared for the SBCTs, stationing of other units at Fort Lewis, and housing (Army 2001a, b; 2004a, b). Previous evaluations of these actions found that they would not have significant effects on wildlife. Although some clearing of vegetation and disturbance of soil would be required, it would be limited to areas in the cantonment area or on training ranges that have already been developed or disturbed. Construction activities would be expected to cause some injury to wildlife (primarily less mobile and burrowing species), but these effects would be minor. Additionally, most construction areas do not provide high-quality habitat, although some urban-dwelling wildlife could be affected.

Wildlife found near construction and demolition sites would be impacted by noise associated with equipment and human activity. However, levels of human activity and noise in the cantonment area are already high, and most wildlife have adapted. Wildlife could also be impacted by fuel spills associated with construction activities and equipment. Because these spills would be cleaned up immediately, impacts to wildlife would be minor.

Under Alternative 1, the number of military personnel on Fort Lewis would remain near the current level of 30,000 for the foreseeable future. However, the on-Post population is expected to increase as a result of new barracks and Family housing construction. This population increase could potentially affect wildlife by increasing the human presence in and around family housing areas and increasing the number of personnel that hunt on Fort Lewis. These impacts would be minor.

Special Status Wildlife Species. Construction projects under Alternative 1 would have a minor effect on special status species. Although construction and associated demolition activities in the cantonment area have the potential to affect bald eagles nesting at American Lake, these activities would not be allowed within 1,310 feet (400 m) of nest sites, per Fort Lewis Regulation 420–5. Demolition of buildings could result in the loss of breeding or roosting habitat for bats, but efforts would be made to determine whether bats were using these buildings, and to remove them, if necessary. Construction-related traffic could lead to collisions with western gray squirrel and streaked horned lark and migratory birds. Forest habitat that could be potentially used by northern spotted owl or marbled murrelet, or coastal habitats that could be used by marine mammals and birds of concern are not among the habitats that would be impacted by construction.

4.3.3.3.2 Live-fire Training Direct and Indirect Effects

4.3.3.3.2.1 Less than Significant Effects

Live-fire training-related fires would continue to occur, with the number of acres burned in a given fire event being highly dependent on weather conditions. Fires would cause some mortality to wildlife, although some animals would be able to flee from fire. More sedentary species, such as prairie butterflies, amphibians and reptiles, small mammals, and the eggs and young of ground-nesting birds, would continue to be at risk for injury or mortality with the increase in wildfires started from training. There would be short-term impacts to prairie habitats as a result of the removal

of cover and forage from fire. However, fire is also an important component in maintaining the dynamic prairie-oak mosaic on Fort Lewis, and inhibits encroachment by Douglas-fir, Scotch broom, and other fire-intolerant species to the benefit of wildlife that uses the prairies (Carey 2001, Ewing 2001).

4.3.3.3.3 Maneuver Training Direct and Indirect Effects

4.3.3.3.3.1 Less than Significant Effects

Current levels of training would continue under Alternative 1. Direct impacts to wildlife in the form of injury and mortality would occur as a result of off-road vehicle movements and digging, with most of these impacts occurring on prairies. Annual off-road mileage by SBCTs under Alternative 1 would be approximately 156,000 miles. Behavioral effects resulting from training-related noises would cause some wildlife to disperse from training areas, and could temporarily limit wildlife access to food, water, and cover. Because training has been ongoing on Fort Lewis for decades, resident species are likely to have adapted to these activities. Therefore, impacts to common wildlife species would be minor. Human disturbances would be more likely to impact migratory birds than resident birds, and training activities could hinder the ability of some individuals to obtain food and other resources. Manci et al. (1988) noted that wildlife are startled by artillery noise, but soon resume normal behavior. However, studies on YTC showed that ravens preferred areas located away from artillery training areas as nest sites (ENSR 1995b).

At present, training activities result in some degradation of wildlife habitat. As discussed in **Section 4.3.1**, prairies and oak woodlands would continue to degrade under Alternative 1, both from current levels of military training and from the influence of other non-military factors, such as forest succession and the natural spread of Scotch broom and other weeds. Given the scarcity of prairie habitat regionally, this degradation represents a moderate loss of habitat for prairie species. Despite efforts by Fort Lewis to maintain prairie and oak woodland habitats, these habitat losses are likely to continue under Alternative 1.

Special Status Wildlife Species. Previous EAs and BAs prepared for the SBCTs and stationing of other units at Fort Lewis (Army 2001a, b; 2004a, b; 2005b, c) stated that species residing in prairies and oak woodlands, including several species of butterfly, Oregon vesper sparrow, streaked horned lark, Mazama pocket gopher, and western gray squirrel, would experience minor to moderate impacts from training activities under Alternative 1. Direct impacts would include injury and mortality to animals from Stryker vehicles and other equipment, loss of eggs and young of ground-nesting species, and destruction of burrows and dens. Indirect impacts would include interference with mating and damage to vegetation and other habitat components used for food and cover. Additional training disturbance would put stress on nesting animals and potentially cause abandonment and nest failure. Prairie butterflies, in particular, would continue to be at highest risk for adverse impacts from training activities, both as a result of physical disturbance (direct impacts, as well as indirect impacts to habitats) and training-induced fire. The Army has identified the highest quality prairies on the installation and implemented programs to minimize the amount of training occurring in these areas, and to restore lands damaged by training. Nonetheless, training-related impacts to special status wildlife species would continue to be moderate under Alternative 1.

Training activities would have few impacts on special status species, such as the bald eagle, northern spotted owl, bats, and herpetofauna that depend on forest and wetland communities. Stryker vehicles use established roads for most training activities in forests, or troops train while on foot. Most forests on Fort Lewis are managed to create late successional habitat, which is preferred by northern spotted owls and bats. The Army creates such habitat primarily through light thinning geared at creating stands of uneven age and size (Foster 2005). Wetlands and other aquatic habitats are designated on

maps to prohibit off-road vehicle travel within 164 feet (50 m) of these areas. Vehicle traffic on roads within wetland buffer areas would continue to cause some mortality of special status herpetofauna species, particularly during spring and fall migration periods. However, breeding habitat would continue to be protected.

Under Alternative 1, ongoing management of wildlife habitat and special status wildlife species would protect these resources to the degree stipulated in regulations, management plans, and any mitigation measures (past and future) committed to by the Army during the NEPA process. Numerous mitigation measures and BMPs have been developed since the 1994 Stationing ROD (Army 1994) to reduce the impacts of military training on wildlife. These measures include programs to prevent fires, control erosion, protect and enhance wetlands, and manage special status species and their habitats. ITAM has ongoing programs to monitor the condition of training lands and to rehabilitate areas damaged by training and other land use activities.

4.3.3.4 Alternative 2 — GTA Actions

4.3.3.4.1 Construction Direct and Indirect Effects

4.3.3.4.1.1 Less than Significant Effects

Proposed construction activities would occur on approximately 75 acres (30 ha) within the cantonment area and on training ranges. Because construction would occur in areas that are already well developed or disturbed for range uses, few wildlife species would be present on or near construction sites. Injury or mortality of predominantly urban-dwelling wildlife could occur, but would be very limited. Nearly all of the sites where new construction would occur do not currently provide high-quality habitat, so removal of any vegetation present on these sites would have limited effects on wildlife habitat, and would not limit the ability of wildlife to use any habitat critical to a species' survival. Wildlife near the construction sites would be exposed to relatively high levels of noise and human activity, but because the urban wildlife in these areas is already adapted to human activity and moderate levels of noise, impacts would be insignificant. In addition, construction-related disturbance would be temporary.

Proposed construction activities at Range 92 in the SSAIA would have the potential to impact Mazama pocket gopher habitat in this area. Although the area is already being used for range activities, proposed construction could have the potential to disturb or destroy burrows and harm animals. The area that would be disturbed by construction represents a small portion of the available pocket gopher habitat in this area, and a small portion of the habitat being used by pocket gophers in this area. It is likely that pocket gophers would move to other suitable areas in the vicinity. Gopher use in this area has been described as patchy and locally dense (Steinberg 1995), and based on observations by Fort Lewis biologists, most use of the range occurs down range, away from the proposed construction site. It is estimated that 20 percent of the available pocket gopher habitat on Range 92 would be lost as a result of construction. Although some localized loss of pocket gopher habitat would occur, and potentially some localized pocket gopher mortality, it is not expected that these losses would result in a trend toward endangerment of the species, or the need for federal listing. Therefore, impacts would not be significant.

The increase in personnel stationed at Fort Lewis under Alternative 2 would result in additional traffic on major roads on Fort Lewis, which could increase the risk of wildlife mortality due to vehicles. Of particular concern is the western gray squirrel, for which automobile traffic has been identified as a factor contributing to the decline of the species. Automobile traffic on East Gate road has been identified as a major threat to squirrels on Fort Lewis because it bisects a heavily used stand of ponderosa pine and is a major road that provides access between the cantonment area and SR 507.

Although use of this road could potentially increase as a result of population increases, it is used for access by less than 10 percent of traffic on Fort Lewis (Transportation Planning and Engineering 2004). Additionally, the Army has installed rope ladders in an area of tree branch connectivity over this road in order to provide squirrels with an alternate means of crossing the road. Therefore, it is not expected that the population increase would have a significant impact on western gray squirrels.

The increase in personnel would also result in an increase in the amount of effluent discharged into the Puget Sound from the Solo Point WWTP. In addition to the aquatic resources discussed in Section **4.3.2**, marine wildlife, including whales, turtles, sea lions, and other species, utilize aquatic habitat in the Puget Sound that could be impacted by WWTP discharge. The biggest concern is BOD, since the WWTP is currently near its BOD design capacity. The reduced dissolved oxygen and other contaminants would impact water quality, particularly in the vicinity of the outfall, but is not expected to have a significant effect on marine wildlife species, including special status specis. Although the outfall area is designated critical habitat for Southern Resident killer whales, the species is seen only occasionally in the South Puget Sound. Other listed marine wildlife species are rarely found in the area.

The increase in personnel could also result in an increase in recreational hunting. However, it is expected that incidents of poaching and violations of harvest regulations would continue to be very low. Most recreational hunting would continue to be associated with waterfowl using wetlands and upland game birds using prairies and forests. No populations of game species are at risk from hunting activities at Fort Lewis.

4.3.3.4.2 Live-fire Training Direct and Indirect Effects

4.3.3.4.2.1 Less than Significant Effects

With the increase in live-fire training under Alternative 2 there would be a greater risk of fire-related injury or mortality to wildlife and degradation of wildlife habitats than under Alternative 1. Range fires could cause mortality to less mobile species (such as butterflies, amphibians, reptiles, small mammals, and ground nesting birds), but most animals would be able to flee from fire. There could also be short-term impacts to prairie habitats as a result of the removal of cover and forage from fire. Additionally, fires in oak or ponderosa pine woodlands could result in a short-term loss of habitat for species that use woodlands, including the western gray squirrel. Periodic fire provides long-term benefits to wildlife species that use open prairies and some woodland habitats. However, in fragmented habitats that support isolated populations of sensitive species (such as prairie butterflies), fire could cause substantial population-level effects, depending on the life stage of the species and the amount of available habitat burned. Overall, it is expected that effects to wildlife from increased gunnery training would be less than significant, given that the resulting increase in fire frequency would likely be minor, and fire management measures would continue to be in place. The risk of a large fire would continue to be highly dependent on weather conditions.

Noise levels associated with live-fire training would not be expected to increase in magnitude under this alternative, although the frequency of loud firing noises would increase. For species that are disturbed by loud noises the frequency of these disturbances would increase. Increased disturbance could potentially interfere with life requisite activities such as mating, nesting, and foraging for food, although many animals that utilize Fort Lewis have habituated to such disturbances, which already are regular occurrences. Additionally, the location of ranges would not change under Alternative 2. Impacts would be less than significant.

4.3.3.4.3 Maneuver Training Direct and Indirect Effects

4.3.3.4.3.1 Significant Effects

More digging would occur under Alternative 2 than under alternative 1 (40 percent increase). Digging activities under Alternative 2 could interfere with or limit the ability of wildlife to use ground burrow systems, and could indirectly affect wildlife by altering habitat structure or reducing native plant species that are important dietary components of certain herbivores. However, species and habitats that would be most adversely affected are unlikely to occur in great numbers in previously disturbed areas. Given that most digging would occur in these areas, effects would not be significant.

Under Alternative 2, annual off-road mileage would increase to approximately 235,000 miles, which would result in a higher risk of injury or mortality to wildlife and degradation of wildlife habitats compared to Alternative 1. Under Alternative 2, the types of effects to wildlife and their habitats from training would be similar to those described for Alternative 1. However, the number of individuals affected and the extent of habitat degradation would increase in proportion to the level of training.

An increase in vehicles would likely result in increased mortality of small mammals on roads. There would also be a greater risk of exposure of small sedentary species, such as ground-nesting birds, to crushing by foot traffic. The increased noise associated with maneuver training, such as vehicle noises, as well as the increased human presence in wildlife habitats, could disturb wildlife, and interfere with activities such as foraging and nesting. Given that the types and locations of such disturbances would be the same as at present, it is not expected that they would result in reductions in wildlife populations on Fort Lewis.

Approximately 15,670 to 23,500 acres (6,341 to 9,510 hectares) of habitat could be affected by maneuver training annually under Alternative 2 (**Section 4.3.1.4**). Assuming equal use of all training lands, it is unlikely that there would be a complete recovery of prairie and oak woodland habitat between disturbance events. In addition, it is expected that the prevalence of non-native species would increase in many of the areas in which maneuver training would take place. Therefore, a substantial, long-term (> 2 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species would likely occur over the long term. These effects to wildlife would be significant.

Special Status Wildlife Species. A BA developed in conjunction with this EIS determined that the proposed actions would be unlikely to adversely affect federally listed threatened and endangered animal species that occur on the installation (**Appendix F**).

Higher levels of training would have less-than-significant impact on species, including marbled murrelets, bats, herpetofauna and marine-dwelling species, that favor forestland, wetland, and coastal habitats. In forested areas, most Stryker vehicle travel would occur on MIL-CLASS 4 and 5 roads, and throughout the installation off-road vehicle travel would not be allowed within 164 feet (50 meters) of wetlands. Increased mileage on roads would likely result in increased mortality to wildlife, including herpetofauna during migration periods. However, since the breeding habitat of these species would continue to be protected, and the level of mortality is not expected to result in a trend toward endangerment or the need for listing, these effects would not be significant. SBCT training is unlikely to occur at Solo Point, and so should not impact listed or sensitive marine species.

Proposed training activities could cause the injury and loss of migratory and other birds, but would not result in significant adverse effects on bird populations. Training activities would comply with the USFWS rule (as directed by Section 315 of the National Defense Authorization Act of FY 2003) that authorizes such take, with limitations, that result from military readiness activities of the Armed Forces (50 CFR Part 21).

Non-listed special status species that occur on prairie and oak woodland habitats on the installation (e.g., Mazama pocket gopher, prairie butterflies, streaked horned lark, western gray squirrel, Pacific Townsend's big-eared bat) would experience some increase in disturbance as a result of training increases, as well as increased opportunities for mortality caused by vehicles or fires. Effects to these species are discussed in more detail below.

Prairie Butterflies. All forms of human disturbance on prairies can cause direct mortality to special status butterfly species on Fort Lewis prairies, which are non-migratory, sedentary species (ENSR 2001). The prairies on Fort Lewis support populations of several special status butterfly species, including the Mardon skipper and Taylor's checkerspot, both of which are candidates for federal listing. Fort Lewis contains the largest colony of Taylor's checkerspot in Washington, but colonies of this species have been extirpated at several locations on Fort Lewis where they once occurred (Wolford et al. 2008). In addition, numbers of Taylor's checkerspots observed at the location of the large colony on Fort Lewis in 2007 were only half the numbers seen during 2006. The Mardon skipper is found in only four counties in Washington. These butterfly species are non-migratory and typically associated with high-quality prairie habitat. Threats to these butterfly species include loss and fragmentation of high-quality prairie habitat and human disturbance.

Butterflies could potentially be affected by increased off-road maneuver training, as well as increased cross-country maneuvers by foot Soldiers, under Alternative 2. These activities have the potential to cause butterfly mortality, particularly during sedentary life stages, through crushing and other physical contact. Additionally, off-road vehicle travel can damage host plants or contribute to the spread of invasive species that potentially outcompete these host plants. Some protection from off-road vehicle maneuvers would continue to be provided in high-quality prairie areas known to support butterfly populations that are Seibert staked to protect them from vehicle maneuvers. However, not all butterfly populations are protected in this fashion. Additionally, no populations would be protected from fire-related effects, which could potentially include localized extirpation in the event of a large fire. Additionally, the observed decline in some butterfly populations on the installation suggests that more aggressive measures may be needed to protect these populations. Therefore, it is assumed that significant impacts to prairie butterflies could potentially occur under Alternative 2.

Streaked Horned Lark. Streaked horned larks favor bare ground or short, open prairie vegetation, often in areas with some amount of ground disturbance. Although streaked horned larks do breed in areas of military training, human disturbance likely affects the success of these birds. Eggs and young in nests are most susceptible to injury or mortality by vehicle maneuvers and fire, risks that would increase with higher levels of training. From 2002 to 2004, most nests were found near GAAF, but nests were also found in 13th Division Prairie, and a nest was found in the AIA. Nest success was highest near GAAF and lowest in the AIA (Pearson and Hopey 2005), suggesting that military activities may adversely impact streaked horned lark nest success. Therefore increased maneuver training under this alternative would potentially affect streaked horned lark populations on Fort Lewis by reducing nest success and increasing the risk that vehicles would injure birds or harm their nests. Disturbance such as fire and maneuver training outside of the nesting period, however, can be beneficial to the species by maintaining low growing vegetation and creating open spaces and exposed gravelly areas.

Mazama Pocket Gopher. The increase in maneuver training could potentially impact pocket gopher populations on the installation, primarily through compaction of soil and digging, although mortality due to vehicles could also occur. Pocket gophers tend to avoid areas with compacted soil, as compaction collapses existing tunnel systems and interferes with the ability of gophers to dig burrows; although it is not known what effect, if any, soil compaction from vehicles driving over pocket gopher habitat has on their populations (Fort Lewis Directorate of Public Works 2006b). Surveys of gophers on the 13th Division Prairie and TA 6 in 1993 and 1994 showed that gophers were absent in areas heavily disturbed by vehicles, although there have been no studies documenting the effects of heavy vehicles on pocket gopher populations (Steinberg 1995). The population most at risk from maneuver training is the population in TA 18, because this area is heavily used for training activities with the potential to disturb and compact soil. These activities would increase under Alternative 2, with more frequent use of all training areas where pocket gophers occur.

Western Gray Squirrel. Increased driving on and off road under this alternative would potentially increase the risk (and incidence) of squirrel mortality on roads throughout the installation and in training areas. Maneuver training activities that occur within western gray squirrel habitat on Fort Lewis include vehicle and foot maneuvers, bivouacking, and military encampments and staging areas. These activities would increase from current levels under Alternative 2, and could potentially result in western gray squirrel mortality, as well as disturbance during critical reproductive or foraging periods. Maneuver training can also result in soil compaction and other disturbances that inhibit the growth of fungi, which are an important food source. Additionally, it is expected that there would be more traffic on all roads on Fort Lewis under this alternative, which would increase the chances that western gray squirrels would be hit by vehicles, particularly where roads bisect habitat utilized by the species. It is hard to estimate whether, or to what degree, mortality of gray squirrels due to vehicles would increase as a result of increased driving on (and off) installation roads, but even a few additional traffic-related deaths per year could constitute a significant impact to the Fort Lewis population of this species.

These candidate species and other special status wildlife would be at increased risk for injury, mortality, and disturbance under Alternative 2, associated with increased levels of maneuver training. However, most of these species would receive some protection from these activities in certain areas by existing Seibert staking. Vehicles are instructed to avoid Seibert-staked areas, although some unauthorized entry into these areas by both military and civilian vehicles does occur. Prairies in the AIA are protected from off-road maneuvers for safety reasons, although wildlife in these areas may be affected by explosive munitions and fires. Overall degradation of prairie quality associated with increased levels of training could also potentially reduce the population, habitat, or viability of sensitive prairie species, which could result in a trend toward endangerment or the need for federal listing, and would therefore be a significant effect.

4.3.3.5 Alternative 3 — GTA Actions + CSS Soldiers

4.3.3.5.1 Construction Direct and Indirect Effects

4.3.3.5.1.1 Less than Significant Effects

Under Alternative 3, the potential for wildlife disturbance and mortality, and loss of habitat would be greater than under Alternative 2 because a larger area would be impacted by construction. In addition to the effects associated with construction in the cantonment area and ranges discussed under Alternative 2, this alternative would entail construction of CSS facilities on approximately 60 acres (24 ha) of potential wildlife habitat adjacent to existing developed areas in the North Fort. As discussed in Section **4.3.1.5.1.1**, the construction area is comprised almost entirely of Oregon white oak, Scotch broom, and non-native grasses. The area has been used intensively for training and has

burned in the last 10 years. Because of its degraded condition and its location adjacent to developed areas, it provides limited wildlife, although the oaks do provide habitat components utilized by a wide range of species. Additionally, the three oak clusters that have been identified in this area are considered Priority Habitats by the WDFW. In order to retain these valuable habitat components, the facilities would be designed to retain the oak clusters and as many individual oaks as possible. However, development in the area would reduce the suitability of this area for wildlife, and would eliminate the potential for restoration of this area to provide high quality wildlife habitat in the future. There is no documented use of this area by western gray squirrels, and the degraded habitat is not likely to provide suitable habitat for western gray squirrels in its current condition. Construction activities would eliminate the potential for this area to provide suitable habitat for the species in the future.

Wildlife could be disturbed by construction noise, but these effects would be temporary. Over the long term, increased noise and other disturbances to wildlife in the area would be more prevalent than at present, given the change to urban use. However, other types of disturbances would be reduced, as the area would no longer support military training. Overall, effects to wildlife from proposed construction would be less than significant under this alternative, based on the significance criteria presented in Section **4.3.3.1**.

Given the proposed increase in personnel stationed at Fort Lewis under Alternative 3, there would be more discharge from the Solo Point WWTP and likely more recreational hunting by military personnel and Family members than under Alternatives 1 and 2. Water quality impacts associated with WWTP effluent would have localized impacts, but would not be expected to significantly impact marine wildlife that might be found in the area. Additionally, it is expected that incidents of poaching and violations of harvest regulations would remain very low. No populations of game species are at risk from hunting activities at Fort Lewis.

The risk of wildlife-vehicle collisions, including potential collisions with western gray squirrels on East Gate road, would be slightly greater than under Alternative 2 with the additional population increases associated with the CSS. Although associated wildlife mortality could be slightly greater than under Alternative 2, it is not expected that effects would be significant.

4.3.3.5.2 Live-fire Training Direct and Indirect Effects

4.3.3.5.2.1 Less than Significant Effects

There would be a small increase in gunnery training (or potential for fire ignition sources) under this alternative compared to Alternative 2. Consequently, the effects would be very similar to those for Alternative 2.

4.3.3.5.3 Maneuver Training Direct and Indirect Effects

4.3.3.5.3.1 Significant Effects

Digging activities, and their impacts on wildlife, would also be similar to those under Alternative 2.

Off-road travel by CSS vehicles, in addition to off-road miles by Strykers and their support vehicles would result in a higher risk of injury or mortality to wildlife and degradation of wildlife habitats compared to Alternative 1. Annual off-road mileage would increase to approximately 239,000 miles. Increased driving would likely result in increased mortality of small mammals on roads. There would also be a greater risk of exposure of small sedentary species, such as ground-nesting birds, to crushing by foot traffic.

Approximately 15,935 to 23,900 acres (6,450 to 9,670 ha) of habitat could be affected by maneuver training annually under Alternative 3 (**Section 4.3.1)**. As discussed for Alternative 2, a substantial, long-term (> 2 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species would likely occur over the long term. These effects to wildlife would be significant and greater than under Alternative 2, but would be mitigated to less than significant (**Section 4.3.3.8**).

Special Status Wildlife Species. A BA developed in conjunction with this EIS determined that the proposed actions would be unlikely to adversely affect federally listed animal species that occur on the installation (**Appendix F**). Additionally, effects to other sensitive species that do not inhabit prairies or oak woodlands (such as bald eagles, marbled murrelets, bats, migratory birds, and marine species) would be minimal. The risk for vehicle mortality to herpetofauna crossing roads within wetland buffers would likely be greater under this alternative than under Alternative 2, although breeding habitat would continue to be protected and the amount of mortality is not expected to result in a trend toward endangerment or a need for listing.

Non-listed special status species that occur in prairie and oak woodland habitats on the installation would experience an increase in disturbance as a result of training increases. The effects to these species would be similar to those discussed under Alternative 2, but would likely be of greater magnitude. A reduction in the population, habitat, or viability of a species of concern or sensitive species (e.g., Mardon skipper, Taylor's checkerspot, Mazama pocket gopher, streaked horned lark, western gray squirrel, Pacific Townsend's big-eared bat) is possible and could result in a trend toward endangerment or the need for federal listing. Species at the greatest risk for mortality, disturbance, and habitat loss would be prairie butterflies, streaked horned larks, and Mazama pocket gophers. Effects to these sensitive species could potentially be significant.

4.3.3.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.3.3.6.1 Construction Direct and Indirect Effects

4.3.3.6.1.1 Less than Significant Effects

Construction of support facilities and housing would entail disturbance of 110 acres (45 ha) more than under Alternative 3, 170 acres (68 ha) more than under Alternative 2, and 245 acres (99 ha) more than under Alternative 1. The areas identified for construction of medium CAB facilities are on or near GAAF within the main cantonment area, in areas that have been developed and disturbed in the past. Some urban-dwelling wildlife would likely be affected, and the risk of mortality to urban-dwelling wildlife would be greatest under this alternative, compared to the other alternatives. However, since the construction sites do not currently provide high-quality habitat, removal of vegetation present in these areas would have limited effects on wildlife habitat, and would not constitute a significant effect. All other effects associated with construction would be the same as those under Alternative 3.

This population increase under Alternative 4 would have a minor impact on wildlife resources, as discharges from the WWTP into the Puget Sound would be greater than under the other alternatives. Although localized impacts to water quality would occur, particularly from BOD, significant impacts to marine wildlife are not expected. Recreational hunting attributable to military personnel would potentially be 20 percent greater than under Alternative 1. Very little hunting by Family members occurs on Fort Lewis, so the increase in hunting associated with the increase in the population of Family members would be very low. The increase in hunting could put pressure on game populations on the installation, although it is expected that effects would remain less than significant. No populations of game species are at risk from hunting activities at Fort Lewis.

4.3.3.6.2 Live-fire Training Direct and Indirect Effects

4.3.3.6.2.1 Less than Significant Effects

Given the addition of gunnery training activities by the medium CAB under Alternative 4, the frequency of loud firing noises, the risk of fire and the number of range fires annually would be greatest under this alternative. Therefore, risks of mortality to less mobile species and short-term impacts to prairie and woodland habitat also would be greatest under this alternative. While fragmented populations of prairie butterflies would be particularly vulnerable to fire, the long-term effects to other prairie species could be beneficial because fire would continue to help maintain open grassland habitats on Fort Lewis. Fire management measures would continue to minimize the risk of a large, damaging fire and associated impacts to habitats not regularly exposed to fire. Overall impacts to wildlife would remain less than significant.

Gunnery activities would produce short, loud blasts that could startle nearby wildlife, temporarily interfering with their activities. Because most wildlife on the installation have habituated to occasional loud noises at ranges and impact areas, an increase in the frequency of these loud noises would not be expected to have significant effects on any wildlife populations on the installation.

4.3.3.6.3 Maneuver Training Direct and Indirect Effects

Under Alternative 4, the types of effects to wildlife and their habitats from maneuver training would be similar to those described for Alternatives 2 and 3. However, the number of individuals affected and the extent of habitat degradation would be greatest under this alternative.

4.3.3.6.3.1 Significant Effects

Additional disturbance to wildlife under this alternative would be associated with helicopter training, including takeoffs and landings, and low-level and nap-of-the-earth training flights.

Helicopter noise would be more frequent than under the other alternatives, and the size of the area experiencing the loudest decibel levels would increase. The loud noise and wind disturbance associated with helicopters would result in a greater incidence of distractions to wildlife than under the other alternatives, and could cause some animals to flee the area. Although many animals would be able to resume normal activities after the disturbance ceased, some interference with life requisite activities and long-term behavioral modification could occur. It is possible that some wildlife would begin to avoid areas frequently used by helicopters. The species most susceptible to noise disturbance would be sensitive species such as the bald eagle. Noise associated with helicopters would not be expected to have a significant impact on species with secure populations on Fort Lewis and/or in the region.

More animals are expected to be hit or crushed by vehicles on roads and in ranges, and more birds hit by helicopters, than under the other alternatives. However, population-level effects should not occur, and overall effects to wildlife would be less than significant.

Additional off-road travel under Alternative 4 would result in a higher risk of impacts to wildlife habitat compared to Alternatives 1, 2, and 3. Annual off-road mileage would increase to approximately 253,000 miles. Approximately 16,870 to 25,300 acres (6,827 to 10,238 ha) of habitat could be affected by maneuver training annually under Alternative 4 (**Section 4.3.1**).

Special Status Wildlife Species. A BA developed in conjunction with this EIS determined that the proposed actions would be unlikely to adversely affect federally listed animal species that occur on the installation (**Appendix F**). Although increased helicopter traffic would cause increased foraging

disruption and avoidance behavior to nesting bald eagles, existing buffer zones around nests and other conservation measures would minimize the risk of significant impacts. Low-flying aircraft could potentially increase avoidance behavior and disruptions in feeding that would potentially affect wintering bald eagles on the Nisqually River. However, Fort Lewis Regulation 420–5 includes height restrictions on aircraft activity along portions the Nisqually River during the primary foraging period (December 1 to March 31). This regulation would prevent significant impacts to foraging eagles from helicopter activity.

Higher levels of training would have a minor impact on species, including bald eagles, marbled murrelets, bats, and marine-dwelling species favoring forestland, wetland, and coastal habitats. Most SBCT, CSS, and medium CAB vehicle travel would be limited to MIL-CLASS 4 and 5 roads in forested areas, and vehicle travel would not be allowed off-road within 164 feet (50 m) of wetlands. SBCT, CSS, and medium CAB training would be unlikely to occur at Solo Point and so should not impact listed or sensitive marine mammal species. The risk for vehicle mortality to herpetofauna crossing roads within wetland buffers could potentially be greater under this alternative than under Alternatives 2 and 3, given the increased total mileage on roads. However, breeding habitat would continue to be protected and the amount of mortality is not expected to result in a trend toward endangerment or a need for listing.

Proposed training activities could cause the injury and loss of migratory and other birds, but would not result in significant adverse effects on bird populations. Training activities would comply with the USFWS rule (as directed by Section 315 of the National Defense Authorization Act of FY 2003) that authorizes such take, with limitations, that result from military readiness activities of the Armed Forces (50 CFR Part 21).

Non-listed special status species that occur in prairies and oak woodlands on the installation would be exposed to the greatest level of disturbance, risk of mortality, and loss/degradation of habitat under Alternative 4. These species include prairie butterflies, streaked horned larks, and Mazama pocket gopher, western gray squirrel, and Pacific Townsend's big-eared bat. In particular, increased use of prairie habitats by vehicles, along with helicopter training, could result in increased risks of mortality to prairie butterflies, especially during life stages when they are sedentary. The effects to these species would be similar to those discussed under Alternative 2, but would likely be of greater magnitude. Effects to sensitive species could potentially be significant.

Aircraft activity by the medium CAB could contribute to increased disturbance of streaked horned larks, which nest near GAAF and in other areas with low grasses that are suitable for helicopter landing. Aircraft activity can be especially disrupting to birds, often causing them to take flight at the approach of the aircraft. The streaked horned lark population that nests at GAAF would likely be disturbed by the increase in helicopter take offs and landings. However, streaked horned larks appear to nest successfully at airports, as the sites with the highest nesting populations in Washington are at airports (Stinson 2005). Mortality of streaked horned larks as a result of collisions with aircraft would likely increase under this alternative, although it is not known whether aircraft collisions are an important source of streaked horned lark mortality on Fort Lewis. A dead lark that was likely struck by an aircraft was found at GAAF a few years ago, but there are no other recorded observations of lark-aircraft collisions (Clouse 2010).

There is little available information on the potential effects of aircraft noise on butterflies. The EPA (1980) and Manci et al. (1988) briefly discuss the effects of noise on insects in their literature reviews. The findings of these reviews suggest that insects have differing responses to noise, which varies based on the frequency of the noise and the duration of the exposure. Effects observed ranged from flying or freezing (cessation of movement) responses. Therefore, it is possible that increased

helicopter flights could increase the occurrence of temporary behavioral changes in prairie butterfly species, which could potentially make them more susceptible to other sources of mortality. Helicopters would primarily conduct landings and takeoffs only at GAAF, which is not located near any sensitive butterfly populations. Wind (rotor wash) from helicopters could potentially affect butterflies during nap-of-the-earth flights, which are typically 10 to 50 feet (3 to 15 meters) above the ground level. It is likely that helicopters flying close to the ground over butterfly habitats could interfere with movements of adult butterflies, and could potentially dislodge eggs or larvae from host plants. These activities could have significant adverse impacts on sensitive butterflies, depending on timing of the disturbance.

4.3.3.7 Cumulative Effects

4.3.3.7.1 Significant Effects

Cumulative effects would be less than significant under Alternative 1. Past and present military training activities contribute to wildlife injury and mortality, as well as loss of habitat. Noise and disturbance associated with military training and other activities have caused some wildlife to avoid training areas for varying time periods. Although noise associated with military training has decreased in recent years as SBCTs and other units have been deployed overseas, noise levels on Fort Lewis in the future could meet or exceed peak levels. Army programs to protect and enhance wildlife habitat, as well as regional efforts by various groups have helped to protect the remaining wildlife populations and habitat in the region.

Cumulative effects for Alternatives 2, 3, and 4 would be significant. Past and present military training activities have resulted, and continue to result, in mortality and injury to wildlife and loss of habitat. Noise and disturbance associated with military training and other activities has caused some wildlife to avoid training areas for varying periods. Increased training as a result of actions under the GTA initiative, as well as future stationing actions, would add to the noise and disturbance on Fort Lewis, and would result in additional mortality and injury to wildlife in training areas. Although most loud noises have only short-term impacts on wildlife behavior, and wildlife habituate to noise, the Army must ensure that noise-generating activities do not significantly impact wildlife populations, especially sensitive species.

Mostly urbanized habitat would be lost due to construction under the action alternatives, the proposed construction would be cumulative to other planned construction (including construction projects identified under the No Action Alternative in Chapter 2), as well as past and likely future construction. Past construction has contributed to the regional loss and fragmentation of wildlife habitats, but current and future effects are/would be largely confined to the same general developed and disturbed areas and overall wildlife connectivity on the installation should continue to be preserved. Training activities by SBCTs and other units on Fort Lewis have the potential to degrade prairies and other habitats on the installation. Past disturbances have favored the growth of non-native species to the detriment of native species. Although the formation of prairies on Fort Lewis may, in part, reflect past burning activities by Native Americans, subsequent controls on burning have encouraged the reforestation of the prairies, and colonization by Scotch broom, to the detriment of prairie vegetation and wildlife. Clearing of vegetation for rights-of-way would create early successional habitat that would need to be maintained at low heights. Construction of military housing would permanently remove wildlife habitat including oak woodlands.

Off Post, an increase in the population will lead to more development, loss of and injury to wildlife, and loss of habitat. Throughout much of the region, habitat fragmentation continues as a result of development, leaving Fort Lewis as one of the few remaining sites of large contiguous tracts of habitat. With the exception of a few large tracts of land that remain intact (e.g., commercial

forestlands, refuges), wildlife habitat in much of the remaining portions of the South Puget Sound region is found in fragmented patches not conducive to the welfare of species, such as pileated woodpecker, deer, and bear, that require this type of habitat. Although wildlife connectivity has been impacted on a regional scale, with very few grasslands and mature forested habitats remaining, ongoing use of the natural habitats on Fort Lewis for training will continue to provide important habitat components, including regional wildlife connectivity for some species.

For several decades, the Army has undertaken programs to protect and enhance wildlife habitat on the installation to offset impacts and to comply with federal and state laws and programs. Some of the highest quality prairies and oak woodlands on Fort Lewis have been Seibert staked, and wetlands have been made off-limits to off-road vehicles, as have many areas on the installation that are used by threatened species. Projects have been implemented or are underway to improve prairie, oak woodland, and wetland habitats. Forest habitats are being managed to promote old-growth characteristics important to northern spotted owl, bats, woodpeckers, and other wildlife. Damaged training lands are revegetated, and invasive vegetation is removed. Most importantly, the contiguous habitat that occupies Fort Lewis training lands and impact areas has remained undeveloped, and it appears that it will continue to be for the foreseeable future. As an indication of the success of these efforts, bald eagle numbers have increased steadily on Fort Lewis during the past decade, and gopher, butterfly, and western gray squirrel populations at most peril from a regional standpoint are still found on Fort Lewis. Similar efforts to mitigate impacts to wildlife have occurred off Post, but successes have often been less notable, as development pressures are much greater off the installation. Fort Lewis, through its involvement in the ACUB program, is underwriting research, monitoring, and reintroduction of the four federal candidate species that occur at off-Post prairie preserves managed by the WDNR, WDFW, and Thurston County.

4.3.3.8 Mitigation

4.3.3.8.1 Ongoing Mitigation

As summarized on **Table 4–41**, the Army currently implements numerous management activities and other resource protection strategies to minimize impacts to wildlife on Fort Lewis, including prairie candidates and other species. These activities would continue to occur, regardless of the EIS alternative selected. These ongoing activities would help to mitigate for some of the impacts associated with the proposed activities under Alternatives 2 through 4. A list of some of the ongoing measures that would help mitigate for impacts to wildlife, including special status species is presented below. Proposed new mitigation is presented in **Section 4.3.3.8.2**.

- Continue to implement management practices in line with goals and objectives identified in the ITAM program. These measures include, but are not limited to: deterring vehicle traffic from new trails and recently established roads; repairing (reseeding) maneuver damaged areas; use of existing hardened crossings in areas of riparian and wetland soils; and use of land condition maps when planning training that may impact soils or vegetation.
- Continue to implement the ITAM program of maintaining sustainable training lands. Actions will include rehabilitating vegetation impacted by wildfires, vehicle maneuvers, and other training activities, and conducting increased soil condition monitoring frequency and reporting.
- Continue to balance training area use with area rotation schedules in accordance with ITAM goals for sustainable training lands.
- Continue to follow resource protection measures required by Fort Lewis Regulation 200–1 during field training (see **Table 4–41** for a complete list).

- Continue procedures for educating land users in minimizing adverse impacts to training land as part of the ITAM Environmental Awareness program.
- Continue to concentrate the most intense forms of training in the most degraded areas to minimize impacts to higher quality prairies.
- Continue to implement the requirements of Fort Lewis Regulation 420–5, such as: limiting certain disturbing activities within bald eagle nest buffers; prohibiting off-road maneuver and ground-disturbing activities in Johnson and Weir prairies, and limiting these activities on the 91st Division Prairie; and restricting mowing at GAAF and recreational activity in TA 14 during the streaked horned lark nesting season.

Additionally, Endangered Species Management Plans for listed and candidate species include monitoring programs, habitat restoration programs, and invasive species removal activities that target habitats utilized by sensitive species. Fort Lewis also participates in the ACUB program, which entails funding mitigation at off-site locations to compensate for impacts on post. However, since this program is relatively new, the Army is currently testing the value of this approach to mitigation before making a decision to increase its level of participation. Fort Lewis is also working on developing a Candidate Conservation Agreement with the USFWS and several state and local government agencies to address the conservation needs of the prairie candidate species that occur on Fort Lewis.

4.3.3.8.2 Proposed New Mitigation

No mitigation measures would be required to address impacts from Alternative 1 on wildlife.

Despite ongoing protection measures, significant impacts that could potentially occur under Alternatives 2, 3, and 4 include: a substantial, long-term (> 2 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species; and a reduction in the population, habitat, or viability of a species of concern or sensitive species (Mardon skipper, Taylor's checkerspot, Western gray squirrel, Mazama pocket gopher, streaked horned lark) that would result in a trend toward endangerment or the need for federal listing. Since many potential impacts to wildlife are associated with loss or degradation of native habitats, mitigation for vegetation should also help to mitigate effects to wildlife. The following mitigation measures are proposed for implementation under Alternatives 2, 3, and 4 to reduce the impacts of Army actions on wildlife:

- Implement ITAM program maintenance of sustainable training lands. Actions will include rehabilitating vegetation impacted by vehicle maneuvers, bivouac, digging, and other training activities. Conduct increased frequency of soil condition monitoring and reporting.
- Construct a new WWTP.
- Increase the environmental staff to address additional program requirements from more intensive use of training lands and increased impacts to natural resources. The requirements include surveying and monitoring of listed and candidate species and monitoring of military activities for their effect on species; management actions to address training impacts, including the increase in infestations of non-native species; and project review and input.
- Conduct increased cleaning of vehicles of noxious weed components from off-Post training sites (YTC, etc.) or from deployment prior to returning to Fort Lewis.
- Create and maintain suitable habitat for candidate species on Fort Lewis (Mardon skipper, Taylor's checkerspot, streaked horned lark, and Mazama pocket gopher). Actions will include site preparation, planting of native vegetation, and maintenance of habitat vegetation.

- Develop and maintain habitat and protective buffers for all identified streaked horned lark nesting colonies, and restrict low level hovering by aircraft near nesting colonies and in buffer areas during the nesting period. (The exceptions to this mitigation are any nesting colonies identified at GAAF. Suitable habitat for these colonies will be developed downrange). Incorporate the protective measures into the INRMP and Fort Lewis Regulation 420–5.
- Enhance adjacent habitat and conduct translocation of pocket gophers from disturbed habitat on an as-needed basis to mitigate for loss of habitat due to range construction projects.
- In coordination with the USFWS, develop and implement additional protective measures for prairie candidate species in the Range 74/76 area. Measures will include improvement of roads designated for maneuver, revegetation of roads that will no longer be used, and placement of signs or Seibert stakes. Incorporate the measures into the INRMP. Prepare a Fort Lewis Policy Statement listing the protective measures that will then be incorporated into the next revision of Fort Lewis Regulation 420–5.
- Install aerial rope bridges at key road crossing points and reduce vehicle speed limits for western gray squirrels within high squirrel population areas.
- In partnership with WDFW, relocate western gray squirrels from eastern Washington to the "squirrel triangle" in the area of TAs 9, 10, and 12.
- Conduct additional monitoring and recording of the frequency, intensity, and location of wildfires on Fort Lewis, and as necessary, implement additional fire prevention and control measures, including firebreak maintenance, prescribed burning, and fire suppression activities.
- Maintain a minimum of 2,000 feet above ground level (AGL) when flying aircraft over the Nisqually National Wildlife Refuge.

4.3.3.9 Other Disclosures

4.3.3.9.1 Migratory Birds

There would be minor impacts to migratory birds from action alternatives. Direct impacts would occur if birds were harmed by Stryker vehicles or munitions during training. Indirect impacts would occur from training-related disturbance and noise and from loss of habitat. Species using prairies would be most affected, while impacts to species using forests and wetlands should be minor. Many grassland migratory bird species (such as the streaked horned lark, Oregon vesper sparrow, and western meadowlark) nest on the ground and are therefore susceptible to injury or mortality, or reduced reproductive success, as a result of maneuver training and other activities in grassland habitats. The Army conducts ongoing activities to benefit migratory species, including habitat enhancement and nest box installation.

Proposed activities could cause the injury and loss of migratory birds, but would not result in significant adverse effects on bird populations. The proposed activities would comply with the USFWS rule (as directed by Section 315 of the National Defense Authorization Act for FY 2003) that authorizes take of migratory birds, with limitations, that result from military readiness activities of the Armed Forces (50 CFR Part 21). The mitigation measures for vegetation and wildlife presented in **Sections 4.3.1.8** and **4.3.3.8** would help to minimize effects to these species. This mitigation includes measures specific to the streaked horned lark, a Candidate for federal listing. Because a significant adverse effect on a population of a migratory bird species is not likely under the action alternatives, additional conservation measures to minimize or mitigate adverse effects are not required.

4.4 WETLANDS

Impacts to wetlands were assessed by evaluating the potential effects of project construction and operations activities on wetlands directly. The evaluation also considered the indirect effects of project activities on soils and water resources.

4.4.1 Resource-specific Significance Criteria

The significance of wetlands effects was determined using the following considerations:

- Non-compliance with policies and regulations related to wetlands conservation and protection (including EO 11990, Protection of Wetlands and Section 404 of the Clean Water Act), and
- Percentage losses in size and functions of local and regional wetland resources

4.4.2 Overview of Impacts to Wetlands by Alternative

Table 4–9 summarizes the impacts associated with wetlands that would occur. Less than significant effects are expected from construction, live-fire training, and maneuver training. Cumulative effects also would be less than significant.

Table 4–9 Summary of Potential Effects to Wetlands at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.4.3 Alternative 1 — No Action Alternative

4.4.3.1 Construction Direct and Indirect Effects

4.4.3.1.1 Less than Significant Effects

Construction-related ground-disturbing activities can adversely affect wetlands in several ways. They can directly affect wetlands through direct disturbance. Indirectly, they can cause sedimentation of wetlands by disturbing soils and exposing them to wind and water, reduced infiltration, and increased runoff.

Implementation of Alternative 1 would disturb wetlands directly and indirectly during construction. These disturbances would result from upgrading the Access Control Point Madigan Gate and the connected road. The road to Madigan Gate crosses Murry Creek, which supports wetlands along its banks. Indirectly, the disturbances associated with this construction also could introduce fugitive dust and sediment into the adjoining wetlands, temporarily affecting them.

The application of standard BMPs would minimize the potential effects of this construction on wetlands. Placing silt fences to trap sediment and minimizing the use of equipment in the wetlands and within the 160-foot (50-m) buffer would limit adverse effects. With the effective use of BMPs to

mitigate disturbance (**Table 4–41**), impacts to this wetland would be less than significant because Fort Lewis would be in compliance with wetlands policies and regulations and would not lead to any loss in size or function of wetland resources.

4.4.3.2 Live-fire Training Direct and Indirect Effects

4.4.3.2.1 Less than Significant Effects

Implementation of this alternative would continue the less than significant live-fire impacts that currently affect wetlands at Fort Lewis. Training on the live-fire ranges would not disturb wetlands directly because they are off limits. Indirectly however, fugitive dust generated by training could drift from the ranges and be deposited in nearby wetlands. The deposition of dust into the wetlands is not expected to affect wetlands adversely because the dust would be limited by natural moisture and standard dust suppression measures. In addition, frequent precipitation at Fort Lewis would flush out any fugitive dust deposited in them. The deposition of fugitive dust into the wetlands is unlikely to result in significant effects to the wetlands because the dust would not cause Fort Lewis to be out of compliance with wetlands policies and regulations and would not lead to any loss in size or function of wetland resources.

4.4.3.3 Maneuver Training Direct and Indirect Effects

4.4.3.3.1 Less than Significant Effects

Maneuver training conducted under this alternative would continue the less than significant impacts that currently affect wetlands at Fort Lewis. Fort Lewis limits the types of activities that can occur within 160 feet (50 m) of all wetlands on the installation. Off-road vehicle traffic, bivouacking, digging, and assembly areas are prohibited within the 160-foot (50-m) buffer. In addition, Fort Lewis does not experience significant erosion impacts from maneuver training because soils are coarse-textured, highly permeable, and not very susceptible to erosion.

Although maneuver training would not directly affect most wetlands, wetlands at approved vehicle stream crossing sites could be affected directly and indirectly. There are ten stream-fording sites and two lake crossing locations used during training activities. At these crossings, vehicles would carry some soil from upland areas and possibly some other contaminants such as oil into the water. Although limited amounts of this sediment and other contaminants may be deposited in downstream wetlands, the deposition would not be sufficient to affect the wetlands adversely. The effects would not be significant because they would not affect compliance with wetlands policies or regulations and would not lead to any loss in size or function of wetland resources.

4.4.4 Alternative 2 — GTA Actions

4.4.4.1 Construction Direct and Indirect Effects

4.4.4.1.1 Less than Significant Effects

Implementation of Alternative 2 would disturb wetlands directly and indirectly during construction. In addition to the disturbances associated with the upgrading of the Access Control Point Madigan Gate and the connected road from Alternative 1, construction of the new MRF at Range 8 under Alternative 2 may affect nearby wetlands. The road to Madigan Gate crosses Murry Creek, which supports wetlands along its banks. Indirectly, the disturbances associated with this construction also could introduce fugitive dust and sediment into the adjoining wetlands temporarily affecting them. Range 8 has a wetland near its northwest corner.

The application of standard BMPs (**Table 4–41**) would minimize the potential effects of this construction on wetlands. Placing silt fences to trap sediment and minimizing the use of equipment in the wetlands and within the 50-meter buffer would limit direct disturbances and adverse effects. The MRF can be oriented to avoid disturbing the Range 8 wetland. With the effective use of BMPs to mitigate disturbance, impacts to this wetlands would be less than significant because Fort Lewis would be in compliance with wetland policies and regulations and would not lead to any loss in size or function of wetland resources.

4.4.4.2 Live-fire Training Direct and Indirect Effects

4.4.4.2.1 Less than Significant Effects

The direct and indirect effects of live-fire training would be similar to those for Alternative 1. Although the amount of fugitive dust generated by training could increase over that of Alternative 1, the deposition of this increased dust into wetlands is not expected to affect wetlands adversely because it would be limited by natural moisture and standard dust suppression measures. In addition, frequent precipitation at Fort Lewis would flush any fugitive dust from the wetlands.

4.4.4.3 Maneuver Training Direct and Indirect Effects

4.4.4.3.1 Less than Significant Effects

Although maneuver training conducted under this alternative would increase over Alternative 1, no additional direct effects are expected because Fort Lewis limits the types of activities that can occur within 160 feet (50 m) of all wetlands on the installation. Consequently, direct effects would be the same as described for Alternative 1. The indirect effects of sediment deposition into wetlands from stream crossings also would be similar to Alternative 1 because crossings would be limited to the same 10 stream-fording sites and two lake crossing locations.

4.4.5 Alternative 3 — GTA Actions + CSS Soldiers

4.4.5.1 Construction Direct and Indirect Effects

4.4.5.1.1 Less than Significant Effects

Implementation of Alternative 3 would disturb wetlands directly and indirectly during construction of facilities. As with Alternatives 1 and 2, construction of the Access Control Point Madigan Gate and the connected road and construction of the new MRF at Range 8 would have less than significant effects. Construction of the new facilities for the CSS Soldiers is not expected to affect wetlands. No wetlands would be disturbed by the construction directly. In addition, the application of standard BMPs (**Table 4–41**), such as silt fences, would minimize the potential of this construction to affect off-site wetlands indirectly. Consequently, construction would result in less than significant effects because it would be in compliance with policies and regulations and would not lead to any loss in size or function of wetland resources.

4.4.5.2 Live-fire Training Direct and Indirect Effects

4.4.5.2.1 Less than Significant Effects

The direct and indirect effects of live-fire training would be similar to those for Alternatives 1 and 2. The amount of fugitive dust generated by training of the CSS Soldiers could increase the deposition of this dust into wetlands over that of Alternative 2. However, this additional dust is not expected to affect wetlands adversely because it would be limited by natural moisture and standard dust

suppression measures. In addition, frequent precipitation at Fort Lewis would flush any fugitive dust from the wetlands.

4.4.5.3 Maneuver Training Direct and Indirect Effects

4.4.5.3.1 Less than Significant Effects

Effects of maneuver training would be similar to those of Alternative 2. The proportional increase in training associated with the additional CSS Soldiers would be minimal because their maneuver training requirements are substantially less than those of the three SBCTs. Thus, most of the effects would be the same as described for Alternatives 1 and 2.

4.4.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.4.6.1 Construction Direct and Indirect Effects

4.4.6.1.1 Less than Significant Effects

Implementation of Alternative 4 would disturb wetlands directly and indirectly during construction of facilities. Construction of the Access Control Point Madigan Gate and the connected road and construction of the new MRF at Range 8 would have less than significant effects as described for Alternatives 1 and 2. Construction of the new facilities for the medium CAB is not expected to affect wetlands. No wetlands would be disturbed by the construction directly because construction would occur in previously disturbed areas. Application of standard BMPs (**Table 4–41**), such as silt fences, would ensure the potential of this construction to affect nearby wetlands indirectly would be minimal. Consequently, construction of the medium CAB's facilities would result in less than significant effects because it would comply with wetlands policies and regulations and would not lead to any loss in size or function of wetland resources.

4.4.6.2 Live-fire Training Direct and Indirect Effects

4.4.6.2.1 Less than Significant Effects

The direct and indirect effects of live-fire training would be similar to those for Alternative 2. The amount of fugitive dust generated by training of the medium CAB could increase the deposition of this dust into wetlands over that of Alternative 3. However, this additional dust is not expected to affect wetlands adversely because it would be limited by natural moisture and standard dust suppression measures. In addition, frequent precipitation at Fort Lewis would flush any fugitive dust from the wetlands.

4.4.6.3 Maneuver Training Direct and Indirect Effects

4.4.6.3.1 Less than Significant Effects

Effects of maneuver training would be similar to those of Alternative 2. The proportional increase in training associated with the additional medium CAB ground support would be minimal because their maneuver training requirements are substantially less than those of the three SBCTs that would be training in the same areas. Helicopter operations would not be permitted in wetlands, so they would not contribute to any adverse effects. Thus, most of the effects would be the same as described for Alternatives 1 and 2.

4.4.7 Cumulative Effects

4.4.7.1 Less than Significant Effects

Cumulative effects would be less than significant under all four alternatives. As discussed above, each alternative by itself would continue to generate direct and indirect impacts to wetlands that are less than significant. These impacts could overlap the effects of one or more of the RFFAs. Despite legal measures, wetlands are still disappearing regionally. Implementation of BMPs and mitigation measures identified for these other actions would limit the cumulative effects for each alternative to less than significant.

4.4.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on wetlands. These BMPs include using existing hardened crossings in wetlands and staying at least 160 feet (50 m) from wetlands (**Table 4–41**). The analysis of the direct, indirect, and cumulative effects for the four alternatives concludes that the effects are less than significant. Therefore, the Army proposes no new or additional mitigation.

4.5 WILDFIRE MANAGEMENT

Many ecosystems require fire for function and productivity, and fire is not always considered an adverse impact. However, wildfires are a concern because of the potential impact on human activities and structures, sensitive biological and cultural resources, air quality, soil retention and water quality, and military operations. Alteration of the natural fire regime by increasing the rate of ignitions is a potential adverse impact. A wildfire can damage animal and plant communities, including listed species, damage cultural resources, increase soil erosion from vegetation removal, and facilitate the spread of invasive plant species. Fires that move off-Post have the potential to damage surrounding homes and community resources.

Each alternative was evaluated for its potential to affect wildfire risk adversely and its affect on wildfire management. Impacts from cantonment area and range construction and live-fire and maneuver training were evaluated for their potential to affect wildfire risk adversely. Construction of facilities and the facilities themselves are not considered to impact wildfire risk adversely. Live-fire and maneuver training were identified as the primary activities capable of increasing the rate of fire to above natural frequencies. An increase in the overall population at Fort Lewis is not considered to increase the risk of wildfire ignitions significantly. Fire-related practices and policies at Fort Lewis applicable to each alternative are presented in Chapter 3, and were evaluated on their ability to appropriately address changes to wildfire risk or management associated with implementing the stationing and realignment decisions of the 2007 ROD for the "Grow the Army" FPEIS, as well as the future stationing of additional CSS Soldiers and a medium CAB, at Fort Lewis.

4.5.1 Resource-specific Significance Criteria

Impact determination was based on the assumption that the existing wildfire condition serves as a baseline. A major increase in frequency and intensity of wildfires, especially in sensitive areas would be a significant impact.

4.5.2 Overview of Impacts to Wildfire Management by Alternative

Table 4–10 summarizes the impacts associated with wildfire management that would occur at Fort Lewis under all four alternatives.

Table 4–10 Summary of Potential Effects to Wildfire Management at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	•	•	•	•
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.5.3 Alternative 1— No Action Alternative

4.5.3.1 Construction Direct and Indirect Effects

4.5.3.1.1 No Effects

While non-GTA construction activities under Alternative 1 would temporarily increase human presence, equipment use, and activity at construction sites, this increase is not expected to affect the risk of accidental wildfire ignition. The small potential for accidental ignition during construction activities would be short-term and negligible. Three 1.5-million gallon drinking water reservoirs with wells for fire-fighting needs would be constructed as planned under Alternative 1 at Ross Hill, Miller Hill, and Noble Hill. This construction would improve future capabilities to fight wildfires occurring at Fort Lewis. No adverse impacts to wildfire management are anticipated from cantonment area construction.

No training range-related construction would occur at Fort Lewis under Alternative 1; therefore, impact analysis is Not Applicable.

4.5.3.2 Live-fire Training Direct and Indirect Effects

4.5.3.2.1 Less than Significant Effects

Under Alternative 1, live-fire training, including Soldier qualification with individual weapons, would continue as it has been occurring on Fort Lewis. Fires would continue to occur at current frequencies on Fort Lewis because of live-fire training activities. Such fires would be concentrated in the NSAIA, CSAIA, SSAIA, and AIA, and would predominantly be small. Although the risk of wildfire would depend on other factors, such as weather conditions and fuel loads, the risk of accidental wildfire ignition is not anticipated to increase under Alternative 1 because the frequency, type, and intensity of training activities would not change over current conditions. The risk of wildfire at Fort Lewis would continue to be low to moderate for most of the year, with an increased potential of wildfires occurring during the warmer summer months. No additional impacts to wildfire management are anticipated, and overall impacts to wildfire management from current training levels would be less than significant.

4.5.3.3 Maneuver Training Direct and Indirect Effects

4.5.3.3.1 Less than Significant Effects

Maneuver training would continue at Fort Lewis at current levels under Alternative 1. Transportation of personnel and equipment, off-road use of vehicles, campfires, and use of flammable or combustible materials (such as fuel or ordnance) would continue to pose a wildfire risk. The inherent

risk of accidental ignition attributed to maneuver training is minor. Although the risk of wildfire would be dependent on other factors, such as weather conditions and fuel loads, the risk of accidental wildfire ignition is not anticipated to increase under Alternative 1 because the frequency, type, and intensity of maneuver training activities would not change over current conditions. The risk of wildfire at Fort Lewis would continue to be low to moderate for most of the year, with an increased potential of wildfires occurring during the warmer summer months. No additional impacts to wildfire management are anticipated, and overall impacts to wildfire management from current training levels would be less than significant.

4.5.4 Alternative 2 — GTA Actions

4.5.4.1 Construction Direct and Indirect Effects

4.5.4.1.1 No Effects

While cantonment and range construction activities occurring under Alternative 2 would temporarily increase human presence, equipment use, and activity at construction sites, this increase is not expected to affect the risk of accidental wildfire ignition. All training range-related construction would occur on existing ranges at Fort Lewis. The small potential for accidental ignition during construction activities would be short-term and negligible. No impacts to wildfire management are anticipated from cantonment area or training range construction.

Alternative 2 would increase the overall population at Fort Lewis with the addition of Soldiers, their Families, and support personnel. There would be a minor increase in the potential for accidental ignitions associated with an increased population living at Fort Lewis; however, any cantonment area fires would be suppressed quickly. No impacts to wildfire management are anticipated from the increase in population.

4.5.4.2 Live-fire Training Direct and Indirect Effects

4.5.4.2.1 Less Than Significant Effects

Under Alternative 2, there would be an approximate 50 percent increase in the amount of live-fire training occurring at Fort Lewis. There would be a corresponding increase in the total number of rounds fired, as well as vehicular traffic. Training would occur at existing live-fire ranges, oriented towards existing ordnance impact areas. Where possible, some weapons systems would use inert training rounds (less likely to cause fires) as a substitute for firing live rounds. However, an increased risk of accidental wildfire ignition would result from increased frequency of use of explosives and munitions as well as increased vehicles, flammable materials, and cigarettes in training areas. Although the risk of wildfire would be dependent on other factors, such as weather conditions and fuel loads, the risk of accidental wildfire ignition would increase under Alternative 2.

Fires would continue to be concentrated in the NSAIA, CSAIA, SSAIA, and AIA on Fort Lewis. The combination of climate (relatively mild) and vegetation (high moisture content) at Fort Lewis contribute to a low to moderate fire danger at the installation for the majority of the year. Most fires that occur at Fort Lewis are low-intensity burns that do not result in significant impacts to resources. Based on Fort Lewis's fire history, climate, and the types of vegetation communities present at the installation, the majority of fires resulting from live-fire training under Alternative 2 would likely continue to be small; however, the potential for a large-scale fire to occur would be greater under Alternative 2 than under Alternative 1 due to increased training, particularly during summer months. Continued implementation of Fort Lewis's fire management program, including limitations on the

use of pyrotechnics and other ignition sources during periods of high fire danger, would reduce the probability of a large-scale wildfire occurring from live-fire training activities.

Due to the fire-fighting support the Forestry Section can receive from I Corps and Fort Lewis Soldiers during the high fire danger season, Fort Lewis and McChord AFB Fire Departments, and through mutual aid agreements with WDNR and local fire districts, fire-fighting resources are considered to be sufficient to respond to the increased fires anticipated at Fort Lewis under Alternative 2. However, Fort Lewis's current fire management plan will require updating to address the increased training frequency and risk of accidental wildfire ignition under Alternative 2. This updating would occur during the regular annual review of the IWFMP.

4.5.4.3 Maneuver Training Direct and Indirect Effects

4.5.4.3.1 Less Than Significant Effects

With an approximate 50 percent increase in the amount of maneuver training occurring at Fort Lewis under Alternative 2, there would be a corresponding increase in the amount of human and vehicle/ equipment activity. Transportation of personnel and equipment, off-road use of vehicles, campfires, and use of flammable or combustible materials (such as fuel or ordnance) would increase under Alternative 2, all of which would increase the potential for an accidental wildfire ignition. Maneuver training under Alternative 2 would occur in areas that are currently used for off-road maneuvers at Fort Lewis and over a wide range of terrain. The inherent risk of accidental ignition attributed to maneuver training is minor. However, increased training use and frequency under Alternative 2 may result in training extending into areas that have not been used as frequently. Based on Fort Lewis's fire history, climate, and the types of vegetation communities present at the installation, the majority of fires would likely continue to be small. Continued implementation of Fort Lewis's fire management program would reduce the probability of wildfire occurrence as a result of training. In addition, due to the fire-fighting support the Forestry Section receives fire-fighting resources would be sufficient to respond to increased fires at Fort Lewis under Alternative 2. Fort Lewis's current fire management program will require updating to address the increased maneuver training frequency and risk of accidental wildfire ignition under Alternative 2. This updating would occur during the regular annual review of the IWFMP.

4.5.5 Alternative 3 — GTA Actions + CSS Soldiers

4.5.5.1 Construction Direct and Indirect Effects

4.5.5.1.1 No Effects

While additional CSS-related cantonment area construction activities would temporarily increase human presence, equipment use, and activity at construction sites under Alternative 3, this increase is not expected to affect the risk of accidental wildfire ignition. The small potential for accidental ignition during construction activities would be short-term and negligible. No impacts to wildfire management are anticipated from cantonment area construction under Alternative 3. No additional training range-related construction would occur at Fort Lewis under Alternative 3 above that which would occur under Alternative 2.

Alternative 3 would increase the overall population at Fort Lewis above that anticipated under Alternative 2. There would be a minor increase in the potential for accidental ignitions associated with an increased population living at Fort Lewis. However, no impacts to wildfire management are anticipated from the increase in population.

4.5.5.2 Live-fire Training Direct and Indirect Effects

4.5.5.2.1 Less Than Significant Effects

All wildfire impacts associated with live-fire training under Alternative 2 would also occur under Alternative 3. The training of CSS Soldiers would further increase the amount of live-fire training and rounds fired at Fort Lewis under Alternative 3, however, the increase above Alternative 2 would be minor. Live-fire training for CSS units would consist of individual weapons and crew-served weapons practice and qualification, and convoy live-fire training. An increased risk of accidental wildfire ignition would result from increased frequency of munitions use, as well as increased vehicles, flammable materials, and cigarettes in training areas. Although the risk of wildfire would depend on other factors, such as weather conditions and fuel loads, the risk of accidental wildfire ignition would increase slightly under Alternative 3. Based on Fort Lewis's fire history, climate, and the types of vegetation communities present at the installation, the majority of fires resulting from live-fire training under Alternative 3 would likely continue to be small. Continued implementation of Fort Lewis's fire management program, including limitations on the use of pyrotechnics and other ignition sources during periods of high fire danger, would reduce the probability of a large-scale wildfire occurring from live-fire training activities. In addition, due to the fire-fighting support the Forestry Section can receive from I Corps and Fort Lewis Soldiers during the high fire danger season, Fort Lewis and McChord AFB Fire Departments, and through mutual aid agreements with WDNR and local fire districts, fire-fighting resources are considered to be sufficient to respond to increased fires at Fort Lewis under Alternative 3.

4.5.5.3 Maneuver Training Direct and Indirect Effects

4.5.5.3.1 Less Than Significant Effects

The training of CSS Soldiers would further increase the amount of maneuver training occurring at Fort Lewis under Alternative 3; however, the increase above Alternative 2 would be minor. There would be a corresponding small increase in accidental wildfire ignitions; however, the majority of fires would likely continue to be small. Continued implementation of Fort Lewis's fire management program would reduce the probability of wildfire occurrence as a result of training. In addition, fire-fighting resources are considered to be sufficient to respond to increased fires at Fort Lewis under Alternative 3.

4.5.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.5.6.1 Construction Direct and Indirect Effects

4.5.6.1.1 No Effects

While additional medium CAB-related construction activities would temporarily increase human presence, equipment use, and activity at construction sites under Alternative 4, this increase is not expected to affect the risk of accidental wildfire ignition. The small potential for accidental ignition during construction activities would be short-term and negligible. No impacts to wildfire management are anticipated from cantonment area construction under Alternative 4. No additional training range-related construction would occur at Fort Lewis under Alternative 4 above that which would occur under Alternative 2.

Alternative 4 would increase the overall population at Fort Lewis above that anticipated under Alternatives 2 and 3. There would be a minor increase in the potential for accidental ignitions associated with an increased population living at Fort Lewis. No impacts to wildfire management are anticipated from the increase in population.

4.5.6.2 Live-fire Training Direct and Indirect Effects

4.5.6.2.1 Less Than Significant Effects

All wildfire impacts associated with live-fire training under Alternative 3 would also occur under Alternative 4. The training of a medium CAB would further increase the amount of live-fire training and rounds fired at Fort Lewis under Alternative 4 over that occurring under Alternative 3. This increase would be moderate in intensity. In addition to individual weapons practice and qualification, aviation units conduct aviation gunnery tasks, such as door gunner qualification, diving fire engagements, and aviation armor engagements. An increased risk of accidental wildfire ignition would result from increased frequency and intensity of live-fire training including frequent gunnery training from helicopters. In addition, with an increased number of aircraft on Fort Lewis under Alternative 4, the risk of fires related to aircraft accidents would be greater. Although the risk of wildfire would be dependent on other factors, such as weather conditions and fuel loads, the risk of accidental wildfire ignition due to live-fire training would be greatest under Alternative 4 compared to the other alternatives.

Based on Fort Lewis's fire history, climate, and the types of vegetation communities present at the installation, the majority of fires resulting from live-fire training under Alternative 4 would likely continue to be small; however, the potential for a large-scale fire to occur would be greatest under Alternative 4 compared to any of the other alternatives, particularly during summer months. Continued implementation of Fort Lewis's fire management program, including limitations on the use of pyrotechnics and other ignition sources during periods of high fire danger, would reduce the probability of a large-scale wildfire resulting from live-fire training activities.

Due to the fire-fighting support the Forestry Section can receive from I Corps and Fort Lewis Soldiers during the high fire danger season, Fort Lewis and McChord AFB Fire Departments, and through mutual aid agreements with WDNR and local fire districts, fire-fighting resources are considered to be sufficient to respond to increased fires at Fort Lewis under Alternative 4. However, Fort Lewis's current fire management program may require updating to address the increased training frequency and risk of accidental wildfire ignition under Alternative 4.

4.5.6.3 Maneuver Training Direct and Indirect Effects

4.5.6.3.1 Less Than Significant Effects

The training of a medium CAB would further increase the amount of maneuver training occurring at Fort Lewis under Alternative 4 over that occurring under Alternative 3. Most flight and joint military training with the medium CAB would occur at YTC; however, some training would occur at Fort Lewis. Medium CAB maneuver training would consist of flight training, sling load operations, assault landings, and rappelling. Aviation maneuver training would also involve the firing of munitions; the effects of medium CAB-related munitions on fire risk and management at Fort Lewis are described above under Live-fire Training. The primary additional wildfire concern from the medium CAB would be an increased potential for fires related to aircraft accidents and from ignitions at landing sites. This risk would be low. Based on Fort Lewis's fire history, climate, and the types of vegetation communities present at the installation, the majority of fires resulting from maneuver training would likely continue to be small. Continued implementation of Fort Lewis's fire management program would reduce the probability of wildfire resulting from training, and fire-fighting resources are considered to be sufficient to respond to increased fires at Fort Lewis under Alternative 4.

4.5.7 Cumulative Effects

4.5.7.1 Less than Significant Effects

There would be some adverse additive wildfire impacts expected from other Army proposals and projects occurring or anticipated to occur at Fort Lewis. Other actions that would increase the potential for a fire on Fort Lewis include ongoing live-fire and maneuver training activities. In addition, continued private development on lands surrounding Fort Lewis has increased the risk of human and socioeconomic impacts associated with wildfires should a fire originating at Fort Lewis spread off Post. This risk would continue and would increase as development continues adjacent to the installation.

Other Army projects occurring or that may occur in the reasonably foreseeable future are expected to contain mitigation measures to minimize the potential for starting a wildfire and to reduce environmental impacts associated with wildfires. The Army has developed an IWFMP to prevent and control fires at Fort Lewis. This IWFMP is reviewed annually and is currently undergoing an update.

Because no increases or changes in current live-fire and maneuver training activities would occur at Fort Lewis under Alternative 1, no increases in wildfire risk are anticipated. High fire-risk areas would continue to be treated to reduce the spread of fire, and training would continue to follow established protocols for fire management. Overall, Alternative 1 would not contribute to significant cumulative wildfire impacts at Fort Lewis.

The increased live-fire and maneuver training under Alternatives 2, 3, and 4 would contribute to cumulative wildfire risk on Fort Lewis. Treatment of high fire-risk areas as stipulated in the IWFMP, including fuel reduction and maintenance of fire trails, would continue to reduce the spread of fire, and training would continue to follow established protocols for fire management. These measures are anticipated to reduce the overall cumulative impact to wildfire risk to less than significant.

4.5.8 Mitigation

Currently, Fort Lewis implements several BMPs to mitigate the potential for wildfires from the Army's activities. These BMPs include treatment of high-risk fire areas, restricting the use of tracers and pyrotechnics during high fire hazard conditions as described in the IWFMP, and use of mutual aid agreements with other local fire districts for firefighting support (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to conduct additional monitoring and implement additional fire prevention and control measures (**Table 4–42**).

4.6 CULTURAL RESOURCES

4.6.1 Resource-specific Significance Criteria

The significance of impacts to cultural resources was assessed by evaluating the degree to which they would:

- Cause adverse effects to a NRHP-eligible or listed historic property, of which examples include: altering the look or use of a contributing resource of a historic district; demolishing historic buildings or structures; damaging, or neglecting to prevent damage to, an archaeological site in a training area; or restricting access to traditional cultural places or resources, including culturally important plant or animal resources, particularly during specific times of the year;

- Jeopardize compliance with ARPA or Revised Code of Washington (RCW) 27.53 through actions including, but not limited to: construction in areas that have not been cleared for archaeological resources; unauthorized digging of emplacements or other ground-disturbing actions for training purposes; accidental or willful disregard for Seibert-staked archaeological sites in training areas; or failure to report damage to archaeological sites;
- Jeopardize compliance with AIRFA by creating conditions that prevent the traditional use of sacred or ceremonial sites or resources, such as restricting access to times that conflict with their traditional use.

4.6.2 Overview of Impacts to Cultural Resources by Alternative

Table 4–11 summarizes the impacts to cultural resources that would occur at Fort Lewis under the four alternatives.

Table 4–11 Summary of Potential Effects to Cultural Resources at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	W	W	W	W
Live-fire Training Direct and Indirect Effects	•	•	•	•
Maneuver Training Direct and Indirect Effects	W	W	W	W
Cumulative Effects	W	W	W	W

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.6.3 Alternative 1 — No Action Alternative

4.6.3.1 Construction Direct and Indirect Effects

4.6.3.1.1 Significant but Mitigable to less than Significant Effects

Implementation of the Fort Lewis Master Plan would adversely impact the Fort Lewis Garrison Historic District by demolishing or modifying historic buildings and altering historic landscapes through the addition of new buildings and infrastructure as proposed in the district ADP. Specific contributing properties of the district that would be impacted include the following:

- Tank Repair Shop (Building 1162). Constructed as part of the original permanent construction of Fort Lewis (1926–1939), this building continues to serve as a repair facility for military vehicles. The ADP proposes a parking lot at this location that would replace the building.
- Warehouse (Building 4070/4071). This is one of only three warehouses that survive from the World War I period of construction at Camp Lewis (1917). The building has been successfully rehabilitated and now serves as a US Post Office and Director of Information Management (DOIM) Post Office. The ADP proposes green space at this location in place of the building.
- Warehouse (Building 4079). This is one of only three warehouses that survive from the World War I period of construction at Camp Lewis (1917). A design has been developed to rehabilitate this building as administrative office space and storage. The ADP proposes green space at this location.

- Seven buildings in "Klatawa Village" originally constructed during World War II as Regimental Officers' Quarters. After World War II, these small bungalows were moved to their current locations and presently serve as temporary lodging. The ADP proposes a school at this location that would replace the bungalows.
- Twenty-two historic buildings constructed as part of the original permanent construction of Fort Lewis (1926–1939). These originally served as animal stables, gun sheds, and motor repair facilities to support an army that was then in transition from horses and mules to mechanized transport. These currently serve as the Public Works Shops. The ADP proposes that a new Public Works shop complex be constructed west of the historic Greenwood housing area, and that the historic buildings currently serving as Public Works shops be demolished and replaced with mixed-use administrative/retail/housing/parking.
- The "Arts and Crafts Building" (Building 5038). This is one of only six buildings that survive from the World War I period at Camp Lewis. This was originally built as a wagon shed in 1917. In 1943, this building became the first "Hobby House" in the Army and continues to serve the same function. The ADP proposes demolition of this building.
- The "Auto Repair Shop" (Building 4043). This was constructed during the initial development of a permanent post at Fort Lewis (1926–1939) and continues to serve its original function. The ADP proposes to demolish this building to make way for a Park-and-Ride lot, and replace it nearby with a new construction.
- The ADP calls for the redevelopment of Pendleton Avenue along its entire length through the core of the Fort Lewis Garrison Historic District. The avenue itself contributes to the historic character of the district, which dates to 1917.

The cantonment area contains 29 known archaeological sites to date. Impacts to these sites would b e avoided during the ADP planning process. Approximately 10 percent of the cantonment area has not been surveyed for archaeological resources. Potential impacts to unknown archaeological resources that may be present in unsurveyed areas, or beneath buildings slated for demolition, would be avoided or minimized by conducting surveys prior to construction and following Fort Lewis protocols for unanticipated discoveries during construction, if needed (**Appendix D**)

Construction of and upgrades to range/training infrastructure scheduled for FY 2010 through 2015 (**Section 2.2.3.4.1**) are not expected to impact known archaeological sites, as sites would be avoided during the planning process. As in the cantonment area, potential impacts to unknown sites in range/ training areas that have not been surveyed would be avoided or minimized by conducting surveys prior to construction and following Fort Lewis protocols for unanticipated discoveries, if needed (**Appendix D**).

Ongoing and specific tribal consultation has not identified impacts to Native American traditional cultural or ceremonial places or resources from proposed construction in cantonment or training ranges (**Appendix I**).

4.6.3.2 Live-fire Training Direct and Indirect Effects

4.6.3.2.1 No Effects

Under Alternative 1, existing ranges would be used and no changes in the frequency or intensity of live-fire training or transport of troops and equipment to training ranges would occur. Because Soldiers would access training areas on established roads and paths, no impacts to archaeological resources are expected.

4.6.3.3 Maneuver Training Direct and Indirect Effects

4.6.3.3.1 Significant but Mitigable to less than Significant Effects

Maneuver training can cause impacts to known and unidentified archaeological resources from off-road vehicle use, or earth-moving activities. Impacts could also be caused by inadvertent or willful disregard for Seibert-staked sites by Soldiers or contractors, or erosion from vehicle rutting near streams and meadows that exposes archaeological sites. Previous archaeological site assessment studies have determined that the ongoing use of training areas has resulted in impacts to known sites on Fort Lewis (Ragsdale et al. 2008, 2009). In a study of 46 of the more than 300 sites that have been identified to date, approximately 50 percent exhibited moderate to high damage from vehicle use or other ground disturbance, despite the fact that many were Seibert-staked and mapped on the Fort Lewis Environmental Coordination Map (**Figure 2–7**), and Soldiers were instructed to avoid them. It must be noted that some of these disturbances may be associated with much earlier training events, and may have been present prior to the implementation of environmental mapping and Seibert staking. Therefore, it is difficult to determine if continued maneuver training under Alternative 1 would result in further impacts to archaeological sites, because the use of specific locations within training areas that also contain archaeological sites cannot be predicted in advance. The conditions under which Seibert stake and mapping protection measures may fail are unknown, and the specific sites that may be impacted by failures cannot be predicted in advance, and ongoing site protection measures continue to improve conditions.

Ongoing consultation with the Nisqually, Puyallup, and Squaxin Island tribes has determined that the tribes wish to access important tribal cultural resources within maneuver training areas, which are restricted for military use 365 days per year. Access to these resources is important to the cultural values of the tribes, particularly at specific times of the year when such resources are traditionally collected, used, or visited. Fort Lewis maintains a policy of scheduling access to training areas for tribal members at least twice yearly as the mission allows.

4.6.4 Alternative 2 — GTA Actions

4.6.4.1 Construction Direct and Indirect Effects

4.6.4.1.1 Significant but Mitigable to less than Significant Effects

Under Alternative 2, the Army would also implement the revised Fort Lewis Master Plan and construction impacts to historic buildings and districts in the cantonment area would be the same as those discussed under Alternative 1.

Impacts to known archaeological sites from proposed construction in cantonment or range/training areas are not expected, as sites can be avoided during the planning process. Potential impacts to unknown sites in cantonment or range/training areas that have not been surveyed for archaeological resources can be avoided or minimized by conducting surveys prior to construction.

Ongoing and specific tribal consultation with the Nisqually, Puyallup, and Squaxin Island tribes has not identified impacts to traditional or ceremonial places or resources from proposed construction in cantonment or training ranges (**Appendix I**).

4.6.4.2 Live-fire Training Direct and Indirect Effects

4.6.4.2.1 No Effects

Under Alternative 2, intensified use of live-fire training areas to accommodate the training of up to three SBCTs simultaneously would likely result in increased duration and frequency of noise levels

from large-caliber weapons over conditions for Alternative 1. However, as discussed for Alternative 1, noise has not been identified as an impact to the use of tribal cultural resources, therefore, increased noise levels under Alternative 2 are not expected to adversely impact the use of Native American traditional or ceremonial places or resources.

Because Soldiers would access live-fire training areas on established roads and paths under Alternative 2, no impacts to archaeological resources are expected.

4.6.4.3 Maneuver Training Direct and Indirect Effects

4.6.4.3.1 Significant but Mitigable to less than Significant Effects

As discussed under Alternative 1, archaeological resources in maneuver training areas have been impacted by maneuver training. It is probable that the intensified use of training areas under Alternative 2 would result in increased impacts to archaeological resources; however, because the conditions under which site protection measures fail and the specific sites that may be impacted by failures cannot be predicted in advance, these impacts cannot be identified at this time.

Traditional cultural resources important to the Nisqually, Puyallup, and Squaxin Island tribes are located in Fort Lewis training areas that would continue to be restricted for military use 365 days per year under Alternative 2. Fort Lewis would maintain its policy of scheduling access for tribal members at least twice yearly as the mission allows, so that intensified use of training areas results in no further access restrictions.

4.6.5 Alternative 3 — GTA Actions + CSS Soldiers

4.6.5.1 Construction Direct and Indirect Effects

4.6.5.1.1 Significant but Mitigable to less than Significant Effects

Under Alternative 3, Fort Lewis would also implement the revised Fort Lewis Master Plan and construction impacts to historic buildings and districts in the cantonment area would be the same as discussed for Alternative 2.

Facilities to accommodate the addition of up to 1,000 CSS Soldiers would be constructed in a 60-acre (24-ha) area in what is now Training Area A East, north of the North Fort. This area has received full archaeological survey coverage, resulting in the identification of nine archaeological sites. These sites would be avoided during the construction planning process. As discussed for Alternative 2, potential impacts to unknown sites in other training or cantonment areas that have not been surveyed can be avoided or minimized by conducting surveys prior to construction.

Ongoing and specific consultation with the Nisqually, Puyallup, and Squaxin Island tribes has not identified impacts to Native American traditional cultural or ceremonial places or resources from proposed construction in cantonment or training ranges, and impacts are not expected (**Appendix I**).

4.6.5.2 Live-fire Training Direct and Indirect Effects

4.6.5.2.1 No Effects

Because Soldiers would access live-fire training areas on established roads and paths under Alternative 3, impacts to archaeological resources from increased off-road vehicle miles traveled are not expected.

Live-fire training for up to 1,000 additional CSS Soldiers under Alternative 3 would likely result in an increase in the duration and frequency of noise levels beyond conditions under Alternative 2. However, as discussed for Alternative 2, consultation with the Nisqually, Puyallup, and Squaxin Island tribes has not identified noise as an impact to the use of traditional cultural resources. Increased noise levels under Alternative 3 are not expected to adversely impact the use of traditional or ceremonial places or resources.

4.6.5.3 Maneuver Training Direct and Indirect Effects

4.6.5.3.1 Significant but Mitigable to less than Significant Effects

As noted previously, while it is probable that the intensified use of training areas under Alternative 3 would result in increased impacts to archaeological resources beyond those identified for Alternative 2, these impacts cannot be identified in advance because the use of specific training areas that may also contain archaeological sites is not known at this time.

As discussed for Alternative 2, while access to training areas under Alternative 3 would continue to be restricted for military use 365 days per year, Fort Lewis would maintain its policy of scheduling access for Nisqually, Puyallup, and Squaxin Island tribal members at least twice yearly, as the mission allows, so that intensified use of training areas results in no further access restrictions.

4.6.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.6.6.1 Construction Direct and Indirect Effects

4.6.6.1.1 Significant but Mitigable to less than Significant Effects

Construction of facilities under Alternative 4 to accommodate a medium CAB would take place on or near GAAF and the East Division Area. The oldest structure still in use at GAAF is Building #3063, an aircraft hanger built in 1942, which has not been evaluated for NRHP eligibility. Fort Lewis is currently planning NRHP evaluations of this resource and several other airfield structures that have recently reached the 50-year age threshold to qualify as NRHP-eligible historic properties. Under Alternative 4, the implementation of the revised Fort Lewis Master Plan and construction impacts to historic buildings and structures in the cantonment area would be the same as those identified for Alternative 2 and 3.

No archaeological survey has been conducted on GAAF. Impacts to unknown archaeological resources discovered during construction can be avoided or minimized by conducting surveys prior to ground disturbance. As discussed for Alternatives 2 ad 3, impacts to known archaeological sites from proposed construction in range/training areas under Alternative 4 are not expected, as sites can be avoided during the planning process.

Consultation with the Nisqually, Puyallup, and Squaxin Island tribes for this analysis has not identified impacts to traditional cultural or ceremonial places or resources from proposed construction in cantonment or training ranges, or GAAF (**Appendix I**).

4.6.6.2 Live-fire Training Direct and Indirect Effects

4.6.6.2.1 No Effects

Under Alternative 4, the addition of a medium CAB is not expected to increase noise levels from live-fire training beyond conditions that would be present under Alternatives 2 or 3, as training would be largely aviation-based. As with Alternatives 2 and 3, noise levels under Alternative 4 are

not expected to adversely impact the use of Native American traditional or ceremonial places or resources. Because Soldiers would access live-fire training areas on established roads and paths, impacts to archaeological resources from increased off-road miles traveled are not expected.

4.6.6.3 Maneuver Training Direct and Indirect Effects

4.6.6.3.1 Significant but Mitigable to less than Significant Effects

Increased impacts to archaeological sites in range/training areas beyond those identified under Alternatives 2 and 3 is unlikely under Alternative 4, as the addition of a medium CAB unit would primarily involve aviation-based training activities.

No additional access restrictions to training areas that contain tribal cultural resources important to the Nisqually, Puyallup, and Squaxin Island tribes beyond those discussed for Alternatives 2 and 3 are expected from the addition of a medium CAB.

4.6.7 Cumulative Effects

4.6.7.1 Significant but Mitigable to less than Significant Effects

Future alterations to the Fort Lewis Garrison Historic District added to those that would be implemented under all alternatives may contribute to the eventual loss of a critical proportion of the district's historic setting and landscape, potentially endangering the district's integrity and NRHP eligibility status.

Potential impacts to archaeological sites under all alternatives from the failure of site protection measures could result in the eventual loss of important archaeological data. Such a cumulative loss may eventually become significant. However, as discussed previously, because the conditions under which site protection measures fail are unknown and the specific sites that may be impacted cannot be predicted, the threshold at which a cumulative loss of archaeological data becomes significant cannot be determined. Ongoing efforts to increase awareness of the need to protect archaeological sites on Fort Lewis is likely improve the rate of success of site protection measures and thus prevent further loss of archaeological data.

Intensified use of range and training areas under Alternatives 2, 3, and 4 could result in further restricted access for Nisqually, Puyallup, and Squaxin Island tribal members to their traditional cultural resources to the point where such resources cannot be used for important annual rituals or ceremonies. Intensified use of range and training areas under Alternatives 2, 3, and 4 could also lead to permanent degradation of specific plant or animal habitat associated with traditional or ceremonial practices.

4.6.8 Mitigation

4.6.8.1 Historic and Archaeological Properties

Fort Lewis would mitigate known and potential adverse impacts to the Fort Lewis Garrison Historic District and NRHP-eligible archaeological resources by implementing the Fort Lewis PA (**Appendix D**). The PA was developed in consultation with the Washington State Historic Preservation Office (SHPO) and the Nisqually, Squaxin Island, Puyallup, Yakama, and Wanapum tribes pursuant to NHPA Section 106 regulations at 36 CFR 800.14. It stipulates measures Fort Lewis will implement to avoid, minimize, or mitigate adverse effects to historic and archaeological properties from the GTA undertaking, and fulfills Fort Lewis's responsibilities under Section 106. Fort Lewis distributed

the PA to the SHPO and the tribes in accordance with 36 CFR 800.8(c), and plans to continue to consult with the tribes as discussed in the PA.

Stipulation I of the PA provides standard operating procedures (SOPs) to ensure that known and currently unforeseen GTA actions will receive adequate consideration to avoid, minimize, or resolve adverse effects to significant historic and archaeological resources. The SOPs in Stipulation I provide a process to:

- identify and avoid impacts to historic buildings/structures and known archaeological sites during construction planning;
- conduct surveys prior to ground disturbance in previously unsurveyed areas to identify and evaluate unknown archaeological sites;
- restrict ground disturbance in areas that have not been cleared by the Fort Lewis Cultural Resources Manager; and
- implement protocols for unanticipated discoveries.

Stipulation II of the PA provides additional specific measures to mitigate impacts that have been identified under the GTA alternatives. These measures are listed below in **Table 4–12** and **Table 4–13** and will be implemented as future funding allows.

4.6.8.2 Native American Traditional Cultural Resources

It is DoD and Fort Lewis policy to accommodate tribal member access to off-reservation sacred and Treaty-protected fishing, hunting, and gathering sites that are located on military installations to the extent practicable and consistent with military training, security, and readiness requirements (*DoD American Indian and Alaska Native Policy, October 20, 1998*; DoDI 4710.02, September 2006). To mitigate adverse impacts to the use of tribal cultural resources identified for all GTA alternatives, Fort Lewis would continue its policy of accommodating access to resources located within training areas. Fort Lewis would also coordinate access for the tribes to conduct annual salmon counting in Muck Creek during the months of December, January, and February. Fort Lewis would also maintain its policy of ongoing communication with the tribes regarding military actions on the installation.

4.7 AIR QUALITY

The potential for impacts to air quality and resulting effects on human health and climate change from proposed construction/demolition activities and long-term operations associated with GTA actions were identified as issues of concern during scoping.

The activities that are most likely to affect air quality on and near Fort Lewis are construction and training. Dust would be produced during soil-disturbing activities and demolition at construction sites, and operation of heavy equipment and increased vehicular traffic associated with construction personnel would result in an increase in pollutants associated with vehicle exhaust. Dust and exhaust emissions would also be generated during training maneuvers with military vehicles and aircraft. Lesser amounts of pollutants would be generated by Soldiers traveling on or near the installation, from natural gas-fired building heaters, and from increased fuel storage and transfer.

Table 4–12 Mitigation of Adverse Effects to the Fort Lewis Garrison Historic District

Mitigation Measure	Planned Action	Anticipated Level of Mitigation 2010-2015
Creative Mitigation: Web-based Documentation, Interpretive Signs and Self-Guided Tour	This creative mitigation project will develop documentation and educational material to preserve and share the history of the Garrison Historic District. The project will mitigate adverse impacts associated with the implementation of the Historic Downtown ADP component of the Fort Lewis Master Plan. The primary product will be a content-rich website designed to educate and entertain a diverse public audience. The project will also develop wayside interpretive signs to be installed in the District, along with a self-guided tour map of the District.	One (1) content-rich website, eight (8) interpretive signs, one (1) self-guided Historic District Tour Map
Adaptive Reuse Plans: Pendleton Avenue Corridor	This project will contract with a qualified historic architect to develop and evaluate adaptive reuse alternatives that will support the goals of the Installation's Master Plan and Installation Sustainability Program. The adaptive reuse plan will focus on the Pendleton Avenue corridor through the District. The plan will develop conceptual drawings to identify alternatives for reuse of historic gun sheds, stables and other buildings proposed for potential demolition in the Historic Downtown ADP. The project will also develop conceptual drawings for historically compatible street-lighting, benches, bus stops and other street furniture for a redeveloped Pendleton Avenue corridor. The plan will develop life-cycle cost comparisons to compare the cost of rehabilitation vs. new construction for typical buildings.	Conceptual drawings for a historically-compatible redeveloped Pendleton Avenue corridor, and adaptive reuse plans for approx. four (4) building types.

Table 4–13 Mitigation Measures for Impacts to Archaeological Resources

Mitigation Measure	Planned Action	Anticipated Level of Mitigation 2010-2015
Site Impact Assessment	Assess the condition of at least 30 archaeological sites per year to determine accumulated GTA damage. Site Impact Assessment will identify those NRHP-eligible sites that are being impacted by GTA actions, and will prioritize those sites for increased protection (i.e., Seibert staking) or data recovery excavations.	Thirty (30) archaeological sites per year.
Prehistoric Site Predictive Model	Build and refine a GIS-based predictive model that will indicate the probability that a particular land parcel contains prehistoric archaeological resources. The model will be used to avoid training and construction impacts to significant prehistoric sites and will be used to prioritize and focus future archaeological survey areas.	Survey and evaluation to sample, test, and refine the predictive model.
Archaeological Survey	Conduct archaeological surveys of proposed construction footprints and downrange areas that are being impacted by increased off-road training and/or usage. Use predictive model results to determine the level of effort required in accordance with PA SOP 3.	One hundred (100) acres per year.
Archaeological Site Evaluation (Phase II Testing for NRHP Eligibility)	Evaluate a sample of downrange archaeological sites for National Register of Historic Places eligibility before ongoing military training impacts result in the destruction of currently unevaluated sites. Protection measures will be put in place for sites determined to be eligible for the National Register; ineligible sites will be opened to unrestricted military training or construction.	Twelve (12) archaeological sites per year.
Data Recovery (Salvage Excavations)	Site Impact Assessment will identify those National Register eligible sites that are being impacted by GTA, and will prioritize sites for data recovery excavations to salvage important scientific and historical information that would otherwise be lost to ongoing military training impacts.	One (1) archaeological site per year.
Public Education and Outreach	Inventory, evaluation, and data recovery projects will include one or more public education/outreach components (i.e. brochures, non-technical reports, web sites, public tours, public archaeology, multi-media CD-ROM, etc.). Education and outreach costs are included in the inventory, evaluation, and data recovery projects.	At least one (1) public education/outreach component per project.

4.7.1 Resource-specific Significance Criteria

Impacts to air quality would be considered significant if the proposed activities were to:

- increase ambient air pollutant concentrations at the installation boundary above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS;
- impair visibility within any federally mandated PSD Class I area; or
- produce emissions of hazardous air pollutants exceeding state or federal emission levels at the installation boundary.

4.7.2 Overview of Impacts to Air Quality by Alternative

Table 4–14 summarizes the impacts associated with air quality that would occur under each of the alternatives. Less than significant effects are expected from construction, live-fire training, maneuver training, and cumulative effects.

Table 4–14 Summary of Potential Effects to Air Quality at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.7.3 Emission Sources

The major air pollutants in the Puget Sound region and at Fort Lewis are vehicular emissions (primarily CO, NO_x, and VOCs). In addition, particulate matter ($PM_{10}/PM_{2.5}$) is generated by military vehicles traveling on unpaved roads and off-road, and by military aircraft. The number of vehicles and aircraft used during training would vary among alternatives, as would the number of miles traveled by vehicles and aircraft. Thus, estimated air emissions associated with vehicle and aircraft use and mileage are analyzed in this EIS. Emissions associated with portable generators used during training are also analyzed.

Impacts to air quality from Army activities also include emissions from stationary sources such as heating and wastewater treatment systems; dust and exhaust emissions from mobile sources such as construction equipment and personal vehicles; and hazardous emissions from building demolition, maintenance and repair shops, and other activities.

4.7.4 General Conformity Determination

The "general conformity" rule (40 CFR Subpart W, §51.850) requires a review of proposed federal actions that may affect air quality in nonattainment and maintenance areas. A conformity analysis must demonstrate that the project would not:

- cause or contribute to a new violation of any standard;

- interfere with the provisions in the applicable State Implementation Plan (SIP) for maintenance of any standard;
- increase the frequency or severity of any existing violation of any standard; or
- delay timely attainment of any standard.

Additional thresholds are pollutant-specific for non-attainment and maintenance areas. Portions of Fort Lewis (northern half) are within a CO maintenance area, and all of Fort Lewis is within an ozone maintenance area. Actions at Fort Lewis resulting in an increase of 100 tons per year (tpy) of ozone precursors (NO_x and VOC) or CO would trigger a conformity analysis.

4.7.5 Description of Methodology to Evaluate Air Emissions

4.7.5.1 Emissions Calculations

Emissions for all criteria pollutants were calculated for each alternative and compared to the conformity thresholds where applicable. **Table 4–15** summarizes the emissions sources calculated and the method used to perform the calculation. If total project emissions are lower than the conformity threshold, then air quality impacts would not be significant. In cases where total project emissions exceeded conformity thresholds, dispersion modeling of these pollutants for short-term and annual periods was completed to determine whether NAAQS would be exceeded or impacted by the proposed activities, resulting in significant impacts to air quality.

Emission rates were calculated for company training events at Fort Lewis; brigade and battalion size events are conducted infrequently at Fort Lewis.

Stryker vehicles are in the heavy-duty diesel vehicle class. Since tactical vehicles are exempt from emissions testing, emissions rates for Stryker vehicles are not readily available (Jones and Kunze 2003). EPA emission standards for a similar vehicle (heavy-duty diesel engine) were used to calculate/model emissions (CO, NO_x, SO_2, VOCs, and $PM_{10}/PM_{2.5}$) associated with operating Stryker vehicles (**Table 4–15**).

4.7.5.2 Dispersion Modeling Analysis

Air pollution models are used to project future air pollution levels or to estimate current pollution levels at locations where monitors are not deployed. Air pollution models are most frequently used to verify that a new source of air pollution will not exceed the NAAQS. The models are generally designed to overestimate air pollutant concentrations in order to be protective of air quality, and must be approved by the EPA. In general, all air quality models require information about the pollutant source being modeled, including pollutant emission rate, and information about the dispersing characteristics of the meteorology, such as wind speed and direction.

The EPA-approved **A**merican Meteorological Society/**E**nvironmental Protection Agency **R**egulatory **Mod**el (AERMOD) was used for dispersion modeling. Meteorological data from GAAF at Fort Lewis and the National Weather Station at Quillayute, Washington, were used as representative weather data for the region. For Fort Lewis actions, pollutant levels must be within established federal and state standards at the installation boundary bordering the maintenance area. Thus, receptor sites are identified for modeling to predict pollution concentrations at fixed points along the installation boundary and beyond. To ensure that pollutants associated with Stryker vehicles would not adversely affect the health of people off-Post, one set of densely spaced receptors used in modeling was placed along the installation boundary, and another set was placed 1,640 feet (500 m) outside the boundary. Additional receptors were placed out to 3.1 miles (5 km) from the facility boundary for further assessment of off-site impacts in the maintenance area.

Table 4–15 Emissions Sources and Calculation Methods

Emission Category	Calculation Method
Construction	URBEMIS Version 9.2 – performs annual emissions calculations based on square footage of buildings, land use/building type, and length of construction period. Pages 18 through 28 in the URBEMIS User's Guide and Appendices A, G, H, and I list the construction emission calculations, assumptions based on square footage, schedule, and emission factors.
Training Activities	AP–42 Section 13.2.1 (Paved Roads) and Section 13.2.2 (Unpaved Roads) equations to calculate PM_{10} and $PM_{2.5}$. These equations take into consideration the silt and moisture content of the soil, precipitation, and vehicle weight when determining the amount of dust generated by a military vehicle.
	EPA Tier 2 Engine emission factors calculate vehicle exhaust emissions.
Commuting	EPA approved MOBILE6 vehicle exhaust emission factors.
Generators	AP–42 Section 3.3 – Gasoline and Diesel Industrial Engines Table 3.3–1
Aircraft	Emissions and Dispersion Modeling System (EDMS Version 5.1) calculates aircraft exhaust based on number of landing and takeoff cycles.
Continuous Operations after Construction	URBEMIS Version 9.2 – performs annual emissions calculations based on square footage of buildings, land use/building type from home heating, landscaping, painting of buildings, and consumer products such as cleaners. Appendices B and C of the URBEMIS User's Guide discuss assumptions for the area/operational emissions.

4.7.5.3 Source Characterization

An emission rate was calculated for each maneuver area in grams/second per square meter. To simulate the emissions from exhaust and airborne dust correctly, the total height of the emission exhaust and the initial Sigma Z (initial vertical dimension of the area source plume) was set to 1.5 times the actual height of the Stryker vehicle. A separate emission rate was calculated for aircraft emissions, and this source was placed at the airfield to represent the takeoff and landing emissions (Alternative 4 only).

4.7.5.4 Permit Applicability

4.7.5.4.1 Synthetic Minor Permit

Fort Lewis maintains a Synthetic Minor Permit with the Puget Sound Clean Air Agency (Notice of Construction Number 9185). Installation-wide emissions are limited to less than 99 tons per year of any criteria pollutant and less than 25 tons (23 metric tons) per year of hazardous air pollutants (HAPs). Fort Lewis will demonstrate compliance with all requirements listed in the permit, including monthly calculations of fuel usage and emissions. The Synthetic Minor Permit includes stationary emissions sources (such as boilers and emergency generators), the wastewater treatment plant, and the landfill gas. It does not include portable field generators, exhaust and fugitive dust from vehicle maneuvers, lawn equipment, helicopter exhaust emissions, or household paint.

4.7.5.4.2 PSD Permit

The PSD baseline date for Fort Lewis is August 23, 1979. In June 1979, the Army submitted an EIS that summarized the emissions at both facilities. At Fort Lewis, particulate emissions were 10,723

tons (9,723 metric tons) per year. This estimate did not include tracked vehicles, which were assumed to contribute additional particulate emissions of at least 10,000 tons (9,072 metric tons) per year.

It is estimated that particulate emissions from the future planned activities, when added to current baseline particulate emissions, would be less than 1979 baseline levels. Therefore, this modeling analysis did not consider PSD increment consumption and visibility impacts.

4.7.6 Alternative 1 — No Action Alternative

4.7.6.1 Construction Direct and Indirect Effects

4.7.6.1.1 Less Than Significant Effects

Short-term, minor air quality impacts would result from the operation of heavy-duty construction equipment, the installation of temporary heaters, demolition, and increased vehicular traffic attributed to construction personnel. Additionally, there would be some emissions associated with operation of new facilities.

Under this alternative, maintenance, repair, and replacement of Fort Lewis's existing facilities and infrastructure would continue. Currently, Fort Lewis is undergoing substantial modernization of its facilities and many projects have been constructed recently, are being constructed, or are planned for construction. They include replacing out-dated buildings and improving infrastructure. **Appendix A** identifies the projects planned for construction in the FY 2010 to FY 2015 period and **Figure 2–5** shows the distribution of these projects. Other projects planned for or under construction would be completed. The Army has conducted environmental review under NEPA for these projects and has determined that no significant impact on the environment would occur from these projects.

Also, the number of Soldiers stationed on Fort Lewis is expected to remain near current levels (30,000). Thus, stationary and mobile source emissions should remain near current levels as discussed in the HIMARS analysis.

4.7.6.2 Live-fire Training Direct and Indirect Effects

4.7.6.2.1 Less than Significant Effects

Under this Alternative, live-fire training would continue to carry the risk of fire, and would result in predominantly small fires concentrated in the impact areas. The risk of accidental ignition should not increase, and would continue to be low to moderate for most of the year, with a greater risk in the summer. Fires would continue to have a less than significant effect on air quality by emitting carbon dioxide (CO_2), CO, PM_{10}, $PM_{2.5}$, and VOCs as plant materials are consumed.

4.7.6.3 Maneuver Training Direct and Indirect Effects

4.7.6.3.1 Less Than Significant Effects

Military units at Fort Lewis would continue to train, for the most part, using the same equipment as at present, which is described in **Table 2-10** of this EIS. Types of equipment with the most potential to affect air quality during training on Fort Lewis include Strykers and other military vehicles, fog oil/graphite smoke generators, and smoke munitions. The impacts of smoke generators and smoke munitions on air quality at Fort Lewis were analyzed in previous Army documents (Army 1999, 2001d).

Under the current levels of training, use of Stryker and other military vehicles and aircraft at Fort Lewis would continue to have moderate short-term impacts on ambient air quality at Fort Lewis. Modeling showed that current Stryker and other military vehicle activity would not cause or contribute to an NAAQS violation (Army 2001b, 2004b). Emissions of criteria pollutants associated with training increases were determined not to be significant based on projected MIL-CLASS 4 and 5 and off-road miles ([84,600] 136,150 km) traveled by Strykers annually during training. Pollutants generated by vehicles would not cause an air quality violation at Fort Lewis and would not adversely affect the health or welfare of humans off the installation. The modeling results are conservative, with all vehicles assumed to be concentrated in a very small area and operated at peak engine output constantly for periods up to 24-hours, and at 90 percent of capacity for periods greater than 24 hours.

Under Alternative 1, there would be no major changes in the number or types of deployment exercises occurring on Fort Lewis. During times of deployment, vehicle emissions would result in local, short-term impacts, especially at staging areas on Fort Lewis and at the Port of Tacoma. When traveling in convoys to YTC, vehicles would travel in groups of no more than 25 vehicles, with no more than 850 vehicles traveling to YTC at any one time. These vehicles would have a negligible impact on air quality along convoy routes, as approximately 120,000 vehicles travel on I–5 each day near Fort Lewis, and about 18,000 vehicles travel on I–82 near YTC.

The Army would manage resources to reduce erosion and would revegetate degraded areas to reduce the amount of dust produced during training exercises. The Army would also conduct prescribed burns to minimize risks from training-induced fires. When managed properly, prescribed fires can remove fuel while minimizing impacts to air quality by controlling the extent and intensity of the burn. Prescribed burning activities would be coordinated with local and region air agencies to ensure that air quality was not adversely affected.

4.7.7 Alternative 2 — GTA Actions

Under Alternative 2, there would be an increase in emissions of pollutants associated with construction, training, and regional population increases than under Alternative 1, but the impacts would be less than significant.

4.7.7.1 Force Structure

The number of Soldiers stationed on Fort Lewis would increase by about 1,900 under Alternative 2. This increase would have minor, long-term impacts on local and regional air quality. Approximately 1,730 Soldiers would live off Post, and approximately 170 Soldiers with Family members would live in family housing. Soldiers would bring about 2,800 Family members with them. On-Post Families would generate a small amount of new air pollutants on Fort Lewis from use of personal vehicles, from natural gas-fired household heaters, and from routine landscaping activities that require gasoline-powered tools.

Assuming a total of 170 new Soldiers living on Fort Lewis and 1,730 Soldiers living off-Post, and a total on-Post commute of 6 miles (10 km) per day and off-Post commute of 24 miles round-trip (39 km) for each Soldier, there would be an annual increase of approximately 18.4 tons of NO_X, 49.0 tons CO, 22.0 tons VOC, and 3.7 tons PM_{10} from current levels (see **Appendix E**). It should be noted that these estimates do not account for reductions in trip mileage due to carpooling by Soldiers, or for vehicle travel by spouses and dependents. Additional emissions of air pollutants would be associated with non-commute driving by Soldiers, as well as vehicle use by Family members with cars. Because it is unknown where accompanied Soldiers would reside in the region, how many dependents would drive, and how far their daily driving habits would be, it is impossible to quantify

these emissions. For the purposes of this analysis, it is assumed that these emissions would be similar to those attributable to commuting by Soldiers, although it is likely that they would be less.

The stationing of military personnel and their dependents in on-Post housing facilities would increase the usage of automotive stations on Fort Lewis, as well as the wastewater treatment plant from current levels. Therefore, there would be a minor increase in the VOC emissions on Fort Lewis associated with these facilities. Based on the projected increase in population, gasoline purchases on Fort Lewis would increase by approximately 6 percent, and wastewater loading into the treatment plant would increase by approximately 2 percent from current levels (see **Appendix E** for calculations). The corresponding increase in VOC emissions on Fort Lewis would be about 3 tons from gas station usage and wastewater treatment from current levels.

Continuous operation of newly constructed facilities, once construction is completed, would result in added emissions from use of natural gas heaters, as well as other sources. The annual emissions associated with these operations are estimated at 4 tons NO_2, 4.4 tons CO, 0 tons SO_2, 0.01 tons PM_{10} and $PM_{2.5}$, and 4.7 tons VOC (see **Appendix E** for calculations).

The only stationary emission sources would be associated with wastewater treatment and continuous operation after construction. Because wastewater emissions include only very small amounts of VOCs, total emissions from stationary sources would be nearly the same as the emissions from continuous operation after construction, described in the preceding paragraph. Emissions of this level are not expected to cause Fort Lewis to exceed limits listed in the synthetic minor permit.

4.7.7.2 Construction Direct and Indirect Effects

4.7.7.2.1 Less Than Significant Effects

Short-term, minor air quality impacts would result from the operation of heavy-duty construction equipment, the installation of temporary heaters, demolition, and increased vehicular traffic attributed to construction personnel.

Actions that Fort Lewis would need to take to support the 2007 GTA ROD include construction of necessary cantonment facilities and training ranges at Fort Lewis. Cantonment construction support involves the construction of SBCT facilities within Fort Lewis's cantonment area that is in line with the alternatives set forth in the Master Plan update. **Appendix A** presents the construction projects for Fort Lewis's cantonment area that would be part of the 2007 GTA FPEIS implementation, and **Figure 2–3** shows the distribution of these projects.

Approximately 3,202,700 SF (74 acres [30 ha]) would be impacted by new construction for administrative, support, training, and dining facilities. In addition, 170 new single-family residences would be constructed to support new Soldiers. Fugitive dust generated during construction activities would be controlled with BMPs, such as the watering of work sites during construction, and interim and final revegetation of disturbed areas to control erosion. In addition, construction work would be spread out over 6 years, thereby moderating the acreage of disturbance per year. The heavy vehicles and equipment used to accomplish the work would also generate emissions. Both the dust and the emissions from equipment would be minor, provided BMPs were used, and would be localized to the sites where work occurred. The effects would last throughout the 6-year construction period. Total estimated construction emissions have been predicted using the URBEMIS model and are summarized by year in **Table 4–16**, with additional information provided in **Appendix E**.

Table 4–16 Total Estimated Annual Construction Emissions at Fort Lewis under Alternative 2

	Estimated Annual Construction Emissions[1] (tpy)					
Year	CO	NO_2	VOCs	SO_2	PM_{10}	$PM_{2.5}$
2010	41.85	28.46	8.51	0.04	52.24	11.96
2011	39.16	26.38	8.23	0.04	52.14	11.87
2012	36.75	24.44	8.01	0.04	52.23	11.81
2013	34.34	22.50	7.79		52.13	11.72
2014	32.13	20.59	7.56	0.04	52.02	11.62
2015	30.06	18.71	7.34	0.04	51.93	11.54

Note
1. Estimates assume that construction sites are watered twice daily to mitigate for dust.

The Army would utilize construction contractors that use equipment that meets the Tier 3 and Tier 4 diesel engine standards and uses Ultra-Low Sulfur Diesel fuel as required by EPA standards.

The Army will submit all required applicable plans, applications, and fees to the appropriate regulatory agencies prior to the commencement of project activities. Demolition of structures at Fort Lewis that contain asbestos material requires a permit from the PSCAA. Fort Lewis staff is familiar with PSCAA's requirements, based on numerous previous demolition projects. No unusual issues regarding asbestos abatement during demolition of housing are anticipated, so the PSCAA approval process should be straightforward. The Army will comply with all applicable requirements related to asbestos surveys, removal, and abatement.

4.7.7.3 Live-fire Training Direct and Indirect Effects

4.7.7.3.1 Less than Significant Effects

Increased live-fire training under Alternative 2 would potentially result in a greater risk of fire than under Alternative 1. Additional fires caused by increased training would primarily be low-intensity burns originating in the impact areas. Fires would be suppressed in areas with high fuel build up, but might be allowed to burn in prairie habitats with low fuels. Pollutants associated with smoke from fire include CO_2, CO, PM_{10}, $PM_{2.5}$, VOCs, and water vapor, with CO_2 and water vapor making up about 90 percent of emissions (Prescribed Fire and Fire Effects Working Team 1985). CO_2 and water vapor do not have direct health or visibility effects, but are both greenhouse gases that can contribute to climate change. CO accounts for nearly 6 percent of the total mass emitted during burning, PM accounts for approximately 2 percent, and VOCs account for nearly 1 percent. The total amounts of these pollutants emitted annually would depend on the number and size of the fires, and the amount of fuel consumed. Although it is likely that more fires would burn each year because of the increased training, this would probably amount to a few additional small range fires each year, which would contribute relatively small amounts of air pollutants to the atmosphere.

It is expected that existing management actions would continue to minimize the risk of larger fires that would consume a large quantity of biomass and emit large quantities of pollutants. Fire management measures include restrictions on where tracers, pyrotechnics, and troop fires are authorized during Level II and Level III fire hazard conditions (Fort Lewis Regulation 350–30); fire suppression activities by troops and the Forestry Program; and maintenance of firebreaks.

Additionally, given that the closest PSD Class I Area is located approximately 50 miles (80 km) away, additional fires under this alternative are not expected to impact any Class I Areas. Effects to

air quality would be temporary and would not be expected to cause significant opacity effects outside the installation boundary.

4.7.7.4 Maneuver Training Direct and Indirect Effects

4.7.7.4.1 Less Than Significant Effects

Under Alternative 2, there would be an increase in training activities on Fort Lewis, which could result in an increase in the amount of exhaust pollutants and other emissions produced relative to Alternative 1.

Under Alternative 2, three SBCTs would train at Fort Lewis simultaneously. In addition, the number of miles traveled by each Stryker vehicle would increase from current levels.

Each Stryker and SBCT support vehicle would travel about 1,920 miles (3,070 km) annually on Fort Lewis. Approximately 140 miles (225 km) would be traveled on MIL-CLASS 4 and 5 roads and off road, while the remainder of miles would be traveled on paved or other surfaced (crushed rock) roads (MIL-CLASS 1, 2, and 3 roads). **Table 4–17** summarizes the amount of pollutants generated by Stryker and SBCT support vehicles on Fort Lewis. Combustion of diesel fuel by these vehicles would generate 128.92 tons of CO, 224.29 tons of NO_x, 112.15 tons of VOCs, 659.36 tons PM_{10}, and 85.76 tons of $PM_{2.5}$ annually during training exercises (**Appendix E**).

Table 4–17 Sources and Estimated New Emissions Annually at Fort Lewis under Alternative 2

	Estimated New Annual Emissions[1] (tpy)					
Source	**CO**	**NO_x**	**VOCs**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Construction[1] (2010 through 2015 only)	41.85	28.46	8.51	0.04	52.24	11.96
SBCT vehicle training	128.92	112.15	112.15	4.90	659.36	85.76
GTA wheeled vehicle training	2.04	1.43	1.43	0.03	4.73	0.63
Helicopter training	0	0	0	0	0	0
Portable Generators	6.61	30.65	2.44	2.03	2.18	2.18
Military vehicle fuel station usage			1.57			
Commuting (on-Post & off-Post)	49.00	18.38	22.05	0.40	3.68	1.90
Other Personal Vehicle Use	49.00	18.38	22.05	0.40	3.68	1.90
Gas station usage (personal vehicles)			3.23			
Continuous operation after construction	4.39	4.00	4.68	0	0.01	0.01
Wastewater treatment			0.002			
Total emissions	281.81	213.45	178.11	7.80	725.88	104.34
Conformity Threshold	100	100	100	N/A[2]	N/A	N/A

Notes:
1. Annual emissions in the first year of construction. Emissions in years 2 through 6 would be equivalent or lower (see **Appendix E**).
2. N/A = not applicable because the area is in attainment for this pollutant.

In addition to SBCT vehicle mileage, GTA support vehicles would also generate PM and other emissions. Approximately 55 support vehicles would be associated with GTA actions. **Table 4–17** summarizes the amount of pollutants generated by support vehicles that would accompany the 1,900 new troops stationed at Fort Lewis under Alternative 2. Combustion of diesel fuel by these support vehicles and trucks would generate approximately 2.04 tons of CO, 2.85 tons of NO_x, 1.43 tons of VOCs, 4.73 tons of PM_{10}, and 0.63 ton of $PM_{2.5}$ annually during training exercises (**Appendix E**).

Increased fuel storage and transfer for military vehicles would generate approximately 1.57 tons of VOCs annually (**Table 4–17**). These VOCs are emitted from vents on storage tanks and during the transfer of fuel from the storage tank to the vehicle.

Increased generator usage by SBCT and GTA units in the field would generate approximately 6.61 tons of CO, 30.65 tons of NO_x, 2.44 tons of VOCs, and 2.18 tons of $PM_{10/2.5}$ annually (**Table 4–17**). These would be exhaust emissions associated with generators used during field exercises.

Under Alternative 2, there would be an increased potential for hazardous air pollutants to be released on Fort Lewis, relative to Alternative 1. There would be increased fuel usage, and therefore an increased potential for release of hazardous air pollutants. In addition, vehicle maintenance activities may involve the use of chemicals that are classified as hazardous air pollutants, such as coatings and solvents that are used on vehicles. All fuel storage and transfer activities and vehicle maintenance activities would follow air quality compliance procedures that meet NESHAPs. Therefore, significant effects to air quality associated with hazardous air pollutants would not be expected to occur.

Criteria and toxic air pollutants would be generated during smoke training. Air emissions associated with different levels of smoke training on Fort Lewis were evaluated in the *Final Environmental Assessment for the Fielding of M56 and M58 Smoke Generators at Fort Lewis and Yakima Training Center* (Army 1999), and in the *Final Environmental Assessment for Training with Smoke Munitions at Fort Lewis and Yakima Training Center, Washington* (Army 2001d). To ensure the smoke training would not violate air quality standards, use of smoke munitions and generators would not exceed the limits identified in these two EAs.

4.7.7.5 Conformity Rule

Section 176(c) of the Clean Air Act requires federal agencies to ensure that their actions are consistent with the Act and with state and local federally enforceable air quality management plans. The General Conformity Rule (40 CFR Subpart W, 51.850) requires that a conformity determination be prepared for federal actions occurring in nonattainment or maintenance areas.

Based on total new emissions occurring under Alternative 2, emissions of NO_x, CO, and VOC would exceed levels that would trigger a conformity analysis (**Table 4–17**). To determine whether the actions under Alternative 2 would cause a violation of the NAAQS, dispersion modeling was performed for emissions of CO and NO_x. The results of this modeling are presented in **Table 4–18**.

These results indicate that emissions of CO and NO_x, including monitored background emissions, are well below the NAAQS, and the actions under Alternative 2 would not cause a violation of the NAAQS. Because there is no NAAQS for VOC, modeling was not performed for this pollutant. However, VOC, in conjunction with NO_x, is a precursor of ozone. Based on regional data, approximately 40,933 tpy of VOCs and 38,714 of NO_x are emitted annually in Pierce and Thurston counties (EPA 2009d). The estimated 178 tpy VOCs and 213 tpy NO_x that would be emitted annually under Alternative 2 represent a 0.4 and 0.6 percent regional increase in VOCs and NO_x, respectively. New emissions of VOCs and NO_x would contribute a minimal amount to ozone formation in the region, would not be of regional significance because they are less than 10 percent of the regional emissions of these pollutants.

Training at Fort Lewis would not contribute to an air quality violation at the installation boundary, and would not adversely affect the health of humans off the installation. Therefore, air quality impacts would be less than significant.

Table 4–18 Air Pollutant Concentrations Modeled at Fort Lewis Installation Boundary (including Monitored Background) Under Alternative 2

	Pollutant Concentrations ($\mu g/m^3$)[1]		
Training Area	**1-hr CO**	**8-hr CO**	**Annual NO_x**
TA 3	737.60	201.40	N/A
TA 4	332.565	190.56	N/A
TA 5	355.11	167.42	N/A
TA 7	993.91	447.37	N/A
TA 8	466.27	261.34	N/A
TA 9	602.36	282.67	N/A
TA 10	241.41	83.46	N/A
TA 11	308.67	165.30	N/A
TA 12	678.37	239.77	N/A
TA 13	457.72	177.03	N/A
TA 14	651.30	190.49	N/A
TA 15	527.07	200.16	N/A
TA 18	503.58	241.55	N/A
TA 19	429.44	169.90	N/A
TA 20	209.86	59.70	N/A
TA 21	241.91	40.43	N/A
TA 22	126.09	31.52	N/A
TA 23	81.44	17.88	N/A
All Training Areas	N/A	N/A	4.09
Maximum Modeled Concentration	933.91	447.37	4.09
Monitored Background	7,011.49	4,482.76	33.84
Total Impact	7,945.40	4,930.13	37.93
NAAQS	40,000	10,000	100

Notes:
1. Includes Monitored Background, which refers to background concentrations of pollutants from natural sources, nearby sources, and unidentified sources. Source of background air data is EPA 2007.

4.7.8 Alternative 3 — GTA Actions + CSS Soldiers

Under Alternative 3, there would be an increase in emissions of pollutants associated with construction, training, and regional population increases than under Alternatives 1 and 2, but the increase would still be less than significant (**Table 4–14**).

4.7.8.1 Force Structure

The number of Soldiers stationed on Fort Lewis under this alternative would increase by about 1,000 from levels under Alternative 2 and by 2,900 from levels under Alternative 1. Therefore, the generation of air pollutants from use of personal vehicles, natural gas-fired heaters, and use of power tools would be greater than under Alternatives 1 and 2. Assuming a total of 260 new Soldiers living on Fort Lewis and 2,640 Soldiers living off Post from personnel associated with GTA and CSS actions there would be an annual increase of approximately 74.78 tons of CO, 28.05 tons of NO_x, 33.65 tons of VOCs, and 5.62 tons $PM_{10/2.5}$ from current levels (**Appendix E**). These emission increases are approximately 50 percent greater than those under Alternative 2. Additional emissions of air pollutants would be associated with non-commute driving by Soldiers, as well as vehicle use by Family members with cars. Similar to Alternative 2, it is assumed that these emissions would be similar to those attributable to commuting by Soldiers, although it is likely that they would be less.

Based on the projected increase in population, gasoline purchases on Fort Lewis would increase by approximately 9 percent, and wastewater loading into the treatment plant would increase by

approximately 4 percent from current levels (see **Appendix E** for calculations). The corresponding increase in VOC emissions on Fort Lewis would be about 4.9 tons from gas station usage and from wastewater treatment from current levels (**Table 4–19**). This increase is approximately 60 percent greater than the increase under Alternative 2, but emissions are still minor.

Table 4–19 Sources and Estimated New Emissions Annually at Fort Lewis under Alternative 3

	Estimated New Annual Emissions[1] (tpy)					
Source	**CO**	**NO_x**	**VOCs**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Construction[1] (2010 through 2015 only)	51.25	38.17	11.01	0.05	62.73	14.58
SBCT vehicle training	128.92	112.15	112.15	4.9	659.36	85.76
GTA wheeled vehicle training	2.04	1.43	1.43	0.03	4.73	0.63
CSS wheeled vehicle training	9.23	7.81	7.81	0.12	29.78	4.03
Helicopter training	0	0	0	0	0	0
Portable Generators	6.93	32.13	2.56	2.13	2.33	2.33
Military vehicle fuel station usage	0	0	1.84	0	0	0
Commuting (on-Post & off-Post)	74.78	28.05	33.65	7.00	5.62	2.90
Other Personal Vehicle Use	74.78	28.05	33.65	7.00	5.62	2.90
Gas station usage (personal vehicles)	0	0	4.94	0	0	0
Continuous operation after construction	5.72	4.63	6.0	0	0.01	0.01
Wastewater treatment	0	0	0.003	0	0	0
Total emissions	353.65	252.42	215.04	21.23	770.18	113.14
Conformity Threshold	100	100	100	N/A[2]	N/A	N/A

Notes:
1 Annual emissions in the first year of construction. Emissions in years 2 through 6 would be equivalent or lower (see **Appendix E**).
2 N/A = not applicable because the area is in attainment for this pollutant.

Continuous operation of newly constructed facilities, once construction is completed, would result in minor increases in emissions associated with use of natural gas heaters and other sources. The annual emissions from these sources would be approximately 5.72 tons of CO, 4.63 tons of NO_x, 0 tons SO_2, 6 tons of VOCs, 0.01 tons of $PM_{10,}$ and 0.01 tons of PM_{10}.

Stationary emission sources would be nearly equal to the emissions from continuous operation after construction. Emissions of this level are not expected to cause Fort Lewis to exceed limits listed in the synthetic minor permit.

4.7.8.2 Construction Direct and Indirect Effects

4.7.8.2.1 Less Than Significant Effects

Short-term, minor air quality impacts would result from the operation of heavy-duty construction equipment, the installation of temporary heaters, demolition, and increased vehicular traffic attributed to construction personnel.

Under Alternative 3, additional construction would occur beyond the projects discussed for Alternative 2, totaling approximately 583,230 SF (13.4 acres, 5.4 hectares) of new administrative, support, and training facilities (**Table 2–5**), and new family housing and barracks spaces. As under Alternative 2, dust emissions at construction sites would be controlled with BMPs, and would be spread out over 6 years. Total estimated emissions from demolition, renovation, and construction

projects under Alternative 3 are summarized in **Table 4–20**. These emissions are approximately 20 percent greater than those under Alternative 2.

Table 4–20 Total Estimated Construction Emissions at Fort Lewis under Alternative 3

	Estimated Annual Construction Emissions[1] (tpy)					
Year	**CO**	**NO_x**	**VOCs**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
2010	51.25	38.17	11.01	0.05	62.73	14.58
2011	48.06	35.47	10.62	0.05	62.56	14.45
2012	45.24	32.99	10.32	0.05	62.64	14.36
2013	42.41	30.5	10.01	0.05	62.5	14.23
2014	32.13	20.59	7.56	0.04	52.02	11.62
2015	30.06	18.71	7.34	0.04	51.93	11.54

Note
1. Estimates assume that construction sites are watered twice daily to mitigate for dust.

The Army would submit all applicable plans, applications, and fees to the appropriate regulatory agencies prior to the commencement of project activities. As under Alternative 2, no unusual issues regarding asbestos abatement during demolition of housing are anticipated, and the PSCAA approval process for demolition of structures with asbestos containing materials should be straightforward. The Army will comply with all applicable requirements related to asbestos surveys, removal, and abatement. Impacts to air quality would be negligible.

4.7.8.3 Live-fire Training Direct and Indirect Effects

4.7.8.3.1 Less than Significant Effects

There would only be a slightly greater amount of live-fire training than under Alternative 2. Therefore, the associated risk of fire and resultant air quality impacts would be much the same as those described under Alternative 2.

4.7.8.4 Maneuver Training Direct and Indirect Effects

4.7.8.4.1 Less Than Significant Effects

Under Alternative 3, the amount of vehicle exhaust and other emissions associated with maneuver training would be greater than under Alternative 1 and Alternative 2. About 200 vehicles are assigned to the CSS units and would contribute to exhaust emissions. Each CSS wheeled vehicle would travel about 145 miles (233 km) annually on MIL-CLASS 4 and 5 roads and off road and about 1,505 miles (2,422 km) annually on paved or other surfaced (crushed rock) roads on Fort Lewis. This mileage would be in addition to ongoing baseline levels of training, as well as training by SBCT, and GTA vehicles. **Table 4–19** summarizes the total estimated emissions associated with maneuver training under Alternative 3. These emissions would include approximately 140.19 tons of CO, 121.39 tons of NO_x and VOCs, 693.87 tons of PM_{10}, and 90.42 tons of $PM_{2.5}$ annually (see **Appendix E** for more information).

Increased fuel storage and transfer associated with military vehicles would generate approximately 1.84 tons of VOCs annually (**Table 4–19**), which would be just slightly greater than that under Alternative 2. Emissions associated with generator usage would also be only slightly greater than under Alternative 2, at approximately 6.93 tons of CO, 32.13 tons of NO_x, 2.56 tons of VOCs, 2.13 tons of SO_2, 2.33 tons of PM_{10}, and 2.33 tons of $PM_{2.5}$ annually.

Under Alternative 3, there would be a slightly greater potential for hazardous air pollutants to be released on Fort Lewis than under Alternative 2. All fuel storage and transfer activities and vehicle maintenance activities would follow air quality compliance procedures that meet NESHAPs, and significant effects to air quality would not be expected to occur.

4.7.8.5 Conformity Rule

Based on total predicted new emissions occurring under Alternative 3, a conformity determination would be triggered for CO and NO_x (**Table 4–19**). To determine whether the actions under Alternative 3 would cause a violation of the NAAQS, dispersion modeling was performed for emissions of CO and NO_x. The results of this modeling are presented in **Table 4–21**.

Table 4–21 Air Pollutant Concentrations Modeled at Fort Lewis Installation Boundary (including Monitored Background) Under Alternative 3

	Pollutant Concentrations ($\mu g/m^3$)[1]		
Training Area	**1-hr CO**	**8-hr CO**	**Annual NO_x**
TA 3	826.24	225.60	N/A
TA 4	371.93	213.11	N/A
TA 5	397.56	187.43	N/A
TA 7	1,041.45	498.89	N/A
TA 8	522.47	292.84	N/A
TA 9	673.40	316.01	N/A
TA 10	270.23	93.43	N/A
TA 11	345.45	184.99	N/A
TA 12	759.67	268.50	N/A
TA 13	511.36	197.77	N/A
TA 14	728.75	213.15	N/A
TA 15	590.32	224.18	N/A
TA 18	563.26	270.18	N/A
TA 19	480.74	190.20	N/A
TA 20	234.90	66.82	N/A
TA 21	270.26	45.16	N/A
TA 22	141.46	35.36	N/A
TA 23	91.21	20.02	N/A
All Training Areas	N/A	N/A	4.55
Maximum Modeled Concentration	1,041.4	498.9	4.55
Monitored Background	7,011.49	4,482.76	33.84
Total Impact	8,052.94	4,981.65	38.39
NAAQS	40,000	10,000	100

Notes:
1. Includes Monitored Background, which refers to background concentrations of pollutants from natural sources, nearby sources, and unidentified sources. Source of background air data is EPA 2007.

These results indicate that emissions of CO and NO_x, including monitored background emissions, are well below the NAAQS. Therefore, the actions under Alternative 3 would not cause a violation of the NAAQS. The estimated 215 tpy VOCs and 252 tpy NO_x that would be emitted annually under Alternative 3 represent a 0.5 and 0.7 percent regional increase in VOCs and NO_x, respectively. New emissions of VOCs and NO_x would contribute a minimal amount to ozone formation in the region, would not be of regional significance because they are less than 10 percent of the regional emissions of these pollutants.

4.7.9 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

Under Alternative 4, there would be an increase in emissions of pollutants associated with construction, training, and regional population increases than under the other alternatives, but the increase would still be less than significant (**Table 4–14**).

4.7.9.1 Force Structure

The number of Soldiers stationed on Fort Lewis under this alternative would increase about 2,800 from numbers under Alternative 3, by 3,800 from numbers under Alternative 2, and by 5,700 from levels under Alternative 1. Therefore, air pollutant emissions from personal vehicles, heaters, and power tools would be greatest under this alternative. Assuming a total of 520 new Soldiers living on Fort Lewis and 5,180 Soldiers living off Post from personnel associated with GTA, CSS, and medium CAB actions, there would be an annual increase of 146.81 tons of CO, 55.06 tons of NO_x, 66.07 tons of VOCs, and 11.02 tons PM_{10} from current levels (**Appendix E**). These emissions are nearly double those under Alternative 3, and approximately triple those under Alternative 1. Additional emissions of air pollutants would be associated with non-commute driving by Soldiers, as well as vehicle use by Family members with cars. Similar to Alternative 2, it is assumed that these emissions would be similar to those attributable to commuting by Soldiers, although it is likely that they would be less.

Based on the projected increase in population, gasoline purchases on Fort Lewis would increase by approximately 18 percent, and wastewater loading into the treatment plant would increase by approximately 7 percent from current levels (see **Appendix E** for calculations; **Table 4–22**). The corresponding increase in VOC emissions on Fort Lewis would be 9.7 tons from gas station usage and 0.006 ton from wastewater treatment from current levels. This increase is nearly double the increase under Alternative 3, but emissions are still minor.

Table 4–22 Sources and Estimated New Emissions Annually at Fort Lewis under Alternative 4

	Estimated New Annual Emissions[1] (tpy)					
Source	**CO**	**NO_x**	**VOCs**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Construction[1] (2010 – 2015 only)	76.43	59.56	16.25	0.07	121.99	27.79
SBCT vehicle training	128.92	112.15	112.15	4.90	659.36	85.76
GTA wheeled vehicle training	2.04	1.43	1.43	0.03	4.73	0.63
CSS wheeled vehicle training	9.23	7.81	7.81	0.12	29.78	4.03
CAB wheeled vehicle training	7.36	6.16	6.16	0.09	20.59	3.75
Helicopter training	163.57	13.64	133.15	4.75	4.71	4.71
Portable Generators	13.64	63.26	5.04	4.19	4.54	4.54
Military vehicle fuel station usage	0	0	5.53	0	0	0
Commuting (on-Post & off-Post)	146.81	55.06	66.07	14.70	11.02	5.70
Other Personal Vehicle Use	146.81	55.06	66.07	14.70	11.02	5.70
Gas station usage (personal vehicles)	0	0	9.74	0	0	0
Continuous operation after construction	13.54	10.56	15.94	0	0.02	0.02
Wastewater treatment	0	0	0.006	0	0	0
Total emissions	708.35	714.53	445.35	43.55	867.76	142.64
Conformity Threshold	100	100	100	N/A[2]	N/A	N/A

Notes:
1 Annual emissions in the first year of construction. Emissions in years 2 through 6 would be equivalent or lower (see **Appendix E**).
2 N/A = not applicable because the area is in attainment for this pollutant.

Continuous operation of newly constructed facilities, once construction is completed, would emissions totaling approximately 13.5 tons of CO, 10.6 tons of NO_x, 0 tons of SO_2, 15.94 tons of VOCs, 0.02 tons PM_{10}, and 0.02 tons $PM_{2.5}$. These emissions are substantially greater than those under the other alternatives.

Stationary emission sources would be nearly equal to the emissions from continuous operation after construction. Emissions of this level are not expected to cause Fort Lewis to exceed limits listed in the synthetic minor permit.

4.7.9.2 Construction Direct and Indirect Effects

4.7.9.2.1 Less Than Significant Effects

Short-term, minor air quality impacts would result from the operation of heavy-duty construction equipment, the installation of temporary heaters, demolition, and increased vehicular traffic attributed to construction personnel.

Under Alternative 4, additional construction would occur (beyond the projects discussed for Alternatives 2 and 3), totaling approximately 2,004,635 SF (46 acres, 18.6 ha) of new administrative, support, and training facilities (**Table 2–6**); and 2,395,710 SF (6.8 acres, 2.8 ha) of new single-family residences/townhomes; and a 295,370-SF (55-acre, 22.3-ha) aircraft maintenance hangar. As under the other alternatives, dust emissions at construction sites would be controlled with BMPs, and would be spread out over 6 years. Total estimated construction emissions have been predicted using the URBEMIS model, and are summarized by year in **Table 4–23,** with additional information provided in **Appendix E**.

Table 4–23 Annual Fort Lewis Emissions from Construction Equipment During 7-year Construction Period under Alternative 4

	Estimated Annual Construction Emissions[1] (tpy)					
Year	**$PM_{2.5}$**	**PM_{10}**	**NO_x**	**CO**	**SO_2**	**VOCs**
2010	27.79	121.99	59.56	76.43	0.07	16.25
2011	27.59	121.74	55.37	71.73	0.07	15.65
2012	27.47	121.96	51.49	67.58	0.07	15.19
2013	27.26	121.74	47.61	63.39	0.07	14.71
2014	24.57	111.17	36.32	51.89	0.06	12.1
2015	24.43	111.01	33.05	48.66	0.06	11.72

Note
1. Estimates assume that construction sites are watered twice daily to mitigate for dust.

The Army would submit all applicable plans, applications, and fees to the appropriate regulatory agencies prior to the commencement of project activities. As under the other alternatives, no unusual issues regarding asbestos abatement during demolition of housing are anticipated, and the PSCAA approval process for demolition of structures with asbestos containing materials should be straightforward. The Army would comply with all applicable requirements related to asbestos surveys, removal, and abatement. Impacts to air quality would be negligible.

4.7.9.3 Live-fire Training Direct and Indirect Effects

4.7.9.3.1 Less than Significant Effects

Under Alternative 4, the amount of live-fire training, and therefore the risk of fire would be greater than under the other alternatives. The total amounts of these pollutants emitted annually would

depend on the number and size of the fires, and the amount of fuel consumed. It is expected that most of the additional fires under this alternative would be small range fires each year, which would contribute relatively small amounts of air pollutants to the atmosphere. Existing fire management actions would continue to minimize the risk of larger fires, as discussed under Alternative 2.

Given that the closest PSD Class I Area is located approximately 50 miles (80 km) away, additional fires under this alternative are not expected to impact any Class I Areas. Effects to air quality would be temporary and would not be expected to cause significant opacity effects outside the installation boundary.

4.7.9.4 Maneuver Training Direct and Indirect Effects

4.7.9.4.1 Less Than Significant Effects

Under Alternative 4, the amount of vehicle exhaust and other emissions associated with maneuver training would be greater than under the other alternatives. A medium CAB has approximately 110 helicopters and 700 tactical vehicles including light trucks, fuelers, and transport vehicles. Under Alternative 4, each medium CAB wheeled vehicle would travel about 50 miles (80 km) annually on MIL-CLASS 4 and 5 roads and off road, and about 330 miles (531 km) annually on paved or other surfaced (crushed rock) roads on Fort Lewis. This mileage would be additive to ongoing baseline levels of training, as well as training by SBCT, GTA, and CSS vehicles. **Table 4–22** summarizes the total estimated emissions associated with maneuver training under Alternative 4. These emissions would include 147.55 tons of CO, 127.55 tons of NO_x and VOCs, 714.46 tons of PM_{10}, and 94.17 tons of $PM_{2.5}$ annually during training exercises (**Appendix E**). These emissions are slightly greater than those under Alternative 3.

Additionally**,** combustion of diesel fuel by helicopters would generate 163.57 tons of CO, 13.64 tons of NO_2, 4.71 tons of $PM_{10}/PM_{2.5}$, 4.75 tons of SO_2, and 133.15 tons of VOCs annually during training exercises. The numbers and types of helicopters used by the medium CAB, annual training hours, landing and take-off cycles, and emissions estimates are presented in **Appendix E**. With the addition of helicopter training, emissions associated with maneuver training are more than double those under Alternative 3.

Increased fuel storage and transfer associated with military vehicles would generate approximately 2.8 tons of VOCs annually (**Table 4–22**), which would be greater than those under the other alternatives, but would still be minor. Emissions associated with generator usage would be more than double those under Alternative 3, at approximately 13.64 tons of CO, 63.26 tons of NO_x, 5.04 tons of VOCs, 4.19 tons of SO_2, and 4.54 tons of $PM_{10}/_{2.5}$ annually.

Under Alternative 4, there would be a greater potential for hazardous air pollutants to be released on than under the other alternatives. All fuel storage and transfer activities and vehicle maintenance activities would follow air quality compliance procedures that meet NESHAPs, and significant effects to air quality would not be expected to occur.

4.7.9.5 Conformity Rule

Based on total new emissions occurring under Alternative 4, emissions of CO, NO_x, and VOCs would exceed levels that would trigger a conformity determination. To determine whether the actions under Alternative 4 would cause a violation of the NAAQS, dispersion modeling was performed for emissions of CO and NO_x. The results of this modeling are presented in **Table 4–24**.

Table 4–24 Air Pollutant Concentrations Modeled at Fort Lewis Installation Boundary (including Monitored Background) Under Alternative 4

	Pollutant Concentrations (µg/m^3)[1]		
Training Area	**1-hr CO**	**8-hr CO**	**Annual NO_x**
TA 3	1,050.58	286.86	N/A
TA 4	473.73	271.45	N/A
TA 5	505.77	238.44	N/A
TA 7	1,330.11	637.17	N/A
TA 8	664.71	372.57	N/A
TA 9	857.51	402.41	N/A
TA 10	343.63	118.80	N/A
TA 11	439.92	235.59	N/A
TA 12	969.09	342.53	N/A
TA 13	650.82	251.71	N/A
TA 14	924.14	270.29	N/A
TA 15	750.79	285.11	N/A
TA 18	716.94	343.90	N/A
TA 19	612.65	242.39	N/A
TA 20	298.82	85.01	N/A
TA 21	343.97	57.48	N/A
TA 22	179.88	44.97	N/A
TA 23	157.09	26.74	N/A
All Training Areas	N/A	N/A	6.60
Maximum Modeled Concentration	1,330.1	637.20	6.60
Monitored Background	7,011.49	4,482.76	33.84
Total Impact	8,341.60	5,119.93	40.44
NAAQS	40,000	10,000	100

Notes:
1. Includes Monitored Background, which refers to background concentrations of pollutants from natural sources, nearby sources, and unidentified sources. Source of background air data is EPA 2007.

These results indicate that emissions of CO and NO_x, including monitored background emissions, are well below the NAAQS, and the actions under Alternative 4 would not cause a violation of the NAAQS. The estimated 445 tpy VOCs and 715 tpy NO_x that would be emitted annually under Alternative 4 represent a 1 and 2 percent regional increase in VOCs and NO_x, respectively. New emissions of VOCs and NO_x would contribute a minimal amount to ozone formation in the region, would not be of regional significance because they are less than 10 percent of the regional emissions of these pollutants.

Training at Fort Lewis would not contribute to an air quality violation at the installation boundary, and would not adversely affect the health of humans off the installation. Therefore, air quality impacts would be less than significant.

4.7.10 Cumulative Effects

4.7.10.1 Less than Significant

Less than significant cumulative impacts to air quality in the South Puget Sound region and on Fort Lewis would be expected under the No Action Alternative. Air quality in the region has been degraded by past and present construction, traffic, and other pollutant-generating activities. Sustainability efforts on Fort Lewis, and regional efforts to protect air quality, would help ensure that air quality in the region would be protected for future generations.

Cumulative effects would also be less than significant under the other alternatives. Development, industry, and population increases in the South Puget Sound region have resulted in cumulative impacts to air quality in the past. Carbon monoxide emissions, in particular, have been a concern for the South Puget Sound region, largely because of increased traffic congestion in the region. Fort Lewis is located in an area that was previously designated as a nonattainment area for CO.

The alternatives and other actions and activities in the area would result in increases in air pollutant emissions within the region. There would be increased exhaust emissions, and in the case of vehicles used in maneuver training, increased dust emissions. On a regional scale, development and growth in the South Puget Sound region will continue to increase emissions associated with traffic, industry, and residences. Agriculture and fire are also sources of air pollution. Therefore, Army actions would be expected to contribute to cumulative impacts to air quality in the region. Some of these increases could be offset by potential regional reductions in air emissions because of better traffic flow associated with transportation improvement projects. In addition, sustainability efforts by Fort Lewis to reduce traffic congestion on the installation and reduce overall energy consumption by 2025 would help decrease air emissions that originate on Fort Lewis and/or are associated with fuel burning to provide energy sources for the installation. Efforts to conduct smoke-, dust- and other pollutant-generating activities during periods with favorable weather (based on factors such as wind speed and direction) would minimize the effects of pollutants generated on Fort Lewis affecting nearby communities.

Off Post, continued improvements in vehicle fuel efficiency and pollution control, upgrading of construction standards for housing and industrial development to reduce energy use, enforcement of pollution control regulations for industry, and enforcement of bans on wood stove use and other types of burning, should help to reduce or stabilize air emissions regionally, despite the steady population increase in the South Puget Sound region. Regional efforts to improve air quality, such as a wood stove replacement program and efforts to clean up diesel engines, have already had a positive impact, as evidenced by the redesignation of Thurston County's non-attainment area for PM_{10} to a maintenance area in 2000 (PSCAA 2010).

The greenhouse effect is the result of heat absorption by certain gases in the atmosphere (called greenhouse gases [GHG] because they effectively "trap" heat in the lower atmosphere) and re-radiation downward of some of that heat. Water vapor is the most abundant greenhouse gas, followed by carbon dioxide and other trace gases. Human activity has been increasing the concentration of GHG in the atmosphere (mostly carbon dioxide from combustion of coal, oil, and gas, plus a few other trace gases). The global concentration of CO_2 in our atmosphere today far exceeds the natural range over the last 650,000 years. Global surface temperatures have increased about 0.74°C (plus or minus 0.18°C) since the late-19th Century, and the linear trend for the past 50 years of 0.13°C (plus or minus 0.03°C) per decade is nearly twice that for the past 100 years.

The proposed action would contribute GHG to the Earth's atmosphere by adding vehicles and personnel, along with associated emissions at Fort Lewis. The proposed action could result in an increase due to additional energy generation associated with energy service to additional buildings and additional vehicles at the installation. Nonetheless, only some of the emissions would represent a net increase in global GHG emissions, as many of these emissions already take place and are merely relocating to Fort Lewis. For example, Stryker vehicles operating in Kuwait, Iraq, or Afghanistan would still contribute to the global GHG inventory. Also, some of the helicopters are coming from either Texas or Alaska, so in terms of GHG, the move to Fort Lewis presents no new emissions because the associated emissions in Texas and Alaska would be eliminated.

Additionally, it is important to place these carbon emissions in the context of the federal government's overall plan to reduce carbon emissions. EO 13423 sets as a goal for all federal agencies the improvement in energy efficiency and the reduction of GHG emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal 2015, relative to the baseline to the agency's energy use in fiscal year 2003. The U.S. Army Energy Strategy for Installation (Army 2005e) also contains strategies to reduce energy waste and improve efficiency.

EO 13514, signed by President Obama on October 5, 2009 expands on EO 13423 by making reductions of GHG emissions a priority of the Federal government and by requiring agencies to develop sustainability plans focused on cost-effective projects and programs. The EO requires agencies to measure, manage, and reduce GHG emissions toward agency-defined targets. It describes a process by which agency goals will be set and reported to the President by the Chair of CEQ. The EO also requires agencies to meet a number of energy, water, and waste reduction targets.

Information relevant to the specific impacts of Army projects, including the proposed actions, on the global climate is not known. The state of science pertaining to GHG is developing and it is not currently possible to predict at what levels emissions impact climate change. Consequently, conclusive scientific findings that would aid decision-makers are not possible at this time (40 CFR 1502.22). However, based on the amount of GHG emissions the proposed alternatives would contribute, in conjunction with Army initiatives to reduce GHG emissions overall, it is not anticipated that any of the alternatives would result in a significant impact on the global climate.

4.7.11 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on air quality. These BMPs include complying with requirements for stationary sources of emissions, using New Source Performance Standards boilers, and conducting air quality permit compliance audits (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to establish monitoring stations as required to collect localized air quality sampling data to assess the effects of HAPs (**Table 4–42**).

4.8 NOISE

The Army conducted a noise study in February 2009 (USACHPPM 2009) to provide noise contours that forecast aircraft and impulsive weapons noise under the Grow the Army Plan. The methodology for generating noise contours is described in that study. USACHPPM conducted the noise modeling for Alternatives 2, 3, and 4. The noise study considers three scenarios:

1. Projected Operating Environment Scenario 1. This scenario represents Alternative 2 and includes Alternative 1 as well. Fort Lewis has three SBCTs; however, only one or two SBCTs have been at Fort Lewis in a full-up training mode at a time due to deployments. Scenario 1 reflects the contemporary operating environment with the full-up training mode of three SBCTs.
2. Projected Operating Environment Scenario 2. This scenario represents Alternative 3. The additional weapons activity of the CSS units would consist of small caliber (.50 caliber and below) operations only. Demolition and large caliber operational noise would continue to be generated by the SBCTs as under Alternative 2.
3. Projected Operating Environment Scenario 3. This scenario represents Alternative 4. The additional weapons activity of the medium CAB would consist of small caliber (.50 caliber and below) operations only. Demolition and large caliber operational noise would continue to be generated by the SBCTs as under Alternatives 2 and 3. The stationing of a medium CAB would increase the rotary wing aircraft stationed at GAAF.

The ROI for noise depends on the intensity of noise generation. The ROI is defined as the outer geographic limit of the direct noise effects (U.S. Army Environmental Command 2007). This includes the land and airspace where noise generated from the project area can be distinguished from other ambient noise. For this project, the distance could be up to 40 miles.

4.8.1 Resource-specific Significance Criteria

The significance of the impacts was determined by the comparison of affected receptors to the acceptable compatible land uses (U.S. Army Environmental Command 2007). Considerations used to evaluate noise impact significance include:

- Whether land use compatibility problems would be created (AR 200–1);
- Whether peak noise and random blast noise levels are exceeded 15 percent of the time and would be likely to cause significant annoyance to individuals in incompatible land uses (USACHPPM evaluation of blast noise complaints); and
- Whether there would be a high risk of complaint by individuals residing in areas near incompatible land uses (USACHPPM evaluation of blast noise complaints)

4.8.2 Overview of Impacts to Noise by Alternative

Table 4–25 summarizes the potential noise effects associated with each of the alternatives for each activity group. Implementation of any of the three action alternatives would result in significant effects.

Table 4–25 Summary of Potential Effects to Noise at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	U	U	U
Maneuver Training Direct and Indirect Effects	€	€	€	U
Cumulative Effects	€	U	U	U

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.8.3 Alternative 1 — No Action Alternative

The modeling effort for Scenario 1 represents Alternative 2, which includes three SBCTs. Impacts to Alternative 1 would be less than impacts from Alterative 2 because fewer than three SBCTs would be operational simultaneously.

4.8.3.1 Construction Direct and Indirect Effects

4.8.3.1.1 Less than Significant Effects

Under this alternative, a variety of facilities would be constructed in the cantonment area at Fort Lewis. These common construction projects would be short term and variable because the projects would be spread out over 6 years and across the cantonment area. Land use compatibility problems are not anticipated with this construction of new facilities, and construction does not generate the peak noise levels (as do large-caliber weapons) that could be exceeded 15 percent of the time. Consequently, impacts to noise would be less than significant.

4.8.3.2 Live-fire Training Direct and Indirect Effects

4.8.3.2.1 Less than Significant Effects

Impacts from this alternative would be similar to current conditions. Therefore, impacts from live-fire would be less than live-fire impacts from Alternative 2 and would be less than significant.

The noise contours for small arms operations near the Fort Lewis cantonment area are shown on **Figure 3–9**. The Zone II (PK15[met] 87 dB) noise contour extends into the Evergreen, Hillside, and Madigan housing areas. The Zone III (PK15[met] 104 dB) noise contours do not extend into the housing areas.

Figure 3–7 shows the noise contours for the baseline condition demolition and large caliber weapons at Fort Lewis. The LUPZ, Noise Zone II, and Noise Zone III extend beyond the boundary into neighboring communities. This indicates that land use compatibility problems could occur just inside the Nisqually Indian Reservation and just inside the City of Roy.

The noise contours for the baseline airfield operations are shown on **Figure 3–8**. The LUPZ (60 ADNL) and Zone II (65 ADNL) noise contours do not extend into the family housing areas or beyond the installation boundary. The low number of operations does not produce a Zone III (75 ADNL) noise contour. Therefore, this indicates that land use land use compatibility problems are not incurred.

The large caliber weapons complaint risk noise contours would be similar to current conditions. The large caliber weapons baseline complaint risk noise contours for Fort Lewis are shown on **Figure 3–10**. The moderate complaint risk contour (PK15[met] 115 dB) extends beyond much of the boundary and into the off-Post communities of DuPont, Lacey, and Yelm. The high complaint risk contour (PK15[met] 130 dB) extends beyond the boundary into the Nisqually Indian Reservation and near the City of Roy. Thus, peak noise would be exceeded 15 percent of the time just inside the Nisqually Indian Reservation and near the City of Roy.

Although the slight extension of the high complaint risk contour into the Nisqually Indian Reservation and near the City of Roy suggests a potential for noise complaints, Fort Lewis has been receiving relatively few complaints. Since Fort Lewis began monitoring the annual number of noise complaints received for more than 10 years ago, the number of complaints has been declining from a peak of 495 in 1998. Since 2002, the number has been less than 100 annually (Van Hoesen 2009b). Based on the number of noise complaints received annually by Fort Lewis, noise has not been a significant issue. Therefore, overall impacts from live-fire would be less than significant.

4.8.3.3 Maneuver Training Direct and Indirect Effects

4.8.3.3.1 Less than Significant Effects

Maneuver training also can involve weapons firing. For example, convoy live-fire involves weapons firing while on the move. Overall, maneuver training involves less firing than specific live-fire training. Maneuver training is not expected to cause land use compatibility problems and no evidence exists to suggest that peak noise would be exceeded 15 percent of the time. Therefore, impacts from maneuver training would be less than significant.

4.8.4 Alternative 2 — GTA Actions

4.8.4.1 Construction Direct and Indirect Effects

4.8.4.1.1 Less than Significant Effects

As with Alternative 1, a variety of facilities would be constructed in the cantonment area at Fort Lewis under this alternative. These common construction projects would be short term and variable because the projects would be spread out over 6 years and across the cantonment area. Land use compatibility problems are not anticipated with this construction of new facilities because the noise would be limited to the Fort Lewis environs. In addition, construction does not generate the peak noise levels (as do large-caliber weapons) that could be exceeded 15 percent of the time. Consequently, impacts to noise would be less than significant.

4.8.4.2 Live-fire Training Direct and Indirect Effects

4.8.4.2.1 Significant Effects

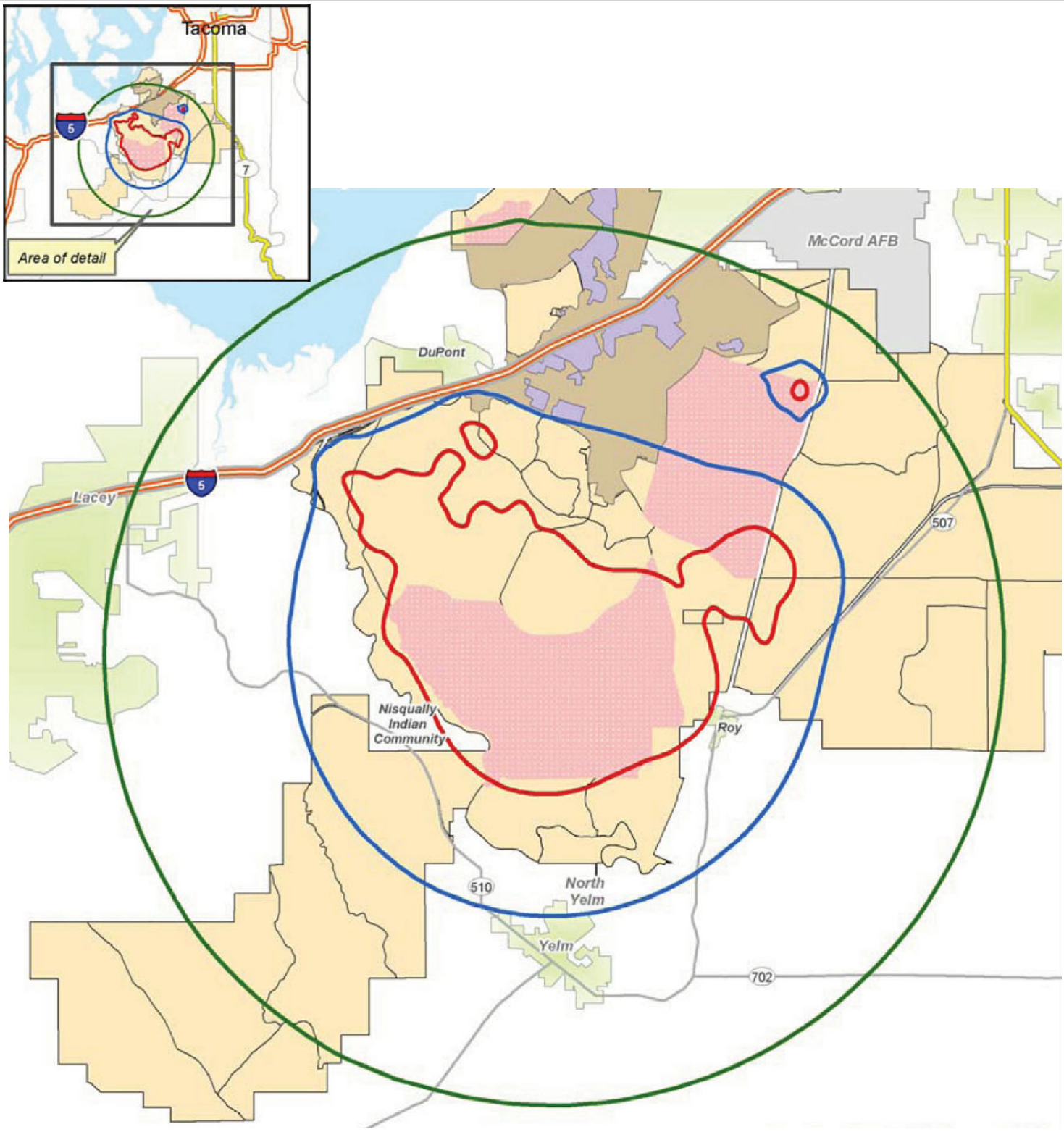
Training ranges and facilities necessary to support an SBCT are detailed in **Table 2–7**. Both small and large caliber weapons are operated. Three SBCTs are stationed at Fort Lewis, and elements of all three would train at Fort Lewis simultaneously.

Noise from demolitions and firing of large caliber weapons would extend out further from Fort Lewis under this alternative than under Alternative 1 (**Figure 4–1**). The LUPZ 57 dB CDNL would extend approximately 2.8 miles (4,500 m) beyond the western boundary of Fort Lewis, towards the City of Lacey; approximately 0.9 mile (1,500 m) into the DuPont area; approximately 2.5 miles (4,000 m) beyond the southern boundary, encompassing the City of Yelm; and approximately 3.4 miles (5,500 m) beyond the southeastern boundary of Fort Lewis. Noise Zone II (62 dB CDNL) would extend beyond the western boundary approximately 0.6 mile (1,000 m) encompassing the Nisqually Indian Reservation; less than 0.3 mile (500 m) beyond the southern boundary, into Yelm; and beyond the southeastern boundary 1.2 miles (2,000 m), encompassing the City of Roy. Finally, the Noise Zone III (70 dB CDNL) contour would extend beyond the western boundary less 0.3 mile (500 m) into the Nisqually Indian Reservation and approximately 0.1 mile (200 m) beyond the southeastern boundary near the City of Roy. Extension of noise contours into communities creates the potential for land use compatibility issues, especially when residential land is involved. In addition, the extension of noise contours out from Fort Lewis would likely increase the potential for noise complaints. Therefore, impacts to noise from demolition and large caliber weapons under Alternative 2 would be significant.

Impacts to noise from GAAF under Alternative 2 would be similar to Alternative 1. The noise contours for the baseline airfield operations are shown on **Figure 3–8**. The LUPZ (60 ADNL) and Zone II (65 ADNL) noise contours do not extend into the family housing areas or beyond the installation boundary. The low number of operations does not produce a Zone III (75 ADNL) noise contour. Therefore, this indicates that land use compatibility problems would not occur and the effects would be less than significant.

4.8.4.2.1.1 Small Caliber Weapons Noise

The contours for small arms operations at Fort Lewis were created using PK15 (met). Because the contours are based on peak levels rather than a cumulative or average level, the size of the contours would not change as the number of rounds fired increases. Therefore, the projected effects to noise are expected to be similar to those for Alternative 1.



Source: USACHPPM 2009

Legend

- Cantonment Area
- Housing Area
- Impact Area
- Fort Lewis
- LUPZ (57 dB CDNL)
- Zone II (62 dB CDNL)
- Zone III (70 dB CDNL)

N W E S

1.5 .75 0 1.5 4.5

Kilometers

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Figure 4-1
Fort Lewis Projected Operating Environment Demolition and Large Caliber Operational Noise Contours

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 7/14/2009	File: Ft. Lewis Figures.dwg
Prepared By: ETC	Layout: 012

The noise contours for small arms operations near the Fort Lewis cantonment area are shown on **Figure 3–9**. The Zone II (PK15[met] 87 dB) noise contour extends into the Evergreen, Hillside, and Madigan housing areas. The Zone III (PK15[met] 104 dB) noise contours extend into the cantonment area, but do not extend into the housing areas. This indicates that land use compatibility problems and a high risk of complaint would not occur. Although the local conditions at Fort Lewis require noise-sensitive land uses in Noise Zone II, on Post, this type of land use is strongly discouraged in AR 200–1 (Army 2007b). Noise-sensitive land uses are acceptable within the LUPZ and Noise Zone I, normally not recommended in Noise Zone II, and not recommended in Noise Zone III. However, if the community determines that land in Noise Zone II (attributable to small arms) areas must be used for residential purposes, then the NLR features of 25 to 30 dB should be incorporated into the design and construction of new buildings to mitigate interior noise levels. Normal construction can be expected to provide an NLR of 20 dB. Therefore, impacts to noise from small caliber weapons are considered similar to Alternative 1 and less than significant.

4.8.4.2.1.2 Complaint Risk Guidelines for Demolition Activity and Large Caliber Weapons

Under the Complaint Risk Guidelines, the peak contours show the expected level that one would see on a sound level meter when a weapon is fired. This metric represents the best available scientific quantification for assessing the complaint risk of large caliber weapons ranges. The complaint risk areas for PK15 (met) noise contours are defined as follows:

1. The high risk of complaint consists of the area around the noise source in which PK15 (met) is greater than 130 dB for large caliber weapons.
2. The moderate risk of complaint area is the area where the PK15 (met) noise contour is between 115 dB and 130 dB for large caliber weapons.
3. The low risk of complaint area is the area where the PK15 (met) noise contour is less than115 dB for large caliber weapons.

The large caliber weapons complaint risk noise contours for Fort Lewis are shown in **Figure 3-10**. The complaint risk contours are based on peak levels rather than a cumulative or average level; therefore, the sizes of the contours would not change if the number of rounds fired increases.

The moderate complaint risk contour (PK15 [met] 115 dB) extends beyond much of the boundary of Fort Lewis and into the communities of DuPont, Lacey, and Yelm. The high complaint risk contour (PK15 [met] 130 dB) extends beyond the boundary into the Nisqually Indian Reservation and near the City of Roy. Because the 130 dB PK (met) contour extends into residential areas, the risk of complaints would be high in those areas. This meets the significance criterion.

The Army noise study concludes that an increase to a full-up training component of three SBCTs could result in an increase in the number of complaints received from residents who were previously unexposed or infrequently exposed to noise from military training (USCHPPM 2009). The study also concludes that, although local conditions at Fort Lewis require noise-sensitive land uses in Noise Zone III, on and off Post, this type of land use is strongly discouraged.

Overall, impacts from noise because of live-fire training would be significant.

4.8.4.3 Maneuver Training Direct and Indirect Effects

4.8.4.3.1 Less than Significant Effects

Effects to noise from maneuver training would increase over those described for Alternative 1, but still be less than significant. Land use compatibility problems are not anticipated and there is no

evidence that peak noise would be exceeded 15 percent of the time. The primary reason for the increase in noise is the increase in SBCT training. Modeling contours do not account for impacts from just vehicle operations noise. Under Alternative 2, impacts to noise from maneuver training are not expected to be significant.

4.8.5 Alternative 3 — GTA Actions + CSS Soldiers

Impacts from Alternative 3 would be similar to impacts from Alternative 2 (**Table 4–25**). The addition of up to 1,000 CSS Soldiers under Alternative 3 does not add substantially more noise than Alternative 2. This action continues to support the training of three SBCTs at one time, as does Alternative 2.

4.8.5.1 Construction Direct and Indirect Effects

4.8.5.1.1 Less than Significant Effects

Construction of the MILCON projects identified for Alternatives 1 and 2 combined with construction in support of the CSS Soldiers would be short term in duration and variable because they would be spread out over 6 years and across the cantonment area. Land use compatibility problems are not anticipated as a result of this construction, and construction does not generate the peak noise levels (as do large-caliber weapons) that could be exceeded 15 percent of the time. Consequently, the increase would still be less than significant.

4.8.5.2 Live-fire Training Direct and Indirect Effects

4.8.5.2.1 Significant Effects

Noise from demolitions and firing of large caliber weapons would extend out further from Fort Lewis's boundary under Alternative 3 than under Alternatives 1 or 2 (**Figure 4–1**). Under Alternative 3, the LUPZ (57 dB CDNL) would extend approximately 4.3 miles (7,000 m) beyond the boundary in most directions. The Noise Zone II (62 dB CDNL) would extend beyond the western boundary approximately 1.2 miles (2,000 m) encompassing the Nisqually Indian Reservation; less than 0.9 miles (1,500 m) beyond the southern boundary, into Yelm; and beyond the southeastern boundary 1.9 miles (3,000 m), encompassing the City of Roy. The Noise Zone III (70 dB CDNL) contour would extend beyond the western boundary approximately 0.6 miles (1,000 m) into the Nisqually Indian Reservation and approximately 0.2 miles (400 m) beyond the southeastern boundary near the City of Roy. The increased contour size over the existing environment (**Figure 3-7**) is driven by the full-up simultaneous training mode of three SBCTs. The increased size is a cumulative effect and is not driven by any particular weapon or activity. Therefore, impacts to noise from Alternative 3 would be similar to Alternative 2, which results in significant effects.

Current land use in the Zone II area consists of residential, scattered residential, and undeveloped areas. The lands in the Zone III areas are undeveloped. Although the local conditions at Fort Lewis require noise-sensitive land uses in Noise Zone II, on and off Post, this type of land use is strongly discouraged in AR 200–1 (Army 2007b). Noise-sensitive land uses are acceptable within the LUPZ and Noise Zone I, normally not recommended in Noise Zone II, and not recommended in Noise Zone III.

Figure 3–10 shows complaint risk contours for the demolition and large caliber weapons for the projected operating environment. The weapon and ammunition types utilized under Alternatives 2 and 3 would be identical. Therefore, impacts to noise from Alternative 3 would be similar to Alternative 2.

Impacts to noise from small caliber operations would be the same as described for Alternative 2. The contours are based on peak levels. Consequently, they would not change with increases in the number of rounds fired.

The addition of CSS Soldiers would not add perceptibly to impacts from GAAF under Alternative 3, because the CSS units do not use helicopters. Therefore, impacts to noise associated with GAAF under Alternative 3 would be the same as under Alternative 2. The LUPZ contour would be in the cantonment area, but it would not overlap housing areas.

4.8.5.3 Maneuver Training Direct and Indirect Effects

4.8.5.3.1 Less than Significant Effects

The effects of maneuver training under Alternative 3 on noise would be similar to those described for Alternative 2. As shown in **Appendix E**, the CSS units would account for a relatively small portion of overall maneuver training miles compared to the SBCTs and the additional noise from their maneuver training exercises would be imperceptible in the overall picture. Land use compatibility problems are not anticipated and peak noise would not exceed 15 percent of the time. Consequently, the effects of this alternative are essentially the same as those for Alternative 2, less than significant.

4.8.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.8.6.1 Construction Direct and Indirect Effects

4.8.6.1.1 Less than Significant Effects

Construction would be short term in duration and variable because the construction projects would be spread out over 6 years and across the entire cantonment area. As with the other alternatives, land use compatibility problems are not anticipated, and construction does not generate the peak noise levels (as do large-caliber weapons) that could be exceeded 15 percent of the time. Consequently, the increase in noise associated with construction of new facilities would be less than significant.

4.8.6.2 Live-fire Training Direct and Indirect Effects

4.8.6.2.1 Significant Effects

Impacts from demolition and large caliber operational noise would increase slightly under this alternative compared to Alternatives 2 and 3 because of training for the Soldiers of the medium CAB. However, as **Table 2–7** suggests, live-fire training by the medium CAB in and of itself would not contribute appreciably to noise levels at Fort Lewis. As under Alternatives 2 and 3, most of the impacts from demolition and large caliber operational noise would continue to be generated by the three SBCTs and impacts from small caliber weapons and complaint risk would be similar to Alternative 3. Consequently, the noise impacts also would be significant.

4.8.6.3 Maneuver Training Direct and Indirect Effects

4.8.6.3.1 Significant Effects

The addition of the medium CAB with its helicopters to maneuver training conducted under Alternative 4 would substantially increase the amount of noise generated by this type of training. Impacts to noise from operations at GAAF would be significant. With the stationing of the medium CAB, the increase in helicopter operations at GAAF would extend the LUPZ (60 ADNL) and Zone

II (65 ADNL) noise contours into the cantonment area (**Figure 4–2**). With this extension of contours, an increase in the number of complaints about noise is expected.

In addition, the helicopters may fly over, or fly a portion of the perimeter of Fort Lewis. Noise from these flights would carry unobstructed into the adjoining communities and cause annoyance. The result of these increased flights would likely be an increase in the number of complaints that Fort Lewis receives annually. Because of the extension of the UPZ and Zone II contours into the cantonment area and increased operations of helicopters along Fort Lewis's perimeter, impacts from maneuver training would be significant.

4.8.7 Cumulative Effects

4.8.7.1 Significant Effects

Cumulative effects for Alternative 1 would be less than significant. The combination of direct and indirect effects of Alternative 1 and other RFFAs is not expected to extend the LUPZ, Noise Zone II, or Noise Zone III contours beyond where they were projected for Alternative 1. Consequently, cumulative land use compatibility problems are not anticipated nor is peak noise expected to exceed 15 percent of the time. Therefore, cumulative impacts to noise would be less than significant.

Cumulative effects associated with Alternatives 2, 3, and 4 would be significant. As discussed above, the direct and indirect effects of live training for each of these alternatives were determined to be significant. In addition, maneuver training under Alternative 4 would result in significant direct and indirect effects. When these significant effects are considered with the direct and indirect effects of other RFFAs, the overall result is cumulative effects that would be significant as well.

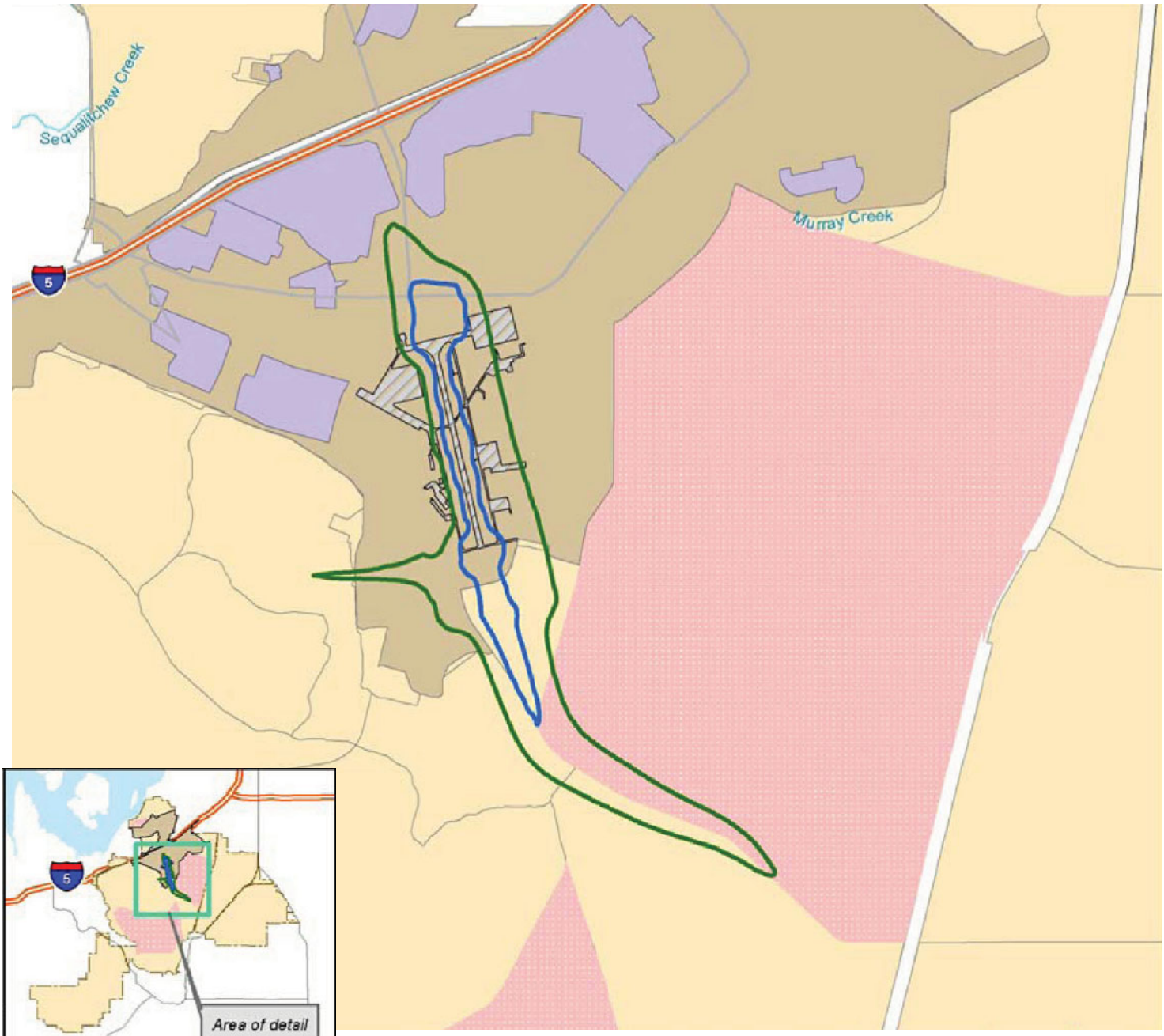
4.8.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on noise. These BMPs include implementing the requirements of Fort Lewis Regulation 360–5, *Noise and Vibration Complaint Procedure,* following the "Fly Friendly" program when flying over congested areas, and implementing noise level reduction features in the design and construction of noise-sensitive receptors (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to maintain 2,000 feet AGL when flying over the Nisqually National Wildlife Refuge and construct sound mitigating berms on selected firing ranges (**Table 4–42**).

4.9 LAND USE CONFLICT/COMPATIBILITY

Impacts to land uses and recreation resources were assessed based on whether the proposed project activities would be compatible with existing or planned land uses in the ROI for each project alternative. Impacts on recreation resources were assessed by determining the types of land and recreational uses in and around the project activities and then evaluating their sensitivity to the short- and long-term project effects. Localized and temporary impacts on land use during construction are also evaluated, as well as training changes to land that is currently used for training. Also considered was the consistency of the proposed project activities with the objectives and policies of the pertinent federal, state, and local land use and recreation plans.

Direct impacts to land uses occur from changes to existing land use designations or conflicts with existing or planned land uses. Indirect impacts to land uses occur from encroachment to neighboring land uses from proposed actions or activities. Noise effects are addressed in **Section 4.8**, and tribal access to Fort Lewis is addressed in **Section 4.6**. Consequently, effects associated with noise and tribal access are not discussed in this section.



Source: USACHPPM 2009

Legend

- Cantonment Area
- Housing Area
- Gray Army Airfield
- Impact Area
- Fort Lewis
- LUPZ (60 dB ADNL)
- Zone II (65 dB ADNL)

N

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Miles

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Figure 4-2
Fort Lewis - Gray Army Airfield Projected Operation Environment - Operational Noise Contours

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 7/14/2009	File: Ft. Lewis Figures.dwg
Prepared By: ETC	Layout: 013

One issue relating to land use conflict/compatibility at Fort Lewis was identified during public scoping. This issue is Temporary and permanent land use effects from implementing GTA actions.

4.9.1 Resource-specific Significance Criteria

Impacts on land use in general and on training areas in particular at Fort Lewis resulting from implementation of the proposed action and its alternatives would be considered significant if the action is:

- incompatible with existing military land uses/land use designations on the installation, or conflicts with Army land use plans, policies, or regulations (specifically including AR 350–19, The Army Sustainable Range Program), or
- incompatible with non-military land uses on the installation, including recreational use or conflicts with non-military land use plans or policies.

4.9.2 Overview of Impacts to Land Use Conflict/Compatibility by Alternative

Table 4–26 summarizes the impacts associated with land use conflict/compatibility that would occur under each of the alternatives. Less than significant effects are expected from construction, live-fire training, maneuver training, and cumulative effects.

Table 4–26 Summary of Potential Effects to Land Use Conflict/Compatibility at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.9.3 Alternative 1 — No Action Alternative

4.9.3.1 Construction Direct and Indirect Effects

4.9.3.1.1 Less than Significant Effects

The construction of new facilities, including administrative, residential, and open spaces, would not change current land uses or land use designations in the cantonment area. Indirect impacts on land use from construction would include increased noise, dust, and construction-related traffic. These impacts, however, would be localized and temporary. Overall, the effects of this construction would be less than significant because the new facilities would be compatible with existing military land uses, land use designations, and Army land use plans, policies, and regulations. They also would also not affect non-military land uses, land use plans, or policies.

4.9.3.2 Live-fire Training Direct and Indirect Effects

4.9.3.2.1 Less than Significant Effects

Direct and indirect effects from live-fire training would continue at current levels. Thus, there would be no changes to land uses or conflicts with existing land use. Indirect impacts, such as noise, dust,

and vehicular traffic, would continue at current levels. Implementation of Fort Lewis's institutional programs and associated land management practices would continue. No changes in existing land uses or and use designations would occur. Consequently, the effects would be less than significant.

4.9.3.3 Maneuver Training Direct and Indirect Effects

4.9.3.3.1 Less than Significant Effects

Direct and indirect effects from maneuver training intensity and frequency at Fort Lewis would remain at current levels. No changes in existing land uses or and use designations would occur. Therefore, the effects of maneuver training on land uses would be less than significant.

4.9.4 Alternative 2 — GTA Actions

4.9.4.1 Construction Direct and Indirect Effects

4.9.4.1.1 Less than Significant Effects

Construction activities would not affect designated land uses in the Fort Lewis cantonment area. Indirect impacts on land use from construction, including noise, dust, and construction-related traffic, would occur and would be localized and temporary. With completion of the construction, existing land uses would be revitalized and residential land at the installation would be used more efficiently.

The construction activities would involve most of the 13 ADP areas that encompass the cantonment area. The primary ADP areas that would be affected include North Fort, Historic Downtown, East Division, Logistics, Old Madigan (Jackson), Miller Hill, 3rd Brigade, Greene Park, and American Lake. Most of the construction would occur in the East Division and North Fort ADP areas. None of the construction would be precluded by any of the constraints identified in the ADPs. Thus, although existing land uses would be temporarily disrupted by construction activities, the completed projects would be compatible with the land uses and land use designations identified in the ADPs.

Construction of range projects could indirectly affect nearby land uses through increased noise, dust, odors, and vehicular traffic at the construction sites. The upgrade and expansion of existing ranges under this alternative would not constitute a change in the land use or conflict with existing land uses.

Overall, direct and indirect impacts to military and non-military land uses from the construction of facilities under Alternative 2 would be less than significant. No change to existing land uses or land use designations would occur. In addition, disruptions of existing land uses from construction activities would be temporary. There would be no change to existing land uses or conflicts with zoning in communities located in close proximity to the cantonment area.

4.9.4.2 Live-fire Training Direct and Indirect Effects

4.9.4.2.1 Less than Significant Effects

Live-fire training would increase at all ranges on Fort Lewis, which would increase the number of training rounds fired, vehicular traffic to and from training areas, noise, and dust. These impacts would be localized to the vicinity around the ranges themselves. The increased live-fire training would not decrease recreational opportunities on Fort Lewis. Finally, the increased use of the ranges would not result in any changes to military or non-military land uses or land use designations nor

would it affect land use plans or policies. Consequently, effects on land use from the increase in live-fire training would be less than significant.

4.9.4.3 Maneuver Training Direct and Indirect Effects

4.9.4.3.1 Less than Significant Effects

There would be no change to existing land uses from increased maneuver training; however, there would be an increase in the frequency and intensity of use. This increased use could cause desired land conditions in the TAs to physically degrade over time and make conditions less desirable for training. This could affect the Army's ability to conduct maneuver training in the desired way. Current management and monitoring objectives focus on rehabilitating training damage, and support ITAM's goals to revegetate disturbed areas and stabilize soils that have been impacted through training activities. Continued success of these efforts would minimize potential conflicts with land use management plans and policies.

The increase in the frequency of maneuver training would affect non-military land use of recreation. Training areas are open to recreational uses during times when there is no scheduled maneuver training. However, the increase in the number of Soldiers training would increase the number of hours during which maneuver training would occur. As a result, opportunities to access training areas for recreation would necessarily be reduced. Although the effect would be to reduce the availability of training areas for recreation, the increase in maneuver training would not result in conflicts with existing land use zones. Consequently, effects to land use from increased maneuver training would be less than significant.

4.9.5 Alternative 3 — GTA Actions + CSS Soldiers

4.9.5.1 Construction Direct and Indirect Effects

4.9.5.1.1 Less than Significant Effects

All direct and indirect impacts to land uses from cantonment area construction under Alternative 2 would also occur under Alternative 3. In addition to increases in Soldiers and Families under Alternative 2, staffing of the CSS Soldiers under Alternative 3 would add approximately 1,000 Soldiers and 1,520 Family members at Fort Lewis. Additional facilities construction would be necessary for stationing the CSS Soldiers at Fort Lewis under Alternative 3. Cantonment area facilities that would be constructed to support CSS Soldiers include barracks, administration, and maintenance facilities, and these facilities would be constructed on land adjoining the North Fort.

Implementation of this alternative would result in a change in land use designation. Current land use designations for the 60-acre (20-ha) area where the CSS facilities would be constructed are maintenance and training area. Development of these facilities would be compatible with the existing maintenance land uses; however, it would require a change from the training land use designation. The change in land use designation from training land to cantonment area would remove a relatively small area of land from the existing training area inventory. The change in land use designation, however, would still support military mission goals. Therefore, impacts to military and non-military land uses from the construction of facilities under Alternative 3 would be less than significant.

4.9.5.2 Live-fire Training Direct and Indirect Effects

4.9.5.2.1 Less than Significant Effects

Although the effects on live-fire training would be slightly greater under Alternative 3 than under Alternatives 1 or 2, training of CSS Soldiers would not results in changes to current land use

designations. In addition, the CSS units would not occupy a substantial amount of life-fire range time, especially when considered with training for the three SBCTs. The increased live-fire training associated with the CSS Soldiers would not decrease recreational opportunities on Fort Lewis. Consequently, effects on land use would be less than significant.

4.9.5.3 Maneuver Training Direct and Indirect Effects

4.9.5.3.1 Less than Significant Effects

The additional increases in maneuver training from the addition of CSS Soldiers would be small and would not result in any changes to existing land uses. The limited amount of maneuver training that the CSS Soldiers would conduct would not contribute measurably to the potential physical degradation of soils and vegetation cover described for Alternative 2. Their training activities would not measurably affect non-military land uses of recreation or result in conflicts with existing land use zones. Consequently, effects to land use and land use designations would be less than significant.

4.9.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.9.6.1 Construction Direct and Indirect Effects

4.9.6.1.1 Less than Significant Effects

All construction associated with the medium CAB would be located in the GAAF and East Division ADP areas of Fort Lewis. Although areal extent of disturbance from construction activities in the cantonment area would be greater than under any of the other alternatives, the resulting new facilities would be compatible with the existing land use designations for the GAAF and East Division ADP areas. Overall, impacts to military and non-military land uses from the construction of the medium CAB facilities would be less than significant because there would be no change to existing land use designations and disruptions of existing land uses by construction activities would be temporary.

4.9.6.2 Live-fire Training Direct and Indirect Effects

4.9.6.2.1 Less than Significant Effects

Current land use designations for ranges and effects to other non-military land uses that include recreation would not change with the additional training of a medium CAB. The effects to land use designations and non-military land uses would be the same as under Alternative 3 with the exception of additional impacts to non-military uses from the 110 helicopters that accompany a medium CAB. There would be no change to non-military land use opportunities; however, the visual and noise disturbance from helicopters conducting live-fire training could diminish the recreational experience for some users. This impact would be less than significant because the primary land use of meeting the military mission would not be affected.

4.9.6.3 Maneuver Training Direct and Indirect Effects

4.9.6.3.1 Less than Significant Effects

Increases in maneuver training are expected to be small from the addition of a medium CAB to Fort Lewis. There would be no direct and indirect changes to existing land uses; however, there would be an increased frequency and intensity of use for maneuver training activities, which could conflict with desired land conditions in training areas. Effects to existing land uses would be an increase in the frequency of noise and visual intrusions of helicopter training over current levels.

An increase in the frequency of training could affect non-military land uses of recreation and access by tribes to cultural and natural resources. Currently, maneuver TAs are open to recreational uses when there is no scheduled maneuver training. However, the addition of a medium CAB training at Fort Lewis would increase the number of operating hours for maneuver training. The opportunities for access to TAs for recreation would be reduced in those areas that support recreation. Although the effect would be to reduce the availability of TAs for recreation, the increase in maneuver training would not result in conflicts with existing land use zones. Consequently, effects to land use would be less than significant.

4.9.7 Cumulative Effects

4.9.7.1 Less than Significant Effects

Implementation of Alternatives 1 through 4 are expected to result in less than significant cumulative effects. No Army or non-Army RFFAs were identified that would involve activities or actions that would be incompatible with existing military land uses or land use designations on Fort Lewis. In addition, no RFFAs were identified that would involve activities or actions that would be incompatible with non-military land uses on the installation. Consequently, the combined effects of alternatives 1, 2, 3, and 4 and identified RFFAs would result in less than significant cumulative effects.

4.9.8 Mitigation

Fort Lewis's Master Plan, which will be updated by the ADPs, directs development and activities on Fort Lewis. By following this Plan, Fort Lewis develops projects and conducts activities in ways that do not affect land uses on Post. No additional mitigation is available.

4.10 TRAFFIC AND TRANSPORTATION

The traffic impact analysis describes the potential impacts from transporting troops and equipment on public roads to training ranges, from increased traffic associated with the increased activity and number of military personnel and their families stationed at Fort Lewis, and from construction traffic. The analysis includes impacts on local intersections, long-term traffic volumes, and construction traffic on the local circulation network. Impacts on local roads, circulation, and traffic safety also were evaluated.

4.10.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact to traffic and transportation include the extent or degree to which its implementation would result in:

- Intersection operations — increase congestion at intersections to LOS E or worse; or
- Construction traffic effects — lane closures or impediments that would disrupt or alter local circulation patterns, based on engineering judgment.

4.10.2 Overview of Impacts to Traffic and Transportation by Alternative

Table 4–27 summarizes the impacts associated with traffic and transportation that would occur under each of the alternatives. Effects range from no effect to less than significant effects for most activity groups and alternatives. Under Alternative 4, however, construction is expected to result in significant effects.

Table 4–27 Summary of Potential Effects to Traffic and Transportation at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	W	W	U
Live-fire Training Direct and Indirect Effects	•	•	•	•
Maneuver Training Direct and Indirect Effects	•	•	•	•
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.10.3 Alternative 1 — No Action Alternative

4.10.3.1 Construction Direct and Indirect Effects

4.10.3.1.1 Less than Significant Effects

Alternative 1 assumes standard annual growth levels in the total Fort Lewis troop levels along with ongoing maintenance, repair, and replacement of existing facilities and infrastructure.

4.10.3.1.1.1 Transportation Facilities

Several transportation facilities are planned for construction, as documented in Chapter 2 and **Appendix A**. The primary projects affecting transportation conditions include:

- Upgrading Madigan Gate with road revisions
- Adding a DuPont Gate connection to Pendleton Avenue and upgrading Pendleton Avenue to four lanes from DuPont Gate to 8th Street
- Upgrading 41st Division Drive to a multi-way boulevard from A Street to I Street

Other planned but unfunded modifications to Fort Lewis are not included in this analysis. These access modifications include the four-lane overpass spanning I–5 to connect the Main Post to North Fort, the closure of the Main Gate, and the development of a new gate serving North Fort. The analysis also does not assume the completion of the Cross-Base Highway because it is currently unfunded for completion. The potential effects of this facility are discussed under Cumulative Effects below.

4.10.3.1.1.2 Travel Demand

The travel demand analysis assumes a proportional relationship between the numbers of stationed Soldiers and the number of vehicle trips within and outside of Fort Lewis. This assumption provides a conservative method for assessing the multiple effects of an increase in the Soldier population of Fort Lewis, and accounts for increases in trips for Soldiers residing in off-base housing, military Families, Army civilians, contractors, and other travel needed to support the stationed Soldiers.

Under Alternative 1, the number of Soldiers stationed at Fort Lewis would increase to approximately 30,000 Soldiers by FY 2015, a 5 percent increase over the FY 2008 level. Traffic levels throughout the installation are also assumed to grow by 5 percent, reflecting the proportional growth in troop strength and the dispersal of the additional troops throughout the base.

4.10.3.1.1.3 Traffic Conditions

Access Control Points and Operations. The ACP traffic volumes under Alternative 1 assume the existing gate locations and configurations. The travel demand from standard growth at Fort Lewis

would add approximately 340 vehicles entering the ACPs in the morning peak hour and 360 vehicles leaving the ACPs in the afternoon peak hour by FY 2015. These demands would be spread across most of the existing and planned ACPs.

Intersection Volumes and Levels of Service. **Figure 4–3** shows the future traffic characteristics and lane configurations at the eight study intersections under Alternative 1. Based on the increase in Soldiers anticipated under Alternative 1, the intersection traffic volumes during the FY 2015 morning and afternoon peak hours would increase by 4.9 percent compared to 2008 conditions. **Figure 4–4** shows the FY 2015 morning and afternoon peak hour intersection volumes for the eight study intersections.

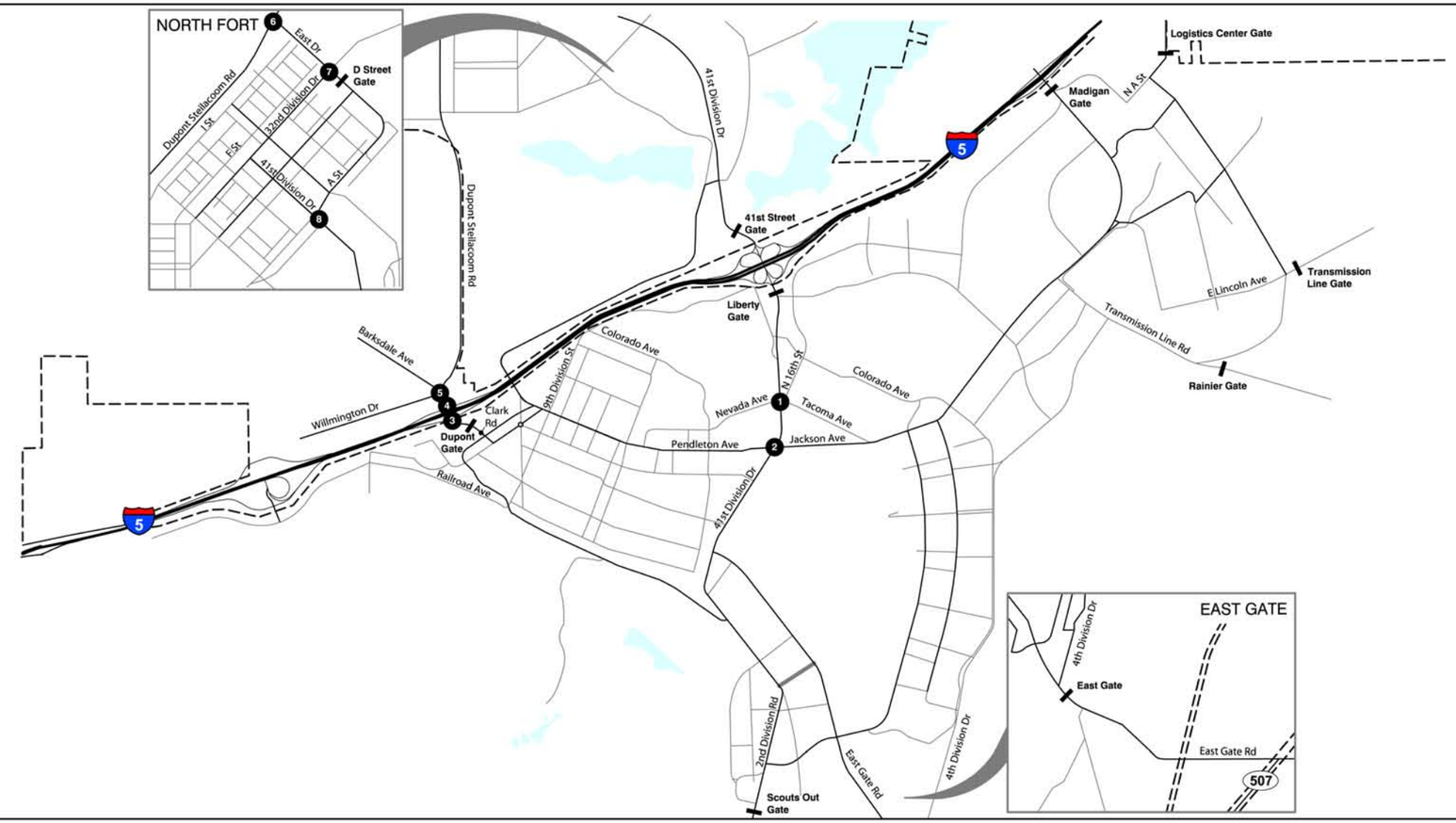
Traffic volumes would increase under Alternative 1, and the study intersections would generally experience longer intersection delays compared to existing conditions. The intersection of 41st. Division Drive and Pendleton Avenue would improve operations compared to existing conditions because a northbound right-turn lane would be added, and Pendleton Avenue would be widened from one through lane to two through lanes in each direction. **Table 4–28** shows the LOS and average control delay for each study intersection under existing conditions (2008) compared to those anticipated under Alternative 1.

Table 4–28 Existing (2008) and Alternative 1 (2015) Intersection Levels of Service

		AM Peak Hour		PM Peak Hour	
Intersection	**Traffic Control[1]**	**2008 Existing LOS (Delay)**	**2015 Alternative 1 LOS (Delay)**	**2008 Existing LOS (Delay)**	**2015 Alternative 1 LOS (Delay)**
1 41st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (16)	B (17)	D (44)	D (52)
2 41st Division Drive/Pendleton Avenue	Signal	D (38)	C (30)	D (50)	D (36)
3 I–5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (23)	D (46)	D (49)
4 I–5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (12)	D (46)	D (53)
5 DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (29)	C (30)	C (29)	C (29)
6 DuPont-Steilacoom Road/East Drive	SSSC	A (7) **NB-E (44)**	A (8) **NB-F (>50)**	**F (>50)** **NB-F (>50)**	**F (>50)** **NB-F (>50)**
7 North Gate Road/East Drive	AWSC	B (11)	B (11)	D (34)	**E (44)**
8 41st Division Drive/A Street	Signal	C (29)	C (31)	C (35)	D (36)

Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled

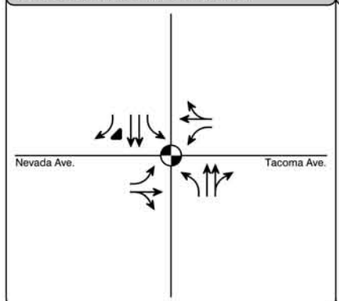
As shown on the table, during the morning peak hour, all study intersections would operate at LOS C or better in 2015 under Alternative 1. Although the unsignalized, two-way stop-controlled intersection of DuPont-Steilacoom Road/East Drive would operate overall at LOS A, the northbound approach would operate at LOS F in 2015. During the afternoon peak hour, the intersection of DuPont-Steilacoom Road/East Drive would continue to operate at LOS F, with intersection delays predicted to increase by 30 percent between existing conditions and 2015 under Alternative 1. The all-way stop-controlled intersection of North Gate Road/East Drive would worsen from LOS D under existing conditions to LOS E under Alternative 1 due to higher traffic volumes.



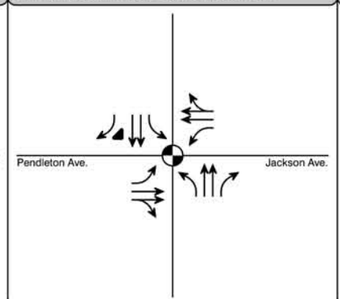
Legend

- Turn Lane
- Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

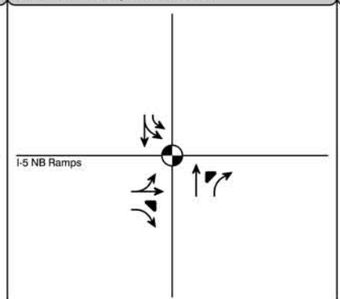
1. Nevada Ave./41st Division Dr.



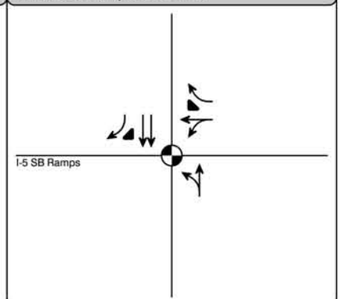
2. Pendleton Ave./41st Division Dr.



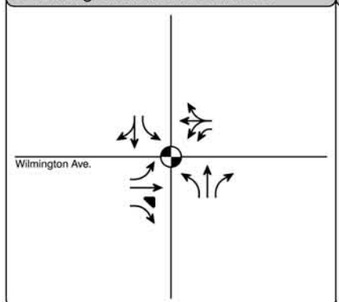
3. I-5 NB Ramps/Clark Rd.



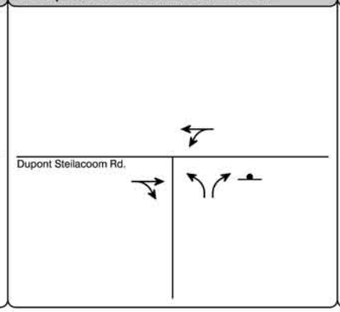
4. I-5 SB Ramps/Clark Rd.



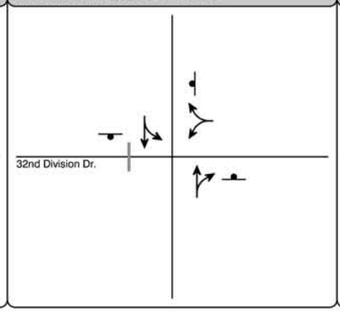
5. Wilmington Ave./Barksdale Ave.



6. Dupont Steilacoom Rd./East Dr.



7. 32nd Division Dr./East Dr.



8. A St./41st Division Dr.

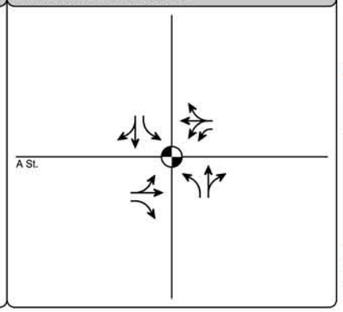


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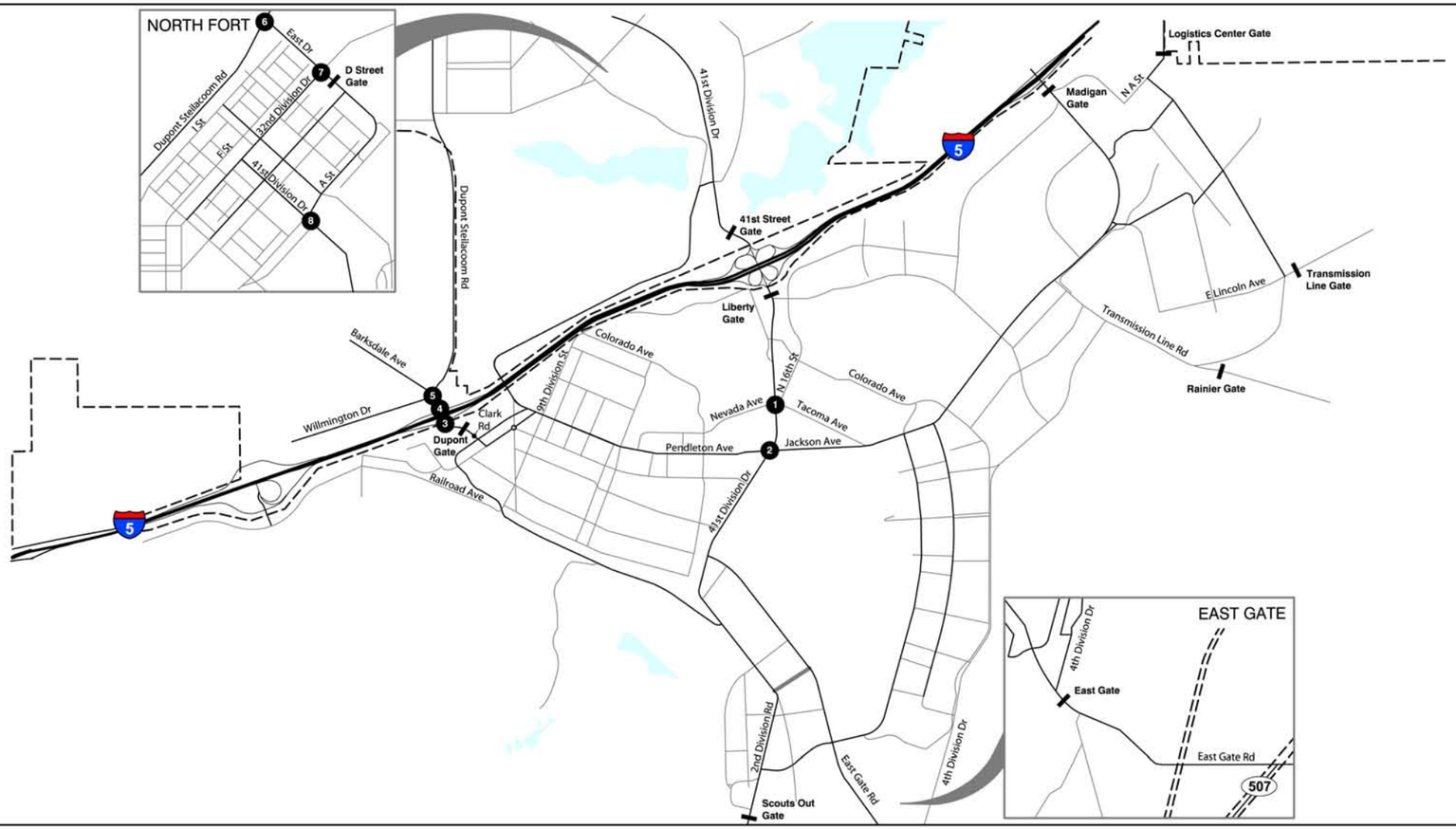
Figure 4-3
No Action Traffic Characteristics
Future Lane Configurations

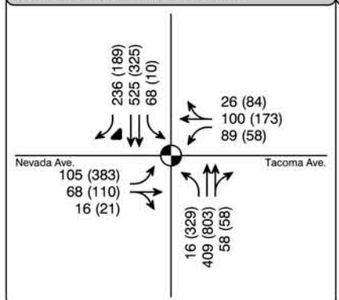
ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/03/2009	File: fig4_1_na_flconfig.dwg
Prepared By: TR	Layout: fig4_1_na_flconfig.pdf



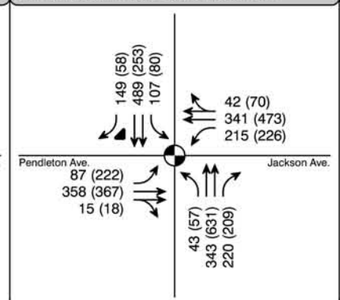
Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- ① Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

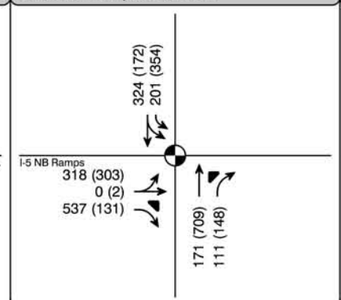
1. Nevada Ave./41st Division Dr.



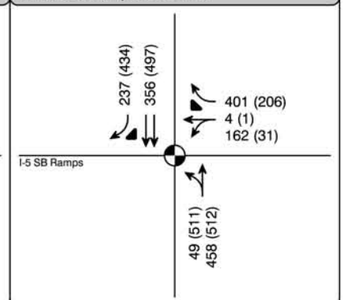
2. Pendleton Ave./41st Division Dr.



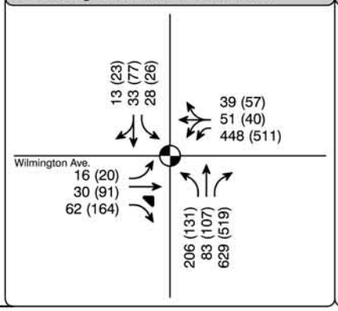
3. I-5 NB Ramps/Clark Rd.



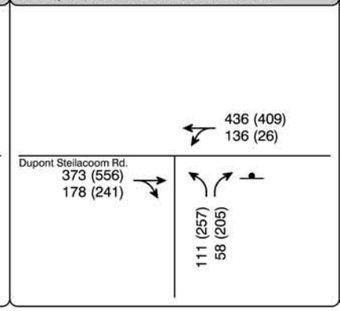
4. I-5 SB Ramps/Clark Rd.



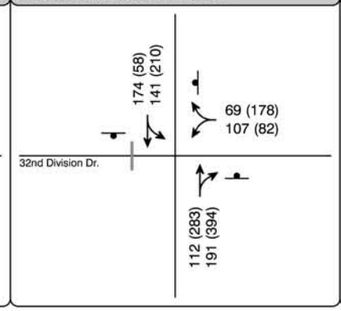
5. Wilmington Ave./Barksdale Ave.



6. Dupont Steilacoom Rd./East Dr.



7. 32nd Division Dr./East Dr.



8. A St./41st Division Dr.

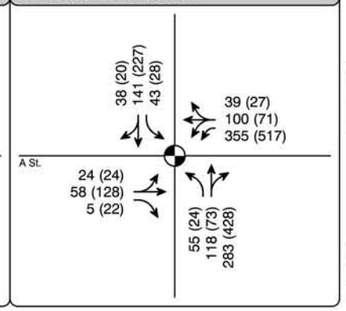


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Figure 4-4
No Action AM/PM
Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
Date: 3/03/2009	File: fig4_2_na_phtv.dwg
Prepared By: TR	Layout: fig4_2_na_phtv.pdf

Interstate 5 Volumes and Operations. The majority of new vehicle trips entering and leaving the ACPs under Alternative 1 would access Fort Lewis from I–5. For 2015, the peak hour volumes to and from Fort Lewis on I–5 are expected to increase by 330 vehicles compared to existing volumes. The effect on I–5 traffic is an increase of approximately 1 to 2 percent of the 2008 peak hour freeway traffic volumes.

The I–5 Transportation Alternatives Analysis and Operations Model Study examined traffic conditions along I–5 to the year 2030. The 2030 forecasts indicate that demand for travel on I–5 would exceed the capacity of the existing freeway by up to 30 percent throughout the study area. This demand is primarily due to regional population and employment growth. In general, demands along I–5 would exceed the current freeway capacity by approximately one full lane of traffic.

To address this projected growth in demand along I–5, the study is evaluating several system-wide concepts, including Intelligent Transportation System improvements, demand management, transit system improvements, I–5 mainline improvements, and parallel corridor improvements. Preliminary findings showed that these strategies could provide some relief to the I–5 mainline, but they would not substantially address operational issues at the ramp terminals.

In response, the I–5 study is examining several interchange improvement concepts at DuPont-Steilacoom Road (Exit 119), 41st Division Drive (Exit 120), Berkeley Street (Exit 122), and Thorne Lane (Exit 123). In the 2030 baseline condition (i.e. without interchange improvements), LOS F conditions are forecasted during the PM peak hour at both Exits 119 and 120, while Exits 122 and 123 would operate at LOS D or better. The interchange concepts being tested are expected to improve conditions at these interchanges to LOS E or better. Results of the I–5 study are expected later in 2010.

4.10.3.1.1.4 Transit Conditions

Alternative 1 would likely increase the transit ridership demand on Pierce Transit Routes #206 and #207 proportionately to the increase in Soldiers at Fort Lewis (approximately 5 percent). Demand for vanpool service would also increase. No changes in transit routes are anticipated, although the growing population at North Fort would increase the market for transit services to that portion of the installation. Additional demand may occur on the regional bus and commuter rail routes with connections to/from the Fort at Lakewood.

4.10.3.1.1.5 Nonmotorized Conditions

Alternative 1 would increase pedestrian and bicycle usage within Fort Lewis proportionate to the increase in Soldiers. Several of the programmed street projects at Fort Lewis (e.g., Pendleton Avenue and 41st Division Drive) include improved provisions for pedestrians and bicycles.

4.10.3.2 Live-fire Training Direct and Indirect Effects

4.10.3.2.1 No Effects

Live-fire training activities at Fort Lewis under Alternative 1 are not expected to affect traffic or transportation conditions.

4.10.3.3 Maneuver Training Direct and Indirect Effects

4.10.3.3.1 No Effects

Maneuver training activities at Fort Lewis under Alternative 1 are not expected to affect traffic or transportation conditions.

4.10.4 Alternative 2 — GTA Actions

4.10.4.1 Construction Direct and Indirect Effects

4.10.4.1.1 Significant but Mitigable to less than Significant Effects

4.10.4.1.1.1 Transportation Facilities

Those transportation projects occurring under Alternative 1 would also occur under Alternative 2. No additional transportation facilities are planned for construction under Alternative 2.

4.10.4.1.1.2 Travel Demand

The travel demand analysis assumes a proportional relationship between the number of stationed Soldiers and the number of vehicle trips within and outside of Fort Lewis. This assumption provides a conservative method for assessing the multiple effects of an increase in the Soldier population of Fort Lewis and accounts for increases in trips for Soldiers residing in off-installation housing, military Families, army civilians, contractors, and other travel needed to support the stationed Soldiers.

Alternative 2 would add GTA Soldiers to Fort Lewis, increasing the number of troops to approximately 31,000 in FY 2015, a 6.4 percent increase in the troop population over Alternative 1. Because Alternative 2 adds Soldiers to housing throughout Fort Lewis, the study assumes that the increase of vehicle trips at Fort Lewis intersections would grow proportionately to the 11.7 percent increase in troop population from the 2008 population.

4.10.4.1.1.3 Traffic Conditions

Access Control Points and Operations. The expected change in ACP traffic volumes under Alternative 2 is shown on **Figure 4–5**. Compared to Alternative 1 volumes, the travel demand from the proposed change in force structure under Alternative 2 would add approximately 470 vehicles entering the ACPs in the morning peak hour and 490 vehicles leaving the ACPs in the afternoon peak hour. The increase in demand represents a 6.4 percent increase during the morning and afternoon peak hours compared to Alternative 1. This increase in demand would be spread across most of the existing and planned ACPs.

Intersection Volumes and Levels of Service. The increase in troops planned under Alternative 2 would increase FY 2015 morning and afternoon peak hour volumes by 6.4 percent compared to Alternative 1. **Figure 4–6** shows the FY 2015 morning and afternoon peak hour intersection volumes for the eight study intersections under Alternative 2.

The increased traffic volumes under Alternative 2 result in each of the study intersections operating at the same or worse LOS compared to Alternative 1 by FY 2015. The increases in intersection delays range from less than 1 second to 28 seconds. **Table 4–29** compares LOS and average control delays for Alternatives 1 and 2 for each study intersection in FY 2015.

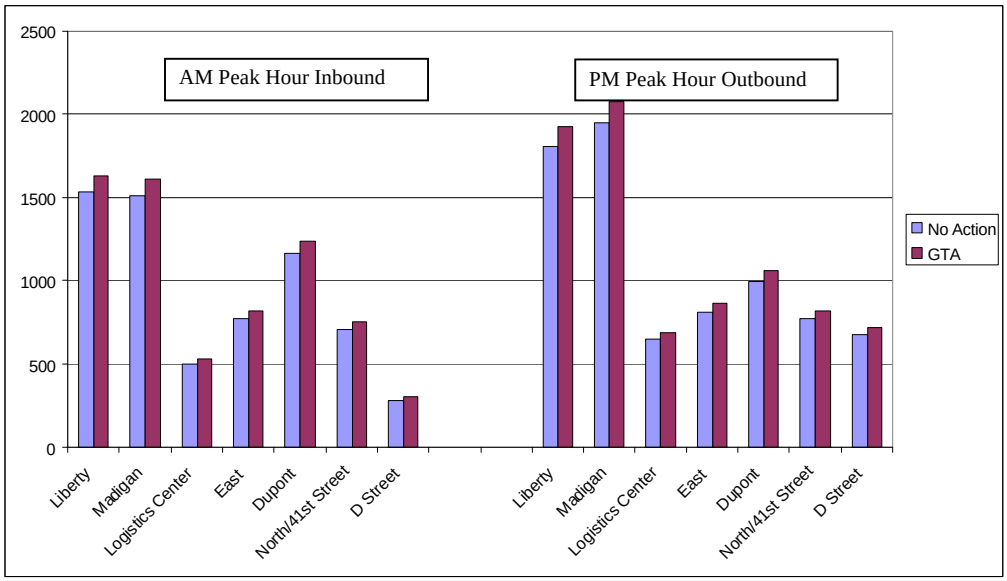


Figure 4–5 ACP Traffic Volumes under Alternatives 1 and 2

As shown in the table, during the morning peak hour, all study intersections would operate at LOS C or better in FY 2015 under Alternative 2. However, the side-street approach at the DuPont-Steilacoom Road/East Drive would operate at LOS F. During the afternoon peak hour, the unsignalized intersection of DuPont-Steilacoom Road/East Drive would operate at LOS F under both Alternatives 1 and 2. This is due to northbound vehicles on East Drive finding insufficient gaps in traffic on DuPont-Steilacoom Road. The all-way stop-controlled intersection of North Gate Road/East Drive would worsen from LOS E (under Alternative 1) to LOS F under Alternative 2 by FY 2015.

Table 4–29 2015 Intersection Levels of Service under Alternatives 1 and 2

			2015 AM Peak Hour		2015 PM Peak Hour	
	Intersection	**Traffic Control[1]**	**Alternative 1 LOS (Delay)**	**Alternative 2 LOS (Delay)**	**Alternative 1 LOS (Delay)**	**Alternative 2 LOS (Delay)**
1	41st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	B (18)	D (52)	**E (65)**
2	41st Division Drive/Pendleton Avenue	Signal	C (30)	C (32)	D (36)	D (39)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (24)	D (49)	**E (56)**
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (13)	D (53)	**E (72)**
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (30)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) **NB-F (>50)**	B (13) **NB-F (>50)**	**F (>50)** **NB-F (>50)**	**F (>50)** **NB-F (>50)**
7	North Gate Road/East Drive	AWSC	B (11)	B (12)	**E (44)**	**F (>50)**
8	41st Division Drive/A Street	Signal	C (31)	C (33)	D (36)	D (39)

Notes: Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled

The higher traffic volumes associated with Alternative 2 would cause operations at the 41st. Division Drive/Nevada Avenue/Tacoma Avenue intersection to worsen from LOS D (Alternative 1) to LOS E. The I–5 interchange at Barksdale Avenue/Clark Road would become more congested under

Alternative 2: both the northbound and southbound ramp intersections would operate at LOS E by FY 2015.

Interstate 5 Volumes and Operations. The majority of new vehicle trips entering and leaving the ACPs due to the change in force structure under Alternative 2 would access I–5. Total peak hour volumes on I–5 under Alternative 2 are expected to increase by 460 vehicles by 2015 compared to Alternative 1. The effect on I–5 traffic is an increase of approximately 2 to 3 percent compared to Alternative 1 volumes.

4.10.4.1.1.4 Transit Conditions

Under Alternative 2, the demand for transit service would likely increase demand on Pierce Transit Routes #206 and #207 proportional to the increase in force structure (approximately a 6.5 percent increase compared to Alternative 1). The demand for vanpool service would also increase. Changes to the transit routes are not anticipated, although the growing population at North Fort would increase the market for transit services to that portion of Fort Lewis. Additional demand may occur on the regional bus and commuter rail routes with connections to/from the Fort at Lakewood.

4.10.4.1.1.5 Non-motorized Conditions

Alternative 2 would increase pedestrian and bicycle usage within Fort Lewis proportionate to the change in force structure. Several of the programmed street projects at Fort Lewis contain pedestrian and bicycle provisions (e.g., Pendleton Avenue and 41st Division Drive) and would serve the growing non-motorized demands.

4.10.4.2 Live-fire Training Direct and Indirect Effects

4.10.4.2.1 No Effects

Live-fire training activities at Fort Lewis under Alternative 2 are not expected to affect traffic or transportation conditions.

4.10.4.3 Maneuver Training Direct and Indirect Effects

4.10.4.3.1 No Effects

Maneuver training activities at Fort Lewis under Alternative 2 are not expected to affect traffic or transportation conditions.

4.10.5 Alternative 3 — GTA Actions + CSS Soldiers

4.10.5.1 Construction Direct and Indirect Effects

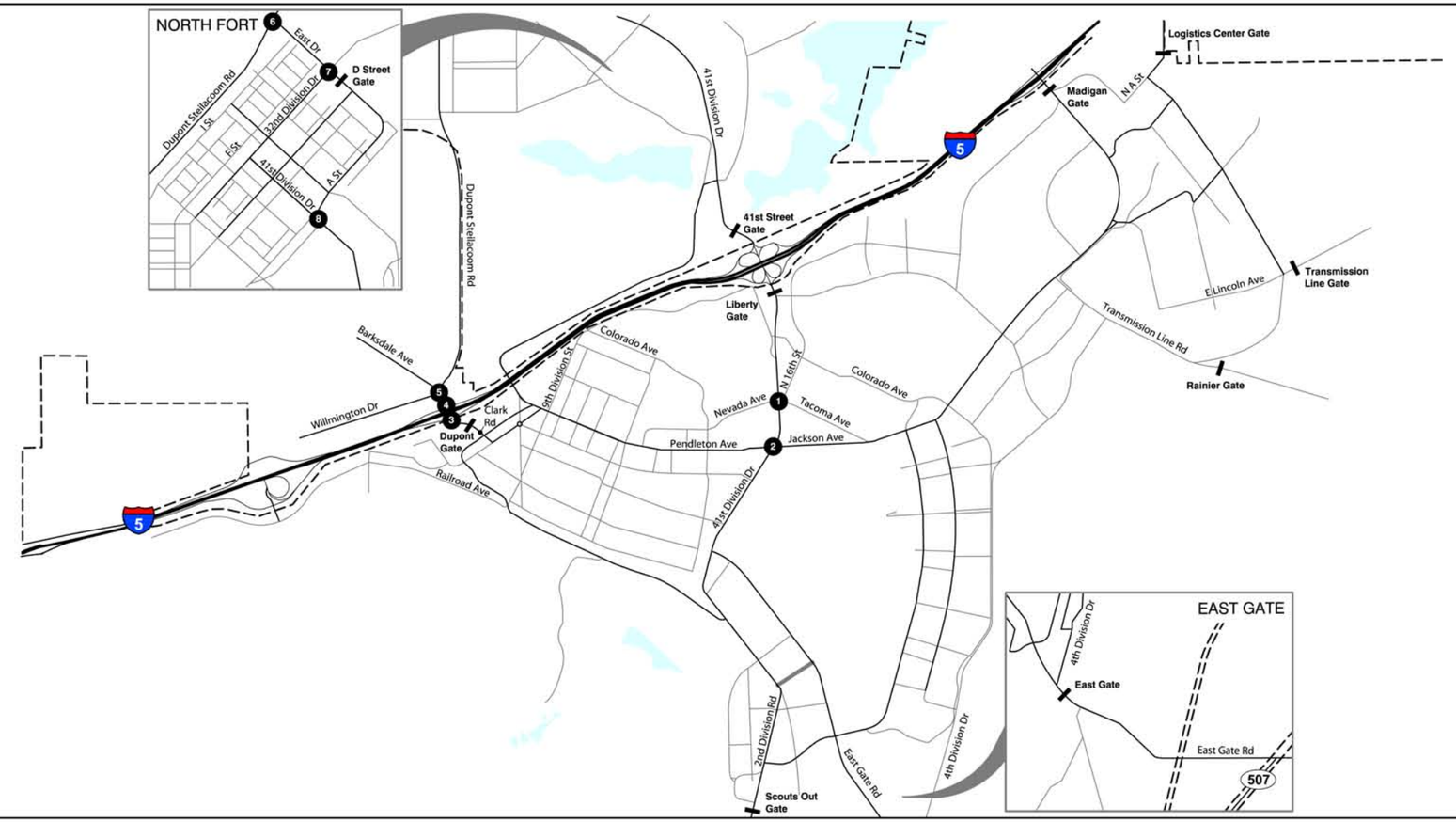
4.10.5.1.1 Significant but Mitigable to less than Significant Effects

4.10.5.1.1.1 Transportation Facilities

The transportation projects occurring under Alternatives 1 and 2 would also occur under Alternative 3. No additional transportation facilities are planned for construction under Alternative 3.

4.10.5.1.1.2 Travel Demand

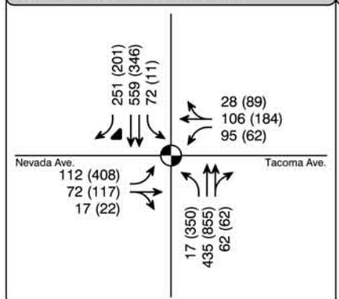
The total number of Soldiers under Alternative 3 would increase by 3.2 percent over Alternative 2 and 9.9 percent over Alternative 1. Because the traffic study assumes that the additional CSS Soldiers under Alternative 3 would be stationed in the North Fort area, the increases in traffic volumes were adjusted to reflect higher levels of traffic volumes to and from the North Fort.



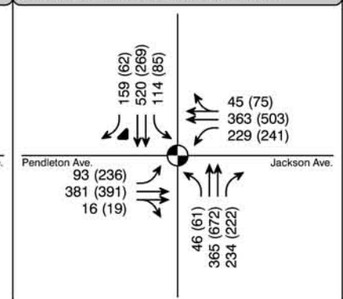
Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- 1 Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

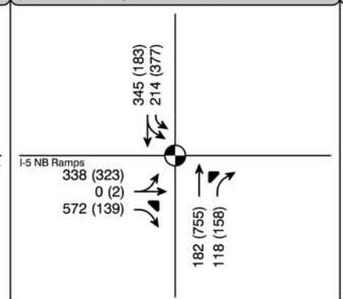
1. Nevada Ave./41st Division Dr.



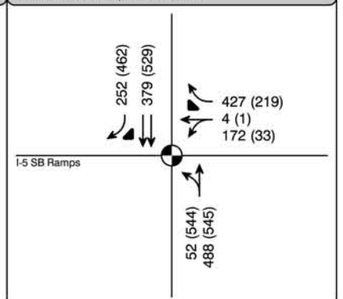
2. Pendleton Ave./41st Division Dr.



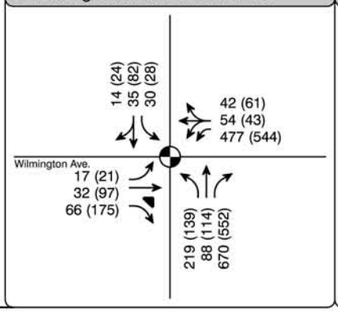
3. I-5 NB Ramps/Clark Rd.



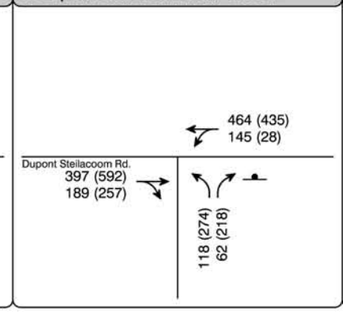
4. I-5 SB Ramps/Clark Rd.



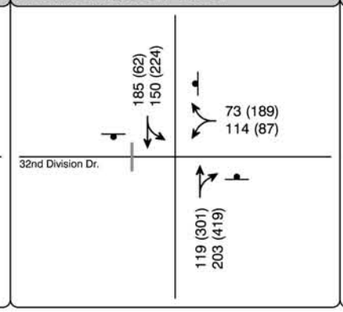
5. Wilmington Ave./Barksdale Ave.



6. Dupont Steilacoom Rd./East Dr.



7. 32nd Division Dr./East Dr.



8. A St./41st Division Dr.

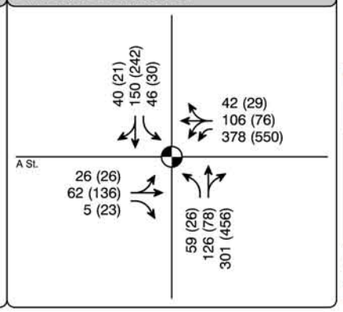


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Figure 4-6
Alternative 2 GTA AM/PM
Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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Prepared By: TR	Layout: fig4_21_alt2_phtv.pdf

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4.10.5.1.1.3 Traffic Conditions

Access Control Points and Operations. The expected change in ACP traffic volumes under Alternative 3 is shown on **Figure 4–7**. Compared to standard growth levels discussed under Alternative 1, the travel demand from the increase in Soldiers under Alternative 3 would add approximately 620 vehicles entering the ACPs in the morning peak hour and 710 vehicles leaving the ACPs in the afternoon peak hour by 2015. These demands represent a 9.9 percent increase during the morning and afternoon peak hours under Alternative 3 compared to Alternative 1. The increase in demand would be focused at the North Fort ACPs due to the concentration of CSS Soldiers at that location.

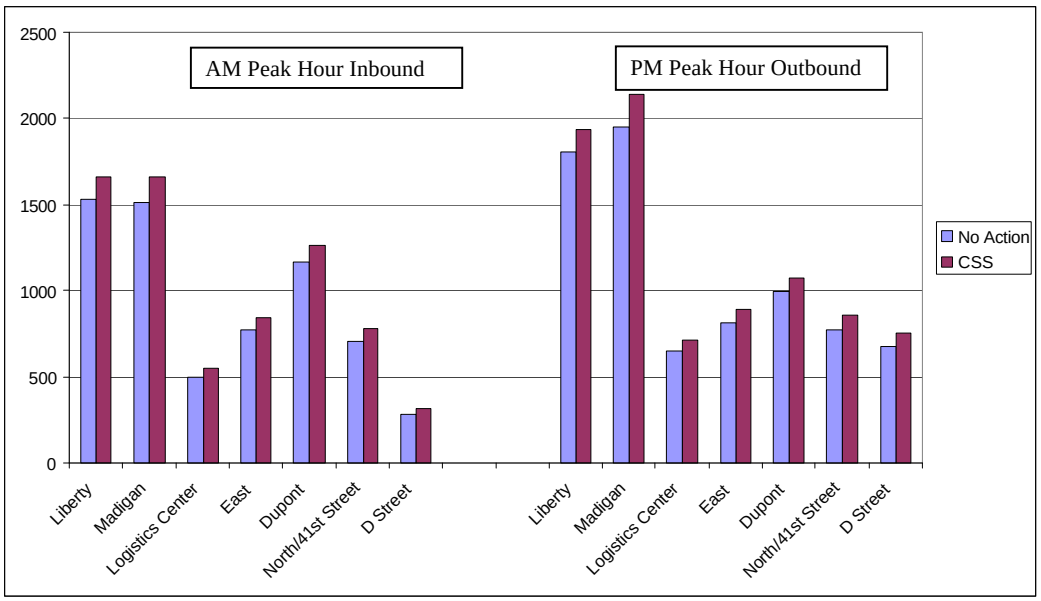


Figure 4–7 ACP Traffic Volumes under Alternatives 1 and 3

Intersection Volumes and Levels of Service. The increase in troops under Alternative 3 would increase morning and afternoon peak hour traffic volumes by an estimated 3.2 percent compared to Alternative 2, and by an estimated 9.9 percent compared to Alternative 1. **Figure 4–8** shows the FY 2015 morning and afternoon peak hour intersection volumes for the eight study intersections under Alternative 3.

Alternative 3 would increase traffic volumes in the Fort Lewis area, and the study intersections would experience longer intersection delays compared to Alternative 1. **Table 4–30** compares LOS and average control delays for Alternatives 1 and 3 for each study intersection in FY 2015.

As shown in the table, during the 2015 morning peak hour, all study intersections would continue to operate at the same LOS under Alternative 3 as they would under Alternative 1, except for the DuPont-Steilacoom Road/East Drive intersection. However, this intersection would continue to operate acceptably. During the 2015 afternoon peak hour under Alternative 3, the two unsignalized intersections of DuPont-Steilacoom Road/East Drive and North Gate Road/East Drive would operate at LOS F. Alternative 3 would also worsen operations at the 41st. Division Drive/Nevada Avenue/Tacoma Avenue intersection from LOS D (under Alternative 1) to LOS E.

Table 4–30 FY 2015 Intersection Levels of Service under Alternatives 1 and 3

	Intersection	Traffic Control[1]	2015 AM Peak Hour		2015 PM Peak Hour	
			Alternative 1 LOS (Delay)	Alternative 3 LOS (Delay)	Alternative 1 LOS (Delay)	Alternative 3 LOS (Delay)
1	41st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	B (18)	D (52)	**E (66)**
2	41st Division Drive/Pendleton Avenue	Signal	C (30)	C (32)	D (36)	D (41)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (24)	D (49)	**E (56)**
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (14)	D (53)	**F (>80)**
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (30)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) **NB-F (>50)**	C (22) **NB-F (>50)**	**F (>50)** **NB-F (>50)**	**F (>50)** **NB-F (>50)**
7	North Gate Road/East Drive	AWSC	B (11)	B (13)	**E (44)**	**F (>50)**
8	41st Division Drive/A Street	Signal	C (31)	C (34)	D (36)	D (43)

Notes: Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled

The I–5 southbound ramps/Barksdale Avenue/Clark Road intersection would worsen from LOS D (under Alternative 1) to LOS F under Alternative 3. The forecasted 550 northbound left-turning vehicles and 560 through vehicles would exceed the capacity for a single northbound lane at this intersection. The adjacent intersection at the I–5 northbound ramps would approach capacity (LOS E) by 2015 under Alternative 3.

Interstate 5 Volumes and Operations. The majority of new vehicle trips entering and leaving the Fort Lewis ACPs due under Alternative 3 would access I–5. Total peak hour volumes on I-5 are expected to increase by 700 vehicles under Alternative 3 compared to Alternative 1. The effect on I–5 traffic is an increase of approximately 3 to 4 percent compared to Alternative 1 volumes.

4.10.5.1.1.4 Transit Conditions

Alternative 3 would likely increase ridership demand on Pierce Transit Routes #206 and #207, but to a lower proportion than the increase in Soldiers under Alternative 3. Demand for vanpool service would also increase under Alternative 3. Given the concentration of additional CSS Soldiers in the North Fort under Alternative 3 and lack of existing bus service to that portion of the installation, there is limited potential for transit usage.

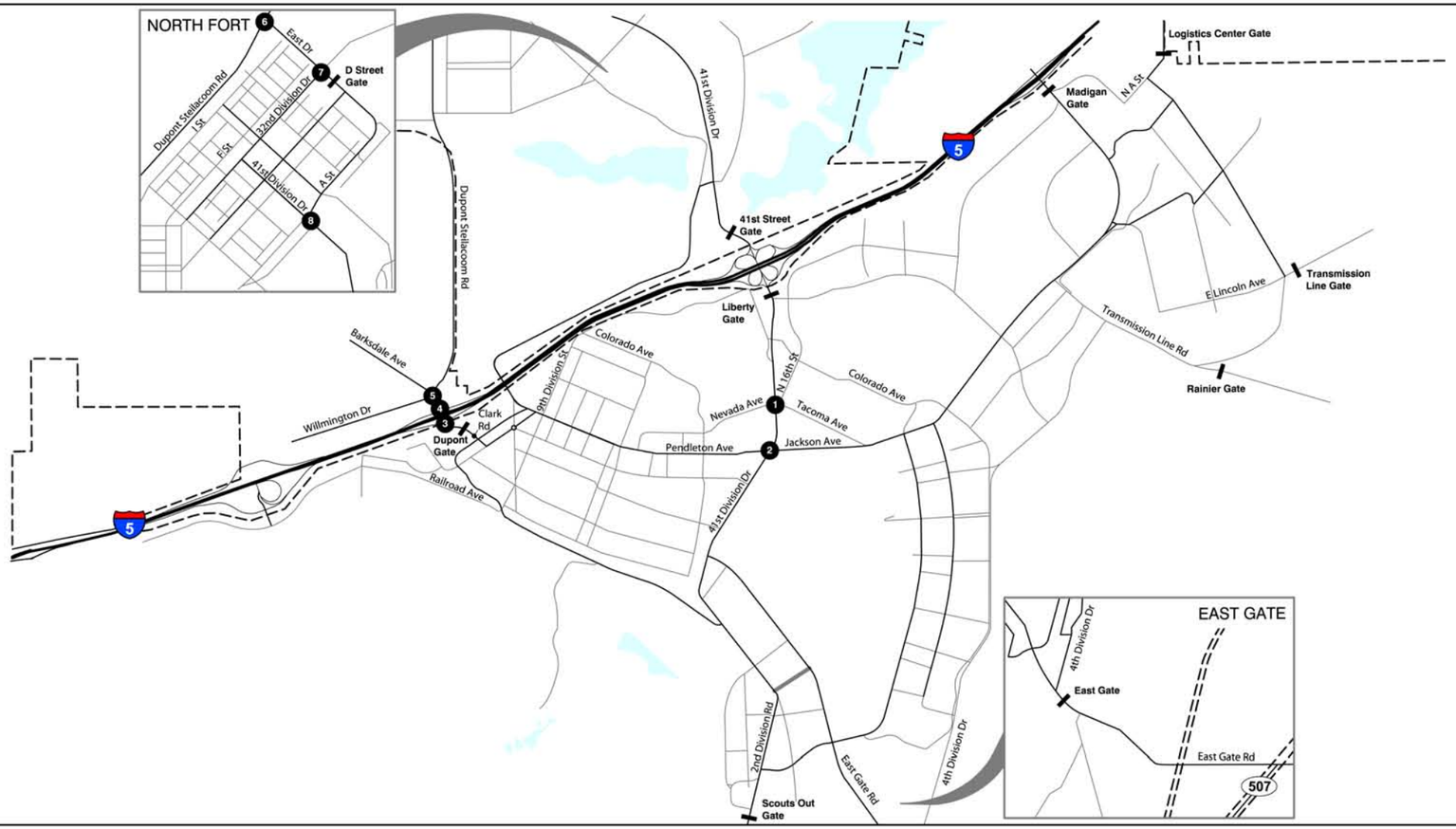
4.10.5.1.1.5 Nonmotorized Conditions

Alternative 3 would increase pedestrian and bicycle usage at Fort Lewis, particularly within the North Fort area. This increase would be proportionate to the increase in Soldiers anticipated under Alternative 3 (an approximate 10 percent increase over Alternative 1).

4.10.5.2 Live-fire Training Direct and Indirect Effects

4.10.5.2.1 No Effects

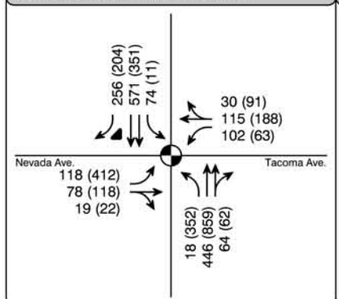
Live-fire training activities at Fort Lewis under Alternative 3 are not expected to affect traffic or transportation conditions.



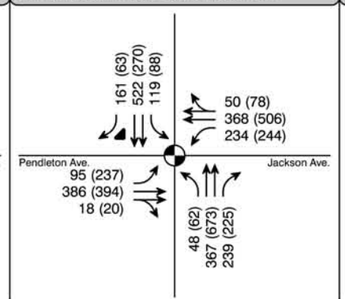
Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- (1) Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

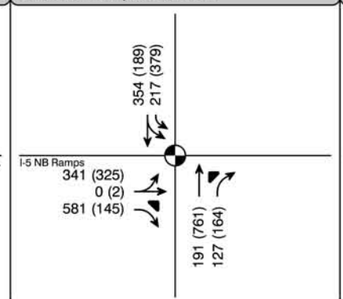
1. Nevada Ave./41st Division Dr.



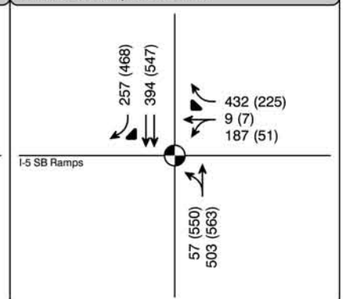
2. Pendleton Ave./41st Division Dr.



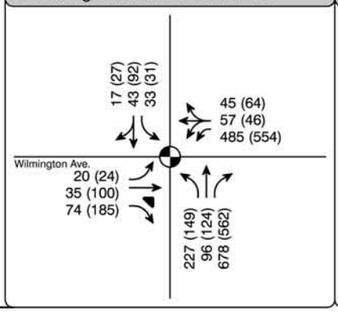
3. I-5 NB Ramps/Clark Rd.



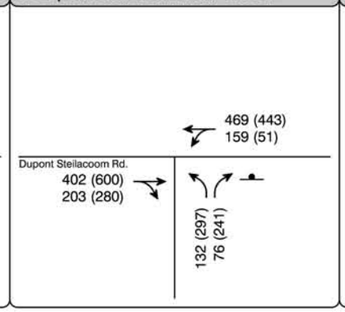
4. I-5 SB Ramps/Clark Rd.



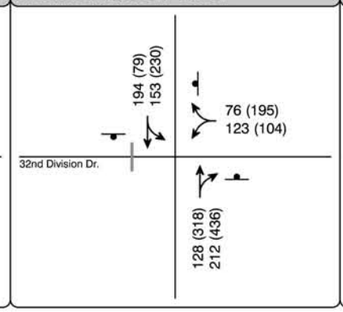
5. Wilmington Ave./Barksdale Ave.



6. Dupont Steilacoom Rd./East Dr.



7. 32nd Division Dr./East Dr.



8. A St./41st Division Dr.

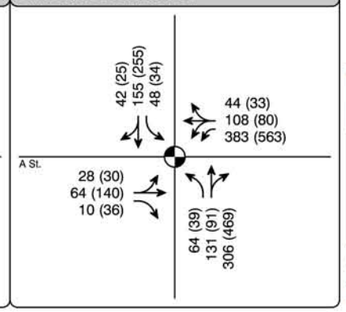


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Figure 4-8
Alternative 3 CSS Soldiers AM/PM Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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Prepared By: TR	Layout: fig4_31_alt3_phtv.pdf

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4.10.5.3 Maneuver Training Direct and Indirect Effects

4.10.5.3.1 No Effects

Maneuver training activities at Fort Lewis under Alternative 3 are not expected to affect traffic or transportation conditions.

4.10.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.10.6.1 Construction Direct and Indirect Effects

4.10.6.1.1 Significant Effects

4.10.6.1.1.1 Transportation Facilities

Those transportation projects occurring under Alternative 3 would also occur under Alternative 4. No additional transportation facilities are planned for construction under Alternative 4.

4.10.6.1.1.2 Travel Demand

Alternative 4 would add approximately 2,800 Soldiers to Fort Lewis above those anticipated under Alternative 3. This would represent a total increase of 25.4 percent over existing levels. Because the additional Medium CAB Soldiers under Alternative 4 would be stationed near GAAF, the increases in traffic volumes were adjusted to reflect higher levels of traffic volumes along Pendleton Avenue, 41st Division Drive, and 2nd Division Drive.

4.10.6.1.1.3 Traffic Conditions

Access Control Points and Operations. The expected change in ACP traffic volumes under Alternative 4 is shown in **Figure 4–9**. Compared to the traffic volumes anticipated under Alternative 1, the travel demand from the change in force structure under Alternative 4 would add approximately 1,390 vehicles entering the ACPs in the morning peak hour and 1,330 vehicles leaving the ACPs in the afternoon peak hour by 2015. These demands represent a 19.4 percent increase during the morning and afternoon peak hours by 2015 compared to Alternative 1. The increase in demand specific to Alternative 4 would be focused at the Main Post ACPs due to the concentration of additional CSS Soldiers near GAAF.

Intersection Volumes and Levels of Service. The increase in troops planned under Alternative 4 would increase FY 2015 morning and afternoon peak hour traffic volumes by 19.4 percent compared to Alternative 1. **Figure 4–10** shows the FY 2015 morning and afternoon peak hour intersection volumes for the eight study intersections under Alternative 4.

The increased traffic volumes associated with Alternative 4 would cause the study intersections to experience longer delays compared to Alternative 1. **Table 4–31** shows the LOS and average control delays in FY 2015 for the study intersections under Alternatives 1 and 4.

As shown on the table, all intersections would operate at LOS D or better during the FY 2015 morning peak hour under Alternative 4. However, the side-street movement at the DuPont-Steilacoom Road/East Drive intersection would operate at LOS F by FY 2015 due to insufficient gaps in traffic on DuPont-Steilacoom Road. During the FY 2015 afternoon peak hour, the two unsignalized intersections of DuPont-Steilacoom Road/East Drive and North Gate Road/East Drive would operate at LOS F under Alternative 4. Alternative 4 would worsen operations at the 41st. Division Drive/Nevada Avenue/Tacoma Avenue intersection from LOS from D (under Alternative 1) to LOS F. The 465 eastbound left-turning vehicles in the single existing left-turn lane would be the primary cause of this intersection delay.

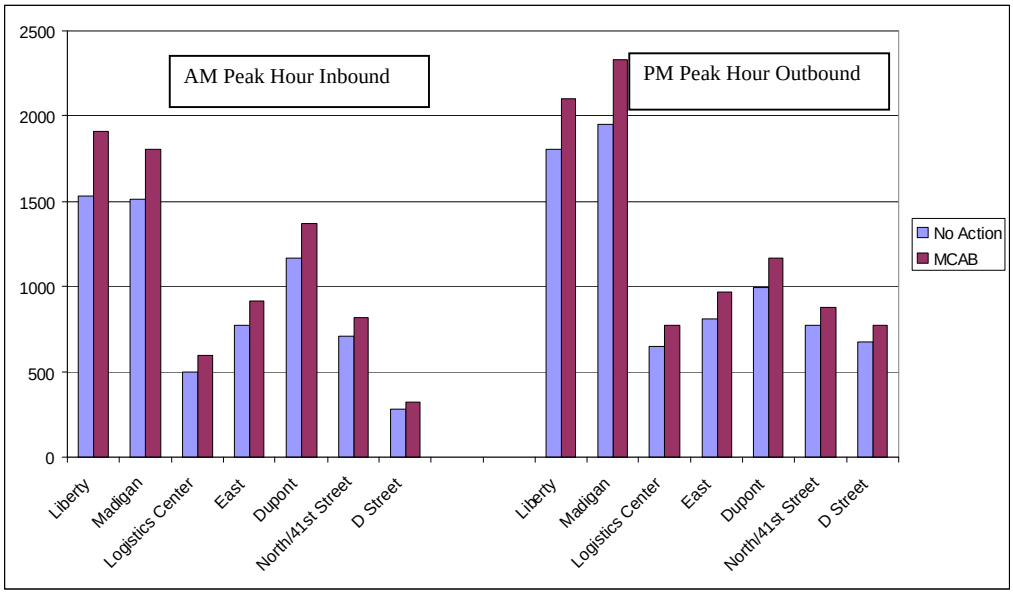


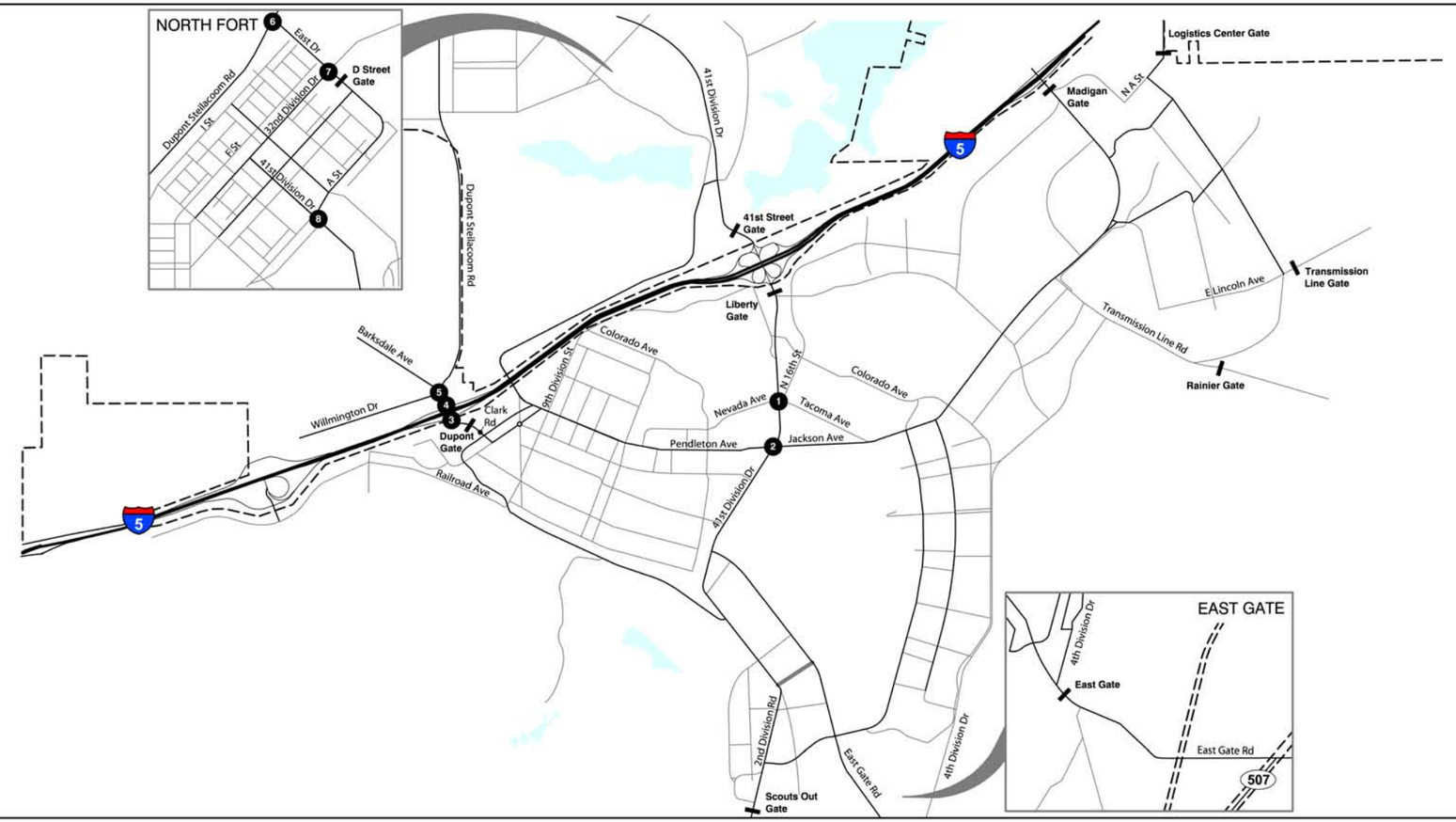
Figure 4–9 ACP Traffic Volumes under Alternatives 1 and 4

Table 4–31 FY 2015 Intersection Levels of Service under Alternatives 1 and 4

			2015 AM Peak Hour		2015 PM Peak Hour	
	Intersection	**Traffic Control**	**Alternative 1 LOS (Delay)**	**Alternative 4 LOS (Delay)**	**Alternative 1 LOS (Delay)**	**Alternative 4 LOS (Delay)**
1	41st Division Drive/Nevada Avenue/Tacoma Avenue	Signal	B (17)	C (22)	D (52)	**F (>80)**
2	41st Division Drive/Pendleton Avenue	Signal	C (30)	D (35)	D (36)	D (51)
3	I-5 NB Ramps/Barksdale Avenue/Clark Road	Signal	C (23)	C (31)	D (49)	**E (78)**
4	I-5 SB Ramps/Barksdale Avenue/Clark Road	Signal	B (12)	B (15)	D (53)	**F (>80)**
5	DuPont-Steilacoom Road/ Barksdale Avenue/Wilmington Drive	Signal	C (30)	C (31)	C (29)	C (29)
6	DuPont-Steilacoom Road/East Drive	SSSC	A (8) **NB-F (>50)**	C (23) **NB-F (>50)**	**F (>50)** **NB-F (>50)**	**F (>50)** **NB-F (>50)**
7	North Gate Road/East Drive	AWSC	B (11)	B (13)	**E (44)**	**F (>50)**
8	41st Division Drive/A Street	Signal	C (31)	D (40)	D (36)	D (46)

Notes: Signal = signalized, SSSC = side-street stop-controlled, AWSC = all-way stop-controlled

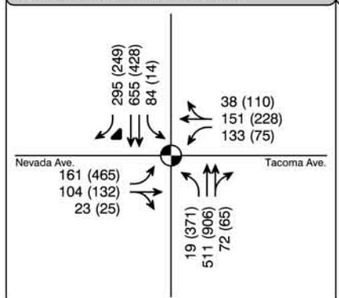
The I–5 interchange with Barksdale Avenue/Clark Road would be significantly over capacity under Alternative 4. The intersection of the I–5 southbound ramps would operate at LOS F and the I–5 northbound ramps intersection would operate at LOS E. The interchange has a three-lane cross section over I–5, which is not sufficient to carry the high volumes projected during the FY 2015 afternoon peak hour under Alternative 4.



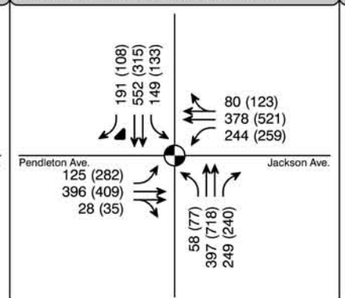
Legend

- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- 1 Study Intersection
- Traffic Signal
- Stop Sign
- Installation Boundary
- Access Control Point (Gate)
- Restricted Access

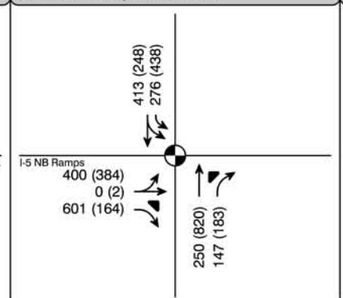
1. Nevada Ave./41st Division Dr.



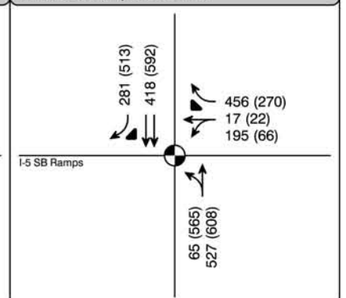
2. Pendleton Ave./41st Division Dr.



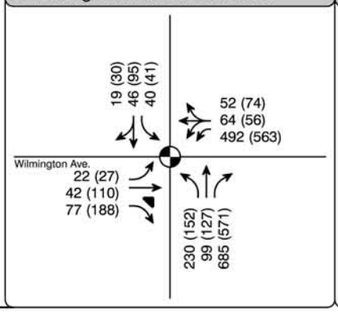
3. I-5 NB Ramps/Clark Rd.



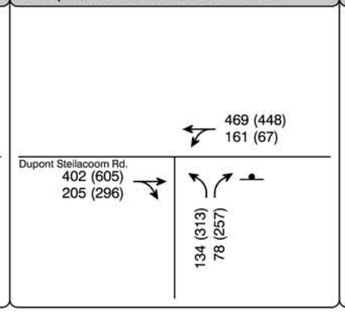
4. I-5 SB Ramps/Clark Rd.



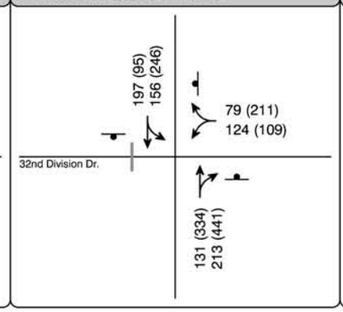
5. Wilmington Ave./Barksdale Ave.



6. Dupont Steilacoom Rd./East Dr.



7. 32nd Division Dr./East Dr.



8. A St./41st Division Dr.

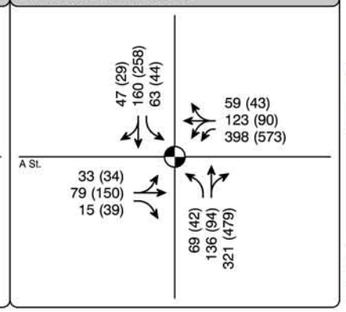


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Figure 4-10
Alternative 4 Medium CAB AM/PM Peak Hour Traffic Volumes

ANALYSIS AREA: Thurston & Pierce Counties, Washington	
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Interstate 5 Volumes and Operations. The majority of new vehicle trips entering and leaving the ACPs under Alternative 4 would access I–5. Total peak hour traffic volumes on I–5 are expected to increase by 1,380 under Alternative 4 compared to Alternative 1. The resulting effect on I–5 traffic would be an increase of approximately 4 to 8 percent compared to Alternative 1 volumes.

4.10.6.1.1.4 Transit Conditions

Alternative 4 is likely to increase the ridership on Pierce Transit Routes #206 and #207 in proportion to the increase in Soldiers at Fort Lewis under this alternative (an approximate 19 percent increase over Alternative 1). Demand for vanpool service would also increase. Given the concentration of medium CAB Soldiers at the Main Post with access to existing bus services, transit usage is likely to increase. Additional demand may occur on the regional bus and commuter rail routes with connections to/from the Fort at Lakewood.

4.10.6.1.1.5 Non-motorized Conditions

Alternative 4 would increase pedestrian and bicycle usage proportionate to the increase in Soldiers. Several of the programmed street projects contain pedestrian and bicycle provisions (e.g., Pendleton Avenue and 41st Division Drive), which would serve the growing non-motorized demand.

4.10.6.2 Live-fire Training Direct and Indirect Effects

4.10.6.2.1 No Effects

Live-fire training activities at Fort Lewis under Alternative 4 are not expected to affect traffic or transportation conditions.

4.10.6.3 Maneuver Training Direct and Indirect Effects

4.10.6.3.1 No Effects

Maneuver training activities at Fort Lewis under Alternative 4 are not expected to affect traffic or transportation conditions.

4.10.7 Cumulative Effects

4.10.7.1 Less than Significant Effects

Regional land use growth would result in general traffic increases along I–5 and county roadways. The impacts of this growth would be accommodated by regional freeway improvements on I–5, expected to occur over the next 20 years. The other notable regional transportation project is the proposed Cross-Base Highway. As stated previously, the traffic and transportation analysis conducted for Alternative 1 assumed that the Cross-Base Highway would not be built by 2015 due to funding limitations. Once the Cross-Base Highway is constructed after 2015, it would provide improved access to/from Fort Lewis and McChord AFB, as well as better connectivity between residents and commuters in mid-Pierce County. The Cross-Base Highway would also improve access to I–5, but would not change traffic operations on I–5 (U.S. Department of Transportation et al. 2003).

The I–5 Transportation Alternatives Analysis and Operations Model Study examined traffic conditions along I–5 to the year 2030. The 2030 forecasts indicate that demand for travel on I–5 would exceed the capacity of the existing freeway by up to 30 percent throughout the study area. This demand is primarily due to regional population and employment growth. The study will recommend regional improvements to I–5 and various interchanges, including those serving Fort

Lewis. Implementation of these improvements will be prioritized along with other regional transportation projects.

Another regional project that is anticipated to occur is the 'Bypass of Point Defiance Rail Project'. This project will reroute passenger trains to an inland route that parallels I–5 on the west side. The WSDOT State Rail and Marine Office issued a Determination of Non-Significance for this project, finding that there wound be no significant transportation impacts. The study examined potential effects of the added trains to traffic delays crossing the tracks. Overall, the expected impacts were found to be minimal. The rail project is expected to implement several improvements to traffic signal coordination, signing, ramp configurations and intersection geometrics to facilitate safe crossings of the railroad by vehicles and non-motorized modes.

The direct impacts of each Alternative are to intersections on or in close proximity to the base and to one interchange access to I–5. Traffic volumes on I–5 and local county roadways are expected to increase by only about 1 percent under Alternative 1, approximately 3 percent under Alternative 2 and Alternative 3, and approximately 5 percent under Alternative 4. As a result, the cumulative effects would not be significant in the context of the other regional growth and planned transportation improvements.

4.10.8 Mitigation

The Army has identified two projects as mitigation for traffic and transportation (**Table 4–42**). Both of these projects are described below.

4.10.8.1 The DuPont-Steilacoom Road/East Drive Intersection

Under Alternative 1 and Alternative 2, this intersection would operate at LOS F with an estimated 73 and 101 seconds of delay, respectively, during the 2015 afternoon peak hour. A traffic signal or a roundabout would improve intersection performance to LOS B. The intersection meets peak hour signal warrants, but further study is required to confirm if a signal or roundabout is warranted at other times of the day. With either improvement, the impact would be less than significant.

Under Alternative 3 and Alternative 4, this intersection would operate at LOS F with a forecasted 143 and 179 seconds of delay, respectively, during the 2015 afternoon peak hour. A traffic signal would improve intersection performance to LOS C. However, unlike Alternatives 1 and 2, a roundabout would not accommodate the higher PM peak hour traffic volumes projected with Alternatives 3 and 4. With the signal, the impact would be less than significant.

4.10.8.2 North Gate Road/East Drive

Under Alternative 2, Alternative 3, and Alternative 4, this all-way stop-controlled intersection would worsen to LOS F by the FY 2015 afternoon peak hour. Constructing a northbound right-turn lane to accommodate the forecasted 400+ vehicles making this right turn would improve intersection operations to LOS C. With this improvement, the impact would be less than significant.

4.11 SOCIOECONOMICS

A number of measures are used to assess the economic effects that a given alternative could have on the regional economy. This analysis is focused on the project-induced effects on population, employment, income, and sales volume.

The initial step in estimating socioeconomic effects is to characterize aspects of the construction and operational phases of the alternatives. With the aid of economic impact modeling techniques (described below), the economic effects of each aspect of the alternatives are translated into measures such as jobs and income.

The primary catalyst for changes to socioeconomic resources is a change in economic activity such as industrial output (value of goods and services), employment, and income. Changes in employment have the potential to affect population, housing, and associated community services and infrastructure.

A distinction is made between direct effects and secondary effects, the latter comprising both indirect and induced effects:

- Direct effects are defined as changes in expenditures on goods and services directly related to construction and operation. For example, an increase of $25 million in the final demand for construction inputs, such as concrete block and brick, will cause that manufacturing sector to increase output by $25 million worth of concrete block and brick.
- Indirect effects are defined as backward linkages through expenditures on intermediate goods or services required by the direct industry in order to increase output. These include construction or operation labor and other inputs. For example, $25 million worth of additional concrete block and brick would require increased output by the cement-producing industry (to produce an additional $2.5 million worth of cement) and aggregate industry (to produce $0.5 million worth of sand/gravel).
- Induced effects are defined as forward linkages derived from employees (both direct and indirect) spending wages within a region. For example, if additional employees were hired to work in the industries supporting and providing inputs to the construction sector, their personal consumption expenditures will induce employment.

The differentiation among direct, indirect, and induced effects contributes to the concept of the "economic multiplier." The larger and more highly urbanized the area, the more complex and integrated the economy is likely to be. Thus, more of the additional economic activity will likely occur within the area and increase the size of the multiplier. Conversely, the smaller and more rural an area, the less complex the economy is likely to be, and thus a larger portion of the additional economic activity spurred by the Proposed Action will occur outside the area and decrease the size of the multiplier.

The U.S. Army's Economic Impact Forecast System (EIFS) model is used to assess the economic effects of GTA alternatives. Results are compared to rational threshold values (RTVs) to evaluate the significance of these effects in relation to the regional economy. RTVs are based on an evaluation of the historical trends for the defined region and measures of local historical fluctuations in the variables of sales volume, income, employment, and population. These evaluations identify the positive and negative changes within which a project can affect the local economy without creating a significant impact. The greatest historical changes define the boundaries that provide a basis for comparing an action's impact on the historical fluctuation in a particular area. Specifically, EIFS sets the upper (positive) boundary by multiplying the maximum historical deviation of the variables by 100 percent; the lower (negative) boundary is set by multiplying the maximum historical deviation of the variables by 75, 67, 67, and 50 percent, respectively. These boundaries determine the amount of change that will affect an area. The percentage allowances are arbitrary, but sensible. The maximum positive historical fluctuation is allowed with expansion because economic growth is beneficial. While cases of damaging economic growth have been cited, and although the zero-growth concept is

being accepted by many local planning groups, military base reductions generally are more injurious to local economics than are expansion.

Therefore, if the change in a given variable resulting from the proposed action, such as sales volume, income, employment, or population is more than the maximum positive historical deviation, i.e., more than 100 percent of the maximum positive historical deviation, it is considered a significant positive impact. However, if the change in a given variable caused by the proposed action is more than 75 percent of the maximum negative historical deviation of sales, it will be considered a significant negative impact.

During the public scoping process, the following issues relating to socioeconomics at Fort Lewis were identified:

- The potential for disproportionate adverse impacts to minority and low-income populations from implementation of the project
- The effects of Army expansion at Fort Lewis on the availability of off-Post housing and community facilities

These issues are addressed below for each alternative.

4.11.1 Resource-specific Significance Criteria

Factors considered in determining whether an alternative would have a significant impact on the socioeconomic structure of the ROI would include the extent or degree to which its implementation:

- Exceeds the RTV for Sales Volume, Personal Income, or Employment contained within the EIFS model.
- Changes the local housing market or vacancy rates, particularly when compared to the availability of affordable housing;
- Increases student enrollment above forecast levels and beyond the enrollment level that local school districts can accommodate;
- Changes any social, economic, physical, environmental, or health conditions so as to disproportionately affect low-income or minority populations; or
- Disproportionately endangers children in areas on or near the proposed project activities or installations.

4.11.2 Overview of Impacts to Socioeconomics by Alternative

Table 4–32 summarizes the impacts associated with socioeconomics that would occur under each of the alternatives. Less than significant effects or no effects are expected for most activities under the four alternatives. Direct and indirect effects from construction and cumulative effects under Alternative 4 would be significant.

4.11.3 Alternative 1 — No Action Alternative

4.11.3.1 Construction and Population Changes: Economic Impacts

4.11.3.1.1 Construction Expenditures

Alternative 1 includes the construction of a substantial number of projects. However, additional and yet unidentified facility construction and training activities may be required in the future to support current activities. These projects would undergo separate NEPA review before implementation in accordance with regulations and current practice.

Table 4–32 Summary of Potential Effects to Socioeconomics at Fort Lewis

Economics	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	W
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	W
Housing				
Construction Direct and Indirect Effects	•	€	€	W
Live-fire Training Direct and Indirect Effects	N/A	N/A	N/A	N/A
Maneuver Training Direct and Indirect Effects	N/A	N/A	N/A	N/A
Cumulative Effects	•	€	€	W
Quality of Life				
Construction Direct and Indirect Effects	€	U	U	U
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	U	U	U
Environmental Justice				
Construction Direct and Indirect Effects	•	•	•	•
Live-fire Training Direct and Indirect Effects	•	€	€	€
Maneuver Training Direct and Indirect Effects	•	•	•	•
Cumulative Effects	•	€	€	€
Protection of Children				
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	•	•	•	•
Maneuver Training Direct and Indirect Effects	•	•	•	•
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
\+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

Under Alternative 1, maintenance, repair, and replacement of Fort Lewis's existing facilities and infrastructure would continue. Currently, Fort Lewis is undergoing substantial modernization of its facilities and many projects have been constructed recently, are being constructed, or are planned for construction. This modernization includes replacing outdated buildings and improving infrastructure.

Appendix A identifies the projects planned for construction in the FY 2011 to FY 2015 period and **Figure 2–5** shows the distribution of these projects, which are all included in Alternative 1. The construction projects slated for completion under Alternative 1 are scheduled to begin between FY 2011 and FY 2015. The cost breakdown for these projects is provided in **Table 4–33**.

Other projects planned or under construction would be completed. The Army has conducted environmental review under NEPA for these planned and under-construction facilities and determined that no significant impact on the environment would occur from these projects. Any new facility construction in support of the SBCT, potential CSS units, or the potential CAB would not be accomplished on Fort Lewis under Alternative 1.

Table 4–33 Cost Breakdown by Year of Projects Identified Under Alternative 1

Fiscal Year	Cost
2011	$60,500,000
2012	$324,500,000
2013	$63,155,000
2014	$111,960,000
2015	$22,400,000

Source: Army 2008a

4.11.3.1.2 Population Changes

Implementation of Alternative 1 would not result in changes to the population in the ROI beyond that evaluated under previous actions. The construction projects at Fort Lewis contained in Alternative 1 are not of a magnitude that would be expected to trigger a temporary movement of workers from outside the ROI to fill the supply of construction job opportunities. However, previous and ongoing actions evaluated separately would result in an increase in active duty military and civilian employment, and increases in military Family members.

4.11.3.1.3 Less than Significant Effects

The construction costs from the above sections were input to EIFS to determine the impact that they would have on the economy of Fort Lewis's ROI. The results are shown in **Table 4–34** and indicate that the construction expenditures at Fort Lewis under Alternative 1 would have a less than significant impact on the economy of the ROI. This is shown by the change percentages, all of which are well within the RTV range for a given indicator.

4.11.3.2 Live-Fire and Maneuver Training: Economic Impacts

4.11.3.2.1 Less than Significant Effects

New training at Fort Lewis, be it live-fire or maneuver training, would have a less than significant economic impact in the ROI. Additional training may require the purchase of additional supplies or fuel; if this material is procured locally, a small but positive economic impact in the ROI would be generated. Additional training may require the letting of new contracts for transportation of equipment or personnel between Fort Lewis and YTC; like the acquisition of material, these contracts can be expected to generate a small but positive economic impact in the ROI if they are awarded to local contractors.

4.11.3.3 Construction, Live-Fire Training, and Maneuver Training: Housing Impacts

4.11.3.3.1 No Effects

4.11.3.3.1.1 On-Post

Because there would be no new Soldiers stationed at Fort Lewis under Alternative 1 beyond those already planned, there would be no change in demand for on-Post housing. The current situation with 11,821 unaccompanied personnel barracks spaces and 3,492 occupied Family housing units at Fort Lewis (the total stock of family housing units exceeds 3,800 units, but some portion of these are unavailable at any time due to renovation) would continue. Consequently, training conducted under Alternative 1 would not impact on-Post housing.

Table 4–34 Economic Impacts from Construction at Fort Lewis under Alternative 1

Fiscal Year	Indicator	Projected Change	Change (Percentage)	Rational Threshold Values Range (Percentage)
2011	Direct Sales Volume	$60,500,000		
	Total Sales Volume	$199,650,000	0.79	-6.27 to 8.98
	Direct Income	$11,540,070		
	Total Income	$38,082,240	0.19	-5.86 to 9.01
	Direct Employment	297		
	Total Employment	980	0.23	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02
2012	Direct Sales Volume	$324,500,000		
	Total Sales Volume	$1,070,850,000	4.23	-6.27 to 8.98
	Direct Income	$61,896,750		
	Total Income	$204,259,300	1.01	-5.86 to 9.01
	Direct Employment	1,594		
	Total Employment	5,259	1.25	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02
2013	Direct Sales Volume	$63,155,000		
	Total Sales Volume	$208,411,500	0.82	-6.27 to 8.98
	Direct Income	$12,046,500		
	Total Income	$39,753,450	0.2	-5.86 to 9.01
	Direct Employment	310		
	Total Employment	1,024	0.24	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02
2014	Direct Sales Volume	$111,960,000		
	Total Sales Volume	$369,468,000	1.46	-6.27 to 8.98
	Direct Income	$21,355,810		
	Total Income	$70,474,170	0.35	-5.86 to 9.01
	Direct Employment	550		
	Total Employment	1,814	0.43	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02
2015	Direct Sales Volume	$22,400,000		
	Total Sales Volume	$73,920,000	0.29	6.27 to 8.98
	Direct Income	$4,272,688		
	Total Income	$14,099,870	0.07	-5.86 to 9.01
	Direct Employment	110		
	Total Employment	363	0.09	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02

Source: EIFS Model

4.11.3.3.1.2 Off-Post

There would be no new Soldiers stationed at Fort Lewis under Alternative 1 other than those already planned; in addition, the construction activities described under Alternative 1 are not expected to trigger in-migration of workers to the ROI. As a result, there would be no change in the off-Post housing market and training conducted under Alternative 1 would not impact off-Post housing.

4.11.3.4 Quality of Life Impacts

4.11.3.4.1 Less than Significant Effects

Alternative 1 would result in an increase in both the on-Post and off-Post populations as a result of previously planned stationing actions, with a resulting proportionate increase in demand for schools and childcare facilities, public safety, and other services as discussed as follows. The training to be conducted under Alternative 1 would not present any quality of life impacts to on- or off-Post populations beyond those discussed elsewhere in this document.

4.11.3.4.1.1 Schools

School enrollment or the number of students requiring bussing would not increase because of activities contained in Alternative 1 beyond that already evaluated for previous actions. There is no expectation that the construction activities under Alternative 1 would lead to in-migration of workers to the ROI or subsequent increases in school enrollment.

4.11.3.4.1.2 Child Care Services, On-Post

There is no expected increase in population associated with Alternative 1 at Fort Lewis beyond that already evaluated under previous actions, and thus there is no projected increased demand for childcare services as a result of actions specific to Alternative 1.

4.11.3.4.1.3 Child Care Services, Off-Post

Demand for off-Post child care services is not expected to rise as a result of Alternative 1.

4.11.3.4.1.4 Family Support and Retirement Services

Services would continue to be provided to residents and retirees by the Army Community Support Center, the Family Connection, Family Readiness Groups, and the Retirement Services Office. No immediate increase in the retiree population is anticipated. Although some of the older active duty personnel may possibly choose to retire or settle in the area after discharge or retirement, most of the new troops are typically younger and many would likely serve at other Posts before discharge or retirement, or return to their place of origin. It is unlikely that Alternative 1 would have an impact on the retiree population.

4.11.3.4.1.5 Shops and Services, On-Post

Because there is no projected increase in population under Alternative 1 beyond those already evaluated, there would be no impacts to on-Post shops and services.

4.11.3.4.1.6 Shops and Services, Off-Post

Off-Post, the services provided through the private sector can be expected to respond to any increased demand for shops and services as a result of increased economic activity within the ROI by increasing supply.

4.11.3.4.1.7 Recreation

Demand for recreational facilities would not increase under Alternative 1. Alternative 1 includes the development of additional on-Post community and recreational facilities, or upgrade of existing facilities including development of the North Fort Neighborhood Park, which will include four baseball fields and a concession area.

4.11.3.4.1.8 Public Safety

There is no expected increase in population associated with Alternative 1 at Fort Lewis beyond that already evaluated under previous actions, and thus there is no projected increased demand upon public safety organizations (police and fire departments) resulting from actions specific to Alternative 1.

4.11.3.5 Construction, Live-Fire Training, and Maneuver Training: Environmental Justice

4.11.3.5.1 No Effects

Construction impacts are temporary in nature, but they can range from annoying to detrimental for those living near a construction site. Most of the construction activity would be carried out in the cantonment area of the installation where officers and enlisted Soldiers of all ranks and ethnicities are housed; because construction activities would be confined to Post, there would be no impacts to any off-Post populations.

Impacts from noise, dust, and traffic generated by construction would be minimized by careful construction planning. Fugitive dust emissions would be minimized throughout the construction period by use of conventional dust suppression, BMPs, and mitigation techniques, such as soil erosion and sedimentation control, restrictions on where vehicles can travel on site, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust. Noise from construction equipment would be controlled by use of appropriate sound mitigation techniques and BMPs. Construction traffic during peak hours would be reduced by the use of centralized construction staging areas.

Increased training at Fort Lewis under Alternative 1 will not result in any significant effects, and will not result in any disproportionately high or adverse impacts to minority or low-income populations or residents of the Nisqually Indian Reservation.

4.11.3.6 Construction, Live-Fire Training, and Maneuver Training: Protection of Children

4.11.3.6.1 Less than Significant Effects

There is a potential for minor short-term adverse impacts to children during construction. Because construction sites can be appealing to children, construction activity and vehicle traffic could pose an increased safety risk. Many of the construction projects contained in Alternative 1 would be located within the cantonment area near family housing areas.

Barriers and “no trespassing” signs would be placed around construction sites to deter children from playing in these areas, as well as to keep out other trespassers. All construction vehicles, equipment, and materials would be stored in fenced areas and secured when not in use. During construction, safety measures stated in 29 CFR Part 1926, “Safety and Health Regulations for Construction,” and other applicable regulations and guidance would be followed to protect the health and safety of all residents on Fort Lewis, as well as construction workers.

All new training activities at Fort Lewis would be carried out on designated training ranges. Access to training ranges is restricted to authorized personnel. Because children are not authorized personnel, impacts to children as a function of training activities are not anticipated under Alternative 1.

4.11.4 Alternative 2 — GTA Actions

4.11.4.1 Construction and Population Change: Economic Impacts

4.11.4.1.1 Less than Significant Effects

Alternative 2 includes the construction of a substantial number of projects; however, additional and yet unidentified facility construction and training activities may be required in the future to support current activities. These projects would undergo separate NEPA review before implementation in accordance with regulations and current practice.

Under Alternative 2, maintenance, repair, and replacement of Fort Lewis's existing facilities and infrastructure would continue, and new facilities would be developed. Currently, Fort Lewis is undergoing substantial modernization of its facilities and many projects have been constructed recently, are being constructed, or are planned for construction. They include replacing outdated buildings and improving infrastructure.

4.11.4.1.1.1 Construction Expenditures

The construction projects slated for completion under Alternative 2 are scheduled to begin between FY 2011 and FY 2015. The cost breakdown for these projects is provided in **Table 4–35**.

Table 4–35 Cost Breakdown by Year of Projects identified under Alternative 2

Fiscal Year	Cost
2011	$178,500,000
2012	$326,800,000
2013	$198,455,000
2014	$319,660,000
2015	$81,400,000

4.11.4.1.1.2 Population Changes

Implementation of Alternative 2 would result in changes to the population in the ROI. While the construction projects at Fort Lewis contained in Alternative 2 are not of a magnitude that would be expected to trigger a temporary movement of workers from outside the ROI to fill the supply of construction job opportunities, the stationing actions contained in Alternative 2 would result in an increase in 1,878 Soldiers, 1,426 civilian employees, and 2,855 military Family members.

4.11.4.1.1.3 Economic Impacts from Construction and Increase in Population

The construction costs and increase in military personnel associated with Alternative 2 were input to EIFS to determine the impact that they would have on the economy of Fort Lewis ROI. It is assumed in the economic impact modeling that all Soldiers will be assigned in FY 2011 and will live off-Post. In reality, Soldiers may be assigned over time, and as discussed in Section 4.11.4.3.1.2 below, some percentage of Soldiers will live on-Post; using these conservative assumptions results in an over-estimation of effects. The results of the modeling, which are shown in **Table 4–36**, indicate that the activities under Alternative 2 would have a less than significant impact on the economy of the ROI. This is shown by the change percentages, all of which are within the RTV range for a given indicator.

Table 4–36 Economic Impacts from Construction and Increase in Population at Fort Lewis under Alternative 2

Fiscal Year	Indicator	Projected Change	Change (Percentage)	Rational Threshold Values Range (Percentage)
2011	Direct Sales Volume	$178,500,000		
	Total Sales Volume	$701,403,800	2.77	-6.27 to 8.98
	Direct Income	$103,673,000		
	Total Income	$196,929,000	0.97	-5.86 to 9.01
	Direct Employment	2,922		
	Total Employment	5,323	1.27	-7.15 to 2.73
	Local Population	4,676		
	Local Off-Post Population	4,676		-2.52 to 2.02
2012	Direct Sales Volume	$26,800,000		
	Total Sales Volume	$1,078,440,000	4.26	-6.27 to 8.98
	Direct Income	$62,335,460		
	Total Income	$205,707,000	1.01	-5.86 to 9.01
	Direct Employment	1,605		
	Total Employment	5,296	1.26	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0		-2.52 to 2.02
2013	Direct Sales Volume	$198,455,000		
	Total Sales Volume	$654,901,500	2.58	-6.27 to 8.98
	Direct Income	$37,854,300		
	Total Income	$124,939,200	0.61	-5.86 to 9.01
	Direct Employment	4,975		
	Total Employment	3,216	0.77	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0		-2.52 to 2.02
2014	Direct Sales Volume	$319,660,000		
	Total Sales Volume	$1,054,878,000	4.16	-6.27 to 8.98
	Direct Income	$60,973,540		
	Total Income	$201,212,700	0.99	-5.86 to 9.01
	Direct Employment	1,570		
	Total Employment	5,183	1.23	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02
2015	Direct Sales Volume	$81,400,000		
	Total Sales Volume	$187,220,000	1.06	-6.27 to 8.98
	Direct Income	$15,526,640		
	Total Income	$51,237,920	0.25	-5.86 to 9.01
	Direct Employment	400		
	Total Employment	1,319	0.31	-7.15 to 2.73
	Local Population	0		
	Local Off-Post Population	0	0	-2.52 to 2.02

Source: EIFS Model

4.11.4.2 Live-Fire and Maneuver Training: Economic Impacts

4.11.4.2.1 Less than Significant Effects

New training activities at Fort Lewis to be conducted under Alternative 2 would have a less than significant economic impact in the ROI. Additional training may require the purchase of additional supplies or fuel; if this material is procured locally, a small but positive economic impact in the ROI will be generated. Additional training may require the letting of new contracts for transportation of

equipment or personnel between Fort Lewis and YTC; like the acquisition of material, these contracts can be expected to generate a small but positive economic impact in the ROI if they are awarded to local contractors.

4.11.4.3 Construction, Live-Fire Training, and Maneuver Training: Housing Impacts

4.11.4.3.1 Less than Significant Effects

4.11.4.3.1.1 On-Post

The stationing of additional Soldiers under Alternative 2 would increase demand for on-Post housing. Despite housing modernization projects in-progress and planned, there would not be enough on-Post housing to accommodate all new Soldiers and their Families; as a result, the demand for off-Post housing in the local housing market would increase under Alternative 2 (see below).

The training conducted by the additional Soldiers described under Alternative 2 would not impact on-Post housing.

4.11.4.3.1.2 Off-Post

Currently, approximately 45.5 percent of all military personnel (accompanied and unaccompanied) assigned to Fort Lewis live off Post; approximately 70 percent of accompanied Soldiers and 30 percent of unaccompanied Soldiers live off Post. Twenty-one percent of officers and 35 percent of enlisted Soldiers are unaccompanied. It is assumed that these percentages would hold true in the future.

The stationing of an additional 1,878 military personnel and hiring of 1,426 civilian employees at Fort Lewis under Alternative 2 would create an increased demand for approximately 2,576 additional off-Post housing units in the ROI (1,150 Soldiers and 1,426 civilian personnel). This demand accounts for the 300 housing units that are planned for construction at Fort Lewis.

Between 2000 and 2007, approximately 6,200 residential units were constructed in the market area each year. A peak of 8,179 construction permits were issued in 2005; 83 percent of these permits were for single-family homes, and the remaining 17 percent were for multi-family developments.

Growth in the civilian population is expected to slow between 2009 and 2012; it is projected that only 5,441 housing units would be permitted in 2012 as a result. Considering slowed civilian population increases over the period (and hence slowed demand for new residences), it is projected that the housing market could meet the demand generated under Alternative 2.

The training conducted by the additional Soldiers described under Alternative 2 would not impact off-Post housing.

4.11.4.4 Construction, Live-Fire Training, and Maneuver Training: Quality of Life Impacts

4.11.4.4.1 Significant Effects

Alternative 2 would result in an increase in both the on-Post and off-Post populations, with a resulting proportionate increase in demand for schools and childcare facilities, public safety, and other services. The training to be conducted under Alternative 2 would not present any quality of life impacts to on- or off-Post populations beyond those discussed elsewhere in this document.

4.11.4.4.1.1 Schools

School enrollment would increase as a result of the increase in both on-Post and off-Post populations under Alternative 2. The elementary school-aged children of Families who live on Post and who choose to attend public school would attend the on-Post elementary schools; middle school and high school children of these Families would attend off-Post schools. Children of families who live off Post could attend off-Post schools.

Under Alternative 2, an additional 912 school-aged children of military personnel would be expected over the current population of 15,551.

Based on existing attendance patterns, population increases at Fort Lewis are expected to result in additional students at the five on-Post elementary schools and at off-Post elementary, middle, and high schools.

Enrollment changes would be expected to occur primarily in the Clover Park School District and Steilacoom Historical School District, as approximately 36 and 15 percent, respectively, of their current enrollments are federally connected students. Assuming apportionment of new students follows the current status, these school districts could expect to receive an additional 328 and 137 students, respectively, equating to approximately 3 and 4 percent of their current student enrollments. Smaller impacts would be felt at other school districts in the area including Yelm, North Thurston, Puyallup, Bethel, Franklin Pierce, and University Place that serve Fort Lewis's on- and off-Post populations. Many of these school districts' facilities are currently at or over capacity: The Steilacoom Historical School District, for example, has restricted the enrollment of out-of-district students, citing overcrowding, and many of the on-Post schools operated by the Clover Park School District are currently over-enrolled.

The increase in the student population associated with Alternative 2 is projected to require the construction of two larger-capacity elementary schools on-Post. The Clover Park School District has initiated activities to address the potential impacts of additional students within their enrollment area under Alternative 2.

An increase in the student population under Alternative 2 will also result in an increased demand for student bussing to both on- and off-Post schools; the traffic impacts of increased bussing are captured in the model results presented in **Section 4.10**. Because of the limited on-Post housing, the large majority of newly-stationed Soldiers under Alternative 2 will reside off-Post; their payment of state and local taxes and fees that are used to fund school district operating budgets will mitigate the increased costs for bussing.

The school districts that serve the children of Fort Lewis personnel receive federal impact aid as an offset for the costs of providing public education to dependents of military personnel. In addition, not all students would attend public schools; some may attend private school or be home-schooled. The additional enrollment envisioned under Alternative 2 could present a significant impact to these school districts.

4.11.4.4.1.2 Child Care Services, On-Post

The expected increase in population associated with Alternative 2 at Fort Lewis could result in an increased demand for child care services. The military personnel that are projected to live on Post, as well as many who live off Post, would increase the demand for child care services. This increased demand would be met by the construction of four additional child care facilities and the expansion of three existing facilities.

4.11.4.4.1.3 Child Care Services, Off-Post

Demand for off-Post child care services is not expected to rise significantly, as many of the military personnel commuting to work at Fort Lewis would likely first look on Post (near their place of employment) for preschool child care services rather than off Post. As with any population increase, the services provided through the private sector would be expected to respond to any increased demand by increasing supply.

4.11.4.4.1.4 Family Support and Retirement Services

Services would continue to be provided to residents and retirees by the Army Community Support Center, the Family Connection, Family Readiness Groups, and the Retirement Services Office. No immediate increase in the retiree population is anticipated. Although some of the older active duty personnel may possibly choose to retire or settle in this area after discharge or retirement, most of the new troops are typically younger, and many would likely serve at other Posts before discharge or retirement, or return to their place of origin. It is unlikely that Alternative 2 would have an impact on the retiree population.

4.11.4.4.1.5 Shops and Services, On-Post

The additional on-Post and off-Post populations would increase demand for on-Post retail, food, and related services such as Fort Lewis's commissary and retail outlets in the PX.

The Army Air Force Exchange Service (AAFES) has proposed to construct a Lifestyle Center—an open-air shopping center that offers a mix of retail, restaurant, and entertainment venues—at Fort Lewis to expand retail operations to meet the needs of the growing and increasingly diverse customer base, and to increase the variety and appeal of its amenities. The Center would be constructed in the main cantonment area, on a 78-acre site currently occupied by PX, Commissary, and other retail operations. The PX and Commissary would serve as major anchors to the Center.

4.11.4.4.1.6 Shops and Services, Off-Post

Off Post, the services provided through the private sector can be expected to respond to an increased demand for shops and services by increasing supply.

4.11.4.4.1.7 Recreation

Demand for recreational facilities would increase with the additional population residing on Post and off Post. In addition to the extensive recreational facility construction and renovation considered in Alternative 1, Alternative 2 includes the development of:

- A multi-use ball field
- A multi-purpose track and field facility
- Baseball field

The increase in off-Post population would also increase the demand for off-Post recreational facilities. The demand for some facilities, such as gyms and pools, may be moderated by the use of on-Post facilities. Increases in demand for off-post recreational facilities will be met by a combination of private and public sector facilities, the latter of which are funded in part by sales taxes collected in localities and paid by Soldiers and civilian employees residing on- and off-Post; by property taxes of Soldiers and civilian employees residing off-Post; and through use fees.

The services provided through the private sector can be expected to respond to the increased demand by increasing supply. Unmet demand for certain types of recreational facilities (pools, general and

activity-specific gymnasiums, etc.) can be expected to be met by an increase in the number of private sector facilities.

4.11.4.4.1.8 Public Safety

Increases in the on- and off-Post populations at Fort Lewis associated with Alternative 2 may cause an increase in the demand for off-Post public safety services (fire, police, emergency response, etc.) Because of the limited amount of on-Post housing, the large majority of newly stationed Soldiers and newly hired civilian employees would reside off-Post under Alternative 2.

Local and state government agencies provide off-Post public safety services; funding for these services is derived from sales and gross receipts taxes, property taxes, and other taxes and charges levied on goods and services. Soldiers and civilians living off-Post will fund additional public safety services through the payment of sales, property, and other taxes. Soldiers living on-Post will also help fund additional public safety services through the payment of sales taxes on purchases made off-Post and other charges. As a result, the increased demand for public safety services presented by these new residents of the area will be at least partially offset by their payment of various taxes and charges.

4.11.4.5 Construction, Live-Fire Training, and Maneuver Training: Environmental Justice

4.11.4.5.1 Less than Significant Effects

Construction impacts are temporary in nature, but they can range from annoying to detrimental for those living near a construction site. Most of the construction activity would be carried out in the cantonment area of the installation where officers and enlisted Soldiers of all ranks and ethnicities are housed; because construction activities would be confined to Post, there would be no impacts to any off-Post populations.

Impacts from noise, dust, and traffic generated by construction would be minimized by careful construction planning. Fugitive dust emissions would be minimized throughout the construction period by use of conventional dust suppression, BMPs, and mitigation techniques, such as soil erosion and sedimentation control, restrictions on where vehicles can travel on site, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust. Noise from construction equipment would be controlled by use of appropriate sound mitigation techniques and BMPs. Construction traffic during peak hours would be reduced by the use of centralized construction staging areas.

As noted in Section 4.8, increased training at Fort Lewis will result in significant noise effects. The impacts would be realized by both on-Post and off-Post populations, including minorities, low-income populations, and Native Americans who reside in areas adjacent to Fort Lewis or on the Nisqually reservation. These impacts will be disproportionately realized by residents of the Nisqually reservation (most of whom identify as American Indian or Native Alaskan) and others who live adjacent to the areas of Fort Lewis used for training. The disproportionate realization of the impact is due to the physical proximity to areas used for live-fire training; those who live closest to the training areas will realize greater impacts from increased noise. This is solely a function of the historical development of ranges on Fort Lewis and the resulting locations of training ranges relative to the Nisqually Indian Reservation, not any intent of the Army to place burdens on the Reservation. Although the effects of noise would disproportionately affect the Reservation, the overall environmental justice effects would be less than significant because the noise impact is not anticipated to change or otherwise affect any social, economic, physical, or health conditions that

would result in social, cultural, or human health effects to the majority American Indian/Alaska Native population.

Increased on-Post populations will present significant socioeconomic-related impacts to off-Post populations in terms of increased school attendance in local school districts. These impacts will be realized equally by all off-Post populations with school-aged children, including children from minority groups, low-income populations, or children belonging to Indian Tribes, and thus will not represent a disproportionately high or adverse impact to minority or low-income populations or Indian Tribes.

4.11.4.6 Construction, Live-Fire Training, and Maneuver Training: Protection of Children

4.11.4.6.1 Less than Significant Effects

The effects of this alternative would be similar to those described for Alternative 1 in that there is a potential for minor short-term adverse impacts to children during construction. Barriers and "no trespassing" signs would be placed around construction sites to deter children from playing in these areas. All construction vehicles, equipment, and materials would be stored in fenced areas and secured when not in use. Finally, because children are not authorized personnel, no impacts to children outside of those discussed under Environmental Justice are anticipated as a function of training activities under Alternative 2.

4.11.5 Alternative 3 — GTA Actions + CSS Soldiers

4.11.5.1 Construction and Population Change: Economic Impacts

4.11.5.1.1 Less than Significant Effects

The construction of the facilities required for the CSS units cannot be determined currently because the precise distribution of units among transportation, quartermaster, medical, headquarters, or other CSS units is currently unknown. Even so, **Table 2–5** provides a generalized estimate of facilities required for 1,000 CSS Soldiers. As these units are defined in the future, the Army would conduct site-specific NEPA analyses before any construction would occur.

Given the relatively modest facilities required to house and support 1,000 CSS Soldiers in comparison to the large number of facilities planned under Alternatives 1 or 2, it is projected that the incremental economic impacts from this construction would be accordingly modest and limited to the ROI. It is not expected that the additional construction activities required under Alternative 3 would significantly increase the percent changes in indicators displayed in **Table 4–32**, and thus the construction activities under Alternative 3 would present a less than significant socioeconomic impact.

4.11.5.1.1.1 Population Change

Implementation of Alternative 3 would result in greater changes to the population in the ROI than Alternative 2. While the construction projects at Fort Lewis under Alternative 3 are not expected to trigger a temporary movement of workers from outside the ROI to fill the supply of construction job opportunities, the permanent stationing of 1,000 CSS Soldiers (and approximately 1,520 Family members) in conjunction with those stationing activities explained in Alternatives 1 and 2 would result in a total increase of 2,878 Soldiers and 4,375 military Family members.

4.11.5.1.1.2 Economic Impacts from Construction and Increase in Population

CSS Soldiers would arrive at Fort Lewis sometime between the present and FY 2013; however, the exact schedule would be subject to variation and change. Because of this, the potential impacts that would be generated by these additional personnel and employees cannot be calculated on a year-by-year basis.

It is not anticipated that the 1,000 CSS Soldiers and their Families would cause the change percentages to exceed the RTV range, and thus the impacts on the economy of the ROI would be less than significant. **Table 4–32** summarizes the potential economic impacts to the community from construction and increase in population for this alternative.

4.11.5.2 Live-Fire and Maneuver Training: Economic Impacts

4.11.5.2.1 Less than Significant Effects

New training at Fort Lewis described under Alternative 3, be it live-fire or maneuver training, would have a less than significant economic impact on the ROI. Additional training may require the purchase of additional supplies or fuel; if this material is procured locally, a small but positive economic impact in the ROI will be generated. Additional training may require the letting of new contracts for transportation of equipment or personnel between Fort Lewis and YTC; like the acquisition of material, these contracts can be expected to generate a small but positive economic impact in the ROI if they are awarded to local contractors.

4.11.5.3 Construction, Live-Fire Training, and Maneuver Training: Housing Impacts

4.11.5.3.1 Less than Significant Effects

4.11.5.3.1.1 On-Post

The stationing of the CSS Soldiers under Alternative 3 would increase demand for on-Post housing. Despite housing modernization projects in-progress and planned, there would not be enough on-Post housing to accommodate all new Soldiers and their Families. As a result, the demand for off-Post housing in the local housing market would increase under Alternative 3.

The training conducted by the additional Soldiers described under Alternative 3 would not impact on-Post housing.

4.11.5.3.1.2 Off-Post

Currently, approximately 45.5 percent of all military personnel (accompanied and unaccompanied) assigned to Fort Lewis live off Post; approximately 70 percent of accompanied Soldiers and 30 percent of unaccompanied Soldiers live off Post. Twenty-one percent of officers and 35 percent of enlisted Soldiers are unaccompanied. It is assumed that these percentages would hold true in the future.

Using the same ratios identified for Alternative 2, the stationing of an additional 2,878 military personnel and hiring of 1,426 civilian employees at Fort Lewis under Alternative 3 would create an increased demand for approximately 3,339 additional off-Post housing units in the ROI (1,913 Soldiers and 1,426 civilian personnel). This demand accounts for the 300 new housing units slated for construction at Fort Lewis.

Between 2000 and 2007, approximately 6,200 residential units were constructed in the market area each year. A peak of 8,179 construction permits were issued in 2005; 83 percent of these permits were for single family homes, and the remaining 17 percent were for multi-family developments.

Growth in the civilian population is expected to slow between 2009 and 2012; it is projected that only 5,441 housing units would be permitted in 2012 as a result. Considering slowed civilian population increases over the period (and hence slowed demand for new residences), it is projected that the housing market could meet the demand generated under Alternative 3 as the projected combined military and civilian demand of 8,780 residential units is only 7 percent greater than that experienced in the peak year of 2005. This impact will be mitigated by the availability of vacant housing stock in the area. The rental unit vacancy rate in the area has historically been around 5.5 percent, which in 2007 equated to 7,545 available rental units; approximately 70 percent of these units are considered suitable for military members.

The training conducted by the additional Soldiers described under Alternative 3 would not impact off-Post housing.

4.11.5.4 Construction, Live-Fire Training, and Maneuver Training: Quality of Life Impacts

4.11.5.4.1 Significant Effects

Alternative 3 would result in an increase in both the on-Post and off-Post populations, with a resulting proportionate increase in demand for schools and child care facilities, public safety, and other services as discussed as follows. The training to be conducted under Alternative 3 would not present any quality of life impacts to on- or off-Post populations beyond those discussed elsewhere in this document.

4.11.5.4.1.1 Schools

School enrollment would increase as a result of the increase in both on-Post and off-Post populations under Alternative 3. The elementary school-aged children of Families who live on Post and who choose to attend public school would attend the on-Post elementary schools; middle school and high school children of these Families would attend off-Post schools. Children of families who live off Post could attend off-Post schools.

Under Alternative 3, an additional 1,404 school-aged children of military personnel would be expected over the current population of 15,049 school-aged children. Based on existing attendance patterns, population increases at Fort Lewis are expected to result in additional students at the five on-Post elementary schools and at off-Post elementary, middle, and high schools.

Enrollment changes would be expected to occur primarily in the Clover Park School District and Steilacoom Historical School District, as approximately 36 and 15 percent, respectively, of their enrollment are federally connected students. Assuming apportionment of new students follows the current status, these school districts could expect to receive an additional 505 and 211 students, respectively, equating to approximately 4 and 7 percent of their current student enrollments. Smaller impacts would be felt at other school districts in the area including Yelm, North Thurston, Puyallup, Bethel, Franklin Pierce, and University Place that serve Fort Lewis's on- and off-Post populations. Many of these school districts' facilities are currently at or over capacity: The Steilacoom Historical School District, for example, has restricted the enrollment of out-of-district students, citing overcrowding, and many of the on-Post schools operated by the Clover Park School District are currently over-subscribed.

The increase in the student population associated with Alternative 3 is projected to require the construction of two larger-capacity elementary schools on-Post. The Clover Park School District has

initiated activities to address the potential impacts of additional students within their enrollment area under Alternative 3.

An increase in the student population under Alternative 3 will also result in an increased demand for student bussing to both on- and off-Post schools; the traffic impacts of increased bussing are captured in the model results presented in Section 4.10. Because of the limited on-Post housing, the large majority of newly stationed Soldiers under Alternative 3 will reside off-Post; their payment of state and local taxes and fees that are used to fund school district operating budgets will mitigate the increased costs for bussing.

These school districts receive federal impact aid as an offset for the costs of providing public education to dependents of military personnel. In addition, not all students would attend public schools; some may attend private school or be home-schooled. However, the additional children envisioned under Alternative 3 could present a significant impact to these school districts.

4.11.5.4.1.2 Child Care Services, On-Post

The expected increase in population associated with Alternative 3 at Fort Lewis could result in an increased demand for child care services. The military personnel that are projected to live on Post, as well as many who live off Post, would increase the demand for child care services. This increased demand may be met by the construction of four additional child care facilities and the expansion of three existing facilities.

4.11.5.4.1.3 Child Care Services, Off-Post

Demand for off-Post child care services is not expected to rise significantly, as many of the military personnel commuting to work at Fort Lewis would likely first look on Post (near their place of employment) for preschool child care services, rather than off Post. As with any population increase, the services provided through the private sector would be expected to respond to any increased demand by increasing supply.

4.11.5.4.1.4 Family Support and Retirement Services

Services would continue to be provided to residents and retirees by the Army Community Support Center, the Family Connection, Family Readiness Groups, and the Retirement Services Office. No immediate increase in the retiree population is anticipated. Although some of the older active duty personnel may possibly choose to retire or settle in this area after discharge or retirement, most of the new troops are typically younger, and many would likely serve at other Posts before discharge or retirement, or return to their place of origin. It is unlikely that Alternative 3 would have an impact on the retiree population.

4.11.5.4.1.5 Shops and Services, On-Post

The additional on-Post and off-Post populations would increase demand for on-Post retail, food, and related services such as Fort Lewis's commissary and retail outlets in the PX.

The AAFES has proposed to construct a Lifestyle Center—an open-air shopping center that offers a mix of retail, restaurant, and entertainment venues—at Fort Lewis to expand retail operations to meet the needs of the growing and increasingly diverse customer base, and to increase the variety and appeal of its amenities. The Center would be constructed in the main cantonment area, on a 78-acre (32-ha) site currently occupied by the PX, Commissary, and other retail operations. The PX and Commissary would serve as major anchors to the Center. The expanded Lifestyle Center may be sufficient to meet increased demand for shops and services.

4.11.5.4.1.6 Shops and Services, Off-Post

Off Post, the services provided through the private sector can be expected to respond to an increased demand for shops and services by increasing supply.

4.11.5.4.1.7 Recreation

Demand for recreational facilities would increase with the additional population residing on Post and off Post. There are no additional planned recreational facilities to be constructed under Alternative 3; increased demand for recreational facilities would be met by the facilities constructed and renovated under Alternatives 1 and 2.

The increase in off-Post population would also increase the demand for off-Post recreational facilities. The demand for some facilities, such as gyms and pools, may be moderated by the use of on-Post facilities. Increases in demand for off-post recreational facilities will be met by a combination of private and public sector facilities, the latter of which are funded in part by sales taxes collected in localities and paid by Soldiers and civilian employees residing on- and off-Post; by property taxes of Soldiers and civilian employees residing off-Post; and through use fees.

The services provided through the private sector can be expected to respond to the increased demand by increasing supply. Unmet demand for certain types of recreational facilities (pools, general and activity-specific gymnasiums, etc.) can be expected to be met by an increase in the number of private sector facilities.

4.11.5.4.1.8 Public Safety

Increases in the on- and off-Post populations at Fort Lewis associated with Alternative 3 may cause an increase in the demand for off-Post public safety services (fire, police, emergency response, etc.) Because of the limited amount of on-Post housing, the large majority of newly stationed Soldiers and newly hired civilian employees would reside off-Post under Alternative 3.

Local and state government agencies provide off-Post public safety services; funding for these services is derived from sales and gross receipts taxes, property taxes, and other taxes and charges levied on goods and services. Soldiers and civilians living off-Post will fund additional public safety services through the payment of sales, property, and other taxes. Soldiers living on-Post will also fund additional public safety services through the payment of sales taxes on purchases made off-Post and other charges. As a result, the increased demand for public safety services presented by these new residents of the area will be offset by their payment of various taxes and charges.

4.11.5.5 Construction, Live-Fire Training, and Maneuver Training: Environmental Justice

4.11.5.5.1 Less than Significant Effects

Construction impacts are temporary in nature, but they can range from annoying to detrimental for those living near a construction site. Most of the construction activity would be carried out in the cantonment area of the installation where officers and enlisted Soldiers of all ranks and ethnicities are housed; because construction activities would be confined to Post, there would be no impacts to any off-Post populations.

Impacts from noise, dust, and traffic generated by construction would be minimized by careful construction planning. Fugitive dust emissions would be minimized throughout the construction period by use of conventional dust suppression, BMPs, and mitigation techniques, such as soil

erosion and sedimentation control, restrictions on where vehicles can travel on site, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust. Noise from construction equipment would be controlled by use of appropriate sound mitigation techniques and BMPs. Construction traffic during peak hours would be reduced by the use of centralized construction staging areas.

As noted in Section 4.8, increased training at Fort Lewis will result in significant noise effects. The impacts would be realized by both on-Post and off-Post populations, including minorities, low-income populations, and Native Americans who reside in areas adjacent to Fort Lewis or on the Nisqually reservation. These impacts will be disproportionately realized by residents of the Nisqually reservation (most of whom identify as American Indian or Native Alaskan) and others who live adjacent to the areas of Fort Lewis used for training. The disproportionate realization of the impact is due to the physical proximity to areas used for live-fire training; those who live closest to the training areas will realize greater impacts from increased noise. This is solely a function of the historical development of ranges on Fort Lewis and the resulting locations of training ranges relative to the Nisqually Indian Reservation, not any intent of the Army to place burdens on the Reservation. Although the effects of noise would disproportionately affect the Reservation, the overall environmental justice effects would be less than significant because the noise impact is not anticipated to change or otherwise affect any social, economic, physical, or health conditions that would result in social, cultural, or human health effects to the majority American Indian/Alaska Native population.

Increased on-Post populations will present significant socioeconomic-related impacts to off-Post populations in terms of increased school attendance in local school districts. These impacts will be realized equally by all off-Post populations with school-aged children, including children from minority groups, low-income populations, or children belonging to Indian Tribes, and thus will not represent a disproportionately high or adverse impact to minority or low-income populations or Indian Tribes. Increased training will result in significant traffic- and transportation-related impacts on-Post; these impacts will not be realized off-Post, and thus will not result in any disproportionate or adverse impact to off-Post minority, low-income, or Tribal populations.

4.11.5.6 Construction, Live-Fire Training and Maneuver Training: Protection of Children

4.11.5.6.1 Less than Significant Effects

The effects of this alternative would be similar to those described for Alternatives 1 and 2 in that there is a potential for minor short-term adverse impacts to children during construction. Barriers and "no trespassing" signs would be placed around construction sites to deter children from playing in these areas. All construction vehicles, equipment, and materials would be stored in fenced areas and secured when not in use. Finally, because children are not authorized personnel, no impacts to children outside of those discussed under Environmental Justice are anticipated as a function of training activities under Alternative 3.

4.11.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.11.6.1 Construction and Population Change: Economic Impacts

4.11.6.1.1 Significant but Mitigable to less than Significant Effects

The cost or schedule of construction of the facilities required for the medium CAB cannot be determined currently. As a result, the potential economic impacts of construction cannot be

estimated. However, conventional construction logistics and management approaches to scheduling, materials ordering, and other activities could be applied to mitigate any potentially significant effects.

4.11.6.1.1.1 Population Changes

Implementation of Alternative 4 would result in greater changes to the population in the ROI than under Alternatives 1, 2, or 3. The construction projects at Fort Lewis under Alternative 4 are not expected to trigger a temporary movement of workers from outside the ROI to fill the supply of construction job opportunities. Alternative 4 calls for the permanent stationing of 2,800 medium CAB Soldiers and approximately 4,256 Family members in addition to those stationing activities explained in Alternatives 1, 2, and 3. This would result in a total increase of 5,678 new Soldiers and 8,631 new military Family members. Civilian employment at Fort Lewis is not projected to be impacted by implementation of Alternative 4, and would remain at the level discussed in Alternative 1.

The exact stationing schedule for the medium CAB is unknown at present. Consequently, the potential impacts that would be generated by these additional personnel and employees cannot be calculated on a year-by-year basis.

4.11.6.2 Live-Fire and Maneuver Training: Economic Impacts

4.11.6.2.1 Less than Significant

New training at Fort Lewis under Alternative 4, be it live-fire or maneuver training, would have a less than significant economic impact on the ROI. Additional training may require the purchase of additional supplies or fuel; if this material is procured locally, a small but positive economic impact in the ROI would be generated. Additional training may require the letting of new contracts for transportation of equipment or personnel between Fort Lewis and YTC; like the acquisition of material, these contracts can be expected to generate a small but positive economic impact in the ROI if they are awarded to local contractors.

4.11.6.3 Construction, Live-Fire Training, and Maneuver Training: Housing Impacts

4.11.6.3.1 Significant but Mitigable to less than Significant Effects

4.11.6.3.1.1 On-Post

The stationing of additional Soldiers under Alternative 4 would increase demand for on-Post housing. Despite housing modernization projects in-progress and planned, there would not be enough on-Post housing to accommodate all new Soldiers and their Families; as result, the demand for off-Post housing in the local housing market would increase under Alternative 4 (see below). The training conducted by the additional Soldiers described under Alternative 4 would not impact on-Post housing.

4.11.6.3.1.2 Off-Post

Using the same ratios identified for Alternatives 2 and 3, the stationing of an additional 5,678 military personnel and hiring of 1,426 civilian employees at Fort Lewis under Alternative 4 would create an increased demand for approximately 5,504 additional off-Post housing units in the ROI (4,078 Soldiers and 1,426 civilian personnel). This demand accounts for the 300 housing units slated for construction at Fort Lewis.

Between 2000 and 2007, approximately 6,200 residential units were constructed in the market area each year. A peak of 8,179 construction permits were issued in 2005; 83 percent of these permits were for single-family homes, and the remaining 17 percent were for multi-family developments.

Growth in the civilian population is expected to slow between 2009 and 2012; it is projected that only 5,441 housing units would be permitted in 2012 as a result. It is projected that builders could meet the demand generated under Alternative 4 depending upon the schedule of the demand and the ability to plan to meet the demand in advance. Meeting all housing demand in a single permitting/ construction year would entail a permitting increase of more than 34 percent greater than the peak single year. This impact will be lessened by the availability of vacant housing stock in the area. The rental unit vacancy rate in the area has historically been around 5.5 percent, which in 2007 equated to 7,545 available rental units; approximately 70 percent of these units are considered suitable for military members.

The training conducted by the additional Soldiers described under Alternative 4 would not impact off-Post housing.

4.11.6.4 Construction, Live-Fire Training, and Maneuver Training: Quality of Life Impacts

4.11.6.4.1 Significant Effects

Alternative 4 would result in the greatest increase in both the on-Post and off-Post populations, with a resulting proportionate increase in demand for schools and child care facilities, public safety, and other services as discussed as follows. The training to be conducted under Alternative 4 would not present any quality of life impacts to on- or off-Post populations beyond those discussed elsewhere in this document.

4.11.6.4.1.1 Schools

School enrollment would increase as a result of the increase in both on-Post and off-Post populations under Alternative 4. The elementary school-aged children of Families who live on Post and who choose to attend public school would attend the on-Post elementary schools; middle school and high school children of these Families would attend off-Post schools. Children of families who live off Post could attend off-Post schools.

Under Alternative 4, an additional 2,770 school-aged children of military personnel would be expected over the current population of 15,551. Enrollment changes would be expected to occur primarily in the Clover Park School District and Steilacoom Historical School District, as approximately 36 and 15 percent, respectively, of their current enrollment are federally connected students. Assuming apportionment of new students follows the current status, these school districts could expect to receive an additional 997 and 416 students, respectively, equating to 9 and 13 percent of their current student enrollments. Smaller impacts would be felt at other school districts in the area including Yelm, North Thurston, Puyallup, Bethel, Franklin Pierce, and University Place that serve Fort Lewis's on- and off-Post populations. Many of these school districts' facilities are currently at or over capacity: The Steilacoom Historical School District, for example, has restricted the enrollment of out-of-district students, citing overcrowding, and many of the on-Post schools operated by the Clover Park School District are currently over-subscribed.

The increase in the student population associated with Alternative 4 is projected to require the construction of two larger-capacity elementary schools on-Post. The Clover Park School District has

initiated activities to address the potential impacts of additional students within their enrollment area under Alternative 4.

An increase in the student population under Alternative 4 would also result in an increased demand for student bussing to both on- and off-Post schools; the traffic impacts of increased bussing are captured in the model results presented in Section 4.10. Because of the limited on-Post housing, the large majority of newly stationed Soldiers under Alternative 4 would reside off-Post; their payment of state and local taxes and fees that are used to fund school district operating budgets will partially mitigate the increased costs for bussing.

These school districts receive federal impact aid as an offset for the costs of providing public education to dependents of military personnel. In addition, not all students would attend public schools; some may attend private school or be home-schooled. However, the additional children envisioned under Alternative 4 could present a significant impact to these school districts.

4.11.6.4.1.2 Child Care Services, On-Post

The expected increase in population associated with Alternative 4 at Fort Lewis could result in a dramatically increased demand for child care services. The military personnel that are projected to live on Post, as well as many who live off Post, would increase the demand for child care services. This increased demand may not be met by the planned construction of four additional child care facilities and the expansion of three existing facilities.

4.11.6.4.1.3 Child Care Services, Off-Post

Demand for off-Post child care services may rise significantly under Alternative 4. While many of the military personnel commuting to work at Fort Lewis would likely first look on Post (near their place of employment) for preschool child care services, they may be forced to utilize off-Post services if planned on-Post child care facility construction and expansion does not sufficiently increase the number of available spaces. As with any population increase, the services provided through the private sector would be expected to respond to any increased demand by increasing supply.

4.11.6.4.1.4 Family Support and Retirement Services

Services would continue to be provided to residents and retirees by the Army Community Support Center, the Family Connection, Family Readiness Groups, and the Retirement Services Office. It is unlikely that Alternative 4 would have an impact on the retiree population.

4.11.6.4.1.5 Shops and Services, On-Post

The additional on-Post and off-Post populations would increase demand for on-Post retail, food, and related services such as Fort Lewis's commissary and retail outlets in the PX. The expanded Lifestyle Center described under Alternative 1 may be sufficient to meet increased demand for shops and services.

4.11.6.4.1.6 Shops and Services, Off-Post

Off Post, the services provided through the private sector can be expected to respond to an increased demand for shops and services by increasing supply.

4.11.6.4.1.7 Recreation

Demand for recreational facilities would increase with the additional population residing on Post and off Post. There are no planned additional recreational facilities to be constructed under Alternative 4; increased demand for recreational facilities would be met by the facilities constructed and renovated under Alternative 3.

The increase in off-Post population would also increase the demand for off-Post recreational facilities. The demand for some facilities, such as gyms and pools, may be moderated by the use of on-Post facilities. Increases in demand for off-post recreational facilities will be met by a combination of private and public sector facilities, the latter of which are funded in part by sales taxes collected in localities and paid by Soldiers and civilian employees residing on- and off-Post; by property taxes of Soldiers and civilian employees residing off-Post; and through use fees.

The services provided through the private sector can be expected to respond to the increased demand by increasing supply. Unmet demand for certain types of recreational facilities (pools, general and activity-specific gymnasiums, etc.) can be expected to be met by an increase in the number of private sector facilities.

4.11.6.4.1.8 Public Safety

Increases in the on- and off-Post populations at Fort Lewis associated with Alternative 4 may cause an increase in the demand for off-Post public safety services (fire, police, emergency response, etc.) Because of the limited amount of on-Post housing, the large majority of newly stationed Soldiers and newly hired civilian employees would reside off-Post under Alternative 4.

Local and state government agencies provide off-Post public safety services; funding for these services is derived from sales and gross receipts taxes, property taxes, and other taxes and charges levied on goods and services. Soldiers and civilians living off-Post will fund additional public safety services through the payment of sales, property, and other taxes. Soldiers living on-Post will also fund additional public safety services through the payment of sales taxes on purchases made off-Post and other charges. As a result, the increased demand for public safety services presented by these new residents of the area will be offset by their payment of various taxes and charges.

4.11.6.5 Construction, Live-Fire Training, and Maneuver Training: Environmental Justice

4.11.6.5.1 Less than Significant Effects

Construction impacts are temporary in nature, but they can range from annoying to detrimental for those living near a construction site. Most of the construction activity would be carried out in the cantonment area of the installation where officers and enlisted Soldiers of all ranks and ethnicities are housed; because construction activities would be confined to Post, there would be no impacts to any off-Post populations.

Impacts from noise, dust, and traffic generated by construction would be minimized by careful construction planning. Fugitive dust emissions would be minimized throughout the construction period by use of conventional dust suppression, BMPs, and mitigation techniques, such as soil erosion and sedimentation control, restrictions on where vehicles can travel on site, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust. Noise from construction equipment would be controlled by use of appropriate sound mitigation techniques and BMPs. Construction traffic during peak hours would be reduced by the use of centralized construction staging areas.

As noted in Section 4.8, increased training at Fort Lewis will result in significant noise effects. The impacts would be realized by both on-Post and off-Post populations, including minorities, low-income populations, and Native Americans who reside in areas adjacent to Fort Lewis or on the Nisqually reservation. These impacts will be disproportionately realized by residents of the Nisqually reservation (most of whom identify as American Indian or Native Alaskan) and others who live adjacent to the areas of Fort Lewis used for training. The disproportionate realization of the impact is due to the physical proximity to areas used for live-fire training; those who live closest to the training areas will realize greater impacts from increased noise. This is solely a function of the historical development of ranges on Fort Lewis and the resulting locations of training ranges relative to the Nisqually Indian Reservation, not any intent of the Army to place burdens on the Reservation. Although the effects of noise would disproportionately affect the Reservation, the overall environmental justice effects would be less than significant because the noise impact is not anticipated to change or otherwise affect any social, economic, physical, or health conditions that would result in social, cultural, or human health effects to the majority American Indian/Alaska Native population.

4.11.6.6 Construction, Live-Fire Training, and Maneuver Training: Protection of Children

4.11.6.6.1 Less than Significant Effects

The effects of this alternative would be similar to those described for Alternatives 1, 2, and 3 in that there is a potential for minor short-term adverse impacts to children during construction. The various measures described previously would deter children from playing in construction areas. In addition, because children outside of those discussed under Environmental Justice are not authorized personnel, no impacts to children are anticipated as a function of training activities under Alternative 4.

4.11.7 Cumulative Impacts

4.11.7.1 Significant Effects

Alternative 1— when considered in concert with activities underway or reasonably foreseeable in the ROI including projects on Fort Lewis and in the surrounding communities— presents no significant cumulative impacts in the ROI. The increased economic activity in the ROI attributable to Alternative 1 falls well within the upper and lower RTV bounds, and the construction activities under Alternative 1 are not of a magnitude that, even when combined with other activities in the ROI, would trigger cumulative economic or social impacts.

Because there would be no increase in population in the ROI under Alternative 1 beyond those already planned, and because regional economic conditions can be expected to slow non-military population and economic growth, there would be no significant cumulative impacts to the housing market and school districts surrounding Fort Lewis.

Alternative 2 presents significant cumulative impacts in the ROI in terms of schools enrollment and noise-related environmental justice issues. The stationing of new Soldiers to Fort Lewis and the expansion of the on-Post civilian workforce under Alternative 2 would spur economic development in the ROI as the private sector responds to meet the increased demand for goods and services from the new military population and civilian employees. This expansion of economic activity may attract workers to the ROI, who would arrive in the same timeframe and geographic locale as the newly assigned Soldiers and their Families. While this cumulative economic effect would likely not exceed any RTVs as presented above, the increase in population in the ROI would exert pressure on the

housing market surrounding Fort Lewis. This increased population would also exert additional pressure on the school districts serving the Fort Lewis-associated population. Additional population growth and economic activity in the ROI may exacerbate noise impacts to populations living adjacent to Fort Lewis, particularly if growth results in additional traffic along State Route 510 and other roads adjacent to impacted populations.

The effect of the recent (late 2008–2009) economic slowdown on population and school attendance in the ROI has not been conclusively shown as of this writing. However, there may be some economic dislocation of employees and their families from the ROI; this may mitigate for some of the pressure on the housing market and schools that would otherwise be caused by a large stationing action.

Alternative 3 could present significant cumulative impacts in terms of schools enrollment in the ROI and noise-related environmental justice issues. In addition, the stationing of new Soldiers to Fort Lewis under Alternative 3 would spur economic development in the ROI as the private sector responds to meet the increased demand for goods and services from the new military population and civilian employees. This expansion of economic activity may attract workers to the ROI, who would arrive in the same timeframe and geographic locale as the newly assigned Soldiers and their Families. While this cumulative economic effect would not exceed any RTVs as presented above, the increase in population in the ROI would exert pressure on the housing market. This increased population would also exert additional pressure on the school districts serving the Fort Lewis-associated population. Additional population growth and economic activity in the ROI may exacerbate noise impacts to populations living adjacent to Fort Lewis, particularly if growth results in additional traffic along State Route 510 and other roads adjacent to impacted populations.

The effect of the recent (late 2008–2009) economic slowdown on population and school attendance in the ROI has not been conclusively shown as of this writing. However, there may be some economic dislocation of employees and their families from the ROI; this may alleviate some of the pressure on the housing market and schools that would otherwise be caused by a large stationing action. Impacts to the value of housing as a result of the economic slowdown in the ROI may negatively impact the financial health of school districts whose operating budgets rely largely on property taxes.

The assignment of new Soldiers to Fort Lewis under Alternative 4 would spur economic development in the ROI as the private sector responds to meet the increased demand for goods and services from the new military population and civilian employees and their dependents. This expansion of economic activity would occur in the same timeframe as economic impacts (increased employment and spending) generated by the construction of the facilities considered under Alternative 4. Taken together, these changes in the economy of the ROI may attract workers to the ROI, who would arrive in the same timeframe and geographic locale as the newly assigned Soldiers and their Families. Because the timing and schedule of potential new Soldier assignments under Alternative 4 is unknown, it is not possible to determine if the economic activity associated with this alternative would exceed any of the RTVs. However, if construction of new facilities and stationing of medium CAB Soldiers were undertaken in parallel with the construction and stationing of other Soldiers envisioned under Alternative 4, it is possible that the RTVs for sales volume and total employment could be exceeded, thus indicating a significant cumulative impact. The exceedances would be on the positive side, indicating a greater than normal volume of sales and employment; positive exceedances are generally less detrimental than negative exceedances, which would indicate significant losses of jobs or sales.

Alternative 4 also presents some significant cumulative impacts in terms of schools and enrollment, and the potential to mitigate the school-related or regional economic impacts. The timing of Soldier

assignments and potential increase in population spurred by economic development in the ROI could result in significant effects in terms of student enrollment. The large numbers of school-aged children projected to accompany the Soldiers to be assigned under Alternative 4 and potentially as a result of economic development in the ROI could significantly impact the school districts that serve the Fort Lewis student population; accommodating these students would likely entail significant capital investments and restructuring within districts. Depending on the schedule of construction activities at Fort Lewis (which may have the effect of increasing construction costs in the ROI and stretching project delivery schedules as the Post consumes the available construction labor in the ROI) and the schedule of stationing, there may not be enough time for school districts to build permanent facilities to meet the increased demand. This could necessitate the use of portable classroom buildings, extended school days to accommodate split schedules, redistribution of students to maximize the use of existing facilities, or other mitigation measures.

The recent (late 2008–2009) economic slowdown may alleviate some of the pressure on the housing market and schools that would otherwise be felt under Alternative 4. Impacts to the value of housing as a result of the economic slowdown in the ROI may negatively impact the financial health of school districts whose operating budgets rely to a large extent on property taxes; while the issuance of bonds may alleviate physical space constraints and create space for districts to enroll the children of newly assigned Soldiers, constrained operating budgets (despite Federal Impact Aid) could become a limiting factor in the number of enrollment spaces that can be created and maintained.

4.11.8 Mitigation

To help mitigate the effects of the alternatives, Fort Lewis proposes to conduct outreach and coordination with surrounding school districts regarding near- and long-term potential stationing actions (**Table 4–42**). This outreach and coordination would help these districts plan for increased enrollment.

4.12 HAZARDOUS MATERIALS AND WASTES

Numerous federal, state, and local laws regulate the storage, use, recycling, disposal, and transportation of hazardous materials and waste. The methods for assessing potential hazards associated with hazardous materials and wastes for each project alternative generally include the following:

- Reviewing and evaluating each of the Alternatives to identify the action's potential to use hazardous materials or to generate hazardous waste based on the activities proposed;
- Comparing the location of each proposed project activity with baseline data on known or potentially contaminated areas including land containing UXO;
- Assessing the compliance of each proposed project activity with applicable site-specific hazardous materials and waste management plans;
- Assessing the compliance of each proposed project activity with applicable site-specific Army SOPs and health and safety plans in order to avoid potential hazards; and
- Determination of known or suspected contamination potentially affected by each proposed project activity including ongoing Army IRP remediation activities.

The overall methodology, including data sources and assumptions, used to conduct the human health and safety hazard impact evaluation is consistent with the Army NEPA Manual for Installation Operations and Training. This manual describes the various types of materials and waste that should be considered to identify potential impacts of the proposed project activities.

4.12.1 Resource-specific Significance Criteria

Factors considered when determining whether hazardous material and waste associated with each project alternative would result in a significant impact include the extent or degree to which the alternative's implementation would:

- Endanger the public or environment during the storage, transport, or use of ammunition;
- Expose military personnel or the public to areas potentially containing UXO without adequate protection;
- Cause a spill or release of a hazardous substance (as defined by Title 40, CFR Part 302 [CERCLA], or Parts 110, 112, 116 and 117 [Clean Water Act]);
- Expose the environment or public to any hazardous condition through release or disposal (for example, exposure to toxic substances including pesticides/ herbicides open burn/open detonation disposal of unused ordnance);
- Adversely affect contaminated sites or the progress of IRP remediation activities;
- Cause the accidental release of friable (easily crumbled by hand pressure) asbestos or LBP during the demolition or renovation of a structure; or
- Generate either hazardous or acutely hazardous waste resulting in increased regulatory requirements over the long term.

The following issue relating to hazardous materials and wastes at Fort Lewis was identified during public scoping. This issue is addressed in the following sections for each alternative.

- The effects on the environment from a potential release of hazardous/toxic chemicals during operations or because of an accident.

All of the action alternatives would result in an increase in the use of hazardous materials and subsequent generation, handing, storage, and disposal of larger quantities of wastes including hazardous wastes. The Army follows strict SOPs for hazardous materials; therefore, no new procedures would need to be implemented. The regulatory and administrative requirements that would continue to be implemented to minimize impacts to the environment or human health and safety are summarized in the following subsections.

4.12.2 Overview of Impacts to Hazardous Materials and Wastes by Alternative

Table 4–37 summarizes the impacts associated with hazardous materials and wastes that would occur under each of the alternatives. Overall, effects would be less than significant for all activity groups and alternatives.

Table 4–37 Summary of Potential Effects to Hazardous Materials and Wastes at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.12.3 Alternative 1 — No Action Alternative

4.12.3.1 Construction Direct and Indirect Effects

4.12.3.1.1 Less than Significant Effects

As a result of the new construction as projected under Alternative 1, the amounts of hazardous materials used and hazardous wastes generated would increase slightly compared to the current conditions (**Section 3.12**). Construction-related activities would require the short-term use of hazardous materials in excess of existing quantities; however, contract specifications control the purchase amounts and use of hazardous materials. These specifications also require compliance with federal, state, and local requirements and with installation policy on hazardous materials. Finally, standard spill prevention measures would be implemented during construction. Consequently, impacts would be less than significant because continued implementation these specifications would minimize the potential for inadvertent spills or exposure of Army personnel, the public, or the environment to hazardous materials.

During renovation or demolition of older buildings, asbestos wastes, LBP, lead-contaminated soils, and other hazardous materials may be encountered, which could generate small amounts of hazardous waste that would require disposal at approved facilities. The Army follows strict regulations and SOPs for the temporary storage and disposal of hazardous wastes and no new procedures would be needed to store or dispose of the hazardous waste. Hazardous materials would continue to be handled in accordance with existing regulations and installation-wide hazardous materials management and SOPs. Impacts would be less than significant because continued implementation of standard Fort Lewis's regulatory and administrative mitigation measures would minimize the potential for a release of hazardous wastes or exposure of Army personnel, the public, or the environment to hazardous wastes.

Construction in the Madigan/Logistics Center would occur within an area of groundwater contamination (Logistics Center NPL site), but the proposed construction is not anticipated to affect permanent pump and treatment systems or hinder any other efforts to clean up this NPL site (Army 2004b). Excavation within IRP sites could result in exposure of construction personnel to hazardous wastes; however, the ADPs identify IRP-related construction constraints within each ADP area. If planned construction is within the boundary of an IRP site or other area of potential contamination, coordination with the IRP Program would be required to address design features, avoidance measures, or other aspects of construction project. Impacts would be less than significant because new facilities would be sited to avoid or minimize disturbance to existing contaminated sites or ongoing remediation activities, and to minimize the potential for the spread of contamination or exposure of construction or Army personnel, the public, or the environment to hazardous wastes during construction.

Construction excavation could expose soils contaminated by historic uses of sites. Excavation Clearance Requests (dig permits) would continue to be required prior to any excavation activities. Any discovered contaminated soil or groundwater would not be removed from construction sites without written approval from an authorized Army representative. With continued implementation of standard Army administrative and regulatory requirements, impacts would be less than significant because contaminated soils would be removed to approved disposal facilities or remediated in place.

Under Alternative 1, quantities of POLs transported, stored, and used on Post would increase. Quantities of POLs would increase temporarily for construction vehicles and equipment during construction of new projects. Transportation, storage, and use of additional quantities of POLs would slightly increase the risk of inadvertent spills or releases of fuels or hazardous materials. Fort Lewis

would continue to use both underground storage tanks and aboveground storage tanks for storing fuels and other petroleum products. Secondary containment would also be used at the vehicle maintenance and repair locations. The continued use of these containment systems would minimize the risk of area contamination from inadvertent POL spills. The Army follows strict regulations and SOPs for the transport and temporary storage of fuels and disposal of contaminated soils or hazardous waste resulting from inadvertent spills in compliance with the SPCC and Contingency Plans. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of spills would be minimized and inadvertent spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

Pesticides and herbicides would continue to be used within the cantonment area and the training areas. Compared to current usage, Alternative 1 could require the use of slightly greater quantities of pesticides and herbicides in order to maintain the additional facilities within the cantonment area. With continued pest management in accordance with the IPMP, impacts would be less than significant because pesticide and herbicide use would be controlled to minimize the potential for human exposure or endangerment of the environment.

Under Alternative 1, sewage sludge production would continue similar to the conditions analyzed for the 2007 GTA FPEIS. A number of upgrades to the sewage treatment facilities are planned to accommodate the stationing and training authorized under the ROD for the 2007 GTA FPEIS. Nonetheless, additional facilities may be required for sewage sludge compost/treatment and these projects would require separate NEPA review.

4.12.3.2 Live-fire Training Direct and Indirect Effects

4.12.3.2.1 Less than Significant Effects

Under Alternative 1, Soldiers stationed at Fort Lewis would continue to conduct live-fire training at the training ranges to meet weapon qualification requirements using existing weapons. There are approximately 80 existing ranges Fort Lewis. For training as projected under this alternative, the number of required live-fire user days per year and the amount of ammunition used would remain similar to current conditions. Ammunition handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations. Impacts would be less than significant because current Army protocols for munitions and for the protection of Army personnel and the public would minimize the risks associated with munitions and live-fire training.

The use of munitions during training would continue to generate UXO and spread lead wastes within the live-fire impact zones. For training as projected under this alternative, range degradation would continue at rates similar to current conditions and the Army would continue to implement regulatory and administrative measures for range maintenance and repair. Impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed and the current Army protocols for the protection of Army personnel and the public would minimize the risk of human or environmental exposure to UXO or lead.

When Soldiers train at the ranges, safety protocol must be followed in order to protect the public from injury or accidents. SDZs are established in accordance with Army Pamphlet 385–64, *Ammunition and Explosive Safety Standards.* In addition, in order to prevent conflict with recreational activities in areas near the training ranges, land use restrictions limit access to the areas during range training times. SDZs are included in the design configuration for the proposed ranges.

Additionally, similar safety protocols must be implemented to protect Army personnel during range training. Soldiers are given safety manuals with a complete discussion of safety procedures while training. In addition, before training, Soldiers are briefed on range-specific safety measures that may be necessary during the special exercise. Finally, Soldiers and officers are provided with field manuals for each specific operation and exercise that give more detailed procedures and protocol to be followed in order to prevent accidents.

All government personnel or government contractors accessing impact areas would continue to follow OSHA and Army standards and guidelines to minimize health and safety impacts from exposure to any contaminants or ordnance. The public would be allowed in or near impact areas only at times and in group sizes approved by Army Command. Army-trained and -certified personnel would escort the public at all times. Access is limited to only those areas deemed safe by Army Range Control (RC). With continued implementation of existing federal, state, and Army protocols, impacts are expected to be less than significant because current Army protocols for protection of Army personnel and the public would minimize the safety risks associated with live-fire training.

4.12.3.3 Maneuver Training Direct and Indirect Effects

4.12.3.3.1 Less than Significant Effects

For this alternative, unit maneuvers would continue at Fort Lewis similar to current conditions. Impacts associated with generation of UXO, lead, and range degradation would be similar to those described for live-fire training. Impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed and the current Army protocols for the protection of Army personnel and the public would minimize the risk of exposure of Army personnel, the public, or the environment to UXO or lead.

Maneuver training also includes convoying the vehicles and equipment to the training areas. There would be a continued potential for inadvertent spills or releases of fuels or hazardous materials during training. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of spills would be minimized and inadvertent spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

4.12.4 Alternative 2 — GTA Actions

4.12.4.1 Construction Direct and Indirect Effects

4.12.4.1.1 Less than Significant Effects

Under Alternative 2, additional construction projects activities would occur within the cantonment area compared to Alternative 1. In addition to construction within the cantonment area, improvements and construction are planned at five of the existing ranges. For this alternative, the same hazardous materials would be used and the same hazardous wastes generated as described for Alternative 1. The quantities of hazardous materials used and hazardous wastes generated would increase proportionate to the number of additional personnel, vehicles, and equipment involved in construction; however, these quantities would increase minimally. Waste collection, storage, and disposal processes would remain mostly unchanged, and current waste management programs would continue. Impacts would be similar to those described for construction under Alternative 1. Impacts would be less than significant because continued implementation of regulatory and administrative mitigation measures would minimize the potential for inadvertent spills or exposure of Army personnel, the public, or the environment to hazardous materials used or hazardous wastes generated during construction.

During construction, demolition and renovation would mostly likely result in an increase in the generation of asbestos, lead-contaminated wastes, and other hazardous waste. Impacts associated with construction would be similar to those described for Alternative 1; however, the quantities of hazardous materials used and hazardous wastes generated would increase slightly proportionate to the number of additional new facilities constructed compared to Alternative 1. Waste collection, storage, and disposal processes would remain mostly unchanged, and current waste management programs would continue to be implemented. Impacts would be less than significant because current Army protocols would minimize the potential for a release of hazardous materials or exposure of Army personnel, the public, or the environment to hazardous wastes generated during construction.

The construction of the new ranges at Fort Lewis would be within lands previously used as ranges. Range construction would involve moving soils that could contain UXO and lead from prior activities in the range ordnance impact area. Before the start of any construction activities, the Army would employ qualified personnel to conduct a UXO survey of the proposed construction area, if necessary. If the risk of encountering UXO is low, then UXO construction support would be used. If the risk of encountering UXO is high, then UXO clearance would be performed to ensure the safety of the site. The Army would document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. The Army would perform UXO clearance activities if rounds are fired outside of designated impact areas or present an immediate threat to human health or safety. In addition to these mitigation measures, the Army would continue to educate Soldiers on how to identify UXO and the proper safety procedures for handling UXO. With continued implementation of standard Army regulatory and administrative requirements, impacts associated with UXO and lead wastes are expected to be less than significant.

Berms would be used to stop projectiles fired at the training ranges that are expected to contain significant quantities of lead and potentially UXO. The Army would retain lead-contaminated soils from existing berms on site and use the soils in the construction of new berms associated with the new ranges. If lead-contaminated soils are not reused at the site for new berm construction, contaminated soils would be remediated for lead in accordance with applicable federal and state standards. Impacts would be less than significant because current Army protocols would minimize the risk for exposure of construction personnel to UXO and lead and there would be a minimal potential for a release of hazardous materials or exposure of the public or the environment to UXO or lead generated during construction.

Implementation of Alternative 2 would result in increased quantities of POLs transported, stored, and used on post for construction equipment. Transportation, storage, and use of additional quantities of POLs would slightly increase the risk of inadvertent spills or releases of POLs. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of POL spills would be minimized and inadvertent spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

To maintain the additional facilities within the cantonment area and the five new ranges, Alternative 2 would require the use of slightly greater quantities of pesticides and herbicides compared to Alternative 1. With continued pest management in accordance with the IPMP, impacts would be less than significant because pesticide and herbicide use would be controlled to minimize the potential for human exposure or endangerment of the environment.

Increased personnel would also result in increased sewage sludge production. For stationing as proposed for this alternative, the increase in sewage sludge production would likely exceed the existing on-site compost/treatment capabilities at the Solo Point WWTP without expansion of the

existing compost facility and operation. The production of sewage sludge would increase proportionate to the number of increased personnel. Currently Fort Lewis is able to compost/treat a limited quantity of the total sewage sludge being generated, but will be unable to do this for the increased demand associated with an increase in personnel without expansion of the current facility infrastructure and staff; therefore, increased amounts of sewage sludge would require off-site land application. Additional facilities and staff may be required for sewage sludge compost/treatment to accommodate stationing as projected under this alternative; however, impacts to human health and the environment would be less than significant for sewage sludge production.

4.12.4.2 Live-fire Training Direct and Indirect Effects

4.12.4.2.1 Less than Significant Effects

Live-fire training as projected under this alternative would result in a greater number of live-fire training days per year compared to Alternative 1. Simultaneous SBCT training would result in a greater number of Soldiers training at all ranges, increasing the number of rounds fired and the use of large caliber munitions would increase. The simultaneous training of three SBCTs at Fort Lewis would increase the overall frequency of Stryker training activities by as much as 50 percent. Although ammunition use would increase for this alternative, artillery and ammunition management would not change. Handling and storage methods, disposal protocols, and safety procedures would continue to be conducted in accordance with existing regulations With continued implementation of existing federal, state, and Army protocols, impacts are expected to be less than significant because current Army protocols for protection of Army personnel and the public would minimize the safety risks associated with ammunition and live-fire training.

As a result of increased training and greater quantities of munitions used during training under this alternative, additional quantities of UXO and lead would be generated within the live-fire impact zones, and range degradation would occur at an accelerated rate compared to Alternative 1. With continued implementation of institutional programs for range sustainability, such as ITAM, integrated natural resource and ecosystem management, and AR 350–19, The Army Sustainable Range Program, the frequency of range maintenance efforts would be adjusted for the rate of range degradation. Impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed and the current Army protocols for the protection of Army personnel and the public would minimize the risk of human or environmental exposure to UXO or lead.

4.12.4.3 Maneuver Training Direct and Indirect Effects

4.12.4.3.1 Less than Significant Effects

Under Alternative 2, the number of vehicles and equipment used for maneuver training would increase by about 50 percent, and somewhat larger quantities of POLs would be transported, stored, and used on Post. The risk of inadvertent spills or releases of fuels or hazardous materials would increase slightly proportionate to the amount of additional POLs transported, stored, and used. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of spills would be minimized and inadvertent spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

4.12.5 Alternative 3 — GTA Actions + CSS Soldiers

4.12.5.1 Construction Direct and Indirect Effects

4.12.5.1.1 Less than Significant Effects

Impacts from construction would be very similar to those described for Alternative 2. The primary difference between Alternatives 2 and 3 is that the quantities of hazardous materials used and hazardous wastes generated under Alternative 3 would increase proportionate to the number of CSS Soldiers stationed at Fort Lewis and the number additional CSS facilities constructed. With continued implementation of regulatory and administrative mitigation measures, impacts would be less than significant because there would be minimal risk of human or environmental exposure to hazardous materials used or hazardous wastes generated during construction.

Compared to Alternative 2, sewage sludge production would increase under this alternative proportionate to the number of additional personnel stationed at Fort Lewis. Additional facilities and staff may be required for sewage sludge compost/treatment to accommodate stationing as projected under this alternative; however, impacts to human health and the environment would be less than significant for sewage sludge production.

4.12.5.2 Live-fire Training Direct and Indirect Effects

4.12.5.2.1 Less than Significant Effects

Under Alternative 3, the number of live-fire days per year would increase compared to Alternative 2 as a result of the 1,000 additional CSS Soldiers performing weapons qualifications. The number of rounds fired would increase at the ranges and the use of large caliber munitions would increase. Training as projected for this alternative would result in the generation of UXO and lead wastes at greater rates proportionate to the quantities of munitions used. Range degradation would occur at significantly greater rates compared to Alternative 2; however, impacts associated with hazardous materials and wastes would be similar to those described for Alternative 1. Impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed and the current Army protocols for the protection of Army personnel and the public would minimize the risk of human or environmental exposure to UXO or lead.

4.12.5.3 Maneuver Training Direct and Indirect Effects

4.12.5.3.1 Less than Significant Effects

Under Alternative 3, maneuver training would be very similar to that described for Alternative 2; however, maneuver training would include the additional 1,000 CSS Soldiers, along with associated vehicles and equipment. The CSS units would likely participate in joint maneuvers with the SBCTs and other units. Implementation of Alternative 3 would result in a greater number of vehicles and equipment convoyed; increased quantities of POLs transported, stored, and used; and a subsequent slightly increased risk of inadvertent spills or releases of fuels or hazardous materials compared to Alternative 2. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of spills would be minimized and inadvertent spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

4.12.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.12.6.1 Construction Direct and Indirect Effects

4.12.6.1.1 Less than Significant Effects

Impacts from construction would be very similar to those described for Alternative 3. The primary difference between Alternatives 3 and 4 is that the quantities of hazardous materials used and hazardous wastes generated under Alternative 4 would increase proportionate to the number of medium CAB Soldiers stationed at Fort Lewis and the additional facilities constructed. With continued implementation of regulatory and administrative mitigation measures, impacts would be less than significant because there would be minimal risk of human or environmental exposure to hazardous materials used or hazardous wastes generated during construction.

Compared to Alternative 3, sewage sludge production would increase under this alternative proportionate to the number of additional personnel stationed at Fort Lewis. Additional facilities and staff may be required for sewage sludge compost/treatment to accommodate stationing as projected under this alternative; however, impacts to human health and the environment would be less than significant for sewage sludge production.

4.12.6.2 Live-fire Training Direct and Indirect Effects

4.12.6.2.1 Less than Significant Effects

Under Alternative 4, the number of live-fire training days per year would increase compared to the other alternatives as a result of the additional 2,800 CAB Soldiers. Under Alternative 4, the number of Soldiers training at the ranges, number of rounds fired, and use of large caliber munitions would increase. The greatest increase in live-fire training at Fort Lewis would be small arms and crew-manned weapons training and qualification. The medium CAB would also conduct aerial gunnery training that would increase live-fire training.

Greater quantities of UXO and lead would be generated within the live-fire impact zones as a result of the use of increased quantities of munitions during training and range degradation would occur at a greater rate compared to the other alternatives. Impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed and the current Army protocols for the protection of Army personnel and the public would minimize the risk of human or environmental exposure to UXO or lead.

4.12.6.3 Maneuver Training Direct and Indirect Effects

4.12.6.3.1 Less than Significant Effects

Under Alternative 4, maneuver training would be similar to that described for Alternative 3; however, the medium CAB would contribute 2,800 additional Soldiers and associated vehicles and equipment to maneuver training. Maneuver training with medium CAB support includes small- and large-scale aviation training. At Fort Lewis, the medium CAB would also support the CALFEX at the same training areas that are presently used.

Implementation of Alternative 4 would result in the greatest number of vehicles and equipment to be used; increased quantities of POLs transported, stored, and used; and a subsequent slightly increased risk of inadvertent spills or releases of fuels or hazardous materials compared to Alternative 3. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant because the likelihood of spills would be minimized and inadvertent

spills would be quickly identified and remediated to avoid exposure of military personnel or the public and to prevent endangerment of the public or environment.

4.12.7 Cumulative Effects

4.12.7.1 Less than Significant Effects

Alternative 1, 2, 3, and 4, in combination with continued increases in anticipated regional population, development, and industry, would continue to add to the generation of solid and hazardous materials and wastes. On Fort Lewis, efforts to achieve zero net waste would help to minimize the Army's contribution to regional increases. Regional efforts to use recyclable materials and to recycle waste materials would also help offset the general regional increase. With continued implementation of standard Army regulatory and administrative requirements, impacts would be less than significant.

4.12.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on hazardous materials and wastes. These BMPs include requiring EPPs and SWPPPs for construction projects, implementing the ISWMP, and following the various programs and plans to manage hazardous materials and wastes (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to expand the services provided by the HMCC, provide additional waste storage facilities, and conduct additional site surveys (**Table 4–42**). Also, the new WWTP would be expected to produced less hazardous effluent than the current WWTP produces.

4.13 AIRSPACE

Impacts on airspace were assessed by evaluating the potential effects of both project construction and operations activities on the principal attributes of airspace, namely controlled and uncontrolled or navigable airspace, special use airspace, en-route airways and jet routes, and airports/airfields. Impacts on controlled and uncontrolled airspace were assessed by determining if the project would reduce the amount of navigable airspace by creating new or expanding existing special use airspace, by introducing temporary flight restrictions, or by constituting an obstruction to air navigation. Impacts on special use airspace were assessed by determining the project's requirement for modifications to existing special use airspace. Impacts on en route airways were assessed by determining if the project would lead to a change in a regular flight course or altitude or instrument procedures. Impacts on airports and airfields were assessed by determining if the project restricts access to or affects the use of airports or airfields available for public use, or if it affects airfield or airport arrival and departure traffic flows.

4.13.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact on airspace, based in part on FAA Order 7400.2G, Procedures for Handling Airspace Matters (FAA 2008), include the extent or degree to which its implementation would result in the following:

- Reduce the amount of navigable airspace;
- Lead to the assignment of new special use airspace (including prohibited areas, restricted areas, warning areas, and military operations areas) or require the modification of special use airspace;

- Change an existing or planned IFR minimum flight altitude, a published or special instrument procedure, or an IFR departure procedure, or require a visual flight rules operation change from a regular flight course or altitude;
- Restrict access to or affect the use of airports or airfields available for public use, or if it would affect commercial or private airfield or airport arrival and departure traffic flows; or
- Create an obstruction to air navigation.

4.13.2 Overview of Impacts to Airspace by Alternative

Table 4–38 summarizes the impacts associated with airspace that would occur under each of the alternatives. Overall, effects would range from no effects to less than significant effects for all activity groups and alternatives.

Table 4–38 Summary of Potential Effects to Airspace at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	•	•	•	•
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.13.3 Alternative 1 — No Action Alternative

4.13.3.1 Construction Direct and Indirect Effects

4.13.3.1.1 No Effects

Construction of projects in the Fort Lewis cantonment area would temporarily increase human presence and activity at the construction sites. It would not, however, create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or otherwise affect the use of airspace over Fort Lewis. Finally, the proposed construction would not require the FAA to modify existing controlled or special use airspace or create new special use airspace.

4.13.3.2 Live-fire Training Direct and Indirect Effects

4.13.3.2.1 Less than Significant Effects

Implementation of this alternative would continue the less than significant impacts that currently affect airspace resources at Fort Lewis. This alternative would not require modifications to existing controlled or special use airspace, and no new special use airspace would be needed. The Special Use Airspace (Restricted Area R–6703 and the three MOAs) that already exists over Fort Lewis excludes non-participating and incompatible aircraft from flying below 14,000 feet (4,300 m) MSL without Fort Lewis or ATC's permission. Helicopters, fixed-wing aircraft, and unmanned aerial systems (UASs) would continue to operate in restricted airspace over Fort Lewis. Current operations, which could include artillery firing, aerial gunnery and bombardment, and high-speed and high-density aerial operations, would continue to occur as is.

4.13.3.3 Maneuver Training Direct and Indirect Effects

4.13.3.3.1 Less than Significant Effects

Maneuver training conducted under this alternative would continue the less than significant impacts that currently affect airspace resources at Fort Lewis. This alternative would not require modifications to existing controlled or special use airspace, and no new special use airspace would be needed. The restricted airspace would allow all current flight operations to continue safely throughout the maneuver training areas without potential interference. Helicopters, fixed-wing aircraft, and UASs would continue to operate in the restricted airspace over Fort Lewis unimpeded by non-participating or incompatible aircraft. Current maneuver operations would continue to occur with the same limited effects on airspace that Fort Lewis experiences (aircraft participating in maneuver training alone or with other units and avoidance of active live-fire ranges).

4.13.4 Alternative 2 — GTA Actions

4.13.4.1 Construction Direct and Indirect Effects

4.13.4.1.1 No Effects

Construction of projects in the Fort Lewis cantonment area and on select ranges would not cause any effects to airspace. As under Alternative 1, construction would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or otherwise affect the use of airspace over Fort Lewis. Nor would it require the FAA to modify existing controlled or special use airspace or create new SUA.

4.13.4.2 Live-fire Training Direct and Indirect Effects

4.13.4.2.1 Less than Significant Effects

The increase in live-fire training associated with the simultaneous training of three SBCTs annually and the approximate 1,880 additional Soldiers would result in less than significant impacts to airspace resources at Fort Lewis. The overall increase in live-fire training would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or require the FAA to modify existing controlled or special use airspace or create new SUA.

Although activity on the live-fire ranges would increase, Army helicopters, fixed-wing aircraft, and UASs would continue to conduct training in the restricted airspace over Fort Lewis. Additional coordination and scheduling would be required to balance increased training requirements with the availability of airspace. This coordination would prevent non-participating flight operations from occurring over active live-fire ranges where artillery firing, aerial gunnery and bombardment, or other active training may be present. Finally, training of the additional Soldiers would not require modifications to existing controlled or special use airspace, and no new SUA would be needed.

4.13.4.3 Maneuver Training Direct and Indirect Effects

4.13.4.3.1 Less than Significant Effects

The increase in maneuver training associated with the training of three SBCTs annually and the approximate 1,880 additional Soldiers would result in less than significant impacts to airspace resources at Fort Lewis. The overall increase in maneuver training would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or require the FAA to modify existing controlled or special use airspace or create new SUA.

Although maneuver training conducted under this alternative would increase in frequency and intensity, it would result in less than significant effects to airspace resources at Fort Lewis. Army helicopters, fixed-wing aircraft, and UASs would continue to operate over training areas in support of maneuver training. The restricted airspace would allow flight operations to continue safely throughout the maneuver training areas without potential interference from non-participating or incompatible aircraft. Consequently, this alternative would not require modifications to existing controlled or special use airspace, and no new SUA would be needed.

4.13.5 Alternative 3 — GTA Actions + CSS Soldiers

4.13.5.1 Construction Direct and Indirect Effects

4.13.5.1.1 No Effects

Construction of projects in the Fort Lewis cantonment area and on select ranges would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or otherwise affect the use of airspace over Fort Lewis. It also would not require the FAA to modify existing controlled or special use airspace or create new special use airspace. Therefore, construction of the new facilities would have no effects on airspace resources.

4.13.5.2 Live-fire Training Direct and Indirect Effects

4.13.5.2.1 Less than Significant Effects

The increase in live-fire training associated with as many as 1,000 additional CSS Soldiers would result in less than significant impacts to airspace resources at Fort Lewis. Although activity on the live-fire ranges would increase, training of the CSS Soldiers would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or require the FAA to modify existing controlled or special use airspace or create new special use airspace.

4.13.5.3 Maneuver Training Direct and Indirect Effects

4.13.5.3.1 Less than Significant Effects

Although training by as many as 1,000 additional CSS Soldiers would slightly increase in the frequency and intensity of maneuver training. This increase would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or require the FAA to modify existing controlled or special use airspace or create new special use airspace. Consequently, the increase in maneuver training would result in less than significant effects to airspace resources at Fort Lewis.

4.13.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.13.6.1 Construction Direct and Indirect Effects

4.13.6.1.1 No Impacts

As with the other alternatives, the effects of the construction of projects in the Fort Lewis cantonment area and on select ranges would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or otherwise affect the use of airspace over Fort Lewis. Therefore, construction of the new facilities would have no effects on airspace resources.

4.13.6.2 Live-fire Training Direct and Indirect Effects

4.13.6.2.1 Less than Significant Effects

Activity on the live-fire ranges would increase more under this alternative than under Alternative 3. This increase primarily would be the result of the medium CAB's live-fire training. As suggested on **Table 2–7**, the amount of aerial gunnery on live-fire ranges would increase; however, the increase would be a fraction of what would occur with the three SBCTs. Training of the medium CAB at Fort Lewis would require additional coordination and scheduling would be required to balance increased training requirements with the availability of airspace. This coordination would prevent non-participating flight operations from occurring over active live-fire ranges where artillery firing, aerial gunnery and bombardment, or other active training may be present. Finally, training of the medium CAB would not require modifications to existing controlled or special use airspace, and no new special use airspace would be needed. Consequently, effects of live-fire training would be less than significant.

4.13.6.3 Maneuver Training Direct and Indirect Effects

4.13.6.3.1 Less than Significant Effects

The increase in maneuver training would be greatest under this alternative. In addition to the annual training requirements of the three SBCTs, the approximate 1,880 additional GTA Soldiers, and up to 1,000 CSS Soldiers, this alternative would involve a substantial increase in helicopter maneuver training. Although the increase in the number of flight hours and landings and takeoffs appears substantial when compared to the current environment, the direct and indirect effects would be less than significant. Even with the units currently stationed at GAAF, the restricted airspace is readily available and can easily accommodate the increase in flight training hours, landings, and takeoffs (Rodriguez 2009). Thus, the increase in maneuver training associated with the medium CAB would not create obstructions to air navigation, affect flight operations at GAAF or any other airfield, or require the FAA to modify existing controlled or special use airspace or create new special use airspace. The Restricted airspace and MOAs would allow flight operations to occur safely throughout the maneuver training areas without potential interference from non-participating or incompatible aircraft. Consequently, this alternative would result in less than significant effects.

4.13.7 Cumulative Effects

4.13.7.1 Less than Significant Effects

Cumulative effects would be less than significant under all four alternatives. As discussed above, each alternative would generate new less than significant direct or indirect impacts to airspace resources (despite the addition of a medium CAB in Alternative 4). None of the RFFAs would involve any actions that would contribute effects to airspace resources. Consequently, cumulative effects also would be less than significant.

4.13.8 Mitigation

Currently, Fort Lewis implements BMPs to mitigate the effects of the Army's activities on airspace resources. These BMPs include coordinating and scheduling to balance training requirements with the availability of airspace and following the "Fly Friendly" program when flying over congested areas (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to maintain 2,000 feet AGL when flying over the Nisqually National Wildlife Refuge to minimize noise disturbance to the Refuge (**Table 4–42**).

4.14 FACILITIES

The evaluation of potential impacts to real estate, installation facilities, infrastructure, and telecommunications is based on the project's potential to affect these facilities. Potential infrastructure shortfalls, inconsistencies, inadequacies, or deficiencies identified between the existing infrastructure and the requirements of a project alternative are identified. Where the existing facilities and infrastructure do not meet the mission requirements, the additional facilities and infrastructure would be acquired through construction by the Army or through community or private sector mechanisms. The effects of acquiring the additional facilities and infrastructure are assessed in this section.

Population changes projected for the proposed project were used for forecasting utility and public services demands. These utility forecasts were compared to existing levels of use and infrastructure capacities to determine if capacities would be exceeded.

The facilities impact analysis identifies the potential environmental consequences to Army real property, including lands, facilities, and infrastructure, within the ROIs for each project alternative. The environmental consequences to facilities, such as buildings, structures, and other improvements, and utilities infrastructure are assessed for each alternative. This analysis included identification and evaluation of the mission requirements for facilities and infrastructure and the extent to which each installation already meets these requirements. The analysis also evaluates the need for upgrades to existing facilities or infrastructure and any secondary impacts associated with those upgrades.

This analysis includes potential impacts on infrastructure for potable water, wastewater, and stormwater management. Existing telecommunications systems are adequate for the planned activities for any of the alternatives. No impact analysis was required for this utility. Potential impacts to housing and educational facilities, land use compatibility, transportation infrastructure, energy infrastructure (electricity and natural gas), and waste management are analyzed in other sections of this document.

No real estate or land acquisitions would occur under any of the alternatives. The proposed activities for all of the alternatives would occur within the current Army installation. Existing land ownership, rights-of-way, easements, and leases on Fort Lewis would continue with no changes or additions. No impacts analysis was required for this significance criterion.

4.14.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact on real estate, facilities, or infrastructure would include the extent or degree to which its implementation would result in the following:

- Result in potential shortfalls, inconsistencies, inadequacies, or deficiencies between the existing facilities or utility infrastructure and the requirements of a project alternative;
- Interrupt or disrupt public services or utilities as a result of physical displacement and subsequent relocation of public utility infrastructure to the extent that the result would be a direct, long-term service interruption or permanent disruption of essential public utilities; or
- Result in an increase in demand for public services or utilities beyond the capacity of the utility provider to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary.

4.14.2 Overview of Impacts to Facilities by Alternative

Table 4–39 summarizes the impacts associated with facilities that would occur under each of the alternatives. Overall, effects would range from no effects to less than significant effects for all activity groups and alternatives.

Table 4–39 Summary of Potential Effects to Facilities at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	W	W	W	W
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.14.3 Alternative 1 — No Action Alternative

4.14.3.1 Construction Direct and Indirect Effects

4.14.3.1.1 Less than Significant Effects

4.14.3.1.1.1 Facilities

Under Alternative 1, construction of new facilities, as well as renovation of existing facilities, would continue to occur through FY 2015. Fort Lewis has adequate space for construction of these new facilities under Alternative 1. Impacts would be less than significant because existing cantonment and training facilities are aging but adequate for the stationing and training as projected for Alternative 1.

During renovation or demolition of older buildings to clear the way for construction of new facilities, asbestos wastes, LBP and lead-contaminated soils, or other hazardous materials may be encountered and removed. Impacts on facilities would be beneficial and less than significant because new facilities would be constructed using non-hazardous building materials.

Short-term impacts to buildings and structures would include temporary interruptions of access to in-use buildings. This impact would be less than significant because the length of access interruptions would be temporary and minimized to the greatest extent possible.

New building and facilities would incorporate water and energy conservation measures in facilities designs to comply with AR 11–27, Army Energy Program; EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management; and the requirements under the new Energy Independence and Security Act of 2007. The Army would construct all new facilities to achieve a minimum Silver LEED rating including water savings and energy efficiency. Long-term impacts of construction and modernization of barracks, headquarters and operations facilities, and maintenance facilities would be beneficial.

4.14.3.1.1.2 Utility Infrastructure

Under Alternative 1, the existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). An

analysis of the capacities of the infrastructure at Fort Lewis with respect to projected stationing suggests that a number of utility infrastructure upgrades have recently been made or are in progress to accommodate additional stationing at Fort Lewis. Assuming programmed upgrades will be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts would be less than significant because the existing utility infrastructure is anticipated to have sufficient excess capacity for the anticipated peak demands.

Capital investments would continue to be required for expansion and improvements to utility infrastructure at Fort Lewis. Impacts to public utilities in the ROI would be less than significant because these impacts would be limited to the Army installation.

During construction, power, natural gas, and water lines may need to be routed to the new planned facilities. In addition, additional gas line connections or increased feeder line sizes would be needed to meet demands. Construction activities could result in service interruptions in order to connect new lines and extend service. This impact would be less than significant because service interruptions would be temporary, minimized to the greatest extent possible and service would be returned to normal after construction.

4.14.3.1.2 Significant, but Mitigable to Less than Significant Effects

4.14.3.1.2.1 Facilities

Although the Solo Point WWTP is currently well below its hydraulic design capacity, it is expected that discharges will violate permit treatment requirements more frequently in the future as demand increases under this alternative. The Army attempts to comply with the conditions of the current EPA wastewater discharge permit for the Solo Point WWTP and will continue to attempt to comply with permit conditions in the future. Over the 2004-to-2009 period of the previous permit, the Army exceeded the permit treatment requirements six times. Given the past performance of the facility, however, it is expected that increased demand combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.14.3.2 Live-fire Training Direct and Indirect Effects

4.14.3.2.1 Less than Significant Effects

4.14.3.2.1.1 Facilities

Under Alternative 1, the number of live-fire training days per year at Fort Lewis would remain similar to current conditions. Impacts on facilities would be less than significant because the existing live-fire training facilities are aging but would still be adequate to support training as projected for this alternative.

4.14.3.2.1.2 Utility Infrastructure

The amount of live-fire training projected for this alternative would result in increased demand for utilities. The existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts on utility infrastructure would be less than significant.

4.14.3.3 Maneuver Training Direct and Indirect Effects

4.14.3.3.1 Less than Significant Effects

4.14.3.3.1.1 Facilities

Maneuver training as projected under Alternative 1 would continue to cause range degradation at rates similar to existing conditions. Unit maneuvers would continue to occur at Fort Lewis in the same training area locations that are presently used. The Army would continue to implement institutional programs for range sustainability, such as ITAM, INRMPs, ecosystem management, and AR 350–19, The Army Sustainable Range Program. Impacts would be less than significant because the maneuver training facilities would be adequate to support training under Alternative 1.

4.14.3.3.1.2 Utility Infrastructure

The amount of maneuver training projected for this alternative would result in increased demand for utilities compared to current conditions. The existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades will be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts on utility infrastructure would be less than significant.

4.14.4 Alternative 2 — GTA Actions

4.14.4.1 Construction Direct and Indirect Effects

4.14.4.1.1 Significant, but Mitigable to Less than Significant Effects

4.14.4.1.1.1 Facilities

Compared to Alternative 1, this alternative would include construction of a substantial number of additional new facilities within the cantonment area in previously disturbed areas. Construction would cause short-term interruptions or delays in access to buildings. In addition, as described under Alternative 1, the new facilities would be designed with water- and energy-saving features and the renovation or demolition of older buildings would likely remove LBP, asbestos, or other hazardous materials. Consequently, the overall impacts of the construction would be beneficial because the new buildings would be efficient and constructed using non-hazardous materials.

4.14.4.1.2 Significant, but Mitigable to Less than Significant Effects

4.14.4.1.2.1 Facilities

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under Alternative 1. The Army attempts to comply with the conditions of the current EPA wastewater discharge permit for the Solo Point WWTP and will continue to attempt to comply with permit conditions in the future. It is expected, however, that the greater increase in demand under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.14.4.1.2.2 Utility Infrastructure

Capital investments may be required for expansion and improvements to utility infrastructure. Impacts to public utilities in the ROI would be less than significant because these impacts would be limited to the Army installation.

Under Alternative 2, an increased demand for utilities is expected as a result of construction of new cantonment area facilities and the five range projects. Based on the number of additional Soldiers stationed at Fort Lewis (along with their Families), this alternative would result in a population increase of only about 0.2 percent compared to the total population within the ROI. Therefore, demand on public utilities within the ROI would increase minimally compared to current conditions. The existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades will be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts on utility infrastructure would be less than significant.

During construction, power, natural gas, and water lines may need to be routed to new planned facilities. Additional gas line connections or increased feeder line sizes would be needed to meet demands. Construction activities could result in service interruptions in order to connect new lines and extend service. This impact would be less than significant because service interruptions would be temporary, minimized to the greatest extent possible, and service would be returned to normal after construction.

4.14.4.2 Live-fire Training Direct and Indirect Effects

4.14.4.2.1 Less than Significant Effects

4.14.4.2.1.1 Facilities

Compared to Alternative 1, the frequency of use would increase for all ranges for live-fire training. Number of training rounds fired annually would increase significantly over Alternative 1. Existing live-fire training facilities together with the five range projects proposed for construction would support this alternative's additional live-fire training needs. Impacts on facilities from increased live-fire training would be less than significant because the live-fire training facilities would be adequate for training.

As a result of greater quantities of munitions used under this alternative compared to Alternative 1, additional quantities of UXO and lead would be generated in the live-fire impact zone and range degradation would occur at an accelerated rate compared to Alternative 1. Maintenance costs for the impact zones would increase in proportion to the rate of damage incurred. With continued implementation of institutional programs for range sustainability, such as ITAM, INRMPs, ecosystem management, and AR 350–19, The Army Sustainable Range Program, impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed.

4.14.4.2.1.2 Utility Infrastructure

Increases in live-fire training under Alternative 2 would result in increased demand for utilities compared to Alternative 1. The existing infrastructure would have sufficient excess capacity for the anticipated peak demands (Army 2007e). Impacts to utility infrastructure would be less than significant.

4.14.4.3 Maneuver Training Direct and Indirect Effects

4.14.4.3.1 Less than Significant Effects

4.14.4.3.1.1 Facilities

Compared to Alternative 1, the frequency and intensity of maneuver training would increase by as much as 50 percent under Alternative 2. Maneuver training, which requires extensive areas of open land, would be restricted to existing training and maneuver areas at Fort Lewis. Maneuver training would result in increased intensity of training within the existing areas available for heavy combat maneuvering including TAs 10, 11, and 12. Impacts would be less than significant because maneuver training facilities would be adequate to support the training requirements as projected for this alternative.

The existing TAs at Fort Lewis are somewhat limited for supporting the training of three SBCTs concurrently (Army 2007e). Because Fort Lewis does not have land available on which to build new training facilities without replacing existing facilities, refinement of the scheduling system for use of the maneuver TAs is anticipated to provide sufficient training opportunities to meet requirements for maneuver training. In addition, some of the increased demand for maneuver training may be offset by increased use of the existing training areas at YTC.

The existing training areas at Fort Lewis are currently in use for 325 days each year, and the use of maneuver areas must be rotated to sustain their viability. Over time, the increased intensity in training would degrade the training areas at an accelerated rate compared to Alternative 1. Degradation of the training areas may reduce the types, quality, and quantity of training activities that Fort Lewis can support. Under this intensity of use, the training areas may not be rotated at the current frequency and, therefore, would have less time for recovery or restoration of vegetation. The training lands would require additional repairs for damages caused by maneuver training and would result in increased demands on institutional programs for management of the TAs. Maintenance costs for the TAs would increase in proportion to the rate of damage incurred. With continued implementation of institutional programs, such as ITAM, INRMPs, ecosystem management, and AR 350–19, The Army Sustainable Range Program, impacts would be less than significant because the TAs would be maintained and repaired as needed.

4.14.4.3.1.2 Utility Infrastructure

With the increase in maneuver training as projected under Alternative 2, the demand for utilities would increase compared to Alternative 1. The existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts on utility infrastructure would be less than significant.

4.14.5 Alternative 3 — GTA Actions + CSS Soldiers

4.14.5.1 Construction Direct and Indirect Effects

4.14.5.1.1 Less than Significant Effects

4.14.5.1.1.1 Facilities

Fort Lewis has adequate space for construction of the new CSS unit facilities under Alternative 3. Short-term construction-related impacts would be similar to those described for Alternative 2. In the

long term, impacts on facilities would be beneficial because new facilities would be efficient, constructed of non-hazardous materials, and would meet current Army standards.

4.14.5.1.1.2 Utility Infrastructure

Because the North Area is currently undeveloped, capital investments would be required for extension of utility infrastructure into this area along with construction of new storm sewers. Short-term construction-related impacts would be similar to those described for Alternative 2. Impacts to public utilities in the ROI would be less than significant because these impacts would be limited to Fort Lewis.

Under Alternative 3, the demand for utilities would increase proportionate to the number of additional Soldiers stationed at Fort Lewis (along with their families). As discussed for Alternative 2, the existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts would be less than significant.

During construction, power, natural gas, and water lines would need to be routed to the new facilities. In addition, additional gas line connections or increased feeder line sizes would be needed to meet demands. Construction activities could result in service interruptions in order to connect new lines and extend service. This impact would be less than significant because service interruptions would be temporary, minimized to the greatest extent possible, and service would be returned to normal after construction.

4.14.5.1.2 Significant, but Mitigable to Less than Significant Effects

4.14.5.1.2.1 Facilities

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under Alternatives 1 and 2. Thus, the Army expects that the greater increase in demand that would occur under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.14.5.2 Live-fire Training Direct and Indirect Effects

4.14.5.2.1 Less than Significant Effects

4.14.5.2.1.1 Facilities

Under Alternative 3, the number of live-fire training days per year would increase at Fort Lewis compared to Alternative 2 as a result of weapon qualifications for the 1,000 CSS Soldiers. Impacts would be less than significant because CSS Soldiers require limited live-fire training and current facilities would be adequate to support their needs.

As a result of greater quantities of munitions used under this alternative, increased quantities of UXO and lead would be generated in the live-fire impact zones and range degradation would occur at an accelerated rate compared to Alternative 2. Maintenance costs for the impact zones would increase in proportion to the rate of damage incurred. With continued implementation of institutional programs for range sustainability, such as ITAM, INRMPs, ecosystem management, and AR 350–19, The

Army Sustainable Range Program, impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed.

4.14.5.2.1.2 Utility Infrastructure

Increased live-fire training projected for Alternative 3 would result in slightly increased demand for utilities at the ranges compared to Alternative 2. The existing utility systems are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Impacts on utility infrastructure would be less than significant.

4.14.5.3 Maneuver Training Direct and Indirect Effects

4.14.5.3.1 Less than Significant Effects

4.14.5.3.1.1 Facilities

Compared to Alternative 2, the frequency and intensity of maneuver training would increase slightly under Alternative 3. The CSS Soldiers, along with associated vehicles and equipment, would conduct limited maneuver training at Fort Lewis. The minor increase in maneuver training associated with CSS Soldiers under Alternative 3 probably would not accelerate the rate of degradation of the TAs in any measurable way. Compared to the training conducted by the SBCTs, maneuver training by CSS Soldiers is minimal.

4.14.5.3.1.2 Utility Infrastructure

The slight increase in maneuver training projected under Alternative 3 is unlikely to increase utility demand measurably compared to Alternative 2. Consequently, the existing utility systems would have sufficient excess capacity for the anticipated peak demands. Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007) and impacts on utility infrastructure would be less than significant.

4.14.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.14.6.1 Construction Direct and Indirect Effects

4.14.6.1.1 Less than Significant Effects

4.14.6.1.1.1 Facilities

Construction for the medium CAB's Soldiers and Families would include renovation of existing facilities and construction of new facilities in or near the GAAF and East Division Areas. Short-term construction-related impacts would be similar to those described for Alternatives 2 and 3. Long-term impacts of the construction would be beneficial for the same reasons discussed for Alternative 3.

4.14.6.1.1.2 Utility Infrastructure

Capital investments would be required for upgrades to utility infrastructure for expansion and renovation of the proposed facilities within GAAF. Short-term construction-related impacts would be similar to those described for Alternative 2. Impacts to public utilities in the ROI would be less than significant because these impacts would be limited to the Army installation.

Under Alternative 4, utility demand would increase proportionate to the number of additional Soldiers stationed at Fort Lewis (along with their families). Because this alternative would result in a population increase of approximately 2.2 percent compared to the total population within the ROI, demand on existing public utilities within the ROI would increase minimally compared to

Alternative 3. The existing infrastructure for potable water, wastewater, and energy are anticipated to have sufficient excess capacity for the anticipated peak demands (Army 2007e). Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007). Impacts would be less than significant.

4.14.6.1.2 Significant, but Mitigable to Less than Significant Effects

4.14.6.1.2.1 Facilities

It is expected that discharges from the Solo Point WWTP will violate permit treatment requirements more frequently in the future as demand increases for the same reasons as discussed under the other alternatives. Thus, the Army expects that the greater increase in demand that would occur under this alternative combined with more stringent requirements for discharges under future NPDES permits would render the Solo Point WWTP insufficiently protective of Puget Sound water quality. Consequently, without substantial modification or replacement of the Solo WWTP, effects are expected to be significant. With replacement, the effects would be significant, but mitigable to less than significant effects.

4.14.6.2 Live-fire Training Direct and Indirect Effects

4.14.6.2.1 Less than Significant Effects

4.14.6.2.1.1 Facilities

Under Alternative 4, the number of live-fire training days per year would increase at Fort Lewis compared to Alternatives 2 and 3 as a result of the medium CAB training requirements. In addition, the five range projects proposed as part of the GTA action are expected to offset the increased demand on the existing ranges at Fort Lewis. Increased use of live-fire training areas at YTC could also offset some of the increased demand for live-fire training. Impacts would be less than significant because live-fire training facilities would be adequate for training as projected for this alternative.

As a result of greater quantities of munitions used under this alternative, increased quantities of UXO and lead would be generated in the live-fire impact zones and range degradation would occur at an accelerated rate compared to Alternative 3. Maintenance costs for the impact zones would increase in proportion to the rate of damage incurred. With continued implementation of institutional programs, impacts would be less than significant because the impact zones would be temporarily closed and remediated as needed.

4.14.6.2.1.2 Utility Infrastructure

The increase in maneuver training projected under Alternative 4 is unlikely to increase utility demand measurably compared to Alternatives 2 or 3. Consequently, the existing utility systems would have sufficient excess capacity for the anticipated peak demands. Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007) and impacts on utility infrastructure would be less than significant.

4.14.6.3 Maneuver Training Direct and Indirect Effects

4.14.6.3.1 Less than Significant Effects

4.14.6.3.1.1 Facilities

Maneuver training with the medium CAB would be conducted at Fort Lewis in the same TAs that are presently used. At Fort Lewis, the medium CAB would support CALFEXs and would provide

helicopter air support for some maneuver exercises conducted by the SBCTs and other Fort Lewis units. Additional maneuver land at YTC would also be available if needed. Impacts would be less than significant because maneuver training land is anticipated to be sufficient to support the training requirements of the medium CAB.

Increased maneuver training projected under this alternative is unlikely to accelerate the rate of degradation of the TAs measurably. Most of the maneuvering conducted by a medium CAB is aerial training. Consequently, the medium CAB would not place increased demands on institutional programs for management of the TAs and maintenance costs for the TAs would not increase in proportion to the medium CAB training.

4.14.6.3.1.2 Utility Infrastructure

The increase in maneuver training projected under Alternative 4 is unlikely to increase utility demand measurably compared to Alternative 3. Consequently, the existing utility systems would have sufficient excess capacity for the anticipated peak demands. Assuming programmed upgrades would be completed as planned, storm water infrastructure would be sufficient for the increased impervious surface (JGA and AMEC 2007) and impacts on utility infrastructure would be less than significant.

4.14.7 Cumulative Effects

4.14.7.1 Less than Significant Effects

Other projects or actions that would contribute to cumulative impacts on facilities and infrastructure at Fort Lewis include continued regional population growth, ongoing regional residential and industrial development, continued military training by all units currently stationed at Fort Lewis as well as visiting units, ongoing replacement of aging facilities and infrastructure at Fort Lewis, and increased stationing at Fort Lewis. These projects and actions would continue to impact availability of land for renovation or demolition and could require replacement of existing facilities within Fort Lewis. New facilities would be built to meet the needs of all units stationed at Fort Lewis. As the number of Soldiers and Family members continues to increase, additional barracks and Family housing units could be built. With the exception of the Solo Point WWTP, the installation has sufficient excess capacity for utility infrastructure. Over time, capital investment may be required for upgrades to aging facilities and utility infrastructure. Cumulative effects to facilities and utility demand and infrastructure would be less than significant.

Under Alternatives 2, 3, and 4, the long-term cumulative impacts on facilities would result in range degradation at an accelerated rate; however, with continued implementation of institutional programs, such as ITAM, INRMPs, ecosystem management, and AR 350–19, The Army Sustainable Range Program, impacts on facilities would be reduced to less than significant.

4.14.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on facilities. These BMPs include incorporating water and energy conservation measures in new buildings and facilities (**Table 4–41**). In addition to the BMPs, Fort Lewis proposes to construct a new WWTP to mitigate the significant effects of the alternatives on discharges into Puget Sound (**Table 4–42**).

4.15 ENERGY DEMAND/GENERATION

The evaluation of potential impacts to energy demand or generation, delivery systems, or costs is based on the project's potential to affect energy demand and costs. Population changes projected for the ROI for each alternative were used for forecasting energy demands. These energy demand forecasts were compared to existing levels of energy use and generation to determine if regional energy prices are expected to increase significantly.

4.15.1 Resource-specific Significance Criteria

Factors considered when determining whether an alternative would have a significant impact on energy demand, generation, delivery systems, or costs would include the extent or degree to which its implementation would result in the following:

- Increased demand for energy beyond the current capacity of generation or delivery systems to the point that substantial expansion, additional facilities, or increased staffing levels would be necessary or result in substantial deterioration over current conditions.

This analysis includes identification and evaluation of the mission requirements for energy and the extent to which each installation component already meets these requirements. The analysis also evaluated whether the proposed project activities for each alternative would expand the specific installation components' demand for regional energy, and if any additional demand for energy or price increases for energy would adversely affect the proposed project or ROI.

Steam is used to a limited extent for heating of older facilities at Fort Lewis; however, no planned new facilities would use steam (JGA and AMEC 2007). Steam facilities are currently being converted to more energy-efficient natural gas facilities. Ongoing and planned construction would have no impact on the demand for or generation of steam heat; therefore, impacts to steam were not analyzed for any of the alternatives.

The following sections summarize the estimated proportionate increases in projected consumption of electricity, natural gas, and liquefied petroleum gas based on the proposed increases in stationing and training personnel for each alternative.

4.15.2 Overview of Impacts to Energy Demand/Generation by Alternative

Table 4–40 summarizes the impacts associated with energy demand/generation that would occur under each of the alternatives. Overall, effects would range from no effects to less than significant effects for all activity groups and alternatives.

Table 4–40 Summary of Potential Effects to Energy Demand/Generation at Fort Lewis

Activity Group	Alt 1	Alt 2	Alt 3	Alt 4
Construction Direct and Indirect Effects	€	€	€	€
Live-fire Training Direct and Indirect Effects	€	€	€	€
Maneuver Training Direct and Indirect Effects	€	€	€	€
Cumulative Effects	€	€	€	€

U = Significant Effects
W = Significant but Mitigable to less than Significant Effects
€ = Less than Significant Effects
+ = Beneficial Effect
N/A = Not Applicable
• = No Effects

4.15.3 Alternative 1 — No Action Alternative

4.15.3.1 Construction Direct and Indirect Effects

4.15.3.1.1 Less than Significant Effects

Under Alternative 1, energy demand would increase as a result of the new facilities (long-term) and during construction (short-term). In anticipation of this construction, a number of upgrades to the energy infrastructure have recently been made or are in progress (JGA and AMEC 2007). Assuming these upgrades are implemented, the existing energy infrastructure would have sufficient excess capacity to support the additional facilities for this alternative.

Although the Army plans to privatize the electric utility system at Fort Lewis (Army 2007e), capital investments would continue to be made for expansion and improvements to energy infrastructure. Ongoing construction projects and planned projects include improvements to the capacity and energy efficiency of the electrical transmission, heating, and natural gas systems at Fort Lewis. Projects have been underway in recent years to increase the energy efficiency of the installation and reduce energy demand, particularly for natural gas. New military facilities would be designed with energy-saving features and construction to comply with AR 11–27, Army Energy Program; EO 13123, Greening the Government through Efficient Energy Management; EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management; and the requirements under the new Energy Independence and Security Act of 2007. The Army would construct all new facilities to achieve a minimum of Silver LEED rating including energy efficiency. Energy demand increases would likely be offset somewhat because a number of older facilities would be replaced by energy efficient facilities.

During construction, power may need to be routed to the new planned facilities. Additional gas line connections or increased feeder line sizes would be needed to meet demands. Construction activities could result in service interruptions in order to connect new gas and electric lines and extend service. This impact would be less than significant because service interruptions would be temporary, minimized to the greatest extent possible, and service would be returned to normal after construction.

4.15.3.2 Live-fire Training Direct and Indirect Effects

4.15.3.2.1 Less than Significant Effects

For training as projected under this alternative, the number of required live-fire user days per year at Fort Lewis would remain similar to current conditions. Energy demand for live-fire training is minimal compared to other facilities at Fort Lewis and would be similar to current conditions. With the continued implementation of Army SOPs for energy conservation, impacts would less than significant.

4.15.3.3 Maneuver Training Direct and Indirect Effects

4.15.3.3.1 Less than Significant Effects

Under Alternative 1, the intensity and frequency of maneuver training at Fort Lewis would be similar to current conditions. During maneuver training, power generation is typically self-contained (generators) and does not tap into the existing power infrastructure. Energy demand would continue to be similar to current conditions and impacts would be less than significant.

4.15.4 Alternative 2 — GTA Actions

4.15.4.1 Construction Direct and Indirect Effects

4.15.4.1.1 Less than Significant Effects

Energy infrastructure would need to be routed to the new facilities during construction. Capital investments may be required for expansion and improvements to Fort Lewis's energy infrastructure. Impacts to energy demand and generation within the ROI would be less than significant because impact to energy infrastructure would be limited to Fort Lewis.

Energy demand on Fort Lewis would increase because of the operation of the new facilities (long-term) and temporarily for additional vehicles and equipment used during construction (short-term). Short-term construction-related impacts would be similar to those described for Alternative 1. Based on the number of additional Soldiers stationed at Fort Lewis (along with their families), this alternative would result in a population increase of only about 0.2 percent compared to the total population within the ROI. Therefore, energy demand within the ROI would increase minimally compared to Alternative 1. The existing energy infrastructure has sufficient excess capacity to support the additional Soldiers, their Families, and mission support personnel (Army 2007e). Consequently, it is unlikely that the capacity of the electrical or natural gas or distribution systems would be exceeded. Energy demand increases would likely be offset somewhat because a number of older facilities would be replaced by more energy efficient facilities.

4.15.4.2 Live-fire Training Direct and Indirect Effects

4.15.4.2.1 Less than Significant Effects

Compared to Alternative 1, the training of three SBCTs simultaneously at Fort Lewis would increase the overall frequency of live-fire training activities by as much as 50 percent. There would be an increase in energy demand because of increased use of the existing and new live-fire training ranges. Ranges create energy demand for target lifters, fiber optic scoring, communications systems, as well as for lights and heat (if applicable); however, energy demand for live-fire training ranges is minimal compared to other facilities at Fort Lewis. The increased energy demand for this alternative would be within the capacity of the current generation and distribution systems (Army 2007e). With the continued implementation of Army SOPs for energy conservation, impacts would be less than significant.

4.15.4.3 Maneuver Training Direct and Indirect Effects

4.15.4.3.1 Less than Significant Effects

Under Alternative 2, energy demand would increase because of additional maneuver training. The additional maneuver training for a third SBCT simultaneously with the other two SBCTs would result in less than significant increased energy demand because maneuver training is generally self-contained and has little direct effect on the demand for energy at Fort Lewis overall.

4.15.5 Alternative 3 — GTA Actions + CSS Soldiers

4.15.5.1 Construction Direct and Indirect Effects

4.15.5.1.1 Less than Significant Effects

Energy infrastructure would need to be routed to the new CSS unit facilities during construction. Consequently, an initial capital investment would be required to extend the existing energy

infrastructure to the new facilities. Impacts to energy demand and generation in the overall ROI would be less than significant because impacts to energy infrastructure would be limited to Fort Lewis and would be minor.

Energy demand would increase both in the short term (for construction of new facilities) and in the long term (for operation of those new facilities). Short-term construction-related impacts would be similar to those described for Alternative 2. Over the long term, the stationing of the CSS Soldiers and their families at Fort Lewis would result in a population increase of less than 1.0 percent compared to the total population within the ROI. Therefore, energy demand within the ROI would increase minimally compared to Alternative 2. The existing energy infrastructure would have sufficient excess capacity to support the additional Soldiers and their Families.

4.15.5.2 Live-fire Training Direct and Indirect Effects

4.15.5.2.1 Less than Significant Effects

The number of required annual live-fire user days would increase proportionately with the CSS Soldiers at Fort Lewis. Energy demand would increase because of increased use of live-fire training ranges; however, the energy demand for live-fire training is minimal compared to other facilities at Fort Lewis. The existing energy infrastructure has sufficient excess capacity to support the additional Soldiers, their Families, and mission support personnel. With the continued implementation of Army SOPs for energy conservation, impacts would be less than significant.

4.15.5.3 Maneuver Training Direct and Indirect Effects

4.15.5.3.1 Less than Significant Effects

Under Alternative 3, energy demand would increase from that under Alternative 2 as the CSS Soldiers participate in maneuver training. Maneuver training for the CSS Soldiers would result in less than significant increased demand for energy because this training is generally self-contained and has little direct effect on the overall demand for energy at Fort Lewis.

4.15.6 Alternative 4 — GTA Actions + CSS Soldiers + Medium CAB

4.15.6.1 Construction Direct and Indirect Effects

4.15.6.1.1 Less than Significant Effects

During construction, energy infrastructure would need to be routed to the new facilities in the GAAF and East Division ADP areas. Capital investments would be required for expansion and improvements to the energy infrastructure. Impacts to energy demand and generation in the ROI would be less than significant because impacts to energy infrastructure would be limited to Fort Lewis.

Energy demand would increase both in the short term (for construction of the medium CAB's new facilities) and in the long term (for operation of those facilities). Short-term construction-related impacts would be similar to those described for Alternative 3. Over the long term, the stationing of the medium CAB Soldiers and their families at Fort Lewis would result in a population increase of less than 1.0 percent compared to the total population within the ROI. Therefore, energy demand within the ROI would increase minimally compared to Alternative 3. The existing energy infrastructure would have sufficient excess capacity to support the additional Soldiers and their Families. In addition, increases in energy demand would likely be offset somewhat by the replacement of a number of older facilities with new energy-efficient facilities.

4.15.6.2 Live-fire Training Direct and Indirect Effects

4.15.6.2.1 Less than Significant Effects

Stationing of the medium CAB Soldiers at Fort Lewis would proportionately increase the number of required annual live-fire user days. Energy demand would increase because of increased use of live-fire training ranges; however, the demand for energy for live-fire training is minimal compared to what is used by other facilities at Fort Lewis. The existing energy infrastructure has sufficient excess capacity to support the additional Soldiers, their Families, and mission support personnel. With the continued implementation of Army SOPs for energy conservation, impacts would be less than significant.

4.15.6.3 Maneuver Training Direct and Indirect Effects

4.15.6.3.1 Less than Significant Effects

Under Alternative 4, the demand for energy would increase from that under Alternative 3 as the medium CAB Soldiers participate in maneuver training. However, maneuver training for the medium CAB Soldiers would result in less than significant increased demand for energy because this training is generally self-contained and has little direct effect on the overall demand for energy at Fort Lewis.

4.15.7 Cumulative Effects

4.15.7.1 Less than Significant Effects

RFFAs that would contribute to cumulative impacts on facilities and infrastructure at Fort Lewis include continued regional population growth, ongoing regional residential and industrial development, continued military training at Fort Lewis, and ongoing replacement of aging facilities at Fort Lewis. These RFFAs would increase the demand for energy in the ROI. However, Fort Lewis's on-going efforts to control energy consumption would help to minimize the Army's contribution to this regional increase in demand for energy. These efforts include sustainability goals of using renewable energy sources (see **Section 4.15.3**) and generating electricity on Post. As a result of Fort Lewis's efforts to minimize the Army's demand for energy and attain sustainability goals for renewable energy, cumulative impacts in the foreseeable future under all alternatives would be less than significant.

4.15.8 Mitigation

Currently, Fort Lewis implements a variety of BMPs to mitigate the effects of the Army's activities on energy demand and generation. These BMPs include incorporating water and energy conservation measures in new buildings and facilities and constructing all new facilities to achieve a minimum LEED rating of Silver.(**Table 4–41**). No additional mitigation is available.

4.16 UNAVOIDABLE ADVERSE IMPACTS

There are unavoidable impacts that could occur because of implementing any of the action alternatives. Some of these impacts would be short-term, while others could be long-term. These unavoidable impacts, which have been described in the EIS, could include:

- The generation of fugitive dust and other pollutants during construction and training activities that could impact air quality in the region (short-term).
- Loss of vegetation and a reduction in the acreage of native plant communities and increased dominance by nonnative species, especially on prairies, as a result of construction and

training activities. Proposed resource sustainability management and mitigation measures should reduce the rate of loss by encouraging more training on degraded prairies and protecting the highest quality prairies (short- and long-term).

- Loss of or harm to wildlife and wildlife habitat as a result of construction and training activities. Prairie species and habitats are most likely to be affected (short- and long-term).
- Loss of or harm to special status species as a result of training activities. Prairie species are most likely to be affected including white-top aster, several butterfly species, and the Mazama pocket gopher (short- and long-term).
- Increased noise levels and disturbance from construction and training that could affect humans and wildlife use of the installation and nearby areas (short-term).

4.17 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Short-term uses are those that generally occur on a year-to-year basis. Examples are wildlife use of forage, timber management, recreation, and uses of water resources. Long-term productivity is the capability of the land to provide resources, both market and non-market, for future generations.

Fort Lewis has been used as a military installation since 1917. The military mission at Fort Lewis is to train, mobilize, and deploy combat-ready forces to fight and win throughout the world. Fort Lewis's proximity to interconnected road, rail, sea, and air facilities make it the premier Army force deployment center on the West Coast of the United States. The Fort Lewis vision is to be an enduring strategic installation that is ready to project combat power wherever needed. Fort Lewis will provide support for Soldiers, their Families, and the civilian workforce, and do what is necessary to sustain a quality installation. As stated in the INRMP (Army 2007b), the mission will be accomplished by:

- providing training areas with modern ranges and other support facilities that meet the needs of assigned and visiting units and tenant activities;
- developing and maintaining state-of-the-art simulation facilities;
- providing and maintaining world-class power projection facilities;
- providing first-class living and working environments for the total force;
- ensuring quality services that meet the continuing professional requirements of Soldiers and civilian employees and the personal needs of Soldiers, their Families, and other authorized individuals; and
- demonstrating leadership and innovation in environmental stewardship.

At the same time, the Nation's commitment to natural resources management is emphasized in the Sikes Act, which requires that INRMPs be developed and maintained for all Army installations.

In this context, long-term impacts to site productivity would be those that last 75 to 100 years or more. Army actions would adversely affect long-term productivity by reducing the productivity of soil and vegetation and ability of prairie communities (and to a lesser extent, other vegetation types) to provide quality habitats that support fish and wildlife. The Army has ongoing programs to restore and enhance upland and wetland habitats to slow this loss, but the gradual loss of soil and plant productivity and habitat quality appears inevitable, even with limits on training and other land-disturbing activities.

From a regional perspective, however, the military mission has had numerous positive impacts on cultural and natural resources at Fort Lewis. The most significant is Fort Lewis's commitment to the protection and management of cultural and natural resources on the installation. Given the large amount of residential and commercial development occurring near Fort Lewis, and the importance of protecting and conserving natural and cultural resources within the region, the protection and management of these resources on the 86,026 acres (35 hectares) that comprise Fort Lewis has become increasingly important.

There are approximately 53,850 acres (21 hectares) of forestland on Fort Lewis. As forestlands surrounding the installation continue to be lost to residential and commercial development, the protection of Fort Lewis's expansive forests will become even more important to forest-dwelling species in the region, especially those that require large blocks of this habitat, such as black bear. During the past two decades, forest management on Fort Lewis has shifted from an emphasis on even-aged timber stand harvests to promoting the development of uneven-aged stands and mature and old-growth forests. This approach will benefit amphibians, woodpeckers, bats, bears, and other forest-dwelling species that require mature forests for all or a portion of their life requisites.

The quality of native grassland and oak woodland habitat on the installation has deteriorated since settlement of the area by Euroamericans. Fort Lewis protects and enhances the remaining native grassland and oak habitats on the installation through controlled burning, selective removal of conifers and young oaks, removal and control of noxious vegetation (primarily Scotch broom), and repair of areas degraded by military activities. These measures will ensure that a diversity of natural settings are available on Fort Lewis for military training, and that grasslands and oak woodlands are available to wildlife that use these habitats.

Fort Lewis has taken numerous actions to benefit threatened and endangered species. Management actions have been taken to protect and enhance forestlands that could be used in the future by northern spotted owls. Old-age forest management activities may provide benefits to marbled murrelets as well. The Army has an active program to monitor key prairie wildlife, including butterflies, and to protect habitats necessary for the survival of these species. To benefit bald eagles, military activities are limited near bald eagle nests during the breeding season and near roosts during winter. Fort Lewis has also taken measures to enhance trees used by eagles for perching along American Lake, and several streams have been restored or enhanced to improve habitat for salmonids and other fish.

The goal of resource sustainability management is to tie land use activity levels (e.g., training, recreation) to the quality of the land, to slow or avoid the loss of soil and plant resources, and the fish and wildlife that depend upon them. When combined with current efforts to manage resources on the installation, this management strategy should ensure that, as long as the Army strives to maintain and enhance its natural resources, Fort Lewis would continue to provide some of the most productive lands in the region.

4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible resource commitments are those that cannot be reversed (loss of future options), except perhaps in the extreme long term. The term relates primarily to nonrenewable resources, such as minerals or cultural resources, or those resources that are renewable only over long periods, such as old-growth forest. Irretrievable resource commitments are those that are lost for a period of time. For example, if prairie habitat is in poor condition and is likely to remain so, the time gap between its current and its ideal (potential) productivity is in itself an ongoing irretrievable loss.

The irreversible commitment of resources would include the consumption of non-renewable energy or materials, such as petroleum products used to operate Stryker vehicles, and sand and gravel materials used to maintain and construct roads on the installation that would later be unavailable for other uses. Eroded soil that is transported off the installation by stormwater runoff and streams would also constitute an irretrievable loss.

Irretrievable resource commitments include the loss of vegetation and fish and wildlife habitat from construction and training activities. Ongoing and proposed mitigation and resource management would reduce these impacts, but the quality of vegetation and habitat is likely to be reduced if training levels remain high.

Populations of special status species, especially those found on prairies, could be irreversibly and irretrievably affected by the action alternatives. Populations of white-top aster and several butterfly species are limited to Fort Lewis and only a few other areas. Loss of these populations could have significant impacts on the future success of the species.

The following BMPs will be used and should be considered part of the proposed action.

Table 4–41 Summary of Best Management Practices at Fort Lewis

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Soil Erosion Water Resources Biological Resources (Vegetation and Wildlife) Wetlands	4.1 4.2 4.3 4.4	Continue to implement management practices in line with goals and objectives identified in the Integrated Training Area Management (ITAM) program. These measures include, but are not limited to: • deterring vehicle traffic from new trails and recently established roads; • repairing (reseeding) maneuver damaged areas; • use of existing hardened crossings in areas of riparian and wetland soils; and • use of Range and Training Land Assessment (RTLA) and other land condition maps when planning training that may impact soils or vegetation.
Soil Erosion Water Resources Biological Resources (Vegetation and Wildlife)	4.1 4.2 4.3	Continue to balance training area use with area rotation schedules in accordance with ITAM goals for sustainable training lands.
Soil Erosion Water Resources Wetlands Cultural Resources Air Quality Noise Hazardous Materials/Hazardous Waste	4.1 4.2 4.4 4.6 4.7 4.8 4.12	For any construction project requiring an Environmental Protection Plan (EPP), implement the pertinent resource protection measures that are part of the EPP.
Soil Erosion Water Resources Wetlands Cultural Resources Air Quality Noise Hazardous Materials/Hazardous Waste	4.1 4.2 4.4 4.6 4.7 4.8 4.12	For any construction project requiring a storm water pollution prevention plan (SWPPP), implement the pertinent resource protection measures contained in the SWPPP. Government approval of the SWPPP is required prior to start of construction.
Soil Erosion Water Resources Biological Resources (Aquatic Species) Wetlands Hazardous Material/Hazardous Waste	4.1 4.2 4.3 4.4 4.12	Continue to follow resource protection practices required by Fort Lewis Regulation 200–1, *Environmental Protection and Enhancement,* during field training, including but not limited *to:* • avoiding maneuver, digging, or establishing assembly areas or bivouac sites in Seibert staked areas; • using only established roads and trails during movement to and from maneuver areas and firing ranges; • crossing rivers/streams only at approved, designated hardened crossing sites (shown on the Fort Lewis Environmental Coordination Map); • staying at least 50 meters from rivers/streams, wetlands, or other water bodies unless a maintained road or designated crossing exists for traversing the restricted area; • conducting water purification training only at approved sites, and insuring that wastewater and excess product water is discharged to a dug sump at least 50 meters from the water source; • obtaining a permit for digging, and conducting digging only in the area specified in the permit; • locating assembly areas and bivouac sites at least 100 meters from any water body; • establishing field refueling sites, field maintenance sites, field kitchens and field showers at least 100 meters from any water body;

Table 4–41 Summary of Best Management Practices at Fort Lewis

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
		• if authorized the use of field latrines, establishing them at least 100 meters from any water body, and closing and marking them per FM 21-10, *Field Sanitation and Hygiene;* • conducting vehicle washing only at installation designated wash facilities; • establishing hazardous material (HM) storage sites at least 100 meters from any wetland or water body; and • following requirements for accumulating and managing hazardous waste (HW), and insuring all HW is returned to the cantonment area for disposal.
Biological Resources (Vegetation and Wildlife)	4.3	Continue procedures for educating land users in minimizing adverse impacts to training lands as part of the ITAM Environmental Awareness program, using guidelines in AR 350-19, *The Army Sustainable Range Awareness Program.*
Biological Resources (Vegetation and Wildlife)	4.3	Continue to concentrate the most intense forms of training on Fort Lewis on the most degraded prairies to minimize impacts to higher quality areas.
Biological Resources (Vegetation and Wildlife)	4.3	Continue to implement the requirements of Fort Lewis Regulation 420-5, *Procedures for the Protection of State and Federally Listed, Threatened, Endangered, Candidate Species, Species of Concern, and Designated Critical Habitat:* <u>Bald Eagle</u> • avoid construction of buildings, roads, trails, or power lines in primary (400 meter radius) and secondary (800 meter radius) zones around nest sites; • avoid timber harvest in the primary zone unless designed to enhance stand characteristics for the benefit of nesting eagles; • avoid bivouacs in the primary zone during the nesting season (exception is Halverson Marsh where bivouac can occur east of the railroad tracks); • avoid training in the primary zone during the nesting period; • avoid blasting and use of firearms during the nesting period; • avoid the use of pyrotechnics during 1 June to 31 October; • aircraft will fly no lower than 1200 feet MSL in the primary zone (no lower than 300 feet MSL for Nisqually Bluff, and any deviation in the approach zone to McChord AFB over Spanaway Marsh will require consultation with the USFWS); and • avoid landing boats on Picnic Point (American Lake). <u>Water Howellia</u> • see Fort Lewis Regulation 200–1 mitigation measures listed above. <u>Salmonids</u> • see Fort Lewis Regulation 200–1 mitigation measures listed above; • off-loading and deployment of all float bridge bays and support vehicles between 1 March and 30 June will be limited to the existing boat ramp at Solo Point; • avoid deploying from the native beach or altering the native beach material at Solo Point between 1 March and 30 June; and • during the eight days of scheduled launch training activity between March and July, limit near shore activity to three hours per day.

Table 4–41 Summary of Best Management Practices at Fort Lewis

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Biological Resources (Vegetation and Wildlife) (continued)	4.3	Northern Spotted Owl • consult with USFWS on activities such as vegetation removal and ground disturbance that affect designated critical habitat, if such activities have not been addressed in previous consultations. Mardon Skipper • as depicted on the Fort Lewis environmental coordination map, training activities involving off-road maneuver and ground disturbing activities are prohibited in Johnson Prairie, Upper and Lower Weir Prairies, and limited on the 91st Division Prairie. White-topped Aster • as depicted on the Fort Lewis environmental coordination map, training activities involving digging or other ground disturbance are prohibited within Johnson and Weir Prairies .
Wildfire Management	4.5	During high fire hazard conditions, continue to implement Fort Lewis's fire management program including restrictions on where tracers, pyrotechnics, and troop fires are authorized (Fort Lewis Regulation 350–30).
Wildfire Management	4.5	Finalize a mutual aid agreement with the WA Department of Natural Resources for firefighting support; continue mutual agreements for firefighting support with I Corps and Fort Lewis Soldiers, Fort Lewis and McChord AFB Fire Departments, and mutual aid agreements with local fire districts.
Air Quality	4.7	Reevaluate the need for modifications to the current Fort Lewis synthetic minor air operating permit based on final site selection and design prior to start of construction that includes new emission producing sources.
Air Quality	4.7	Continue to comply with requirements for new permitted stationary sources of emissions, including BACT review for each criteria pollutant, MACT review for regulated HAPs and designated categories, and meeting the New Source Performance Standards (NSPS) and NESHAP requirements.
Air Quality	4.7	Continue to obtain permits required by the Puget Sound Clean Air Agency (PSCAA) for demolition of structures at Fort Lewis that contain asbestos material and/or lead-based paint.
Air Quality	4.7	For all new construction requiring boilers greater than 10 million BTU/hr, use New Source Performance Standards (NSPS) boilers that would emit no more than 9 ppm NO_x . (Low NO_x boilers).
Air Quality	4.7	Continue to conduct air quality permit compliance audits.
Air Quality	4.7	Air emissions associated with different levels of smoke training on Fort Lewis will not exceed the limits identified in the *Final Environmental Assessment for the Fielding of M56 and M58 Smoke Generators at Fort Lewis and Yakima Training Center* (Army 1999), and in the *Final Environmental Assessment for Training with Smoke Munitions at Fort Lewis and Yakima Training Center, Washington* (Army 2001a).
Air Quality	4.7	Continue to follow procedures that meet national emissions standards for hazardous air pollutants (NESHAPs) for all fuel storage and transfer activities and vehicle maintenance activities.
Noise	4.8	Continue to implement the requirements of Fort Lewis Regulation 360–5, *Noise and Vibration Complaint Procedure,* for management of noise complaints, public notification of nighttime firing, and the public notification of exceptions to firing hours.
Noise Airspace	4.8 4.13	Aircraft will continue to follow the "Fly Friendly" program as stated in Fort Lewis Regulation 95–1, *Flight Regulations,* when flying over congested areas.
Noise	4.8	Avoid locating noise-sensitive receptors (e.g., residential housing, schools, hospitals) in areas where the average C-weighted day/night sound level (CDNL) is greater than 70 decibels (Noise Zone III).

Table 4–41 Summary of Best Management Practices at Fort Lewis

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Noise	4.8	Implement noise level reduction features in the design and construction of noise-sensitive receptors (e.g., residential housing, schools, barracks, hospitals) that are located in areas where the average CDNL is higher than 62 decibels but less than 70 decibels (Noise Zone II).
Traffic and Transportation	4.10	Continue to time the convoys traveling between Fort Lewis and YTC to avoid the primary rush hours of 0600 to 0900 and 1500 to 1700 on I–5, I–405, and I–90.
Hazardous Materials/Hazardous Waste	4.12	Continue to implement the Integrated Solid Waste Management (ISWMP) Plan at the installation.
Hazardous Materials/Hazardous Waste	4.12	Continue to implement the following programs or plans to manage hazardous materials and wastes at Fort Lewis: The Installation Restoration Program, Military Munitions Response Program (MMRP), Compliance-Related Cleanup (CC), Pollution Prevention Plan, Installation Spill Contingency Plan (ISCP), Facility Response Plan (FRP), and Pest Management Plan (PMP).
Air Space	4.13	Continue coordination and scheduling to balance increased training requirements with the availability of airspace at Fort Lewis.
Facilities Energy Demand/Generation	4.14 4.15	Incorporate water and energy conservation measures in new building and facilities designs to comply with AR 11–27, Army Energy Program, EO. 13123, Greening the Government through Efficient Energy Management, EO 13123, Greening the Government through Efficient Energy Management, EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management, and the requirements under the new Energy Independence and Security Act of 2007.
Energy Demand/Generation	4.15	Construct all new facilities to achieve a minimum LEED rating of Silver.

Table 4–42 Summary of Mitigation Measures at Fort Lewis for the Preferred Alternative

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Soil Erosion Water Resources Biological Resources (Vegetation and Wildlife)	4.1 4.2 4.3	Implement ITAM program maintenance of sustainable training lands. Actions will include re-habilitating vegetation impacted by vehicle maneuvers, bivouac, digging, and other training activities. Conduct increased frequency of soil condition monitoring and reporting.
Water Resources Air Quality Facilities	4.2 4.7 4.14	Construct a new Wastewater Treatment Plant (WWTP) to mitigate the significant impact of the Proposed Action. The 2010 permit to be issued by the EPA for the existing WWTP will require compliance with more stringent effluent discharge limits, including the removal of biological oxygen demand (BOD) and total suspended solids (TSS) from 80% to 85% on a monthly average, and a reduction in the maximum daily concentration of chlorine in the effluent from 0.5 mg/L to 0.36 mg/L. The next permit to be issued in 2015 will further increase restrictions on effluent. The WWTP is already near the current permit effluent discharge levels and with the increased population from implementation of the Proposed Action, will not be able to meet the more restrictive permit limits.
Biological Resources (Vegetation and Wildlife)	4.3	Increase the environmental staff to address additional program requirements from more intensive use of training lands and increased impacts to natural resources. The requirements include surveying and monitoring of listed and candidate species and monitoring of military activities for their effect on species; management actions to address training impacts, including the increase in infestations of non-native species; and project review and input.
Biological Resources (Vegetation and Wildlife)	4.3	Conduct additional noxious weed monitoring and control.
Biological Resources (Vegetation and Wildlife)	4.3	Conduct increased cleaning of vehicles of noxious weed components from off-post training sites (YTC, NTC, etc.) or from deployment prior to returning to Fort Lewis.
Biological Resources (Vegetation and Wildlife)	4.3	Create and maintain suitable habitat for candidate species on Fort Lewis (Mardon skipper, Taylor's checkerspot, Streaked horned lark, and Mazama pocket gopher). Actions will include site preparation, planting of native vegetation, control of non-native vegetation, and maintenance of habitat vegetation.
Biological Resources (Vegetation and Wildlife)	4.3	Develop and maintain habitat and protective buffers for all identified streaked horned lark nesting colonies, and restrict low level hovering by aircraft near nesting colonies and in buffer areas during the nesting period. (The exceptions to this mitigation are any nesting colonies identified at GAAF. Suitable habitat for these colonies will be developed downrange). Incorporate the protective measures into the INRMP and Fort Lewis Regulation 420–5.
Biological Resources (Vegetation and Wildlife)	4.3	Enhance adjacent habitat and conduct translocations of pocket gophers from disturbed habitat on an as-needed basis to mitigate for loss of habitat due to range construction projects.

Table 4–42 Summary of Mitigation Measures at Fort Lewis for the Preferred Alternative

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Biological Resources (Vegetation and Wildlife)	4.3	In coordination with the USFWS, develop and implement additional protective measures for prairie candidate species in the Range 74/76 area. Measures will include improvement of roads designated for maneuver, revegetation of roads that will no longer be used, and placement of signs or Seibert stakes. Incorporate the measures in the INRMP. Prepare a Fort Lewis Policy Statement listing the protective measures that will then be incorporated in the next revision of Fort Lewis Regulation 420–5.
Biological Resources (Vegetation and Wildlife)	4.3	Continue to implement the requirements of Fort Lewis Regulation 420–5, *Procedures for the Protection of State and Federally Listed, Threatened, Endangered, Candidate Species, Species of Concern, and Designated Critical Habitat:* <u>Taylor's Checkerspot</u> • as depicted on the Fort Lewis environmental coordination map, training activities involving off-road maneuver and ground disturbing activities are prohibited in Johnson Prairie, Upper and Lower Weir Prairies, and limited on the 91st Division Prairie. <u>Streaked Horned Lark</u> • restrict mowing of areas at Gray Army Airfield identified as nesting sites during the nesting season (15 April to 15 July) unless vegetation height poses a safety concern to aviation; • prohibit recreational activity in Training Area 14 during the nesting season; and • review and potentially revise planned training activities within nesting areas to minimize adverse impacts. <u>Mazama Pocket Gopher</u> • as depicted on the Fort Lewis environmental coordination map, training activities involving off-road maneuver and ground disturbing activities are prohibited in Johnson Prairie, Upper and Lower Weir Prairies, and limited on the 91st Division Prairie.
Biological Resources (Vegetation and Wildlife)		Install aerial rope bridges at key road crossing points and reduce vehicle speed limits for western gray squirrels (federal species of concern and state threatened species) within high squirrel population areas.
Biological Resources (Vegetation and Wildlife)	4.3	In partnership with the WA Department of Fish and Wildlife, relocate western gray squirrels from eastern Washington to potential habitat on Fort Lewis.
Biological Resources (Aquatic Species)	4.3	Repair and maintain maneuver trails on Fort Lewis impacted by significantly increased travel related to maneuver training.
Biological Resources (Aquatic Species)	4.3	Conduct additional annual monitoring of all hardened crossings, and perform any required repairs such as re-graveling the approaches and extending the hardened approaches to crossings.

Table 4–42 Summary of Mitigation Measures at Fort Lewis for the Preferred Alternative

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Wildfire Management	4.5	Conduct additional monitoring and recording of the frequency, intensity, and location of wildfires on Fort Lewis, and as necessary, implement additional fire prevention and control measures including firebreak maintenance, prescribed burning, and fire suppression activities.
Cultural Resources	4.6	Site Impact Assessment per PA: Assess the condition of at least 30 archaeological sites per year to determine accumulated GTA damage. Site Impact Assessment will identify those NRHP-eligible sites that are being impacted by GTA actions, and will prioritize those sites for increased protection (i.e., Seibert staking) or data recovery excavations. (PA Mitigation Measure A).
Cultural Resources	4.6	Prehistoric Site Predictive Model per PA: Build and refine a GIS-based predictive model that will indicate the probability that a particular land parcel contains prehistoric archaeological resources. The model will be used to avoid training and construction impacts to significant prehistoric sites and will be used to prioritize and focus future archaeological survey areas. (PA Mitigation Measure B).
Cultural Resources	4.6	Archaeological Survey per PA: Conduct archaeological surveys of proposed construction footprints and downrange areas that are being impacted by increased off-road training and/or usage. Use predictive model results to determine the level of effort required in accordance with PA SOP 3. Approximately 100 acres per year. (PA Mitigation Measure C).
Cultural Resources	4.6	Archaeological Site Evaluation (Phase II Testing for NRHP Eligibility) per PA: Evaluate a sample of downrange archaeological sites for National Register of Historic Places eligibility before ongoing military training impacts results in the destruction of currently unevaluated sites. Protection measures will be put in place for sites determined to be eligible for the National Register; ineligible sites will be opened to unrestricted military training or construction. Approximately twelve archaeological sites per year. (PA Mitigation Measure D).
Cultural Resources	4.6	Archaeological Data Recovery per PA: Site Impact Assessment will identify those National Register eligible sites that are being impacted by GTA, and will prioritize sites for data recovery excavations to salvage important scientific and historical information that would otherwise be lost to ongoing military training impacts. Approximately one archaeological site per year. (PA Mitigation Measure E).
Cultural Resources	4.6	Public Education and Outreach per PA: Inventory, evaluation, and data recovery projects will include one or more public education/outreach components (i.e. brochures, non-technical reports, web sites, public tours, public archaeology, multi-media cd-rom, etc.). (PA Mitigation Measure F).

Table 4–42 Summary of Mitigation Measures at Fort Lewis for the Preferred Alternative

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Cultural Resources	4.6	Creative Mitigation Project per PA: Web-based Documentation, Interpretive Signs and Self-Guided Tour. This creative mitigation project will develop documentation and educational material to preserve and share the history of the Garrison Historic District. The project will mitigate adverse impacts associated with the implementation of the Historic Downtown Area Development Plan (ADP) component of the Fort Lewis Master Plan. The primary product will be a content-rich website designed to educate and entertain a diverse public audience. The project will also develop wayside interpretive signs to be installed in the District, along with a self-guided tour map of the District. (PA Mitigation Measure G).
Cultural Resources	4.6	Adaptive Reuse Plans per PA: Pendleton Avenue Corridor. This project will contract with a qualified historic architect to develop and evaluate adaptive reuse alternatives that will support the goals of the Installation's Master Plan and Installation Sustainability Program. The adaptive reuse plan will focus on the Pendleton Avenue corridor through the Fort Lewis Garrison Historic District. The plan will develop conceptual drawings to identify alternatives for reuse of historic gun sheds, stables and other buildings proposed for potential demolition in the Historic Downtown Area Development Plan (ADP). The project will also develop conceptual drawings for historically compatible street-lighting, benches, bus stops and other street furniture for a redeveloped Pendleton Avenue corridor. The plan will develop life-cycle cost comparisons to compare the cost of rehabilitation vs. new construction for typical buildings. (PA Mitigation Measure H).
Air Quality	4.7	As required, establish monitoring stations to collect localized air quality sampling data to assess impacts of hazardous air pollutants.
Noise Airspace	4.8 4.13	Aircraft will maintain a minimum of 2000 feet AGL when flying over the Nisqually National Wildlife Refuge.
Noise	4.8	Construct sound mitigating berms on selected firing ranges (Ranges 1–4, 43–45, 47, 52, and 53).
Traffic and Transportation	4.10	Install a traffic signal, construct a traffic island and remark lanes at the intersection of DuPont-Steilacoom Road and East Drive.
Traffic and Transportation	4.10	Construct a northbound right-turn lane on A Street at the intersection of North Gate Road and East Drive.
Socioeconomics	4.11	Conduct enhanced outreach and coordination with surrounding school districts regarding near- and long-term potential stationing actions, which would help these districts plan for changes in enrollment.

Table 4–42 Summary of Mitigation Measures at Fort Lewis for the Preferred Alternative

Resource Area (Mitigation Project Title)	Final EIS Sections	Description of Mitigation
Hazardous Materials/Hazardous Waste	4.12	To support the increase in troop strength, expand the services provided by the Hazardous Materials Control Center (HMCC) in managing the purchase, storage, delivery, use, and recovery of hazardous materials.
Hazardous Materials/Hazardous Waste	4.12	Provide additional waste storage facilities, and conduct more frequent waste pick-up and additional on-site waste storage due to the increased waste streams at the installation.
Hazardous Materials/Hazardous Waste	4.12	Conduct additional site surveys, development of process maps and audit compliance with environmental operating permits.