APPENDIX B
IMPACT METHODOLOGY

B.1 OVERVIEW

This appendix of the EIS describes the methodology used to analyze the potential impacts (environmental consequences) on the affected environment that would result from implementation of the alternatives for the Fort Lewis GTA EIS. An environmental impact or consequence is defined as a modification or change in the existing environment brought about by the action taken. Effects can be direct, indirect, or cumulative and can be temporary (short term) or permanent (long term). Effects can also vary in degree, ranging from only a slight discernable change to a drastic change in the environment. The terms "effect" and "impact" are synonymous as used in this EIS.

B.1.1 Introduction to Impact Methodology

A systematic approach to analysis of impacts has been developed for this assessment. This approach consists of a description of the components of each alternative, identification of each Valued Environmental Component (VEC), development of methods to analyze impacts, identification of significance criteria to determine the intensity of impacts, and development of mitigation measures that may be applied to reduce or eliminate impacts. Each of these components is described in the sections that follow.

B.1.2 Standardized Impact Analysis and Significance Criteria

To compare adequately the alternatives, standardized impact analysis methods and significance criteria will be established and used throughout the assessment process. The following sections of this chapter provide these methods and criteria for each environmental resource.

B.1.3 Presentation of Impacts

B.1.3.1 Summary of Impacts

Three levels of summary tables are included to provide an overview of impacts by alternative and by resource. These tables show the highest level of impact for each resource by valued environmental component (see Section B.2.7 below).

Text supporting these conclusions is presented and mitigations are listed for all adverse impacts, where mitigation is available. There may be both adverse and beneficial impacts within a single resource category; for instance, a project could interfere with a pre-existing land use such as recreation (an adverse impact) while expanding public access to different recreational resources (a beneficial impact). Where there are both adverse and beneficial impacts, both are listed on the tables and in the text.

B.1.3.2 Detailed Analysis

At the resource level, potential effects on the resource from three groups of activities associated with the Fort Lewis GTA EIS are described. The three groups of activities are construction, live-fire training, and maneuver training.

B.2 DEFINITION OF KEY CONCEPTS

B.2.1 Direct and Indirect Impacts

CEQ's regulations define three types of impacts. They are direct, indirect, and cumulative. Direct impacts are those that are caused by an action and occur at the same time and place as the action. Indirect impacts are those effects caused by an action and that occur later in time or is farther removed in distance from the action.

B.2.2 Short-term versus Long-term Impacts

Impacts also may be expressed in terms of duration. The duration of short-term impacts is considered to be one year or less, and long-term impacts are described as lasting beyond one year. Long-term impacts can potentially continue in perpetuity.

B.2.3 Measure of Impacts

To the extent possible, potential impacts are measured and quantified using appropriate metrics for each environmental resource. For example, erosion from disturbed areas may occur and can be calculated in tons per acre per year, depending on a variety of influences such as soil type, slope, and cover. These impacts are than compared to available standards to determine significance. Mitigation measures or other best management practices are then applied to reduce the intensity of the affects.

B.2.4 Cumulative Impacts

Cumulative impact is the "cumulative effect on the environment that results from the incremental impact of the action when added to "other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions". Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

CEQ regulations implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR Parts 1500-1508). Army regulation 200-2 (32 CFR 651.51) also requires that cumulative actions, when viewed with other proposed actions that have cumulatively significant impacts, be discussed in the same impact statement. Direct, indirect, and cumulative impacts should be viewed together to determine the full impacts from each alternative identified in this EIS. Cumulative impacts are discussed separately at the end of Chapter 5 of this EIS.

In addition, this EIS may identify significant direct or indirect impacts for certain resources while finding that there are no significant cumulative impacts for the same resource. In addition, the converse may occur where a less than significant direct or indirect project-level impact may tip the scale and cause a significant cumulative impact to the same resource. This difference is normally due to the different geographical context (Region of Influence (ROI)) for measuring direct and indirect versus cumulative impacts. The ROI for cumulative impact analysis is generally larger than the ROI for project-related impacts. This is because impacts to resources at a project level can result in synergistic impacts to the same resources at a larger scale, such as regional air quality or the population levels of a certain species.

This EIS uses a variety of methods, depending on the resource area, to determine cumulative socioeconomic and environmental effects. Methods for gathering and assessing data regarding cumulative impacts include interviews, use of checklists, trends analysis, and forecasting. In general,

past, present, and reasonably foreseeable future actions are assessed by resource area. Cumulative impacts from the four alternatives would occur in all resource areas as described in Chapters 4 and 6 of this EIS.

B.2.5 Magnitude of Impacts (context and intensity)

To determine whether an impact is significant, CEQ regulations also require the consideration of context and intensity of potential impacts (40 CFR 1508.27). Context normally refers to the setting, whether local or regional, and intensity in regards to the severity of the impact. Also, an EIS should include a discussion of the possible conflicts between the action and the objectives of federal, regional, state and local land use plans and policies for the area concerned (40 CFR 1502.16 C).

B.2.6 Significance Criteria (elements leading to a significance threshold)

Each resource section in this chapter includes the methodology used for impact analysis and a discussion of factors used to determine the significance of cumulative, direct, and indirect impacts (40 CFR 1508.7 through 1508.8) and proposed mitigation, as appropriate for that resource. Direct impacts are those that are caused by the action taken and occur at the same time and place. Indirect impacts are those caused by the action taken and occur later in time or are farther removed in distance from the action. Impacts are defined in the following categories:

- Significant Effects
- Significant but Mitigable to less than Significant Effects
- Less than Significant Effects
- No Effects
- Beneficial Effects

Impacts identified for each resource in the top two categories (significant or significant but mitigable to less than significant) are assigned an impact number in the text (e.g. Impact 1) with a corresponding numbered mitigation (e.g. Mitigation 1). Impacts in the next two categories (less than significant or no impact) are not assigned an impact number; however, SOPs, BMPs, or other standard practices would be implemented to ensure impacts are minimized. Beneficial impacts are also described when applicable.

B.2.7 Valued Environmental Components (VECs)

In 1997, CEQ published specific guidelines for Cumulative Effects Analysis (CEA), establishing a new impact assessment approach (or paradigm) that focuses on important regional resources, as opposed to the traditional action-impact approach used for direct and indirect effects. The new assessment approach focuses on valued environmental components (VECs) or resources that are important in a specific region. In 2007, the Army released its NEPA Analysis Guidance Manual. This manual provides a specific, detailed Army methodology to implement requirements outlined in the CEQ's CEA guidelines. The Army used the VEC methodology put forward in the NEPA Analysis Guidance Manual in the preparation of this EIS.

B.2.8 Institutional Programs

Fort Lewis Army Growth and Force Structure Realignment may affect installation management. Installation programs that directly affect the environment include range management, environmental management, and real property management. Implementation of the following institutional programs at all training areas include: ITAM, an INRMP, an ICRMP, a range development plan, institutional

controls, IWFMP, and a real property management plan. The Army would continue to fund these programs under any action alternative, as funding is available, with the complexity and scope of the program proportional to the proposed land use.

B.2.9 Mitigation

In instances where adverse impacts are identified, measures that could be used to mitigate those impacts are discussed. Mitigation is divided into two categories:

- Regulatory and administrative mitigation which is required in compliance with federal environmental laws and regulations that are SOPs or BMPs, or that are part of an on-going program to minimize impacts through careful project design
- Additional mitigation, which is proposed by the Army, other agencies, or the public and which may be implemented, depending on funding availability.

The Army has listed these additional mitigations to provide the public and regulatory agencies with information on all possible mitigations, and to request input on which mitigations the public would like to see implemented. The Army will identify in the Final EIS which of these mitigations are likely or unlikely to be implemented. The final determination on mitigation commitments will be outlined in the record of decision.

Where no significant adverse impacts are identified, mitigation measures are not proposed.

B.3 MANEUVER TRAINING MILEAGE ESTIMATION

Commanders maneuver forces to create the conditions for tactical and operational success (Army 2002a). Maneuver involves movement to achieve positions of advantage with respect to enemy forces. Through maneuver, friendly forces gain the ability to destroy enemy forces or hinder enemy movement by direct and indirect application of firepower or threat of its application.

Although all units stationed at Fort Lewis conduct at least some maneuver training, the SBCTs would account for most of the maneuver training that is conducted annually at Fort Lewis and YTC. In general, this training involves units traveling from an assembly area to a point near their objective where they then tactically deploy through off-road movement around the objective. As a result, most of this maneuvering (about 80 percent) occurs on roads, which include everything from paved roads, improved gravel roads, unimproved roads, and trails. About 20 percent of maneuver training involves cross-country or off-road travel that is mostly confined to assembly areas and areas around objectives.

The Army bases its estimate of the approximate proportion of on-road versus off-road maneuvering (80 percent versus 20 percent) on vehicle tracking and additional Stryker training observations conducted at YTC. During this tracking effort, the Army installed vehicle-tracking systems on 20 vehicles in the 3rd Brigade, 1/14 Cavalry during a reconnaissance training exercise at YTC. Data from the vehicles and the additional training observations were used to estimate on-road/off-road distances and proportions of distance traveled per type of road. On average, individual Stryker vehicles traveled 16 miles/day on roads and 4 miles per day off roads, whereas the SBCT support vehicles traveled approximately 90 percent of the Stryker vehicle miles on and off road (McDonald 2009d).

Based on the vehicle tracking and additional Stryker training observations, the Army estimates that individual Strykers log approximately 3,200 maneuver miles per year at YTC and Fort Lewis. Although Stryker vehicles put on a greater number of miles in daily maneuvering at YTC than at Fort Lewis, they only go to YTC a few times per year. They maneuver more frequently at Fort Lewis, but

drive fewer miles daily. Consequently, the Army estimates that approximately 60 percent of the maneuver miles driven annually by Stryker vehicles occurs at Fort Lewis and 40 percent occurs at YTC (Larson 2009f). Consequently, approximately 1,280 maneuver miles are driven at YTC annually and 1,920 maneuver miles are driven at Fort Lewis annually.

In addition, the Army estimates that about 70 percent of the off-road miles driven by Stryker vehicles occur at YTC because Fort Lewis maneuver lands offer fewer places to leave the road (Larson 2009d). Accordingly, approximately 256 miles are driven off road at YTC annually and 110 miles are driven off road at Fort Lewis annually (Larson 2009f). These estimates would vary from year to year depending on a number of factors, including local conditions, deployments, and types of exercises.

The Army has estimated the proportion of on-road miles driven by military road class using vehicle tracking and additional Stryker training observations conducted at YTC. Military Class 1. 2. or 3 roads have hard or improved surfaces (paved or graveled). Military Class 4 roads have unimproved surfaces and Military Class 5 roads are trails. YTC range personnel and other staff observations suggest that Stryker vehicles drive approximately 334 miles annually on Military Class 4 and 5 roads, which is about 26 percent of their total mileage (McDonald 2009f). The remaining 690 miles driven annually by Stryker vehicles at YTC occur on Military Class 1, 2, or 3 roads. At Fort Lewis, similar observations estimate that Stryker vehicles drive approximately 140 miles annually on Military Class 4 and 5 roads and about 1,670 miles annually on Military Class 1, 2, or 3 roads.

Finally, the Army has estimated the number of miles traveled annually by SBCT support vehicles, CSS unit vehicles, and medium CAB vehicles, relative to those driven by the Stryker vehicles. Vehicle tracking and additional Stryker training observations conducted at YTC suggest SBCT support vehicles travel about 90 percent of what Stryker vehicles travel annually (McDonald 2009f). Observations also suggest that CSS vehicles travel about the same distances on road as SBCT support vehicles, but only 20 percent of the off-road distances (McDonald 2009e). Support vehicles for a medium CAB travel about 20 percent of the annual miles driven by an SBCT (McDonald 2009e).

Appendix C includes separate tables for SBCTs, CSS units, and a medium CAB that show the estimated breakdown of mileage by type of vehicle and class of road. The mileages shown on these tables are used in calculations of the annual emissions from the various vehicles over the distances driven.

B.4 REASONABLY FORESEEABLE FUTURE ACTIONS

A variety of reasonably foreseeable future actions (RFFA) were considered in the impact analysis. They included Army and non-Army projects. All are listed below.

B.4.1 Army RFFA

B.4.1.1 High Mobility Artillery Rocket System

The Army at Fort Lewis, Washington, is proposing to train field artillery battalions at Fort Lewis and YTC to include the launching of HIMARS rockets. The objectives of the proposed action are to:

- Support all training requirements of two Field Artillery (HIMARS) battalions.
- Conduct launch procedure certification training at Fort Lewis. This would require the launching of up to 54 rockets quarterly for a possible yearly total of 216 rockets.
- Allows battalion soldiers to spend more time with their families;
- Reduces overall unit deployment costs by travelling fewer times to YTC.

- Additional rockets may be launched at YTC as part of "collective tasks" training.
- At Fort Lewis, expand a firing point clear zone by 42 acres to facilitate rocket trajectory clearance.

An Environmental Assessment (EA), which further describes the proposed project and discusses the anticipated environmental impacts, has been prepared by the Army in compliance with NEPA.

B.4.1.2 Other Army RFFA

- Continued training at Fort Lewis and YTC by all the units currently stationed there, as well as by visiting units;
- Activities associated with installation-wide resource sustainability efforts;
- Army MILCON Projects Approved Under NEPA but Not Yet Constructed (Table B–1)

B.4.2 Non-Army RFFA

1. Cross-Base Highway (EIS completed 2003). Documents available at: http://www.piercecountywa.org/pc/abtus/ourorg/pwu/crp/crossbase.htm
2. Revisions to roadways and interchanges in the cantonment area to improve traffic flow and reduce traffic congestion.
3. Rerouting of a Bonneville Power Administration transmission line from the Nisqually Reservation to the Army controlled Rainier Training Area;
4. Population increases and associated development and encroachment in the vicinity of Fort Lewis;
5. Expansion of the Nisqually National Wildlife Refuge and restoration of its estuarine marshes.

Table B–1 Army MILCON Projects with Completed NEPA Analysis

YR	FORM	PROJ DESCRIPTION FORT LEWIS	UNIT	($000)	SCOPE
2008	63327	INDOOR BAFFLE RANGE	1st SFG	$5,000	SOCOM
2008	64473	MEDICAL DENTAL CLINIC	MAMC	$23,000	Outpatient Health Clinic, Ancillary Departments, Dental Clinic
2008	65933	4/2 SBCT COMPLEX INCR 2	17th FIRES	$102,000	Bde Hq, 3 Bn Hq, 11 Co Hq, 2 TEMFs, DFAC
2008	61148	ALTERNATIVE REFUELING FACILITY		$3,300	Dispensing Island, Biodiesel, E85, Propane, CNG, Fast Elec Charge, Hydrogen
2008	63837	CHILD DEVELOPMENT CENTER, PRESCHOOL		$10,600	303 Pre-School Ages 0 to 5
2008	62077	RAILROAD YARD UPGRADE		$14,600	3 Interchange Tracks for 60 cars, Maintenance Fac
2008	68845	ARMY GROWTH - BRIGADES/BATTALIONS/COFS	62nd MED, 51st SIG, 5-2 SBCT	$51,000	62nd MED-Bn Hq, 4 Co COF; 51st SIG-Bn Hq; 5-2 SBCT-Bde Hq, 2 Bn Hq
2008	68840	ARMY GROWTH COMPLEX - JACKSON AVENUE	51st SIG	$32,000	300 UPH Barracks
2008	68842	ARMY GROWTH COMPLEX 2 - JACKSON AVENUE	201st MI, 3rd ORD, 864th ENG	$62,000	201st MI-6 Co COF, 4 Co COF; 3rd ORD-4 Co COF; 864th ENG-TEMF
2008	68876	FAMILY HOUSING PRIVATIZATION (GROWTH)		$72,700	520 Dwelling Units
2008	60151	BARRACKS COMPLEX, 2/75TH RANGERS	2/75 Rangers	$25,000	Revised-210 UPH Barracks
2008	59555	BARRACKS COMPLEX, SOAR & NF EDUCATION COMPLEX	4-160th SOAR	$46,000	200 UPH Brks, Ed Ctr, DFAC
2008	64528	BRAC - YTC ARMED FORCES RESERVE CENTER		$20,000	
2008	64963	SOF SUPPORT BATTALION COMPLEX, GSB, 1 SFG	1st SFG	$30,000	Consolidated Bn Hq and Co Hq, TEMF, Warehouses
2008	64964	SOF BATTALION OPS COMPLEX, 4/1 SFG	1st SFG	$47,000	Consolidated Bn Hq and Co Hq, TEMF, MAROPS Fac
2009	65184	110th CHEM BN	110th CHEM	$54,000	Bn Hq, Admin w/SCIF, 4 Co Hq, TEMF, Warehouse
2009	65292	5-5 ADA BATTALION COMPLEX	5-5 ADA	$47,000	152 UPH Brks, Bn Hq, 5 Co Hq, TEMF, DFAC Exp
2009	65934	4/2 SBCT COMPLEX INCR 3	201st MI, 51st SIG, MAMC	$102,000	201st MI-2 Bn Hq, 350 UPH Barracks; 51st SIG-4 Co COF; MAMC-260 UPH Barracks
2009	69167	ARMY GROWTH COMPLEX ESC	ESC	$30,000	Bde Hq, 1 Co Hq, TEMF
2009	70102	CHILD DEVELOPMENT CENTER	MWR	$27,000	3 Renovations, 3 Additions
2009	530012	READINESS CENTER, GRAY FIELD, CAB, 66th TAC (MCNG)		$32,000	

Table B–1 Army MILCON Projects with Completed NEPA Analysis

YR	FORM	PROJ DESCRIPTION FORT LEWIS	UNIT	($000)	SCOPE
2009	67414	CDC - PERMANENT MODULAR - MADIGAN		$5,000	100 Pre-School Ages 0 to 5
2009	70111	CDC - NORTH FORT		$4,800	144 Pre-School Ages 0 to 5, Beachwood
2009	70112	CDC - HILLSIDE SKIES		$4,850	135 School Age, Ages 6 to 12
2009	67970	YOUTH CENTER (HILLSIDE GREEN)		$7,500	Youth Center for middle and high school youth
		RIOR ENTERTAINMENT CENTER		$11,000	Food & Beverage, entertainment, games, dance floor
2009	50347	SOF BATTALION AND COMPANY OPS, 2/75 RGR	2/75th Rangers	$38,000	Bn Hq w/SCIF, 2 Co Hq,
2010	41842	LIVE FIRE EXERCISE SHOOT HOUSE		$2,550	Rg 25, Shoot house, AAR bldg, Storage, Ops, Latrine
2010	63513	MILITARY WORKING DOG KENNEL	2/75th Rangers	$3,050	Admin, 20 Dog Kennels, Workout Area, Storage
2010	66531	MODIFIED RECORD FIRE (MRF) RANGE		$4,100	Rg 8, 16 FP, Ops, Tower, Classroom, Latrine, etc
2010	65935	4/2 SBCT COMPLEX INCR 4	17th FIRES	$102,000	Bn HQ, 10 Co Hq, 124 UPH Barracks, 2 TEMFs
2010	70343	MEDICAL DENTAL ADD/ALT	C	$16,000	ions to FY 08 PN 64473 Med Dental Clinic
		SUPPORT COMPANY FACILITY, 2/75 RGR	Rangers	$14,500	Hq
		MISSARY ADD/ALT	A	$27,000	nissary (revising scope for new commissary)
		3CT (Ball Fields)			
2011	55198	3/2 SBCT (Company Operations Facilities)			
2011	55198	3/2 SBCT (200 UPH Barracks)			
2012	53637	BARRACKS, JACKSON AVE, MED & MP, PH 2	4/2 SBCT	$50,000	156 UPH Barracks, 2 Bn Hq, Relocate TEMF
2012	60344	AIR SUPPORT OPERATIONS SQUADRON	5th ASOS	$7,500	Simulator Facility, Vehicle Covers
2012	64014	23RD CHEMICAL BATTALION COMPLEX	23rd CHEM	$52,000	183 UPH Barracks, 3 Co Hq, Bn Hq, Admin, TEMF
2012	64283	SUSTAINMENT BDE COMPLEX, PHASE 1	593rd	$91,000	Bn Hq, Bn Annex, 3 Co Hq, 12 Co Hq Additions, TEMF
2012	58046	ROTC RENOVATION, DIVISION AREA, PHASE 1	ORTC	$17,500	Revised-ORTC
2013	53640	BARRACKS COMPLEX SBCT, 62ND MED BDE (LOSS OF SCOPE)		$25,000	$52M-Bde Hq, Bn Hq, 5 Co Hq, RSU, 4 Ball Fields
2013	67091	SUSTAINMENT BDE COMPLEX, PHASE 2	593rd	$45,000	200 UPH Brks, Bde Hq, Renovate Existing Bde Hq
2013	49482	NORTH FORT PHYSICAL FITNESS CENTER		$37,000	Gym, Pool, Ball Fields, Expand Sheridan PFC
2013	59633	ROTC RENOVATION, DIVISION AREA, PHASE 2	ORTC	$23,000	Revised-ORTC

Table B–1 Army MILCON Projects with Completed NEPA Analysis

YR	FORM	PROJ DESCRIPTION	UNIT	($000)	SCOPE
		FORT LEWIS			
2013	72089	RAPPELLING TRAINING AREA		$5,300	SOCOM
2014	61147	Regional Confinement Facility (480 beds)			
		YAKIMA TRAINING CENTER			
2008	43088	DIGITAL MPRC, YTC		$29,000	Modernize existing MPRC (Light), add 3 Lanes