Greenlief
TRAINING SITE

JOINT LAND USE STUDY

BACKGROUND REPORT

SEPTEMBER 2015

Greenlief TRAINING SITE JOINT LAND USE STUDY

This study was prepared under contract with SCEDD, with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of SCEDD and the jurisdictions, agencies and organizations participating in the JLUS program, and does not necessarily reflect the views of the Office of Economic Adjustment.

Greenlief TRAINING SITE

JOINT LAND USE STUDY

Background Report

Prepared Under Contract with:

SCEDD
SOUTH CENTRAL ECONOMIC DEVELOPMENT DISTRICT

South Central Economic Development District
P.O. Box 79
Holdrege, NE 68949

Prepared by

Matrix DESIGN GROUP

September 2015

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Policy Committee

The Policy Committee (PC) served an active and important role in providing policy direction during the development of the Greenlief Training Site Joint Land Use Study. The Policy Committee was composed of the following individuals:

- **Michael Anderson**
  Clay County
- **LTC Ross Finley**
  Nebraska Army National Guard
- **Charles Neumann**
  Adams County
- **David Wacker**
  City of Hastings

Working Group

The Working Group (WG) served a key role in the development of the Greenlief Training Site Joint Land Use Study. They provided the overall technical support, review, and guidance of the study. The WG was composed of the following individuals:

- **Riley Cook**
  T-L Irrigation Co
- **Barb Barnett**
  Clay County
- **Bucky Herman**,
  US Meat Animal Research Center
- **Bill Hitesman**
  Central Community College
- **Kim Jacobitz**
  City of Hastings
- **Judy Mignery**
  Adams County
- **Mike Onnen**
  Little Blue Natural Resource District
- **Ryan Petr**
  Village of Glenvil
- **Jim Price**
  Four Rivers Sportsman's Club
- **Dave Rippe**
  Hastings Economic Development Corporation
- **Clay Stryker**
  Nebraska Army National Guard

South Central Economic Development District

The South Central Economic Development District (SCEDD) served as the overall JLUS project management agency and the administrator of the Office of Economic Adjustment grant that helped to fund the study.

- **Sharon Hueftle**
  Executive Director
- **Bobbi Pettit, AICP**
  Community Planner, JLUS Project Manager

JLUS Consultant / Technical Advisors

Matrix Design Group was the project consultant hired to conduct the JLUS project through coordination with and assistance from SCEDD, the PC, the WG, the public, and other stakeholders.

- **Rick Rust, AICP**
  Project Manager
- **Celeste Werner, AICP**
  Deputy Project Manager
- **Bren Cox, AICP**
  Lead Planner
- **Mike Hrapla**
  Military Liaison

Figures

Tables

Please see the next page.

A

ACLUP	Adams County Land Use Plan
ACUB	Army Compatible Use Buffer
ADNL	A-weighted day-night average sound level
AGL	above ground level
APZ	Accident Potential Zone
AR	Army Regulation
ASP	ammunition supply point
AT	anti-terrorism

B

BASH	Bird / Wildlife Aircraft Strike Hazard
BHWG	Bird Hazard Warning Group
BRAC	Base Realignment and Closure
BSC	Brigade Support Company

C

CDNL	C-weighted day-night average sound level
CFMO	Construction and Facilities Management Office
CLUMP	County Land Use Management Policy
COA	Certificate of Authorization
COE	Corps of Engineers
CoJMC	College of Journalism and Mass Communications
COM	Coordination / Communication
CR	County Road
CR	Cultural Resources (in relation to compatibility factors)
CUP	Conditional Use Permit
CUPs	Conditional Use Permits
CWA	Clean Water Act
CZ	Clear Zone

D

DA	Department of the Army
DA PAM 385-63	Department of Army Pamphlet 385-63: Range Safety
DA PAM 525-27	Department of the Army Pamphlet 525-27
dB	decibel
dBA	A-weighted decibel
dBP	dB peak
DNL	Day-Night Average Sound Level
DOD	Department of Defense
DODI	Department of Defense Instruction
DSS	Dust, Smoke, and Steam

E

EA	Environmental Assessment
ED	Energy Development
EIS	Environmental Impact Statement
EMP	emergency management program
EOD	explosive ordnance disposal
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETJ	Extraterritorial Jurisdiction

F

FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FLPMA	Federal Land Policy and Management Act
FMP	Forestry Management Plan
FONSI	Finding of No Significant Impact
ft	foot

G

GA	General Aviation
GIS	geographic information system
GTS	Greenlief Training Site

H

HEDC	Hastings Economic Development Corporation

I

ICRMP	Integrated Cultural Resources Management Plan
IDA	International Dark Sky Association
IDG	Installation Design Guide
IE	Infrastructure Extensions
INRMP	Integrated Natural Resources Management Plan
INRMPs	Integrated Natural Resources Management Plans
IP	Information Publication
IP A-001	Information Publication A-001

J

JFHQ	Joint Force Headquarters
JLUS	Joint Land Use Study

K

L

LAS	Land / Air / Sea Spaces
LEOP	Local Emergency Operations Plan
LEOPs	Local Emergency Operations Plans
LG	Light and Glare
LOS	Level of Service
LU	Land Use
LUPZ	Land Use Planning Zone

M

MARC	ADD THIS Meat Animal Research Center
MCA	Military Compatibility Area
MCAOD	Military Compatibility Area Overlay District
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain

N

NAAQS	National Ambient Air Quality Standards
NACo	National Association of Counties
NAD	Naval Ammunition Depot
NDEQ	Nebraska Department of Environmental Quality
NDNR	Nebraska Department of Natural Resources
NDOR	Nebraska Department of Roads
NEARNG	Nebraska Army National Guard
NEMA	Nebraska Emergency Management Agency
NEPA	National Environmental Policy Act
NFS	Nebraska Forest Service
NGOs	nongovernmental organizations
NGPC	Nebraska Game and Parks Commission
NGRC	National Guard Reserve Center
NHPA	National Historic Preservation Act
NLR	noise level reduction
NOAA	National Oceanic and Atmospheric Administration
NOI	Noise
NOTAM	notice to airmen
NPDES	National Pollutant Discharge Elimination System
NVG	night vision goggles
NZ	Noise Zone

O

OD	Ordnance Disposal
OEA	Office of Economic Adjustment
OIC	Officer in Charge
ONMP	Operational Noise Management Plan

P

(PM2.5)	fine particles
PC	Policy Committee
PIF	Partners in Flight
PM	Particulate Matter
PM10	course particles
PT	Public Trespassing

Q

R

RC	Roadway Capacity
REPI	Readiness and Environment Protection Integration
ROD	Record of Decision

S

SA	Safety Zones
SAR	Suspicious Activity Reporting
SARNAM	Small Arms Range Noise Assessment Model
SARSA	Small Arms Range Safety Area
SCEDD	South Central Economic Development District
SDZ	surface danger zone
SHPO	State Historic Preservation Office
SIPs	State Implementation Plans
SLATT	State and Local Anti-Terrorism Training
SLUCM	Standard Land Use Code Manual
SNOMP	Statewide Noise Operational Management Plan
SUA	special use airspace

T

TSA	Transportation Security Administration
TCC	Training Center Command

U

UAC	Urban Assault Course
UAS	unmanned aerial systems
UAV	unmanned aerial vehicles
UAV / UAS	Unmanned Aerial Vehicles / Systems
UFC	Unified Facilities Criteria
US	United States
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
UTES	Unit Training Equipment Site
UXO	unexploded ordnance

V

V	Vibration
VFR	Visual Flight Rules
VO	Vertical Obstructions
VOCs	Volatile Organic Compounds

W

WG	Working Group
WQQ	Water Quality / Quantity

X, Y, Z

Please see the next page.

Greenlief TRAINING SITE
JOINT LAND USE STUDY

1 INTRODUCTION

Please see the next page.

1 INTRODUCTION

Inside Chapter 1 ...

Greenlief Training Site main gate sign

Military installations are critical to local economies, generating thousands of jobs and millions of dollars in economic activity and tax revenue annually. In the past, incompatible development has been a factor in the loss of training operations and the restructuring of mission-critical components to other military installations. To protect the missions of military installations and the health of the economies and industries which rely upon them, encroachment must be addressed through collaboration and joint planning between installations and local communities. This Joint Land Use Study (JLUS) attempts to mitigate future issues and strengthen coordination between the local communities and the weapons training programs at Francis S. Greenlief Training Site (GTS).

GTS is located approximately seven miles southeast of the City of Hastings, Nebraska, on the border of Adams and Clay counties and occupies 3,279 acres. The JLUS Study Area encompasses all lands in the vicinity of GTS that have actual or potential adverse impacts on military operations at the installation.

Several communities participated as partners in this JLUS, including the City of Hastings, the Village of Glenvil, Adams County and Clay County. An organized communication effort between these jurisdictions, GTS, and other stakeholder entities that own or manage land or resources in the region is needed to ensure that future growth around GTS is coordinated and compatible with military training activities.

1.1. What Is A Joint Land Use Study?

A JLUS is a planning process accomplished through the collaborative efforts of a comprehensive list of stakeholders in a defined study area, in order to identify compatible land uses and growth management guidelines within, and adjacent to, active military installations. These stakeholders include local, state, and federal officials, residents, business owners, nongovernmental organizations, and the military.

Encroachment refers to incompatible uses of land, air, water, and other resources that may individually or cumulatively impact the military's ability to carry out its testing and training mission. The intent of the JLUS process is to encourage a working relationship between military installations and their proximate communities so they can act as a team to prevent and / or reduce encroachment issues associated with current and future mission expansion and local community growth.

A JLUS culminates in a set of recommendations or potential guidelines that can be implemented by identified stakeholders in order to promote compatible development and constructive relationships between the military and neighboring communities.

Although primarily funded by the US Department of Defense's (DOD), Office of Economic Adjustment (OEA), a JLUS is produced by and for local communities. Accordingly, the project management entity for the GTS JLUS is the South Central Economic Development District (SCEDD).

This JLUS is critically important for several reasons. It will help to establish and preserve long-term land use compatibility between GTS and the surrounding jurisdictions. By doing so, this JLUS will better protect the health, safety, and welfare of surrounding communities and the civilian and military community at GTS. The JLUS is representative of collaboration between GTS and the local county and city governments for the purpose of planning for compatible land use, while ensuring the continued presence of the military.

GTS JLUS Goal

The goal of the GTS JLUS is to protect the viability of current and future training operations, while simultaneously guiding community growth, sustaining the environmental and economic health of the region, and protecting public health, safety, and welfare.

GTS JLUS Objectives

To help accomplish this goal, three primary JLUS objectives were identified.

- Understanding. Convene community and military representatives to identify, confirm, and understand the issues in an open forum, taking into consideration both community and GTS perspectives and needs. This includes public awareness, education, and input organized in a cohesive outreach program.
- Collaboration. Encourage cooperative land use and resource planning among GTS and surrounding communities so that future community growth and development are compatible with the training and operational missions at GTS, while at the same time seeking ways to reduce operational impacts on adjacent lands.
- Actions. Provide a set of mutually supported tools, activities, and procedures from which local jurisdictions, agencies, and GTS can select, prepare, and approve / adopt and then use to implement the recommendations developed during the JLUS process. The actions proposed include both operational measures to mitigate installation impacts on surrounding communities, and local government and agency approaches to reduce community impacts on military operations. The tools identified through the JLUS process will help decision makers resolve compatibility issues associated with GTS and prioritize projects within the annual budgeting process of their respective entity / jurisdiction.

1.2 Why Prepare a Joint Land Use Study?

Although military installations and nearby communities may be separated by a fence line, they often share natural and manmade resources such as land, airspace, water, and infrastructure. Despite the many positive interactions among local jurisdictions, agencies, and the military, and because so many resources are shared, the activities or actions of one entity can pose unintended negative impacts on another, resulting in conflicts. As communities develop and expand, potentially incompatible development can move closer to military installations and associated operational areas. This can initiate new, or exacerbate existing, land use and other conflicts. This threat to military readiness activities is currently one of the military's greatest challenges.

Collaboration and joint planning among military installations, local communities, and agencies should occur to protect the long-term viability of existing and future military missions. Working together also enhances the health of economies and industries of the communities before incompatibility becomes an issue. Recognizing the close relationship that should exist between installations and adjacent communities, the OEA implemented the JLUS program in an effort to mitigate existing and future conflicts and to enhance communication and coordination among all affected stakeholders. This program aims to preserve the sustainability of local communities within the JLUS Study Area, while protecting current and future operational and training missions at GTS.

Regional Economic and Local Importance

GTS is located at 6700 East J Street, just south of Highway 6 in south-central Nebraska (see Figure 1-1). It is approximately seven miles southeast of downtown Hastings and occupies portions of Adams and Clay counties. GTS is an important asset to the regional community, as it is the primary weapons training area for the Nebraska Army National Guard and it is also used by non-military users for training such as local law enforcement officers. Personnel training at GTS often purchase food or goods from local restaurants and retailers, which supports the local economy.

GTS also provides important economic, social, and security contributions to the local communities. National Guard members provide numerous community services to surrounding area, including mutual aid and community services.

Military Strategic Importance

The National Guard is important because it serves both state and federal missions. GTS provides unique and irreplaceable assets for both the Nebraska National Guard and the nation's military and as such, has two distinct missions – federal military preparedness / national security and state emergency assistance. GTS is the only site within the Nebraska Army National Guard where live fire military training takes place.

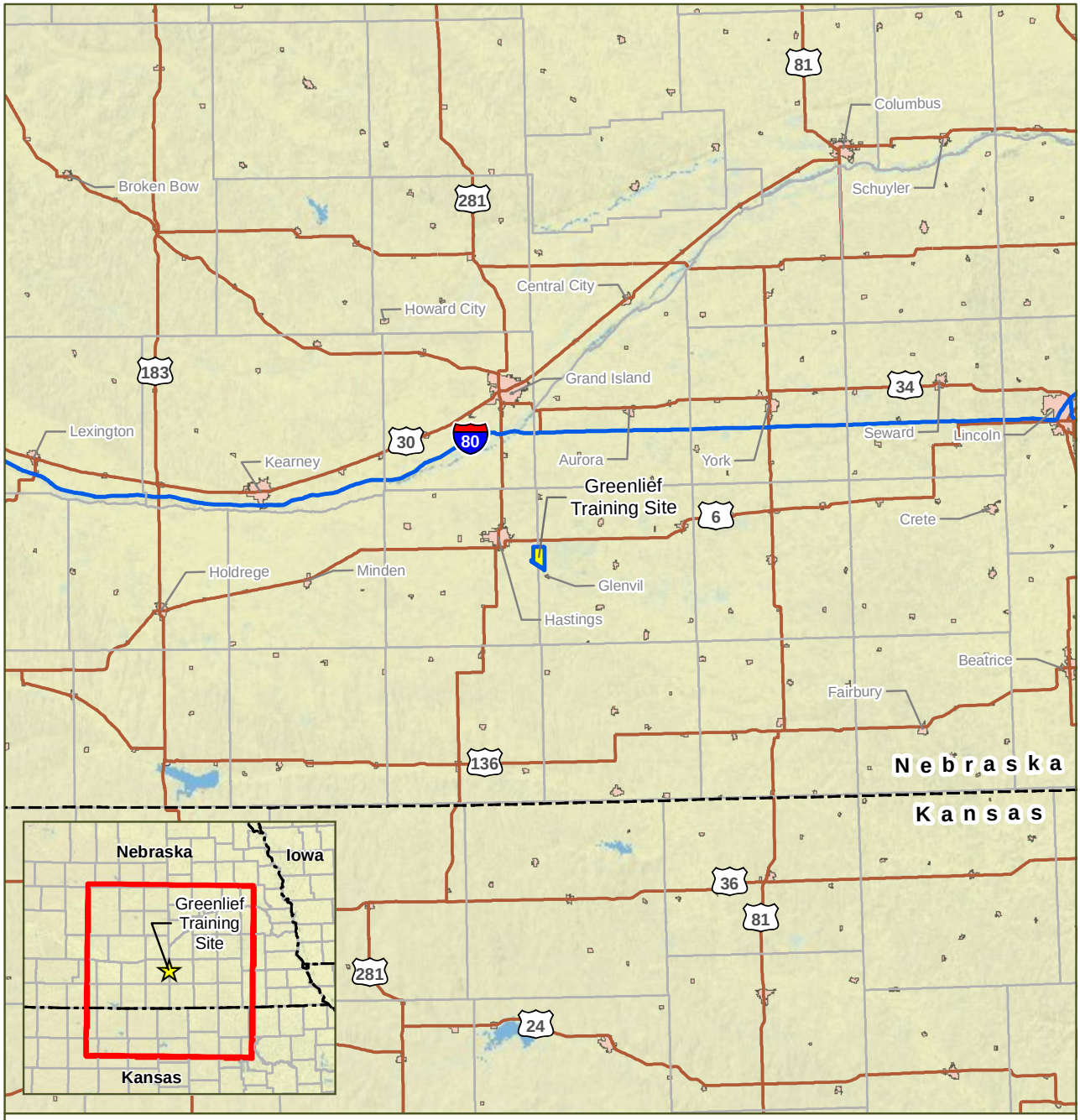
GTS has served as a training site for the Nebraska Army National Guard since 1966 and currently trains around 37,000 troops per fiscal year. For the State of Nebraska, the National Guard is a vital asset when faced with planning and is trained and ready to respond quickly and efficiently to national security concerns when directed by the President and natural and man-made disasters / incidents as requested by the Governor.

GTS is utilized for both annual and weekend training activities and serves as an NEARNG mobilization site for units being deployed.

A more detailed description of the mission and operations that occur at GTS is described in Chapter 3, Greenlief Training Site Profile.

Local Communities Working Together

As a member of the community, GTS provides more than just an economic benefit for the region. GTS contributes to the community through shared use of facilities with other military, federal, and local agencies, including local, county, and state law enforcement officers and students, the Federal Bureau of Investigations, Department of Homeland Security, Immigration and Customs Enforcement, US Forest Service, Drug Enforcement Agency, Bureau of Alcohol, Tobacco and Firearms, Internal Revenue Service, and Civil Air Patrol. GTS also works with local communities to provide important services. During emergency or safety events such as a fire, personnel at GTS provide responder assistance.



Legend

Greenlief Training Site
State Boundary
County Boundary
City / Village
Interstate
Federal Highway

Source: Greenlief TS, 2014.

0 10 20 Miles

Figure 1-1

Greenlief Training Site Location Map

1.3 Public Outreach

As highlighted in the objectives stated previously, the JLUS process was designed to create a locally relevant plan that builds consensus and obtains support from the various stakeholders involved. To achieve the JLUS goal and objectives, the JLUS process utilized a stakeholder and public outreach program that included a variety of opportunities for interested parties to contribute to its development.

Stakeholders

An early step in any planning process is the identification of stakeholders. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the JLUS project. Informing or involving them early in the project is instrumental in identifying their compatibility issues so that they can be resolved through the development of integrated strategies and measures. Stakeholders identified for the GTS JLUS included, but were not limited to:

- Local jurisdictions (cities and counties);
- DOD officials (including OEA representatives) and military installation personnel;
- Local, regional, and state planning, regulatory, and land management agencies;
- Landholding and regulatory federal agencies;
- The public (including residents and landowners);
- Environmental advocacy organizations;
- Nongovernmental organizations (NGOs); and
- Other special interest groups (including local educational institutions and school districts).

Policy Committee and Working Group

The development of the GTS JLUS was guided by two committees, made up of city, county, federal and state agencies, GTS personnel, resource agencies, and other stakeholders.

JLUS Policy Committee (PC): The PC consisted of officials from participating jurisdictions, military installation leadership, and representatives from other interested and affected agencies. The PC was responsible for the direction of the JLUS, preparation and approval of the study design, approval of policy recommendations, and approval of draft and final JLUS documents.

Working Group (WG): The WG was responsible for identifying and studying technical issues. Membership included area planners, military base planners, business and development community representatives, and other subject matter experts as needed to assist in the development and evaluation of implementation strategies and tools. Items discussed by the WG were brought before the PC for consideration and action.

The PC and WG served as liaisons to their respective stakeholder groups. PC and WG members were charged with conveying committee activities and information to their organizations and constituencies and relaying their organization's comments and suggestions to both committees for consideration. PC members were encouraged to set up meetings with their organizations and / or constituencies to facilitate this input. The list of participants and their responsibilities for the JLUS sponsors, the PC, and the WG are identified in Tables 1-1, 1-2, and 1-3, respectively.

Table 1-1. JLUS Sponsor Responsibilities and Participants

Responsibilities	Participants
■ Coordination ■ Accountability ■ Grant Management ■ Financial Contribution	■ Office of Economic Adjustment ■ South Central Economic Development District (SCEDD)

Table 1-2. JLUS PC Responsibilities and Participants

Responsibilities	Participants
■ Policy Direction ■ Study Oversight ■ Monitoring ■ Report Adoption	■ Adams County ■ City of Hastings ■ Clay County ■ Nebraska Army National Guard / Nebraska Military Department ■ Village of Glenvil

Table 1-3. JLUS WG Responsibilities and Participants

Responsibilities	Participants
■ Identify Issues ■ Provide Expertise to Address Technical Issues ■ Evaluate and Recommend Implementation Options to the PC ■ Provide Draft and Final Report Recommendations to the PC	■ Adams County ■ Central Community College ■ City of Hastings ■ Clay County ■ Hastings Economic Development ■ Little Blue Natural Resources District ■ Nebraska Army National Guard / Nebraska Military Department ■ T&L Irrigation ■ US Meat Animal Research Center ■ Village of Glenvil

Committee meetings were held throughout the process to ensure the JLUS identified and appropriately addressed local issues. The meetings conducted are highlighted as follows:

- Meeting #1 (April 29, 2014) – The kick-off meeting was held to identify the Study Area extent, identify initial compatibility issues, recommend technical expertise and advisory individuals to be considered for the WG, identify additional key stakeholders to interview, introduce the JLUS Project Team to the committee members
- Meeting #2 (September 19, 2014) – This meeting was held to review and prioritize compatibility issues, discuss the first public workshop, review data gap analysis, and review preliminary draft compatibility issues.
- Meeting #3 (February 6, 2015) – This meeting was held with two main focuses. The first part of the meeting provided an update on the compatibility issues identified to date and an overview of the Background Report chapters. The second half of the meeting focused on the development of draft strategies to address the identified issues.
- Meeting #4 (June 16, 2015) – The purpose of this meeting was to review and receive input on strategies, implementation actions, and compatibility planning tools.

First committee meeting, April 29, 2014

Public Workshops

In addition to the PC and WG meetings, a series of public workshops were held throughout the development of the JLUS. These workshops provided an opportunity for the exchange of information with the greater community, assisted in identifying the issues to be addressed in the JLUS, and provided input on the strategies proposed. Each workshop included a traditional presentation and a facilitated exercise providing a "hands on," interactive opportunity for the public to participate in the development of the plan. The public workshops that were conducted are highlighted as follows:

- Public Workshop #1 (September 18, 2014 / Central Community College) – This workshop explained the purpose and function of the JLUS, the nature of military operations at GTS, introduced project participants, shared the JLUS approach, and discussed the goals of the JLUS. The GTS project website was made available, with the components explained, and direction on how to submit comments throughout the JLUS process. The format of this workshop included a presentation to the public, followed by an interactive working session where attendees were invited and encouraged to share their input on potential JLUS issues. Attendees worked in groups around large printed Study Area maps to complete a compatibility issues

worksheet as well as engage in small group discussions with the JLUS team. Participants were also able to provide input through interactive audience response systems that allowed for immediate response viewing and tracking.

- Public Workshop #2 (June 15, 2015 / Central Community College) – This public workshop provided a chance for attendees to review and comment on the compatibility issues that have been identified for evaluation as part of the JLUS and provide input on the prioritization of these issues. The issues that were presented were developed based on inputs from the JLUS Policy Committee and Working Group (made up of representatives from the jurisdictions, agencies and organizations involved in this project) and public inputs provided at the first Public Workshop held on September 18, 2014. The workshop also provided an overview of the types of tools that will be used to develop recommendations / strategies to address the JLUS issues. At the end of the workshop, attendees engaged in an open forum question and answer session and were encouraged to share their ideas on potential strategies that can be used to address compatibility issues that have been identified.
- Public Workshop #3 (August 24, 2015 / Central Community College) – The third and final public workshop was held during the Public Draft review and comment period (August 13 through September 3, 2015). Attendees of the workshop were given a brief summary of the JLUS process and were provided with a breakdown of the JLUS Report and Background Report chapters and how the compatibility issues were addressed. A focus of the meeting was the JLUS Implementation Plan (Chapter 6 of the JLUS Report), how the strategies were developed, and how to read the strategies. The process for submitting comments on the draft was explained and all attendees were encouraged to review the documents and provide any comments or concerns they have.

First public workshop, September 18, 2014

Public Outreach Materials

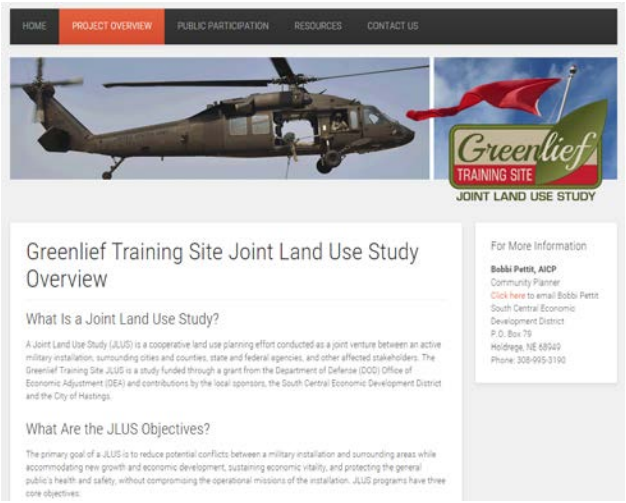

Greenlief Training Site
JOINT LAND USE STUDY
Fact Sheet #1: Overview / Factors
JLUS Objectives
What is a Joint Land Use Study?
Who will Guide the JLUS Development?
Why is it Important to Partner with Greenlief Training Site?
Stay up-to-date on the Greenlief Training Site JLUS at www.greenliefjlus.com

JLUS Overview Fact Sheet – At the beginning of the JLUS project, a fact sheet was developed describing the JLUS program, objectives, methods for the public to provide input into the process, an overview of the 25 compatibility factors that would be analyzed throughout the project, and the proposed GTS JLUS Study Area. This fact sheet was made available at the public workshops for review by interested members of the public, as well as posted on the website for download.


Greenlief Training Site
JOINT LAND USE STUDY
Fact Sheet #2: Strategy Toolbox
What are JLUS Strategies?
The Strategy "Toolbox"
Stay up-to-date on the Greenlief Training Site JLUS at www.greenliefjlus.com

Strategy Tools Brochure – The Strategy Tools Brochure was prepared for the second public workshops. JLUS strategies constitute a variety of actions that local governments, military installations, agencies, and other stakeholders can take to promote compatible land use planning. This brochure provides an overview of the strategy types that could be applied to address compatibility issues around GTS.

Website – A project website was developed and maintained to provide stakeholders, the public, and media representatives with access to project information. This website was maintained for the entire duration of the project to ensure information was easily accessible. Information on the website included program points of contact, schedules, documents, maps, public meeting information, and downloadable comment forms. The project website is located at www.greenliefjlus.com.



1.4 JLUS Study Area

The GTS JLUS Study Area, as depicted on Figure 1-2, is designed to address all lands near GTS, where uses and activities may impact current or future military operations or where such uses and activities may be impacted by operations. GTS is located in south-central Nebraska and is divided on the borders of Adams and Clay counties.

The primary characteristics used to determine the extent of the study area included various compatibility factors such as heights of structures that may impact military helicopter flights, safety associated with live weapons firing, noise caused by weapons firing, and vibration from weapons firing and vehicle movement.

1.5 JLUS Organization

The following is a brief overview of the organization of the GTS JLUS, including the contents of the main JLUS Report and each of the chapters of the Background Report.

JLUS Report

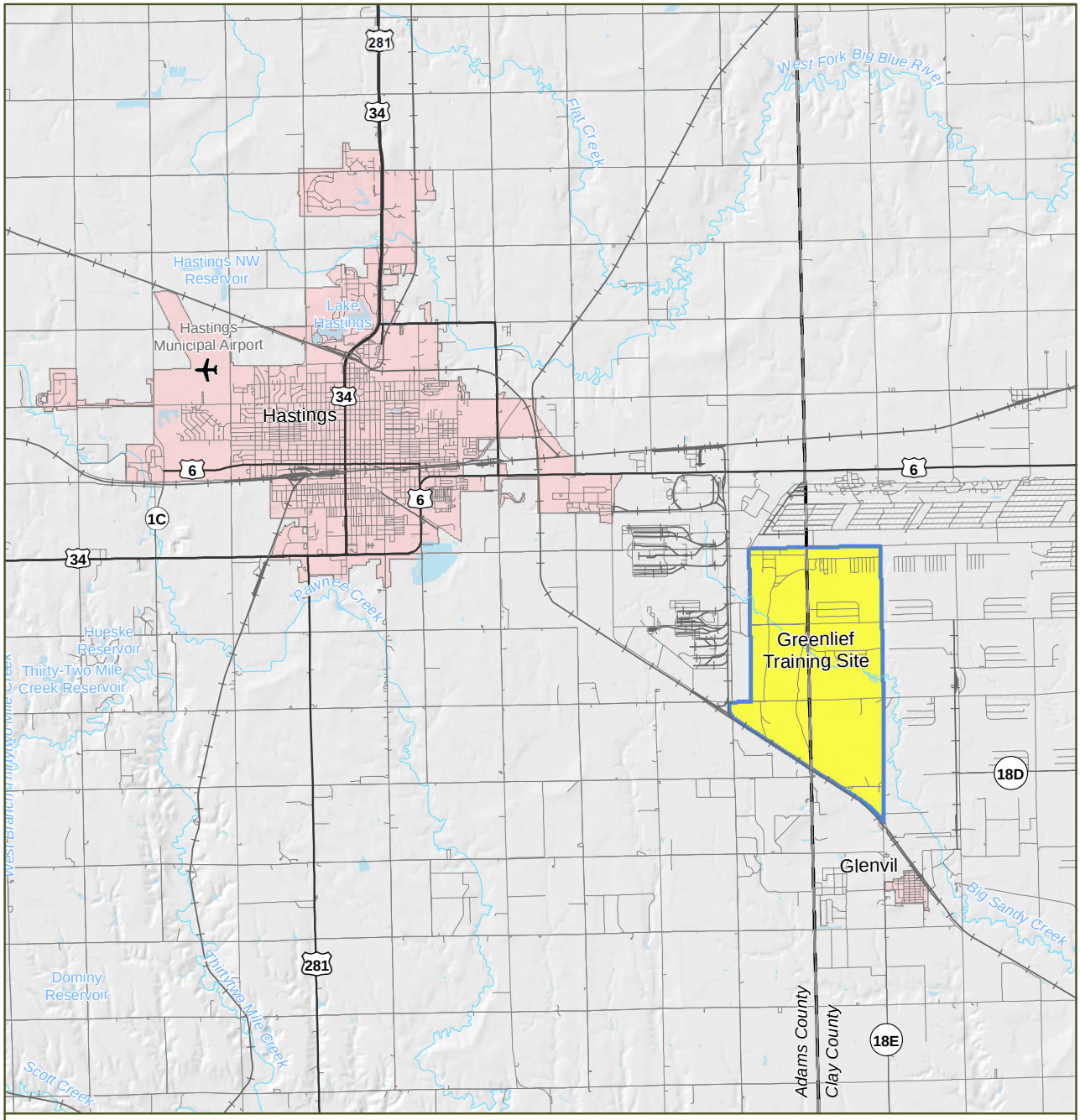
The JLUS Report documents the key issues and strategies identified in the GTS JLUS. The report provides a user-friendly reference of the JLUS accessible for all stakeholders. The report provides a brief discussion on the purpose and objectives of a JLUS, describes the overall benefit, and provides an overview of the various JLUS partners that assisted in developing the GTS JLUS. The report outlines the relevant compatibility issues accompanied by strategies identified in the JLUS and provides strategy summaries by jurisdiction.

Background Report

The JLUS Background Report is a detailed document that includes information about the communities within the study area, the military, the tools available to both the communities and military, and a compatibility assessment for all identified issues. This report is fairly voluminous and provides supporting and supplementary information to the JLUS Report. It is intended to serve as a reference tool to the JLUS Report.

Chapter 1: Introduction – Chapter 1 provides an introduction and overview of the GTS JLUS. This chapter describes the strategic and local importance of GTS, the working relationships among the entities, the background and intent of the JLUS, the study area, the objectives used to guide development of the JLUS, the stakeholders involved in developing the JLUS, public outreach methods, and the organization of the document.

Chapter 2: Community Profile – This chapter introduces the communities that are within the JLUS Study Area and gives an overview of their history and current statistics, including population, housing characteristics, economic outlook, and past, present, and future trends of growth and development. The chapter also provides an overview of the transportation system within the JLUS Study Area.



Legend

- Greenlief Training Site
- County Boundary
- City / Village
- Water Body
- River / Creek
- Federal Highway
- State Highway
- Local Road
- Railroad
- Hastings Municipal Airport

Source: Greenlief TS, 2014.

0 1 2 Miles

Figure 1-2

Greenlief Training Site JLUS Study Area

Chapter 3: Greenlief Training Site Profile – The military profile chapter describes the military activities that take place within the JLUS Study Area. This includes an overview of the military facilities, as well as the military operations that take place at GTS. A brief history of the installation and its economic impact on the surrounding communities are also provided. Chapter 3 also includes information on the military units and tenants that operate out of the base.

Chapter 4: Existing Compatibility Tools – This chapter provides an overview of relevant plans, programs, and studies that are, or could be, used as tools to address compatibility issues in the JLUS Study Area. The applicable tools are reviewed in order to set a baseline for the evaluation of the effectiveness of each plan or program relative to addressing compatibility issues, as identified and described in Chapter 5.

Chapter 5: Compatibility Assessment – Compatibility, in relation to military readiness, can be defined as the balance or compromise between community needs and interests and military needs and interests. In this chapter, the Background Report analyzes the compatibility issues identified for the GTS JLUS. These issues were identified based on input from the PC and WG, members of the public, existing plans and technical reports, and evaluation by the project team. This chapter categorizes the issues into the following 25 compatibility factors:

- Air Quality
- Anti-terrorism / Force Protection
- Biological Resources
- Climate Adaptation
- Coordination / Communication
- Cultural Resources
- Dust / Smoke / Steam
- Energy Development
- Frequency Spectrum Capacity
- Frequency Spectrum Impedance / Interference
- Housing Availability
- Infrastructure Extensions
- Land / Air / Sea Spaces
- Land Use
- Legislative Initiatives
- Light and Glare
- Marine Environments
- Noise
- Public Trespassing
- Roadway Capacity
- Safety Zones
- Scarce Natural Resources
- Vertical Obstructions
- Vibration
- Water Quality / Quantity

Greenlief TRAINING SITE
JOINT LAND USE STUDY

2 COMMUNITY PROFILE

Please see the next page.

2 COMMUNITY PROFILE

Inside Chapter 2 ...

This chapter provides an overview of the civilian communities within the Francis S. Greenlief Training Site (GTS) Joint Land Use Study (JLUS) Study Area. Profiles of community growth and development trends are provided in this chapter, as well as a description of the general setting of the JLUS Study Area.

Capturing and describing certain demographic characteristics of the participating JLUS communities can help to provide a baseline context from which informed decisions can be made when developing compatibility strategies. The goal is to provide information that enables stakeholders to gain an understanding of population and development trends that have the potential to affect the future of GTS. It is intended that this information, combined with other factors presented herein, help decision-makers develop consistent, informed planning policies about future development and economic growth of the communities they represent, before compatibility issues arise.

Furthermore, this chapter is designed to foster an understanding by the military about the types of activities occurring "outside the fence" when considering future missions and operations.

2.1 Regional Overview

The JLUS Study Area includes the nearby City of Hastings and Village of Glenvil and is separated by Adams and Clay counties in southern Nebraska. Figure 2.-1 illustrates the locations for all of the jurisdictions and the regional area for the GTS JLUS Study Area. The area consists mostly of agricultural flatlands.

Community Profiles

Adams County

Adams County Courthouse Annex

Adams County comprises 564 square miles within the south-central Nebraska. The largest city, and county seat, of Adams County is Hastings.

The county was named after the second US president, John Adams. Adams County was officially established in 1871, four years after the State of Nebraska was founded.

Municipalities in this county include; the City of Hastings and the villages of Kenesaw, Juniata, Roseland, Holstein, Ayr, and Prosser. Adams County is bordered by Hall County to the north, Hamilton County to the northeast, Clay County to the east, Webster County to the south, Franklin County to the southwest, Kearney County to the west, and Buffalo County to the northwest.

After the Civil War many settlers found Nebraska to be a destination for their families due to the incentives that followed the establishment of the Homestead Act of 1863 and the beginning development of the railroad. The government was able to sell land, loans, and low interest rates on property that was not needed for the railroads to settlers who were in need of cheap farm land. By selling these lands the government was able to continue financing the railroad operations. The railroad and agriculture stimulated development within the rural areas of Adams County, and to this day continue to be an economic driver for the state of Nebraska.

Six months after Pearl Harbor, Adams County and the City of Hastings were notified of the establishment of a Naval Ammunition Depot (NAD) being placed southeast of Hastings. The depot soon became a top economic driver for the county, where almost anyone who applied was hired. The Blaine NAD was one of four such facilities in the country and was the largest. It occupied more than 48,000 acres of land in Adams and Clay counties that was purchased from over 230 landowners in the area. The location was chosen for several reasons – it was centrally located within the country, away from the western and eastern seaboards to protect it from foreign attacks, several railroads connected through Hastings to provide easy rail access for transporting supplies and munitions, and there was an abundance of electricity supplied by the Tri-County irrigation project.

Once WWII had ended, the depot's use declined. It saw a small surge in use during the Korean Conflict in the 1950s, but was officially closed in 1966, bringing Hastings' last population growth period to an end. After the Blaine NAD was closed, its lands were given to other entities or sold. The administrative complex and buildings were converted into Central Community College, some of the land was used for the US Meat Animal Research Center, some was sold and used for agricultural or industrial, and a portion is used as Greenlief Training Site.

Today, Adams County is mostly rural and much of the land is used for agriculture and industrial.

Adams County utilizes a Board of Supervisors form of government. The job of the Board of Supervisors calls for hands-on service delivery as well as policy-making and budget decisions. The Election Supervisor is also responsible for maintaining all voter registration records and conducting all primary, general, and special elections.

City of Hastings

Downtown Hastings

The City of Hastings is situated in the northern portion of Adams County. At 13.66 square miles in area, Hastings is approximately 100 miles due west of the state capital of Lincoln and accessible via Interstate 80 / US Highway 281.

The City of Hastings was platted in 1872, and became the county seat for Adams County after only six years. The city was named after Colonel D. T. Hastings of the St. Joseph and Denver City Railroad, who was a key contributor in constructing the railroad through Hastings and Adams County. Hastings was established by the railroad as a hub for its new rail line and it grew quickly. In the 1870s, there was a large population of European settlers coming to Nebraska with assurance of work in the pronounced amount of railroad development going on at the time. As a result, within the next decade, the population in Hastings grew by 2,800, establishing itself as a boomtown. Hastings continued to grow rapidly when several other railroad lines chose to pass through it. Hastings became the third largest city in Nebraska and had an estimated population of 19,000 by 1920.

Over the years, Hastings' population began to decline. Then, in 1942, the construction of the Blaine NAD led to a new period of growth for Hastings. The ammunition depot was established to meet the demand of World War II. The population of Hastings grew from roughly 15,000 in May 1942 to more than 23,000 in December 1943 after the depot was opened, resulting in a critical housing shortage. This prompted both adjustment of existing housing stock and rapid construction of new neighborhoods. The Blaine NAD declined in use after World War II and eventually closed in 1966.

In the years following the closure of the Blaine NAD, the city is still the primary population center of Adams County. Today, the economy of Hastings is driven by agriculture, industry, and retail. On June 24, 2007, Hastings was awarded the title of "Greenest City in America" by Yahoo.

The City of Hastings operates under a Council-Manager form of government. This system combines the political leadership of elected officials, in the form of a City Council, with the managerial experience of an appointed City Manager. The Council-Manager form of government establishes a representative system where all power is concentrated in the elected Council and the Council hires a professionally trained manager to oversee the delivery of public services. The City of Hastings has a Mayor and eight-member City Council elected in non-partisan elections. Their terms of service are for four years.

Clay County

Clay County Courthouse

Clay County covers 573 square miles directly East of Adams County. The county seat of Clay County is the City of Clay Center.

Clay County was named after a Kentucky statesperson, Henry Clay, who was an American lawyer, politician, and orator that represented Kentucky in both the United States Senate and House of Representatives. Clay County was originally located to the west of Pierce County in 1855, in the southeastern part of Nebraska, bordering the Missouri River.

After the territorial laws were ratified on February 15, 1864, Clay County was relocated in-between Lancaster County, to the north, and Gage County, to the south. Clay County was finally assigned to its present location after the Legislature of the Territory of Nebraska on February 16, 1867.

The county was originally divided into three precincts, determined from the commissioners' proceedings held in Sutton, the county seat at the time, on November 4, 1871. Those three precincts were School Creek, which encompassed the eastern half of the county, Harvard, the northwestern quarter, and Little Blue, the southwestern quarter.

On March 1, 1875, the county was divided into the 16 townships, each consisting of 36 sections of land, as are seen today.

Clay County utilizes a Commissioners' Court form of government. The job of the County Commissioners calls for hands-on service delivery as well as policy-making budget decisions. The Election Commissioner is also responsible for maintaining all voter registration records and conduction all primary, general and special elections.

This County Commissioners office works in conjunction with the Nebraska Secretary of State's office to ensure compliance with all state and federal election guidelines.

Village of Glenvil

Glenvil Water Tower

The Village of Glenvil is located in the western portion of Clay County and covers 0.17 square miles in area. It is considered a part of the Hastings Micropolitan Statistical Area; an area defined by the United States Census Bureau consisting of both communities in Adams County and Clay County.

The Village of Glenvil was founded in 1873. It was established when the St. Joseph and Denver City Railroad reached to this point.

2.2 Study Area Growth Trends

The following section provides a profile of the Nebraska component of the Study Area's population growth, housing growth, and median home values. This information assists in setting the regional context and growth potential for the JLUS.

Population

The population information used is based on 2000 and 2010 US Census data, in addition to the 2007-2011 American Community Survey. Population projections show the overall trends in population change in the area and assist policy makers in making informed decisions based on these prevailing tendencies. The following information provides an overview of the changes in population in the GTS JLUS Study Area in the 10 year period from 2000 to 2010.

Between 2000 and 2010, the State of Nebraska experienced a minimal population increase, which is expected to remain steady for the foreseeable future.

The communities in the JLUS Study Area grew at a much smaller rate than Nebraska overall, some even showing a decline in population. Table 2-1 shows the population changes in Adams County, Clay County, the City of Hastings, and Village of Glenvil compared with the State of Nebraska from 2000 to 2010.

Population-wise, Adams County had the largest population in 2010 with 31,364 people, of which the City of Hastings accounted for 24,907 of the people. Hastings experienced a greater increase in percentage growth in population than the county as a whole from 2000 to 2010, with an increase of 2.32 percent compared to the county's 0.68 percent. Both of these were much lower than the State of Nebraska's total growth, which was almost three times that of Hastings.

Table 2-1. Adams County Population, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
Nebraska	1,711,263	1,826,341	115,078	6.72%
Adams County	31,151	31,364	213	0.68%
City of Hastings	24,343	24,907	564	2.32%
Clay County	7,039	6,542	-497	-7.06%
Village of Glenvil	332	310	-22	-6.63%

Sources: 2000 - 2010 US Census

As Table 2-1 shows, both Clay County and the Village of Glenvil experienced decreases in population from 2000 to 2010. Clay County's total population in 2010 was 6,542, which was a 7.06 percent decrease from the year 2000. Similarly, the Village of Glenvil's total population in 2010 was 310, which was a 6.63 percent decrease from the year 2000. The two jurisdictions experience fluctuations in population due to the agricultural land uses, which generally do not contain the same population densities as experienced in the City of Hastings or Adams County.

Figure 2-1 illustrates the population densities in the JLUS Study Area in 2000 and Figure 2-2 illustrates the densities in 2010. As these figures indicate, there has not been much of a change in population densities. The population densities have shifted somewhat within the City of Hastings, but there was not a noticeable increase in any areas of additional densities.

Future Population Projections

It is also important to assess projected population increases to predict future growth. The US Census Bureau population projections for Nebraska and Adams and Clay counties through the year 2030 are shown in Table 2-2.

Adams County is expected to see an increase in population growth over the coming decades and reach an approximate population of 36,821 by the year 2030, a 17 percent increase from the year 2010. Clay County is expected to reach an approximate population of 5,966 by the year 2030, a nine percent decrease from the year 2010.

In the last nine years, Clay County has been experiencing an out-migration pattern. Due to this natural decrease the county population is expected to continue to decline.

Table 2-2. Forecasted Growth Trends for Adams and Clay County

Jurisdiction	2010	2020	2030
Nebraska	1,826,341	1,892,011	2,154,780
Adams County	31,364	35,521	36,821
Clay County	6,542	6,326	5,966

Source: University of Nebraska, Bureau of Business Research, Nebraska County Population Projections, 2009; http://www.ccpe.state.ne.us/publicdoc/ccpe/reports/LR174/baseline/pdf/volume1/appendix3.PDF

Housing Trends

Housing trends are an important indicator of economic activity and vitality, as they demonstrate the population growth or decline relative to new residential construction within an area. They also represent market decisions relative to home ownership versus rental properties. Ultimately, housing trends potentially indicate future development and the types of residential and commercial development to come. The following information portrays the housing market trend and median monthly gross rents, and median home values within the JLUS Study Area.

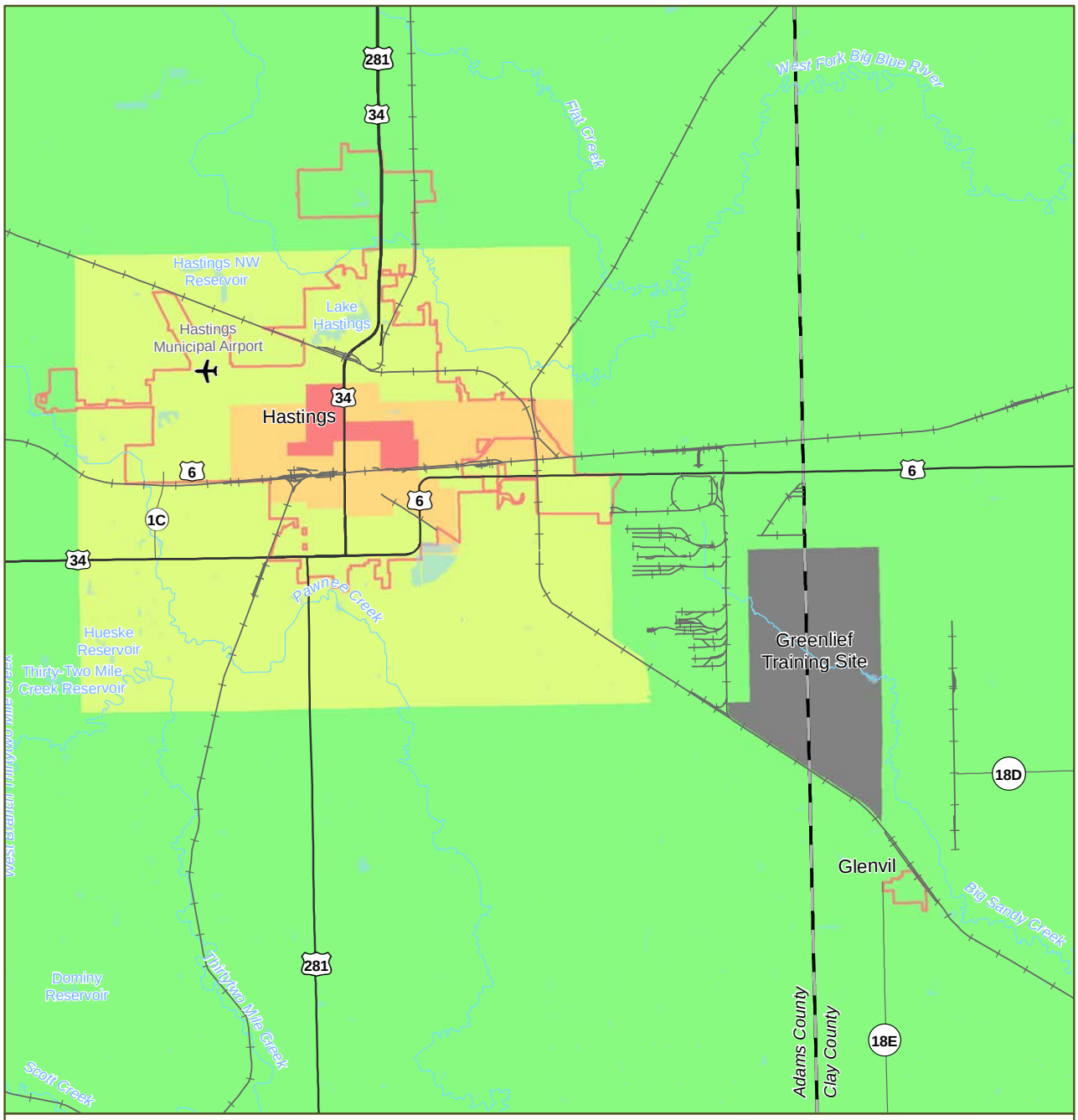


Figure 2-1
JLUS Study Area Population Density, 2000

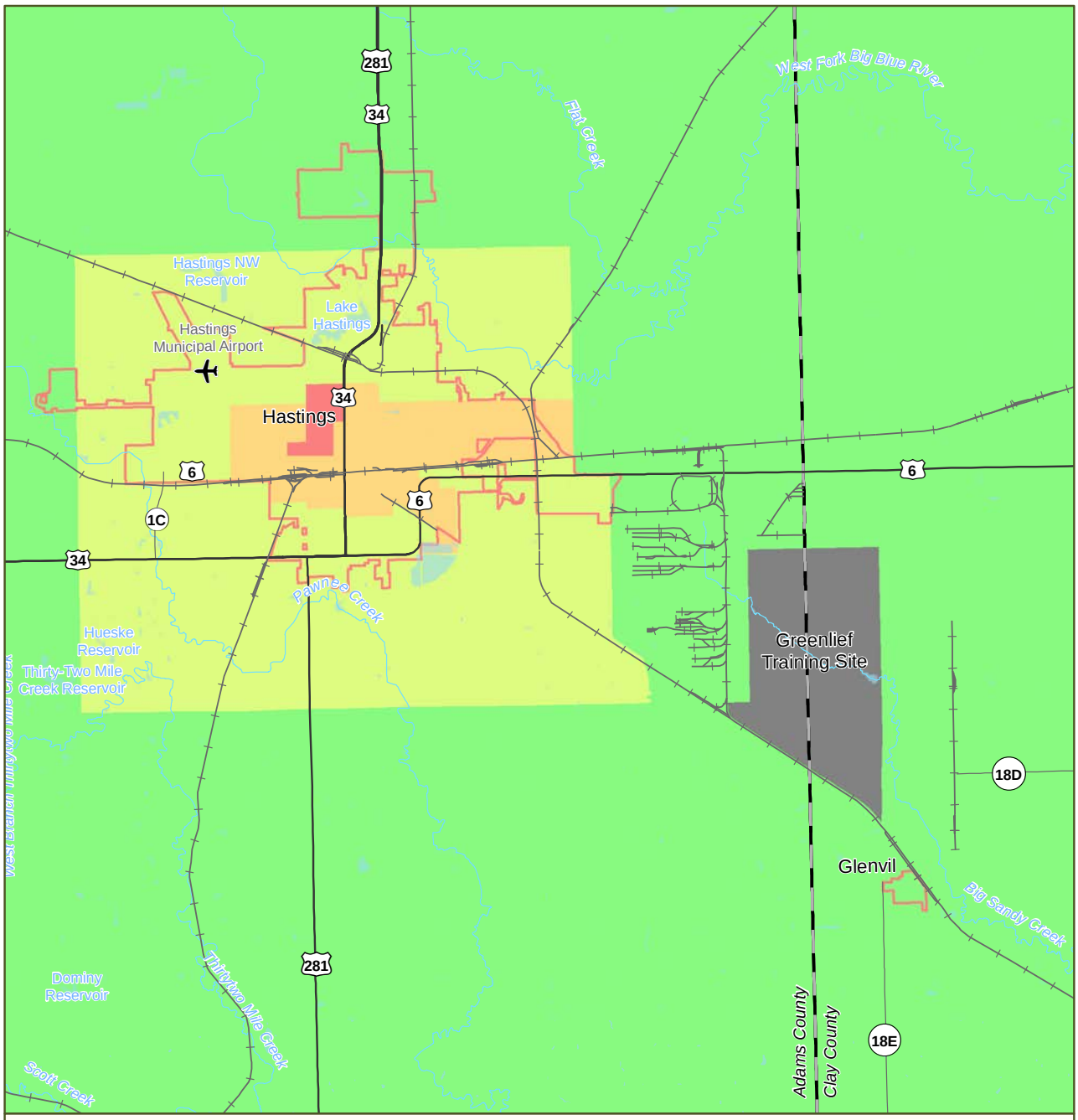


Figure 2-2
JLUS Study Area Population Density, 2010

Table 2-3 shows the change in median monthly gross rents in the Study Area from 2000 to 2010.

Table 2-3. Median Monthly Gross Rent in Surrounding Jurisdictions

Jurisdiction	2000	2010	Dollar Change	Percentage Change
Nebraska	$412	$669	$257	62.40%
Adams County	$445	$583	$138	31.01%
City of Hastings	$446	$607	$161	36.11%
Clay County	$363	$473	$110	30.30%

Source: US Census Bureau, Median Gross Rent (Dollars) 2000

Each jurisdiction in the Study Area experienced an increase in median monthly gross rent prices between the years 2000 to 2010. The City of Hastings experienced the largest median monthly gross rent increase of $607 in the year 2010, a 36 percent increase from the year 2000. In the year 2010, Adams County had a median monthly gross rent of $583, and Clay County of $473. The counties experienced similar percentage increases of 31 to 30 percent from the years 2000 to 2010.

Housing Value Trends

Housing value trends assist in illustrating the changes in land and home values relative to market fluctuations. These fluctuations can be indicative of development activity or inactivity as well as the location or migration patterns of populations. Table 2-4 reports the median housing value trends in the Study Area from 2000 to 2010.

Table 2-4. Median Housing Values, 2000-2010

Jurisdiction	2000	2010	Dollar Change	Percentage Change
Nebraska	$88,000	$127,600	$39,600	45%
Adams County	$77,200	$95,000	$17,800	23.06%
City of Hastings	$74,900	$92,700	$17,800	23.77%
Clay County	$50,900	$73,700	$22,800	44.79%

Source: US Census Bureau

From the year 2000 to 2010, Nebraska experienced a 45 percent increase in median housing values, totaling $127,600 in the year 2010. Adams County and the City of Hastings, both saw more than a 23 percent increase, although the increase was not sudden.

There are no available housing units on GTS to accommodate military personnel. There are, however, on-base barracks for weekend operations.

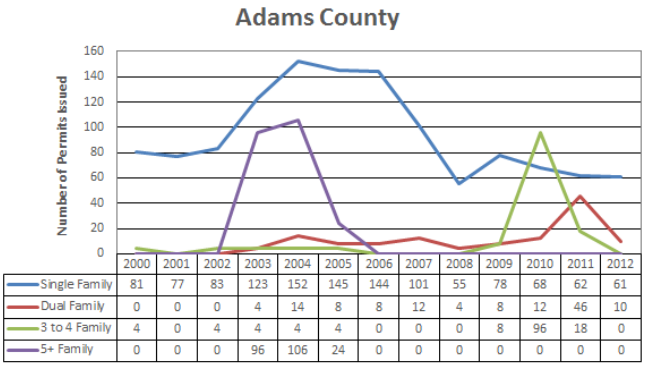
Building Permits

An analysis of the number of building permits issued can be a good indicator of the growth of a community. Between 2000 and 2012, a total of 1,356 single-family unit building permits were issued within Adams and Clay County. This development peaked in 2004 and 2005 and then declined for the next several years, following the national housing recession. Among all types of housing unit permits issued in Adams and Clay County between 2000 and 2012, the majority were issued within Adams County.

Clay County did not record any multifamily housing unit permits from 2000 to 2012. Within Adams County, permits were issued for 126 duplex units during the same timeframe. For three to four family units, a total of 142 units were permitted between 2000 and 2012 with a temporary increase in 2010. For five or more family units, a total of 226 units were permitted between 2003 and 2005.

Figures 2-3 and 2-4 illustrate the trend of housing unit permits that were approved in the counties from 2000 to 2012. These numbers reflect the number of units that received permits, and not necessarily the number of buildings.

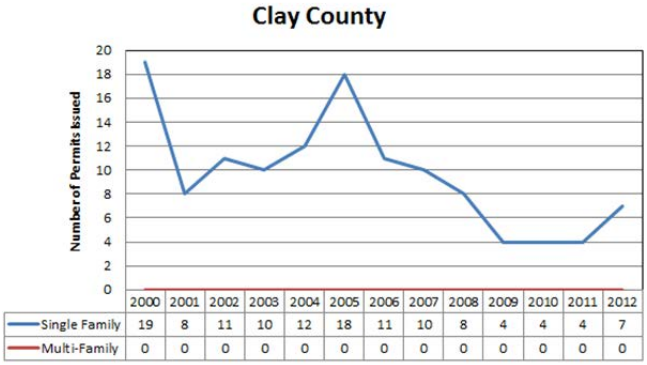
Figure 2-3. Housing Unit Permits in Adams County, 2000-2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Single Family	81	77	83	123	152	145	144	101	55	78	68	62	61
Dual Family	0	0	0	4	14	8	8	12	4	8	12	46	10
3 to 4 Family	4	0	4	4	4	4	0	0	0	8	96	18	0
5+ Family	0	0	0	96	106	24	0	0	0	0	0	0	0

Source: US Census Bureau - http://censtats.census.gov/bldg/bldgprmt.shtml

Figure 2-4. Housing Unit Permits in Clay County, 2000 – 2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Single Family	19	8	11	10	12	18	11	10	8	4	4	4	7
Multi-Family	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: US Census Bureau - http://censtats.census.gov/bldg/bldgprmt.shtml

Economy

The regional economy within the JLUS Study Area is based primarily in agriculture, manufacturing, wholesale and retail trade, educational services, health care and social assistance, and food services.

Source: US Census Bureau, QWI Online, 2012 First Quarter Estimates

Adams County

Adams County's 2013 top workforce sectors include education and health services, manufacturing and construction, and warehousing, transportation, and utilities.

Source: NE Workforce Development, 2013 Workforce Summary average

City of Hastings

To boost the growth in the industrial sector, Hastings Utilities has dedicated up to $5.5 million in incentive funding to provide support for development projects throughout the City. The Hastings Economic Development Corporation (HEDC) hopes to capture some of this funding by supporting individuals efforts to develop new business. Within the 50 mile area, HEDC helps bring new businesses and industry to the area, employing approximately 100,000 citizens. With major employers including Dutton Lainson and Thermo King, manufacturing employment levels double than that of the national average.

Source: NE Workforce Development, 2013 Workforce Summary average

Clay County

Clay County's agricultural and livestock productions are two important economic drivers for county with over $159 million products sold in 2002. In the year 2006, 67 percent of the county's employment comprised of the livestock industry.

Source: Economic Importance of Economic Impacts Associated with Livestock Production in Clay County, 2008

Village of Glenvil

The top work force sectors for the Village of Glenvil from the years 2008 to 2012 consist of agricultural, manufacturing, retail, and construction. With the most common occupations in production, farming and labor, Glenvil depends on agriculture to sustain an economic balance within the village.

Source: http://www.city-data.com/city/Glenvil-Nebraska.html

2.3 Current Development Overview within the Study Area

Land uses throughout the JLUS Study Area range from open space and agriculture to the residential and urban population centers of Adams and Clay County, with varying sizes of employment and population levels throughout.

The area surrounding GTS is a mix of agriculture, rural residential, and open space uses. Urban development exists primarily northwest of the installation in the city of Hastings.

North

Mostly made up of open space, the north end of the site consists primarily of privately owned land, a large portion of which dedicated to the production and raising of livestock.

East

Roughly five miles east of the installation is the Meat Animal Research Center, which is owned land by the Department of Agriculture.

South

Along with agricultural and local dairy production, to the south runs the Union Pacific Rail Line which neighbors the Village of Glenvil.

West

The area outside the western boundary of GTS is characterized by light industry, agricultural, and private uses such as the Blick's Fertilizer Plant and the Four Rivers Sportsman's Club.

2.4 Transportation

This section provides a brief summary of the transportation network, while Figure 2-5 illustrates the transportation network within the Study Area. Accessibility poses a limiting factor to development throughout much of the JLUS Study Area.
US Highway 6 is located north of GTS, running parallel to the site border. Directly adjacent to the northern border is County Road (CR) 73. This road provides access to the north end facilities and connects to the installations headquarters.

To the east of the installation are networks of gravel and off road trails. CR 71 runs through GTS in an east/west direction but is not available to the public.

The City of Hastings is approximately 14 miles south of the I-80, and is served by numerous major highways. In addition to US Highway 6, US Highway 34 runs east to west, and US Highway 281 runs north to south. Burlington Avenue which is the main street in Hastings runs from south to north, leading to the US Highway 281.

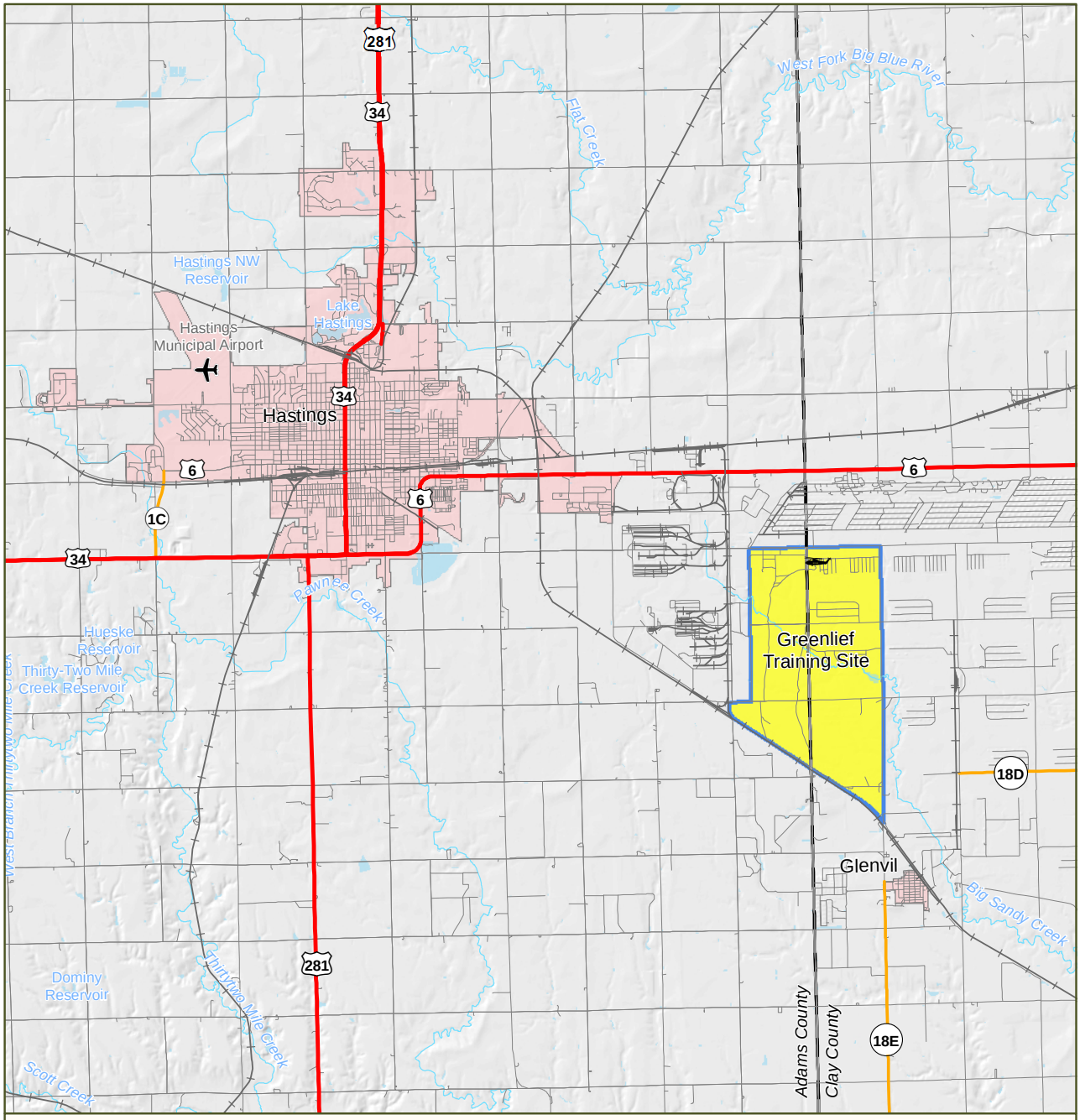
Highway 34 runs through Iowa, east of Plattsmouth between Hastings, before overlapping with US Highway 6. Within Hastings, US Highway 34, and US Highway 6 intersect the US Highway 281. Here US Highway 34 heads north with US Highway 281. Both highways follow a divided highway north to Grand Island where they intersect with I-80. Mostly local traffic takes the I-80 from Grand Island to Lincoln since it has higher speed corridors.

Rail

The National Railroad Passenger Corporation, referred to as Amtrak, provides east to west rail service routes from Hastings to Denver and Omaha. This rail line also hosts the Burlington Northern commercial rail service which runs approximately one and a half miles north of GTS. Commercial rail service is also provided by the Union Pacific Railroad which is the area's primary freight rail provider. Their route runs directly adjacent of the south end of GTS.

In addition, Burlington Northern Rail, another large freight railroad network, also services the City of Hastings.

Burlington Station, Amtrak and train station in Hastings



Legend

- Hastings Municipal Airport
- Greenlief Training Site Helipad
- Federal Highway
- State Highway
- Local Road
- Railroad
- Greenlief Training Site
- County Boundary
- City / Village
- Water Body
- River / Creek

Sources: Greenlief TS, 2014; National Transportation Atlas, 2014.

0 1 2 Miles

Figure 2-5
JLUS Study Area Transportation

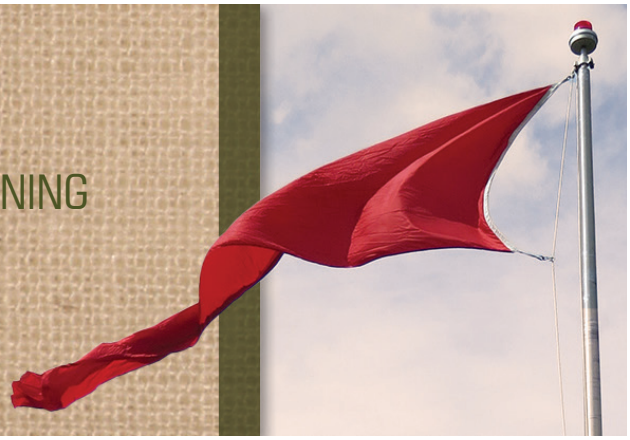
Air

Hastings Municipal Airport is located at 12th street, in between Marian Road and Highland Road. The airport has two runways; the main runway stretches 6,451 feet long and the second, 4,501 feet. Areas adjacent to each runway consist of open space.

Hasting Municipal Airport hangar

Greenlief TRAINING SITE
JOINT LAND USE STUDY

3 GREENLIEF TRAINING SITE PROFILE



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3 GREENLIEF TRAINING SITE PROFILE

Inside Chapter 3 ...

Greenlief Armed Forces Readiness Center

This chapter provides an overview of Greenlief Training Site (GTS) and its military profile including its history and current operation, location and setting in Adams and Clay counties, its economic and strategic importance and the military footprint that it has based on training operations.

Identifying and describing the various activities performed on the military installation provides valuable insight into the importance of GTS as a national strategic asset. This information enables stakeholders to make informed decisions about the future development and economic growth of communities and institutions surrounding to GTS, which could potentially impact the existence and future role of the installation.

This chapter describes GTS and the operations that take place and their importance to the Nebraska National Guard and the State of Nebraska. This discussion includes an overview the Nebraska Army National Guard, a brief history of GTS, its economic benefit on the local communities, the setting of the installation and surrounding region, and the operations that take place on the land.

3.1. Nebraska Army National Guard

The Nebraska Army National Guard (NEARNG) maintains three training sites in the State of Nebraska, one of which is Greenlief Training Site. NEARNG has both a federal and state mission. The federal mission is to maintain properly trained and equipped units available for prompt mobilization for war, national emergencies, or as otherwise needed. If and when necessary, the President of the United States has the authority to mobilize the NEARNG in support of its federal mission. The state mission is to protect the public safety of the citizens of Nebraska by providing military support to civil authorities during natural disasters, civil unrest, and other emergencies. The Governor is responsible for mobilizing NEARNG personnel to respond to the state mission as needed. This action is done through coordination with the Adjutant General, who is in charge of the NEARNG. The NEARNG also supports several programs at the community level.

NEARNG Soldiers and Airmen train year-round in preparation for any mission, foreign or domestic. This dual mission role is an important difference with the National Guard relative to active Army or Air Force units. While NEARNG and active military units share similar training and engagement responsibilities as a military force, the defining characteristic of the National Guard is its domestic response mission in times of need. For response to natural disasters, wildfires, civil distress, or other state emergencies, the NEARNG is the state's first responders for providing assistance to the people of Nebraska.

3.2. Greenlief Training Site History

In 1942 the Blaine Naval Ammunition Depot (NAD) was established outside Hastings, Nebraska to store large quantities of ammunition, based on President Roosevelt's concern for the US involvement in future wars. The Blaine NAD was the largest ammunition depot in the US during World War II and was one of two important storage, shipment centers, and manufacturing facilities for the Navy. The site was chosen because of its proximity to three surrounding railroads, and distance from the coasts, making it far enough inland to protect the site from Japanese or German bombs. The benefits of the site's geography allowed for simple design plans and engineering, which saved money and time.

The Blaine NAD underwent a $20 million expansion in 1950, but was shut down in 1958 after war activities came to an end. In 1964, large parcels of land were sold to various businesses, individuals, and other agencies. The US Department of Agriculture purchased approximately 35,000 acres to develop the US Meat Animal Research Center. Over 6,000 acres located in the western region of the former NAD was developed into the Central Community College. In August 1966 the Department of the Army received 3,000 acres to establish Hastings Training Site that has served as the primary range and armor training site for the NEARNG since.

Lt. General Francis S. Greenlief

In September 2000, the NEARNG renamed Hastings Training Site Francis S. Greenlief National Guard Training Site after Lt. General Francis S. Greenlief, a World War II veteran and former National Guard bureau chief.

3.3. Regional Economic Benefit

The GTS Joint Land Use Study (JLUS) area encompasses the counties of Adams and Clay, the City of Hastings, and Village of Glenvil in central Nebraska. Though agriculture is a primary contributor to the Nebraska economy, the Department of Defense (DOD) maintains a significant economic footprint in the regional and local economies.

In fiscal year 2014, the NEARNG provided a total gross payroll of $88,080,228 to personnel in Nebraska, with an additional $36,271,421 paid in benefits and incentives. The NEARNG also created an estimated 902 indirect jobs through contractors and other types of employment, which added an estimated $36,198,487 in additional economic benefit.

In total, these three categories combined account for a statewide economic benefit from the NEARNG of $160,550,136.

Source: 2014 Nebraska Military Department Annual Report

Installation Economic Benefit

Since GTS is a National Guard training site and does not have a large personnel workforce permanently stationed there, it is more difficult to accurately identify the economic benefit the installation provides in terms of dollars. In fiscal year 2014, approximately $650,000 were spent on maintenance and repair of GTS's ranges and facilities, of which around $510,000 was paid to local vendors within a 50-mile radius. Additionally, troops that train at GTS pass through areas such as Hastings and purchase food and other supplies. In terms of annual payroll, in fiscal year 2014, $815,839 was paid to personnel in or near Hastings.

Source: Greenlief Training Site and NEARNG, 2014; 2014 Nebraska Military Department Annual Report

3.4. Installation Setting

GTS covers 3,279 acres and is located at 6700 East J Street, just south of Highway 6 within south-central Nebraska. It is approximately seven miles southeast of downtown Hastings, and is located partially in both Adams and Clay counties. Figure 3-2 provides an overview of GTS's installation and facilities.

To the south, the site is bordered by the Union Pacific Rail Line, which runs northwest to southeast. The Village of Glenvil sits next to the rail line south of the installation. Bordering to the west is the Blick's fertilizer plant and to the east is the US Meat Animal Research Center. North of GTS is partially used for farm storage by the Hastings Pork Producers facility and other parts of the area used for placing excess storage bunkers. The land use surrounding the bunkers on the east is mainly dedicated to agriculture.

In relation to other military facilities, GTS is approximately 127 miles southwest of Camp Ashland Training Site and 138 miles southwest of Camp Ashland - Mead Training Site.

This region of Nebraska is characterized by moderate year to year temperatures with light rainfalls and low humidity. Nebraska weather is impacted from all sides, warm air from the Gulf of Mexico, Arid desert air from the Southwest, and cool air from the Pacific Ocean and Canada. With the mixture of hot and cold, tornados have been recorded to pass through Nebraska on average 10 times per year.

Cantonment Area

The GTS cantonment area consists of 126 acres located in the north-central section of the site. The area includes barracks, and facilities such as dining, administrative, maintenance, and training support structures. There is also one helicopter pad used for visiting personnel.

Greenlief Training Site cantonment area

Training Areas

Facilities on GTS allow for units to train on the range and since the terrain is relatively flat and surrounded by grassland and trees, it is an ideal training location. Numerous training activities are supported on GTS. The largest training zone is divided into training areas, the range, training fields, and a theatre specific.

Facilities located on the range include, storage buildings, observation towers, replica training villages, shelters, firing stations and their supportive structures.

GTS has numerous training areas ranging from 347 acres to 724 acres. Figure 3-3 shows a breakdown of each of the six training areas at the installation. All training fields are located down range from the shooting stations acting as a buffer between firing activities and other facilities. Approximately 93 percent of the land on GTS is grassland.

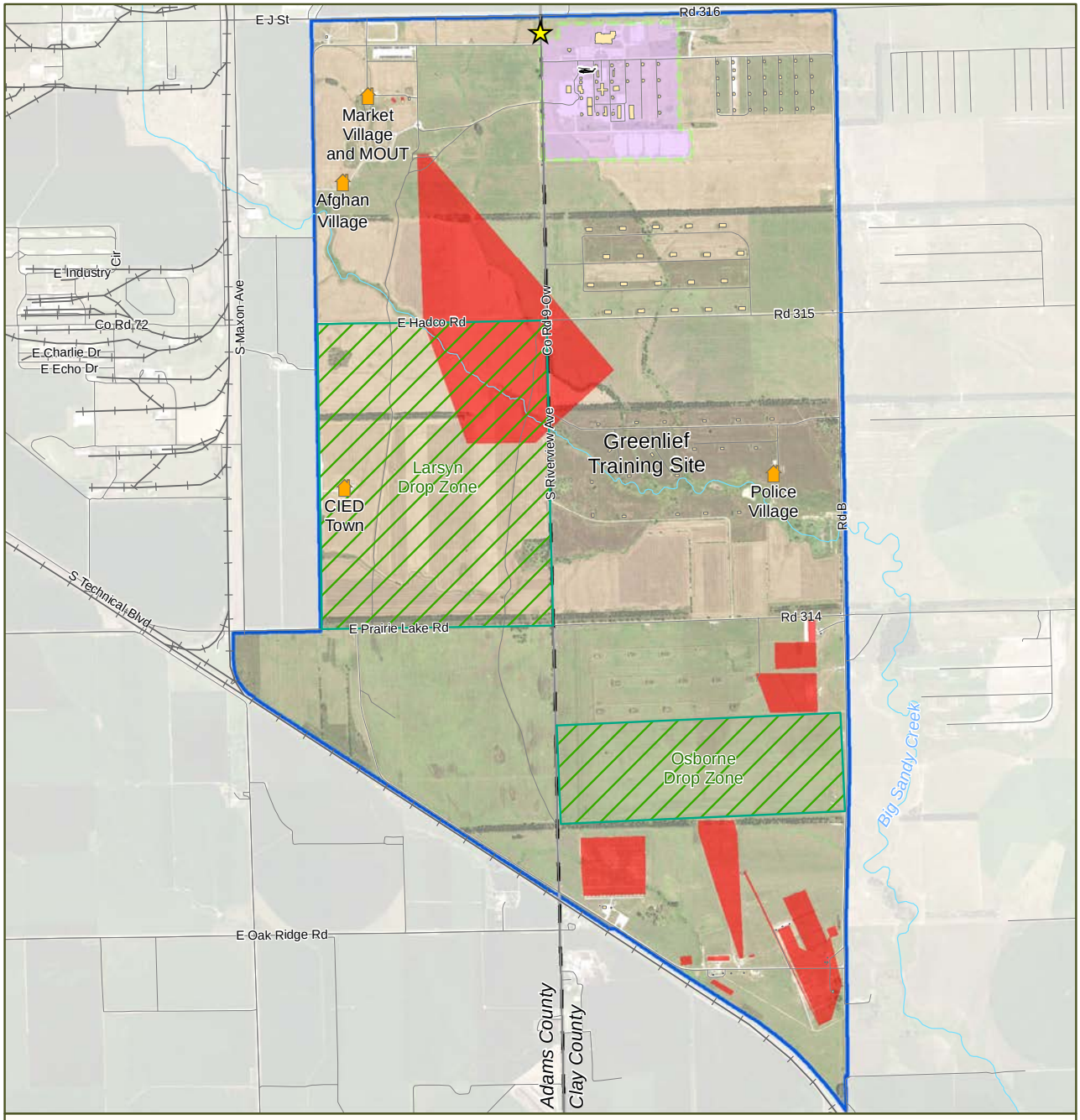


Figure 3-2
Greenlief Training Site Installation Setting

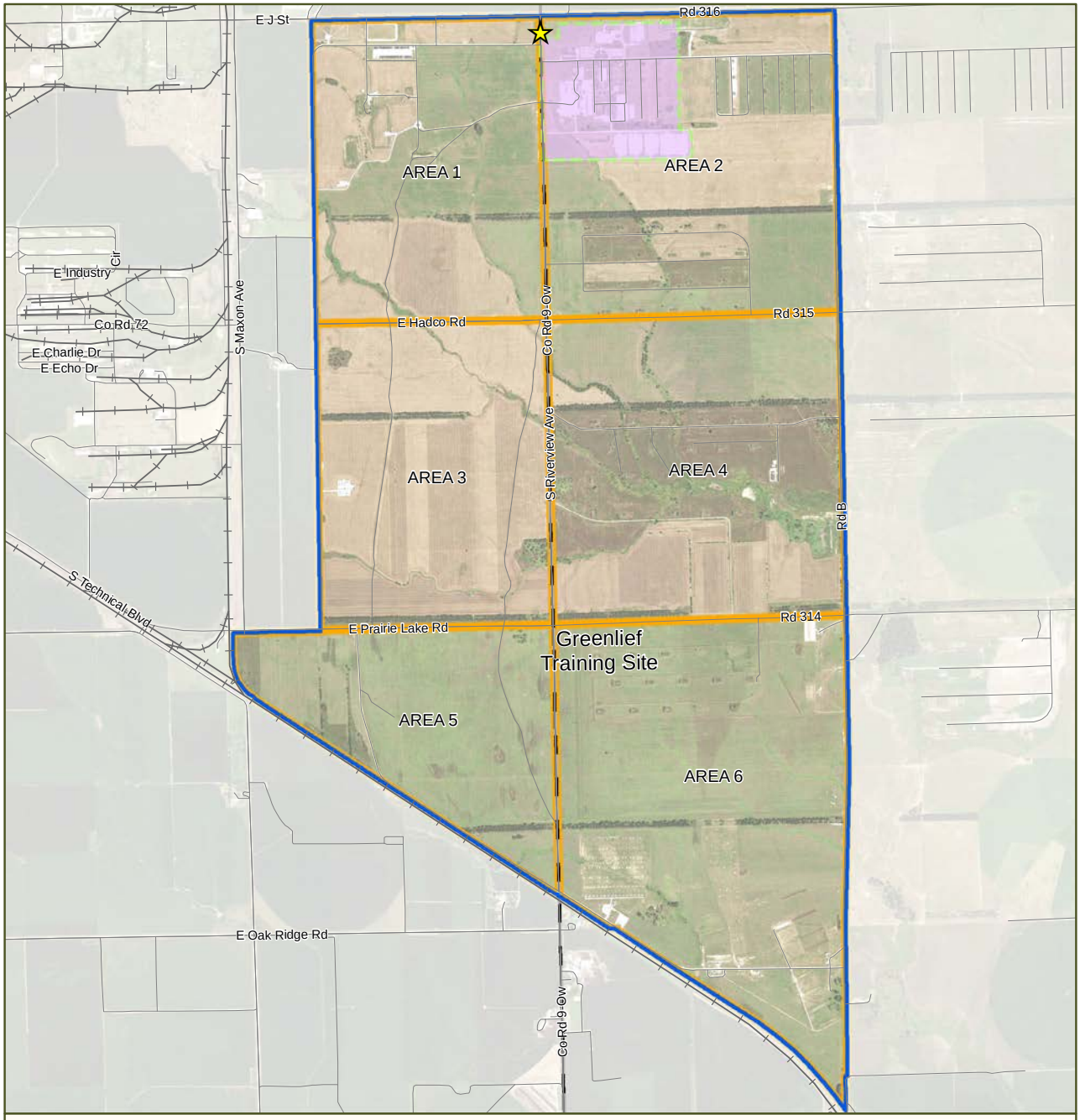


Figure 3-3
Greenlief Training Site Training Areas

A contract is in place with a private entity to hay the vegetation that grows. This reduces land maintenance costs and provides income for NEARNG. Additionally, when the fields are leased it provides GTS a larger area for vehicular training activities. GTS also has over 197 acres of forest areas allowing for different land training to be available to the units.

There are two non-live fire training ranges at GTS, including a Military Operations in Urban Terrain (MOUT) Urban Assault Course (UAC) and a Land Navigation Course. The MOUT UAC course trains military personnel on operational tasks within an urban area. The Land Navigation Course provides units at GTS navigational training for map reading activities and includes 12 starting points.

Source: GTS Installation Design Guide, 2013; Final INRMP, 2001 September

Part of the MOUT UAC course at Greenlief Training Site

Weapons Firing Ranges

GTS has a variety of weapons firing training ranges. The following provides an overview of the current activities that occur on GTS ranges:

- Combat/Competition Pistol and Shotgun Training
- Zeroing weapon sights and accuracy
- Army-standard individual weapons qualification with M16 and M4 rifles
- Training and qualifications range with stationary targets set at a specific distance away from the firing point to measure accuracy

Weapons firing range and pop-up target at Greenlief Training Site

Table 3-1 describes the ranges at GTS and the type of weapons that are fired at each.

Table 3-1. Greenlief Training Site Firing Ranges

Range Area	Training Range Type	Operations
H-1	Known Distance Range	Use: weapons testing/familiarization with moving targets 4 firing lanes, 24 firing points
H-2	M203 Grenade Launcher Range	Use: grenade launcher qualification/familiarization 2 range facility, 4 firing points
H-3	Field Fire Range (closed)	20 firing points
H-4	Pistol Range (alternative)	30 firing points (semi-active)
H-5	Submachine Range M3A1 (closed)	15 firing points
H-6	M60 MG Transition Range	Use: machine gun qualification/familiarization 3 firing points
H-7	Shotgun Range	Use: police shotgun training/qualification 2 firing lanes, 13/10 firing points
H-9	AT4 LAW Range	Use: LAW / AT4 training/qualification 8 firing points
H-10	M72 LAW Range	Use: LAW / M72 training/qualification 10 firing points
H-11	Practice Hand Grenade Range	Use: hand grenade qualification/familiarization 6 firing points
H-13	Night Fire Range (closed)	15 firing points
H-14	M2 .50 Cal SRPA Range (10m)	5 firing points
H-16	Basic 25 Meter Range (Zero)	Use: weapons zeroing exercise, modified C record qualification 24/48 Firing Points
H-17	Machine Gun 10 Meter Range	Use: machine gun qualification/familiarization 1 lane each,3/5 firing points for 10m range
H-18	Helicopter MOC Test Fire Range	1 firing points
H-19	Pistol Competition Range	10 firing points
H-20	Combat Pistol Range (closed)	Use: combat pistol qualification/classrooms 8 firing points
	Multipurpose Record Fire Range	16 firing points

Source: Final Integrated Natural Resource Management Plan, 2001
Source: NE ARNG Range and Training Facilities, 2011

3.5. Current Military Operations

The primary mission of GTS is to:

> *"Provide the protection of the property, and preservation of life, peace, order and public safety."*

As a National Guard Facility, GTS is committed to both state and federal missions and provides highly trained and equipped personnel and units to be made available at times of war or during a state of emergency. It serves as the primary training site for the NEARNG and offers open training lands and a variety of firing ranges. The assets and training options available at GTS include physical training courses, a wide array of weapons firing ranges, a simulated forward operating base, a MOUT site, navigational courses, and aerial drop zones.

The mission of Greenlief focuses on training and skills proficiency testing for various combat target ranges. The range serves supports a variety of training requirements including land navigation and qualification courses, specialized training opportunities and classroom facilities for weapons training.

While GTS throughput numbers vary depending on certain factors including training needs and budgets, GTS throughput averaged 32,121 troops annually for the three years from July 1, 2012 to June 30, 2015. However, the 2014 GTS throughput from January to December was 27, 274.

Source: NEARNG, July 2015

On occasion, helicopter operations at Greenlief include air-to-ground drop zones, low-level and nap-of-the-earth flying, insertion and extraction, hovering, traffic patterns and external load operations. National Guard members are required to attend drills one weekend of each month consisting of both Saturday and Sunday, as well as one for two weeks in the summer each year. The National Guard is able to provide real life training and provides a mix of combat support and service support units.

Units

GTS is a Training Center designed to support individual and collective training up to the battalion level. It is commanded by The Adjutant General of Nebraska, administered by the United States Property and Fiscal Officer for Nebraska, and operated by the State Training Center Command.

In addition to training area, GTS is home to a Unit Training and Equipment Site (UTES), which is located in the cantonment area. UTES facilities are established to support field and sustainment maintenance needs at local training sites with limited maneuver area, such as GTS.

A National Guard Reserve Center (NGRC) is located at GTS. An NGRC is a joint facility for Reserve Components to conduct weekend drill.

While GTS is utilized for numerous training activities, the military personnel and Units in training are not permanently housed on the installation. However, there are a number of permanent activities and Units currently stationed at GTS, including:

- Detachment 1, Training Center Command – The TCC Detachment commands, manages and operates the daily activities at GTS to accomplish all assigned missions. They provide year-round customer service to any organization that utilizes the Training Site.
- Unit Training and Equipment Site #1 – As mentioned above, this Unit performs field and sustainment maintenance at the UTES facility for all types of ground surface equipment to ensure ready availability for transient training Units.
- Construction and Facilities Management Office (CFMO) – The CFMO provides construction, sustainment and maintenance services for all the permanent facilities located on site.
- Detachment 1, 1167th Brigade Support Company – This Unit provides logistics and maintenance support to a Brigade and attached units stationed in Nebraska.

- Joint Force Headquarters – The mission of the Joint Force Headquarters (JFHQ) is to provide statewide policy, oversight, and guidance to ensure a ready, relevant, and reliable force to meet both state and federal missions.
- 1167th Brigade Support Company – The 1167th Brigade Support Company (BSC) provides field and distribution services for GTS. It also serves as recovery and field maintenance support to the Battlefield Surveillance Brigade.
- 267th Ordnance Disposal – The 267th Ordnance Disposal (OD) provides command and control assistance over teams that are performing field maintenance operations.
- Troop A, 1-134th Cavalry Company Squadron – The Cavalry Squadron conducts reconnaissance and surveillance operations to enable a Command to focus combat power and effects with precision.
- Detachment 1, 623rd Vertical Engineer Company – The Vertical Construction Company constructs basecamps and internment facilities; and constructs, repairs, and maintains vertical infrastructures.
- 295th Ordinance Company – This USAR Unit provides command, control, administrative, planning and logistical support for modular ammunition platoons.
- Troop Detachment 1, Troop C, 1-134th Cavalry – The Troop C, 1-134th Cavalry conducts reconnaissance and surveillance for the Corps, Joint Task Force, Multi-National Force Area of Operations and any assigned areas as to support priority requirements.

3.6. Future Operations and Missions

GTS serves approximately two thirds of Nebraska's National Guard, yet the lack of utilization of the installations ranges hinders the bases ability to attract new training units. Future development of the ranges will maximize training scenarios resulting in an increase in range utilization by attracting new units onto GTS.

3.7. Greenlief Training Site Mission Footprint

Due to the types of training operations at GTS, particularly weapons firing, there are several types of mission activities that cause the "footprint" of GTS to extend past the boundaries of the site. The military is sensitive to the footprint it casts on communities around installations, just as the community must be mindful of how development and land use outside an installation affects military operations.

Noise

Understanding Noise

Due to the technical nature of this topic and its importance to the JLUS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts. The following key terms are used to describe noise.

- Ambient Noise. The total noise associated with an existing environment, which usually comprises sounds from many sources, both near and far.
- Noise Contours. Connecting points of equal noise exposure. Typically expressed in five dBA increments (i.e., 60, 65, 70, 75, etc.).
- PK15(met). The peak sound level, which factors in weather caused variations, and is likely to exceed 15 percent of the time. This occurs for land use planning for small arms testing, large arms, and other sounds.
- A-Weighted Decibel. The A-weighted decibel (dBA) is the most commonly weighted sound filter used to measure perceived loudness versus actual sound intensity by the human ear. The human ear responds differently to frequencies. For example, the human hearing system perceives mid-frequency sounds as louder than low and high frequency sounds.

  To accommodate this condition when measuring sound levels, filters need to be installed into sound meters. The results are a more accurate measurement of sound for the human hearing system.

- Noise Zone I includes all areas in which the PK15(met) decibels are less than 87 (for small arms). All activities in this area are acceptable.
- Noise Zone II includes areas where the PK15(met) decibels are between 87 and 104. Land uses for this zone should typically be limited to activities such as manufacturing, warehousing, transportation, and resource protection. If land area, determined by the community, is to be used for residential development, a reduction to the noise level of 25 to 30 decibels should be incorporated.
- Noise Zone III is located closest to the source of noise. It includes PK15(met) decibels greater than 104. No noise sensitive uses should occur within this area.

Weapons Firing Noise

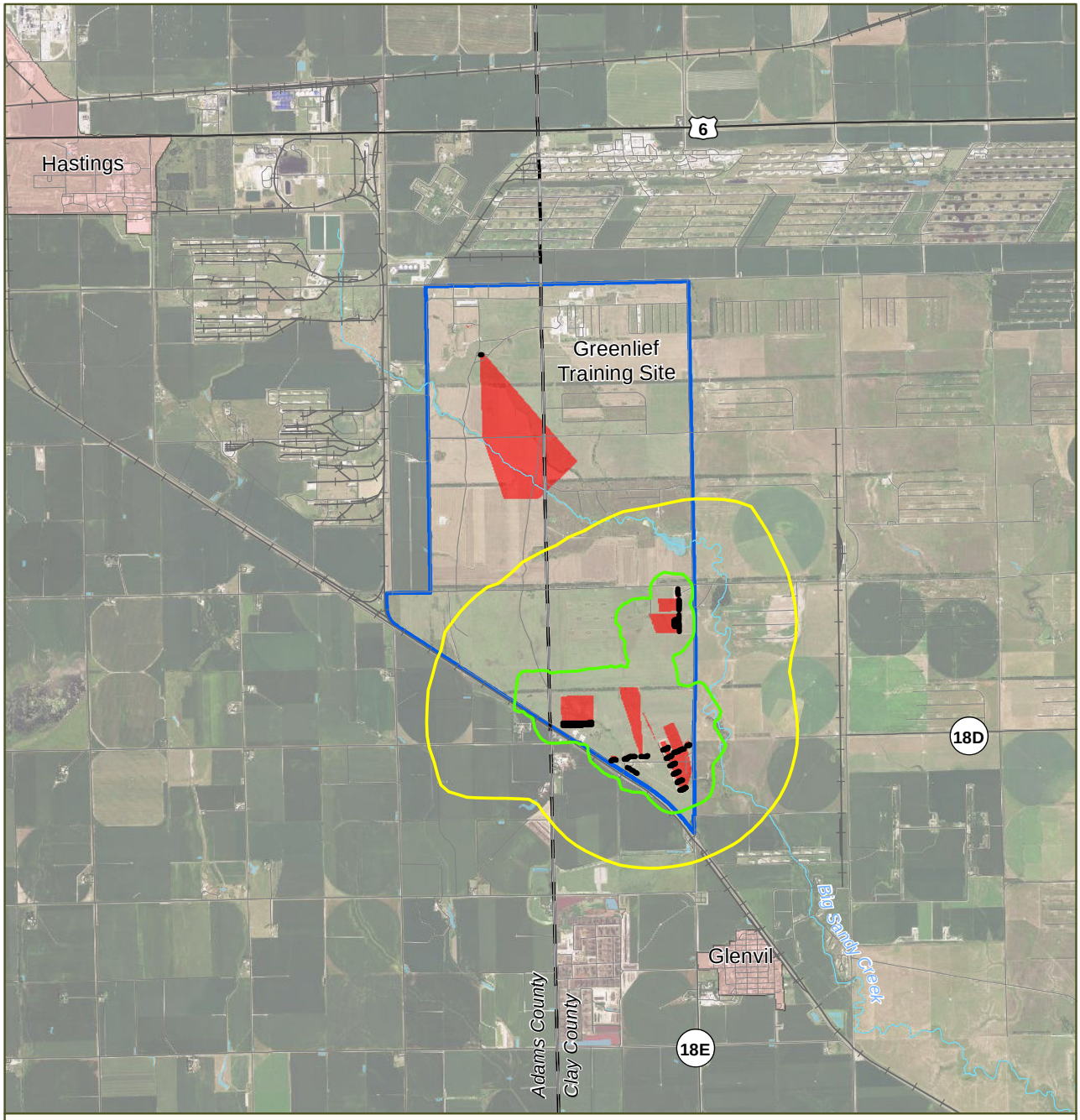
Small arms are the most common types of weapons fired at training ranges. Weapons that fire rounds less than 20 mm are considered small arms. The Small Arms Range Noise Assessment Model (SARNAM) is the computer program used to model small arms noise zones. It uses the peak noise level and incorporates the most recent available information on weapons noise source models, sound propagation, ricochet barriers, noise mitigation and safety structures, and the direction weapons are fired to create the noise zones.

As shown on Figure 3-4, the noise contours for small arms weapons at GTS extend past the boundaries of the installation. Noise Zone III is mostly contained within the boundaries, but extends beyond the eastern boundary approximately 300 meters and southwest side roughly 150 meters. Noise Zone II extends to the southwestern and eastern boundaries of the GTS approximately 1,000 meters. Scattered residential uses, which are considered incompatible uses, are located in portions of Noise Zone II.

Depending on the future mission changes to the GTS live-fire ranges, the predicted noise contours would be similar to those described for the southern boundaries. The eastern boundaries for Zone III would extend 100 meters from ranges H9 and H20. From Range H6, the noise zone would extend 150 meters beyond the southwestern and 300 meters from the eastern boundary.

Source: Final NEARNG Statewide Operational Noise Management Plan, 2007

Weapons training at Greenlief Training Site



Legend

Small Arms Noise Contour
- Zone II (87 dB PK15[MET])
- Zone III (104 dB PK15[MET])

- Firing Point
- Live Fire Range Area
- Greenlief Training Site
- County Boundary
- City / Village
- Water Body
- River / Creek
- Federal Highway
- State Highway
- Local Road
- Railroad

Source: Greenlief TS, 2014.

0 0.5 1 Mile

Figure 3-4
Greenlief Training Site Mission Footprint: Noise

Weapons Range Safety Zones

A surface danger zone (SDZ) is an area around a weapons firing range from which the access of all military personnel and civilians is restricted due to the inherent dangers associated with the firing of live munitions. An SDZ can include the surface (and subsurface) of land and water, as well as the overhead air space which provides the medium for launched projectiles. An SDZ includes the weapons firing position, target impact area and a secondary buffer area, which is an additional distance where errant projectile/munitions fragments may land without risking harm to life or property. The area of a SDZ can vary in size and shape and is specifically dependent on the type of weapon(s) fired, their firing location and projectile trajectory.

Warning sign that is put up when firing ranges are active

The current layout of the ranges and the types of ammunition fired at GTS is positioned in such a way that all of the SDZs for current weapons systems are located within the boundaries of GTS. This is done to protect the public and neighboring landowners from being at risk of ricochet or stray bullets landing on their property and causing injury or damage. The weapons ranges and associated SDZs for GTS are illustrated on Figure 3-5.

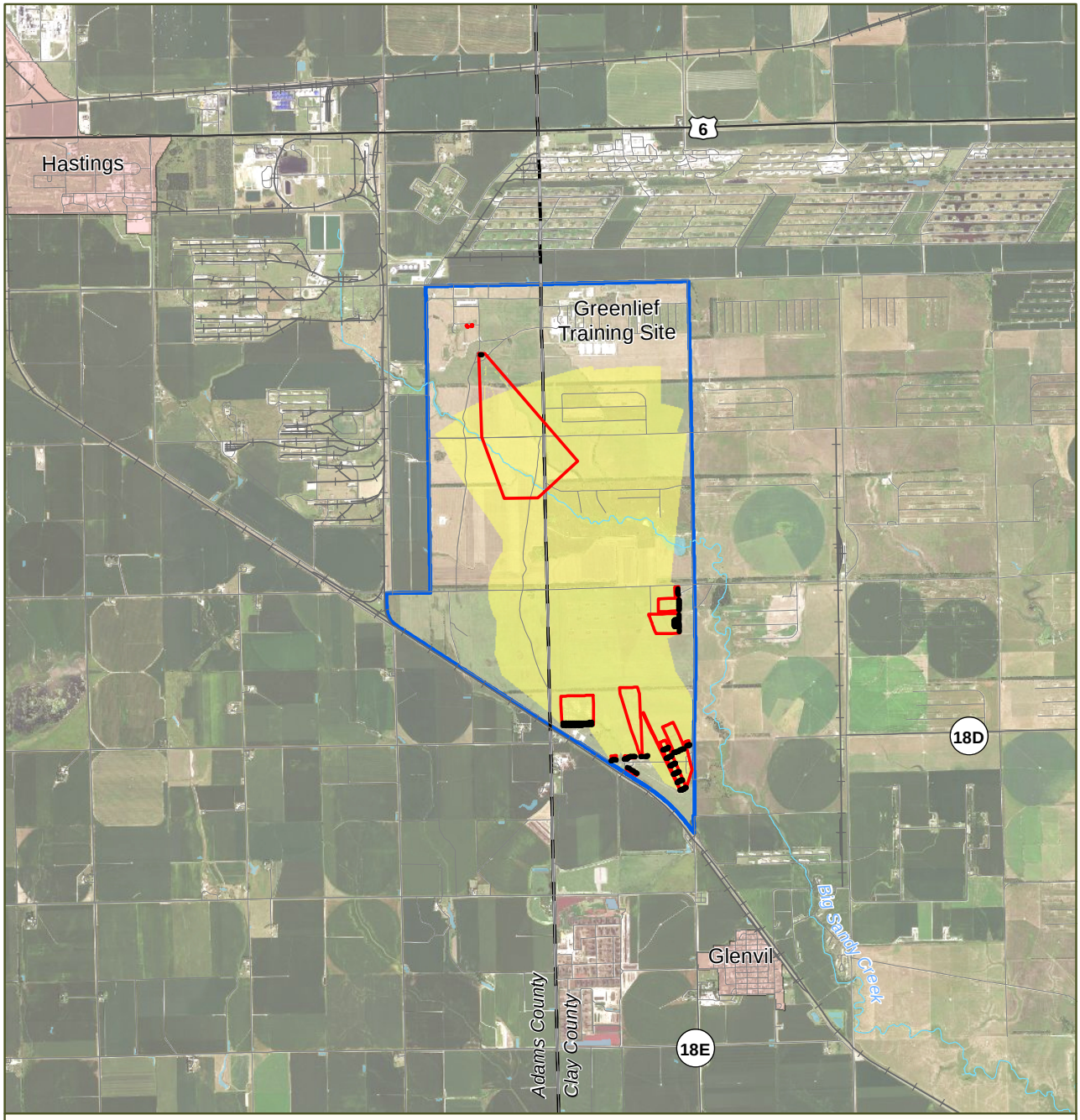


Figure 3-5
Greenlief Training Site Mission Footprint: Safety Zones

Helicopter Safety Zones

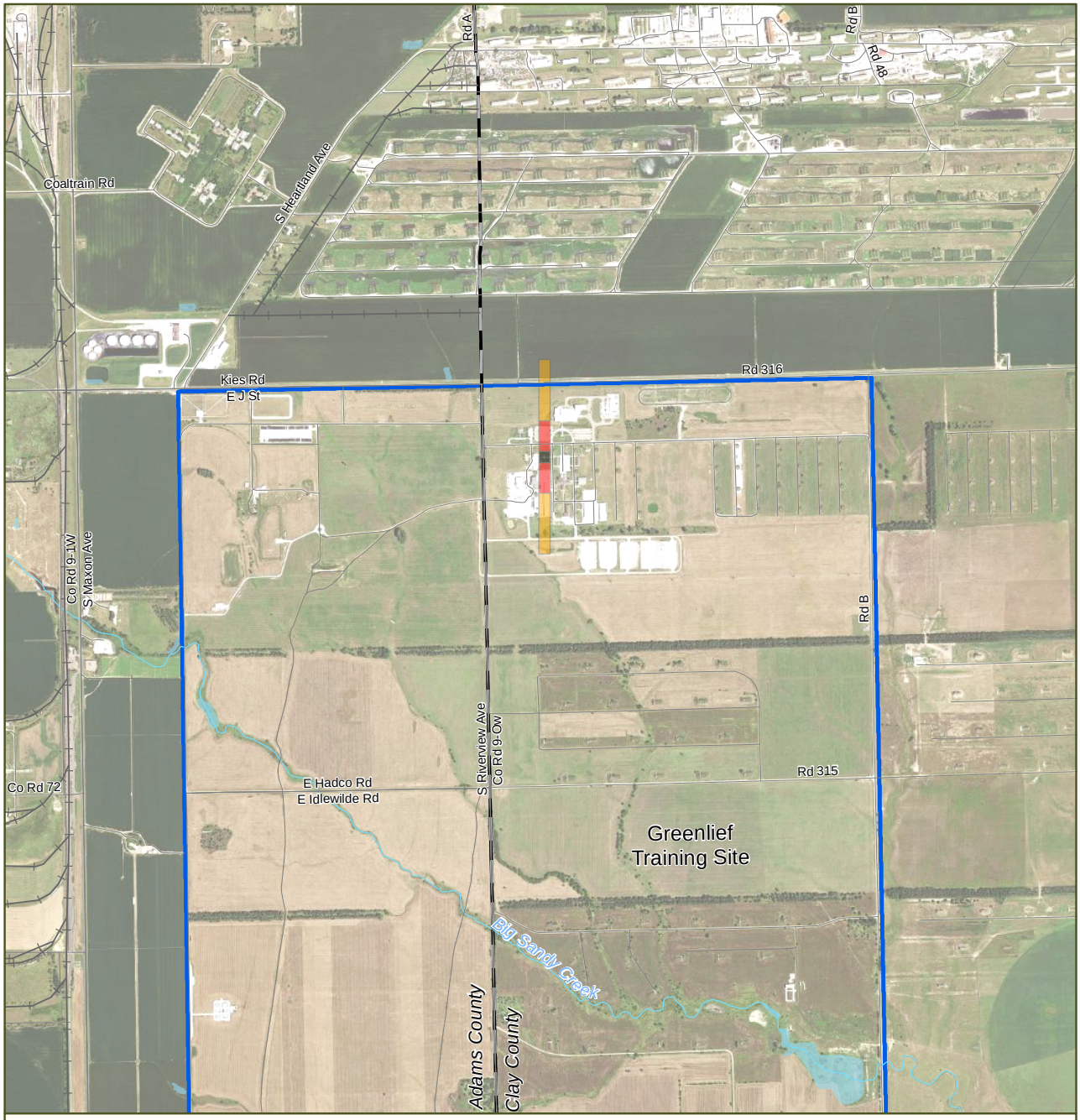
The DOD has created safety zones around runways and landing areas based on historical data identifying areas that are most prone to be impacted in the highly unlikely event of an aircraft accident. These safety zones are divided into Clear Zones (CZ), Accident Potential Zone (APZ) I, and APZ II. The zones are based on the dimensions of the associated runway. Helicopter landing pads such as the one located at GTS do not have an APZ II because of their size. The orientation of the safety zones is usually determined by typical flight patterns that aircraft take directionally when approaching the runway or land area. The safety zones start at the ends of another zone, called the primary surface. A primary surface immediately surrounds the landing surface offset by 150 feet and must be kept free of all obstructions not directly required for airfield operations.

For safety reasons, CZs should be entirely clear of any obstructions, whether man-made or natural, unless they are necessary for aircraft landing. To ensure this, it is generally the DOD's strategy either to acquire the land, initiate a long-term lease, or establish an easement to prevent any development or growth. The guidelines for development within APZ I are less stringent than in the CZ, but development should be limited, and residential is generally not recommended.

The helipad at GTS is categorized as a visual flight rule limited use helipad, meaning that landings and takeoffs there are done visually and without the aid of instrumentation. Due to the small size (approximately 40 feet by 40 feet) and minimal use of the helipad at GTS, safety zones have not been established. For the purposes of this JLUS, a primary surface, CZs, and APZs have been developed and shown on Figure 3-6 using DOD Unified Facilities Criteria 3-260-01 *Airfield and Heliport Planning and Design*. According to this criteria, a helipad this size has an associated Primary Surface that is 150 feet by 150 feet. The CZ extends from the end of this at 150 feet wide by 400 feet long, and the APZ I continues from the end of the CZ at 150 feet wide by 800 feet long.

Using a north-south orientation, as shown on Figure 3-6, the APZ I extends less than 500 feet past the boundary of GTS onto private land. The land is currently undeveloped.

Helicopter landing to pick up personnel / supplies



Legend

- Primary Surface
- **Accident Potential Zone**
  - Clear Zone
  - APZ I
- Greenlief Training Site
- County Boundary
- Water Body
- River / Creek
- Local Road
- Railroad

Source: Matrix Design Group, 2015.

0 1,000 2,000 Feet

Figure 3-6

Greenlief Training Site Mission Footprint: Accident Potential Zones

Helicopter Vertical Obstructions

The FAA and DOD have identified certain imaginary surfaces around runways and helipads that are used to determine how structures and facilities are evaluated to identify if they pose a vertical obstruction in relation to the airspace around a runway or helipad. The levels of imaginary surfaces build upon one another and are designed to eliminate obstructions to air navigation and operations, either natural or man-made. The dimension or size of an imaginary surface depends on the type of runway or helipad around which it is based.

Fixed-wing runways generally have several more imaginary surfaces than helicopter landing areas do. For the type of helipad at GTS, the following imaginary surfaces apply:

- Primary surface – immediately surrounds the landing surface offset by 150 feet and must be kept free of all obstructions not directly required for airfield operations.
- Approach-departure clearance surface – symmetrically centered centerline of the helipad and starting, beginning as an inclined plane at the end of the primary surface, and extending for 1,200 feet. The slope of the approach-departure clearance surface is 8:1. The width of this surface at the primary surface is 150 feet, widening uniformly to a width of 500 feet at the end point.
- Transitional surface – extends outward and upward at right angles to the primary surface and extended landing lane at a slope of 2:1. The transitional surface starts at the lateral edges of the primary surface and the approach-departure clearance surface. It continues outward and upward at the prescribed slope to an elevation of 87.5 feet above the established helipad. It then rises vertically to an elevation of 150 feet above the established helipad elevation.

Figure 3-7 illustrates the standard imaginary surfaces for a visual flight rule limited use helipad.

Due to the small size and minimal use of the helipad at GTS, imaginary surfaces have not been established. For the purposes of this JLUS, a primary surface, approach-departure clearance surfaces, and transitional surfaces have been developed and shown on Figure 3-8 using DOD Unified Facilities Criteria 3-260-01 *Airfield and Heliport Planning and Design*. Using a north-south orientation of imaginary surfaces, as shown on Figure 3-8, the imaginary surfaces for the helipad at GTS fall slightly outside the boundary of GTS, less than 500 feet, onto private property. The land is currently undeveloped.

UH-60 Black Hawk helicopters taking off

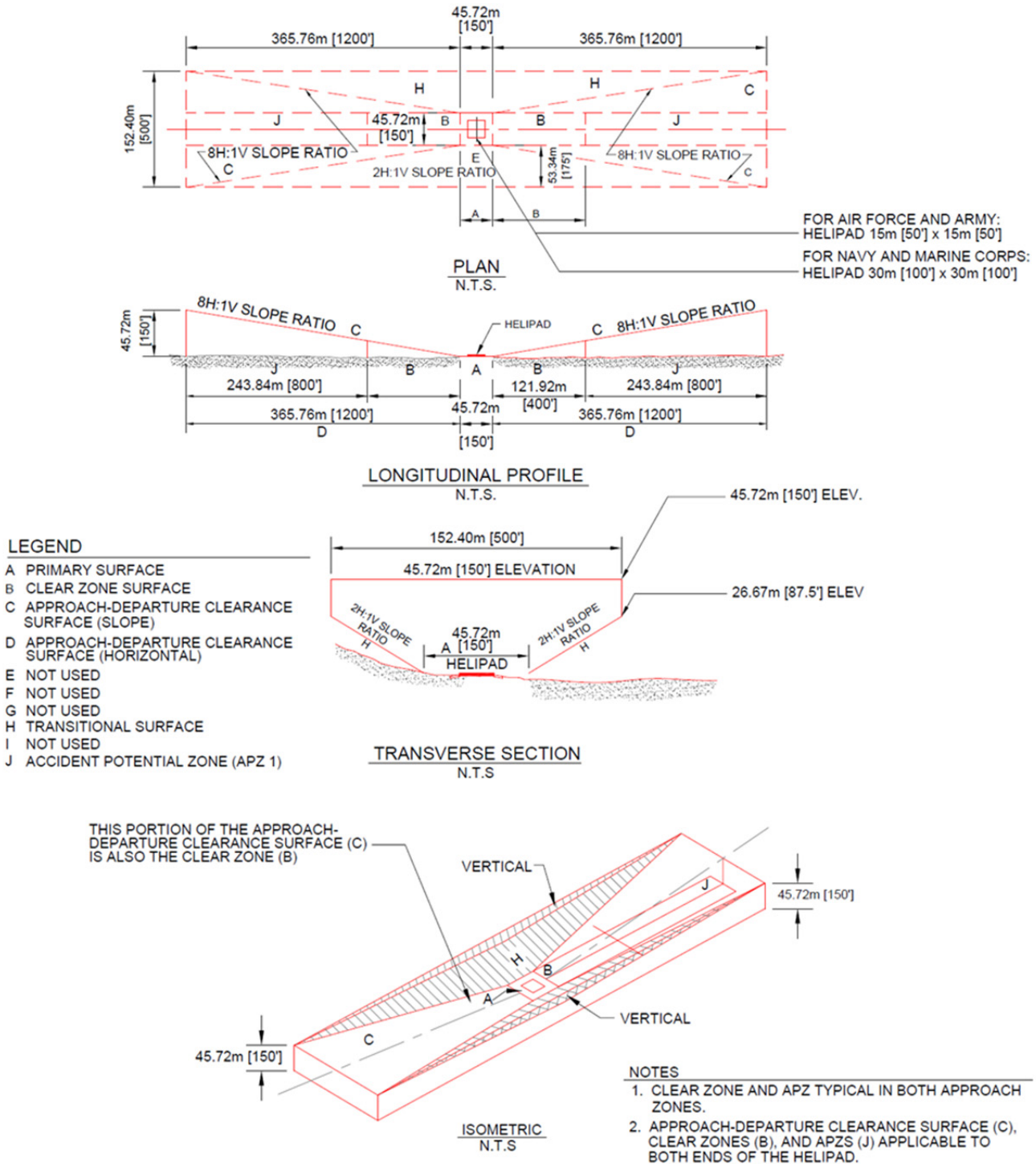
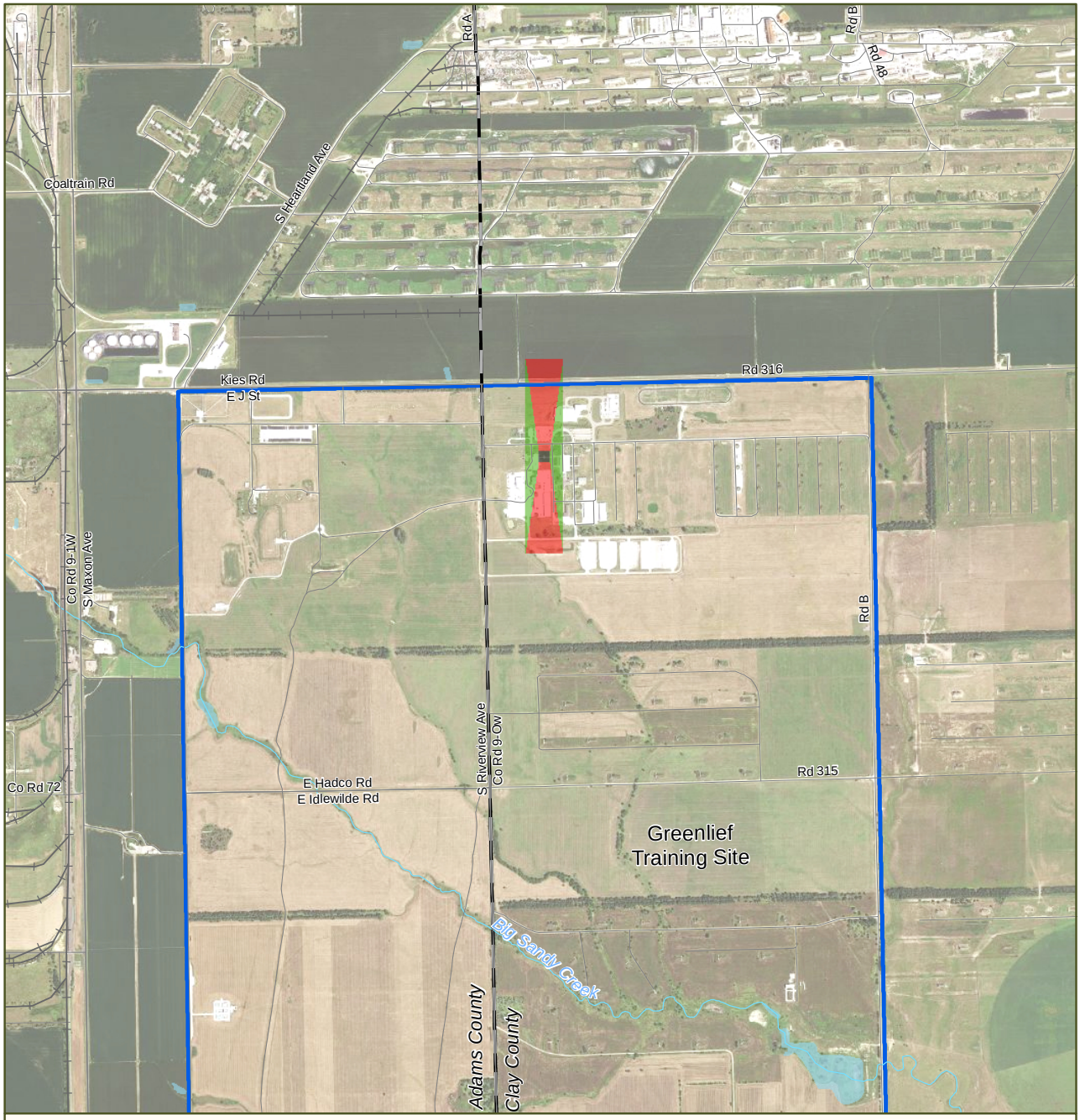


Figure 3-7. Standard Army Visual Flight Rule Helipad Zones



Legend

Imaginary Surface
- Primary Surface
- Transitional Surface
- Approach-Departure Clearance Surface

- Greenlief Training Site
- County Boundary
- Water Body
- River / Creek
- Local Road
- Railroad

Source: Matrix Design Group, 2015.

0 1,000 2,000 Feet

Figure 3-8

Greenlief Training Site Mission Footprint: Imaginary Surfaces

Greenlief TRAINING SITE
JOINT LAND USE STUDY

4 EXISTING COMPATIBILITY TOOLS

Please see the next page.

4 EXISTING COMPATIBILITY TOOLS

Inside Chapter 4 ...

There are many existing tools that can be used to encourage, promote, and manage compatibility between military installations and their neighboring communities. These tools exist at the federal, military, state, regional, and local level and can be used for compatibility purposes to guide every day land use and operational decisions in communities and near military installations.

This chapter lists some of the key tools that are currently, or are recommended to be more efficiently, utilized or enhanced for the compatibility issues identified through the Greenlief Training Site (GTS) JLUS process. The tools listed in this chapter are not exhaustive, but are meant to provide a brief overview of the primary tools currently utilized in the JLUS Study Area.

4.1. Federal Programs and Policies

Federal tools authorize other federal, state, and local agencies to implement regulatory measures and policies to protect the multiple resources that are involved in land use and military compatibility planning. The intent of these regulatory measures and policies includes the protection and preservation of the quality of life and general welfare of the public and natural resources including land, water, and airspace.

These tools assist land use decision makers and planners of all levels of government to make informed decisions that enable compatible land use development between the military and the communities that benefit from the military's operations.

Federal programs and policies were evaluated in the GTSJLUS to assist in determining where areas of improvement could enable better land use planning at the local level.

Army Compatible Use Buffer Program

Title 10, Section 2684a of the United States Code authorizes the DOD to partner with non-federal governments and private organizations to establish buffer zones around critical active military assets. Within the Department of the Army, this program is called the Army Compatible Use Buffer Program (ACUB) program. Through the ACUB program, military installations work with agency partners to establish buffer zones that can help to protect habitat, sensitive areas, and training areas without acquiring any new land for Army ownership.

At the time that this JLUS was written, the ACUB for GTS had yet to be proposed.

Base Realignment and Closure Task Force

The Base Realignment and Closure (BRAC) Task Force examines military assets to determine if the state can benefit from a base realignment or closure. The objective of this program is to protect the state's military installations and missions so that the state can continue to support the nation's security. The Task Force identifies (1) installations that are vulnerable to a realignment and/ or closure, (2) installations that are able to benefit from the process, (3) installations reviewed by other states that are in need of protection, (4) actions taken by Nebraska to protect the military assets and installations.

Recommendations from the Task Force suggest that Nebraska increase its appropriation to support infrastructure needs of the National Guard base. The Task Force also finds that expansion of military installations is necessary to stay competitive and the option of implementing a permanent state-wide commission is recommended. State-wide cooperation between the communities and military facilities is another suggested alternative, which can be ensured through all land-use planning and zoning jurisdictions.

Bird / Wildlife Aircraft Strike Hazard

A Bird / Wildlife Aircraft Strike Hazard (BASH) plan is designed to minimize wildlife and bird strike damage to military aircraft. A BASH plan is designed to manage birds, alert aircrew and operations personnel, and provide increased levels of flight safety, particularly during the critical take-off and landing phases of flight. A BASH plan is designed to:

- Designate a Bird Hazard Warning Group (BHWG) and outline each members' responsibilities;
- Establish procedures to identify high hazard situations and establish aircraft and airfield operating procedures to avoid these situations;
- Ensure that all permanent and transient aircrews are aware of bird hazards and the procedures for avoidance; and
- Develop guidelines to decrease the attractiveness of the airfield to birds and disperse their numbers on the airfield.

A BASH Plan is important for any base with aircraft activity. However, because GTS focuses on rotary wing aircraft, the threat is less prominent. Rotary wing aircraft travel at lower speeds than fixed wing aircraft which decreases the chance of a detrimental mishap.

Clean Air Act

The CAA is the comprehensive federal law that regulates air emissions from stationary and mobile sources in order to control air pollution in the United States. Under the CAA, the US Environmental Protection Agency (EPA) establishes limits on six criteria pollutants through the National Ambient Air

Quality Standards (NAAQS). Standards are set to protect public health and public welfare. The CAA also gives EPA the authority to limit emissions of air pollutants coming from sources like chemical plants, utilities, and steel mills. Individual states may have stronger air pollution laws, but they may not have weaker pollution limits than those set by EPA. Under the law, states have to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the CAA.

The CAA is important to GTS because regional non-attainment for air pollutants may obstruct attempts by the military to expand mission parameters at GTS. Non-attainment will make it more difficult for the military to implement new programs because new programs may add to the regional non-attainment status.

Clean Water Act

The Clean Water Act (CWA) governs the management of water resources and controls and monitors water pollution in the US. The CWA establishes the goals of eliminating the release of toxic substances and other sources of water pollution to ensure that surface waters meet high quality standards. In so doing the CWA prevents the contamination of nearshore, underground and surface water sources.

The CWA is important to GTS because potential flooding could increase levels of water pollution and decrease water availability. Decreased water availability may obstruct the expansion of mission activities or cause certain activities to be discontinued and/or relocated.

Department of Defense Conservation Partnering Initiative

In 2003, Congress amended Title 10 U.S.C. §2684a and §2692a (P.L. 107-314), the National Defense Authorization Act, to add authority to the Department of Defense (DOD) to partner with other federal agencies, states, local governments, and conservation based nongovernmental organizations (NGO's) to set aside lands near military bases for conservation purposes and to prevent incompatible development from encroaching on, and interfering with, military missions. This law provides an additional tool to support smart growth, conservation, and environmental stewardship on and off military installations.

DOD Energy Siting Clearinghouse

Section 358 of the 2011 National Defense Authorization Act authorized the study of the effects of new construction and obstructions on military installations and operations. The Energy Siting Clearinghouse serves to coordinate the DOD review of existing applications for energy projects. Several key elements of Section 358 include designation of a senior official and lead organization to conduct the review of energy project applications, a specific timeframe for completion of a hazard assessment associated with an application (30 days), specific criteria for DOD objections to projects and a requirement to provide an annual status report to Congress. This legislation facilitates procedural certainty and a predictable process that promotes compatibility between energy independence and military capability.

DOD Minimum Antiterrorism Standards for Buildings (UFC 4-010-01)

The DOD published minimum security standards for use in facility and master planning through the Unified Facilities Criteria 4-010-01. The purpose of these standards is to provide appropriate, implementable, and enforceable measures to establish a level of protection against terrorist attacks based on the needed level of protection specific to each facility or installation. Security measures are required for four categories of DOD buildings:

- Inhabited buildings that are routinely occupied by 11 or more personnel at a population density of at least one person per 430 square feet of gross area
- Primary gathering buildings, which are inhabited buildings routinely occupied by 50 or more personnel. All areas of such a facility that meet the population density requirement for an inhabited building must be treated as primary gathering.
- Billeting, in which 11 or more unaccompanied personnel are routinely housed.
- High-occupancy family housing, which has 13 or more units per building.

Security measures required, such as allowable standoff distances, vary for facilities contained within a controlled perimeter and those within an open installation. As defined by the UFC, a controlled perimeter is a physical boundary that possesses sufficient means to channel vehicles to the access control point and where there is a demonstrated capability to search for and detect explosives. Although a controlled perimeter is typically in the form of an installation fence, natural features such as densely wooded terrain or other topographical features that assist in impeding or denying access to an area may qualify as an AT/FP measure.

DOD Partners in Flight Program

The DOD Partners in Flight (PIF) program employs habitat-based management strategies to maintain healthy landscapes and training lands. The PIF representatives assist natural resource managers in improving the monitoring, management, and education programs involving birds and bird habitat. The PIF published a Strategic Plan which identifies actions that support mission activities while protecting bird populations.

The PIF program not only helps to ensure mission-critical aviation activity at GTS but also to promote the protection of important local bird species.

DOD Readiness and Environmental Protection Integration

To implement the authority provided by the DOD Conservation Partnering Initiative, the DOD established the Readiness and Environment Protection Integration (REPI). This initiative enables the DOD to work with state and local governments, nongovernmental organizations, and willing landowners to limit encroachment and incompatible land use.

REPI funds are used to support a variety of DOD partnerships that promote compatible land use. By relieving encroachment pressures, the military is able to test and train in a more effective and efficient manner. By preserving the land surrounding military installations, habitats for plant and animal species are conserved and protected.

It is important for the Nebraska Army National Guard (NEARNG) to ensure that military activities are not encroached upon by incompatible land uses. The REPI program allows local agencies an opportunity to partner with the federal government to conserve lands, which could allow for buffers around the base to be established to help further the installation mission.

Endangered Species Act

The Endangered Species Act (ESA) establishes a program for the conservation of threatened and endangered plants and animals and their habitats. The US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) are the lead implementing agencies of ESA. The ESA requires federal agencies, in consultation with the USFWS and/or the NOAA Fisheries Service, to ensure that actions they "authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species." The law also prohibits any action that results in a taking of any listed species of endangered plant, fish, or wildlife. The ESA provides a platform for the protection of critical habitat and species that may be at risk of extinction.

The ESA is important as it limits the activities that the military can perform, if they pose a risk to any threatened or endangered species. In some cases, presence of a threatened or endangered species may cause the cancelation of a mission program.

Federal Aviation Act

The Federal Aviation Act was passed in 1958 to provide methods for overseeing and regulating civilian and military use of airspace. The Act requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable air space. The intent is to serve the needs of both civilian aeronautics and national defense, but the law does not address specific needs of military agencies. Military planning strives to work alongside local, state, and federal aviation law and policies, but sometimes must supersede these due to national security interests. The Federal Aviation Administration (FAA) was created as a result of the Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has "a public right of freedom of transit in air commerce through the navigable air space of the United States". The rule was formally announced in the 1963 Court of Claims ruling in Aaron v. United States and states that flights 500 feet or more above ground level (AGL) do not represent a compensable taking because flights 500 feet AGL enjoy a right of free passage without liability to the owners below.

Another important outcome of the Act is FAA Regulation Part 77, commonly known simply as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation determines compatibility based on the height of proposed structures or natural features in relation to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can assess the height restrictions near airfields. Additional information on Part 77 is located on the Federal Aviation Administration website at http://www.faa.gov/.

As of January 29, 2013, the main focus of Part 77.17 is to establish standards to determine obstructions within navigable airspace, typically within a certain distance from an airport or airfield. The law defines an obstruction to air navigation as an object of greater height than any of the following heights or surfaces in the following manner:

- A height of 499 feet AGL at the site of the object.
- A height that is 200 feet AGL or above the established airport elevation, whichever is higher, within three nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 499 feet.
- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required clearance.
- A height within an en route obstacle clearance area, including turn and termination areas, of a federal airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.
- The surface of a takeoff and landing area of an airport or any imaginary surface established under 77.19, DOD: 77.21, and heliports: 77.23. However, no part of the takeoff or landing area itself will be considered an obstruction.
- The Federal Aviation Act helps to protect areas critical to aviation activity at GTS. Without regulations that dictate structure placement near approach and departure areas of an airfield, certain uses may encroach and inhibit the free use of navigable airspace.

Federal Land Policy and Management Act of 1976

The Federal Land Policy and Management Act (FLPMA) established the authority for public agencies that possess public lands to be managed and planned according to national and local interests. Additionally, the law prescribes that public lands that have been identified for development shall uphold and protect the scientific, scenic, historical, ecological, environmental, and other values that are unique to specific geographies. This law provides the impetus for the various resource management plans that have been developed and prepared for public agencies.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 is a federal regulation that established a US national policy promoting the protection and enhancement of the environment. It requires federal agencies to analyze and consider the potential environmental impact of their actions. The purpose of NEPA is to promote informed decision-making by federal agencies by making detailed information concerning significant environmental impacts available to both agency leaders and the public.

All projects receiving federal funding require NEPA compliance and documentation. NEPA is applicable to all federal agencies, including the military. Not all federal actions require a full Environmental

Impact Assessment (EIS). In cases where an action may not cause a significant impact, the agency would be allowed to produce a less detailed Environmental Assessment (EA).

A NEPA document can serve as a valuable planning tool for local planning officials. An EA or EIS can assist in the determination of potential impacts that may result from changing military actions or operations and their effect on municipal policies, plans and programs, and the surrounding community. Public hearings are required for all EIS documents released under NEPA. An EA requires publishing of a draft EA and Finding of No Significant Impact (FONSI) allowing public comment for a period of 30 days. An EA can either result in a FONSI, or a Record of Decision (ROD) concluding there will be a significant impact. The information obtained by the EA / EIS is valuable in planning coordination and policy formation at the local government level.

NEPA mandates that the military analyze the impact of its actions and operations on the environment, including surrounding civilian communities. Part of this analysis explores ways to reduce any adverse environmental impact.

NEPA helps to ensure that projects receiving federal funding at GTS do not have adverse effects on the local environment. However, this also prohibits what projects the installation may be able to implement. The purpose of NEPA is to identify significant environmental impacts and inform the public of the findings. While in some cases a statement of overriding concern may allow a potentially significant environmental impact to be allowed, strong public opinion could also prohibit a project from moving forward or from moving forward at its desired capacity.

National Historic Preservation Act

Issues and related strategies have been developed based on guidance provided through the National Historic Preservation Act (NHPA) of 1966, which requires federal agencies to consider the effects of a proposed project on properties listed in, or eligible for listing in, the National Register of Historic Places. Since no specific action is being proposed as part of this planning process, the review of cultural resources is focused on the identification of existing resources and not potential effects that would result from a specific proposed action.

National Pollutant Discharge Elimination System

Per the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge into US waters. Point sources are discrete conveyances such as pipes or man-made ditches. According to the law, individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if they discharge directly to surface waters.

The NPDES is important because it limits what GTS can discharge directly into surface waters.

Noise Control Act of 1972

The Noise Control Act of 1972 determined that noise not adequately controlled has the potential to endanger the health and welfare of humans. The law states that all Americans are entitled to an environment free from noise that can jeopardize their general health and quality of life. Along with state, local, and territorial governments, actions from the federal government were needed to ensure that the objectives of the Act were met.

Conversely, military installations were experiencing the impacts related to encroaching urban development locating adjacent to their boundaries and the resulting complaints regarding noise from military operations.

The Noise Control Act is important because encroaching development and increased population near military installations often creates compatibility concerns. As communities grow, it is important that the military installation, developers, and the affected communities work together to mitigate the issue of noise and develop ways to coexist.

Very few noise complaints have been recorded near GTS. Further land use management will allow for future military missions to continue.

Safe Drinking Water Act

The SDWA is the main federal law that ensures the quality of drinking water in the United States. SDWA authorizes the Environmental Protection Agency (EPA) to set national health-based drinking water standards to protect against both naturally-occurring and man-made water contaminants. SDWA applies to every public water system in the US.

A reliable and clean water source is necessary for any population center to function and grow. A decrease in the quality of the drinking water in the Study Area may decrease the amount of people that can reside in the region. If a reliable and clean water source is not available to GTS, it may obstruct mission activities and cause their discontinuation or relocation.

The Sikes Act

The Sikes Act requires the DOD to develop and implement Integrated Natural Resources Management Plans (INRMPs) for military installations across the United States. INRMPs are prepared in cooperation with the Fish and Wildlife Service and State fish and wildlife agencies to ensure proper consideration of fish, wildlife, and habitat needs. The Sikes Act requires INRMPs to be reviewed at least every 5 years with the Fish and Wildlife Service and with the States. Army Regulation 200-1, "Environmental Protection and Enhancement," and policy memoranda guide the implementation process of the Sikes Act.

Findings from an INRMP could have an effect on mission activities at GTS. The INRMP findings could recognize areas where the military needs to better manage the natural resources on the property.

4.2. Nebraska Army National Guard / GTS Plans and Programs

The NEARNG / GTS plans and programs provide guidance for land uses and development activities on the installation. These tools govern land use decisions that occur inside the fenceline or within the boundary of the military mission footprint in relation to the military mission or proposed military missions.

These tools provide guidance and establish measures for standard operating procedures during certain events such as weapons firing. There are various installation tools that are instrumental in assisting and guiding land use decisions as they interface with the military mission.

Forestry Management Plan

The Forestry Management Plan (FMP) establishes procedures, identified by the NEARNG, for managing and improving the forest areas that surround GTS. With three types of forest resources, managing these areas is critical to support the military mission. Not only do the forest areas act as a buffer, but they contribute as an ecological benefit to the base by providing a quality environment. FMP analyzes these sites to establish a growing environment that is consistent throughout GTS.

These areas can provide shading, and better climate conditions for training operations. These areas are to be monitored in order to protect future military missions.

Integrated Cultural Resources Management Plan

Department of Defense Instruction 4715.3, Army Regulation (AR) 200-1 requires installations to develop an Integrated Cultural Resources Management Plan (ICRMP) as an internal compliance and management tool integrating the entirety of the cultural resources program with ongoing mission activities. As a component of the installation master plan, the ICRMP is the NEARNG commander's decision document for conduct of cultural resources management actions and specific compliance procedures. It also allows for ready identification of potential conflicts between the ARNG's mission and cultural resources, and identifies compliance actions necessary to maintain the availability of mission essential properties and acreage.

Integrated Natural Resources Management Plan

The Integrated Natural Resources Management Plan (INRMP) was created to ensure long range habitat protection and natural resource management at the installation. The INRMP outlines various natural resources including threatened and endangered species and important habitat, management of noxious weeds, grasslands and wildland fire, wildlife and riparian management, water resources and water rights, inter-agency responsibilities and coordination efforts, and the overall management plan for natural resources at GTS to ensure no loss of capability for

training exercises. The plan utilizes a no-net-loss approach to protecting habitat and natural resource quality. This plan receives regular updates which modify plans and programs to meet the needs of management practices. The INRMP was most recently updated in September 2001, which was followed by a memorandum from the US Fish and Wildlife Service in May 2009. This memorandum determined that the plan still met the identified goals and objectives, which deferred the need for an update of the plan at this time. The plan also provides guidance for interagency cooperation and agreements on management practices at GTS.

NEARNG Regulation 385-1 and Small Arms Range Safety Area

GTS airspace is controlled at the installation level by utilizing a Small Arms Range Safety Area (SARSA). SARSAs are similar to Controlled Firing Areas and are not considered SUAs. SARSAs are Army-established areas to contain small arms range activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. It is the Installation Manager's responsibility to provide for the safety of persons and property on the surface and in the air by ensuring that airspace above and adjacent to small arms ranges is monitored to prevent endangering nearby aircraft operations.

According to the NEARNG Regulation 385-1: Range and Training Facilities, firing activities on GTS ranges are not to be conducted if the cloud height is less than 305 meters above the maximum vertical limit of the ordnance being fired. It is the responsibility of the Range Officer in Charge (OIC) to have up to five miles of visible airspace from the boundaries of the SDZ with a maximum ceiling of 3,152 feet above ground level (AGL). This is determined based on the 7.62mm M80 ball ordnance that is fired at GTS. The maximum vertical limits is determined by various factors including type of ordnance fired, location of target, stationary or mobile targets, etc. The Department of Army Pamphlet 385-63: Range Safety (DA PAM 385-63) provides all the information for all the types of ordnance fired on training ranges including the vertical limits.

If an aircraft does enter, the OIC must call a cease fire until the aircraft has left visibility over the range.

Sources: NEARNG Regulation 385-1: Safety Range and Training Facilities, November 2011; Department of Army Pamphlet 385-63: Range Safety, April 2014.

NEARNG Statewide Operational Noise Management Plan

Established by the Department of the Army (DA), the Operational Noise Management Plan (ONMP) was designed to minimize Army impacts on the human environment. The current NEARNG ONMP, adopted in February 2007, provides the NEARNG facilities strategic plans to educate, manage noise complaints, and procedures for noise mitigation. This methodology provides military operations land use guidelines that analyze the compatibility between the Army and surrounding communities. Working with communities allows for installation efforts to be placed, solving noise incompatibility issues. The ONMP provides a set of noise zones based on the decibel level of the noise produced by various activities. These zones are described below.

- Noise Zone I is the noise zone that includes all areas in which the PK15 (met) decibels are less than 87 (for small arms), the ADNL is less than 65 (for aircraft), and/or the CDNL is less than 62 (for large arms and explosions). This area is suitable for all types of land use.
- Noise Zone II includes areas where the PK15 (met) decibels are between 87 and 104, the ADNL is between 65 and 75, and/or the CDNL is between 62 and 70. Land uses for this zone should typically be limited to manufacturing, warehousing, transportation, and resource protection.
- Noise Zone III is the zone located closest to the source of noise. It includes PK15 (met) decibels greater than 104, ADNL greater than 75, and/or CDNL greater than 70. No noise sensitive uses should occur within this area due to the severity of noise. The current plan evaluates noise incompatibilities and complaints at GTS and does not identify any serious noise and land use incompatibilities.

- Land Use Planning Zone (LUPZ) is at the upper end of the NZ I and is defined by a CDNL of 57-62 or an ADNL of 60-65. It accounts for the fact that some installations have seasonal variability in their operations (or several unusually busy days during certain times of the year) and that averaging those busier days over the course of a year (as with the DNL) effectively dilutes their impact. Showing this extra zone creates one more added buffer layer to encroachment and it signals to planners that encroachment into this area is the beginning of where complaints may become an issue, and that extra care should be taken when approving plans.

Operational Noise Consultation

The purpose of the Operational Noise Consultation is to provide Greenlief Training Site recommended noise contours to satisfy the NEPA regulations. The DOD and NEARNG should continue to inform the public of the possible noise, and also conduct noise management, and outreach programs to gain community support for the installation. NEARNG and GTS should continue monitoring noise impacts on the surrounding installation.

4.3. State of Nebraska Plans and Programs

The state tools provide further assistance and protection of land uses in the State of Nebraska. The tools authorize or mandate local counties and cities to provide for the protection of the state's valuable industries including the DOD and agriculture. In addition, the state's tools require communities and developers to protect and preserve the state's natural resources, including land and water, through regulatory measures to protect them from over-consumptive practices.

Extraterritorial Jurisdictions of Municipalities

An Extraterritorial Jurisdiction (ETJ) of a municipality designates the area beyond the municipality's boundaries for future growth. The governing body of a city, town, or village may request for an ETJ of land that is located within two miles of its corporate boundaries if it is designated as first class city and one mile from the corporate boundaries if it is designated as second class city. Cities of second class are defined by the Nebraska Legislature as all cities, towns, and villages containing more than eight hundred and not more than five thousand inhabitants, Cities of the first class, both requiring population record, are all cities having more than five thousand and not more than one hundred thousand inhabitants, as may be ascertained and officially promulgated by the United States or under the authority of the State of Nebraska or by the authority of the mayor and city council of any such city.

Nebraska Revised Statutes

Nebraska law, through the Nebraska Revised Statutes, has several mechanisms in place for the notification of military installations on certain types of proposed land use changes. A summary of them is provided below.

14-407. Zoning; exercise of powers; planning board or official; notice to military installation.

A city of the metropolitan class shall exercise the powers conferred by sections 14-401 to 14-418 through such appropriate planning board or official as exists in such city.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the city shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning board shall deliver the notification to the military installation at least ten days prior to the meeting of the planning board at which the proposal is to be considered.

15-1103. Planning director; prepare comprehensive plan; review by commission; city council; adopt or amend plan; notice to military installation.

The planning director shall be responsible for preparing the comprehensive plan and amendments and extensions thereto and for submitting such plans and modifications to the city planning commission for its consideration and action. The commission shall review such plans and modifications and those which the city council may suggest and, after holding at least one public hearing on each proposed action, shall provide its recommendations to the city council within a

reasonable period of time. The city council shall review the recommendations of the planning commission and, after at least one public hearing on each proposed action, shall adopt or reject such plans as submitted, except that the city council may, by an affirmative vote of at least five members of the city council, adopt a plan or amendments to the proposed plan different from that recommended by the planning commission.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the planning director shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning director shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

19-923. Municipality; notify board of education; when; notice to military installation.

(1) In order to provide for orderly school planning and development, a municipality considering the adoption or amendment of a zoning ordinance or approval of the platting or replatting of any development of real estate shall notify the board of education of each school district in which the real estate, or some part thereof, to be affected by such a proposal lies, of the next regular meeting of the planning commission at which such proposal is to be considered and shall submit a copy of the proposal to the board of education at least ten days prior to such meeting.

(2) When a municipality is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the municipality shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the municipality if the municipality has received a written request for such notification from the military installation. The municipality shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

(3) The provisions of this section shall not apply to zoning, rezoning, or approval of plats by any city of the metropolitan or primary class, which has adopted a comprehensive subdivision ordinance pursuant to sections 14-115 and 14-116, or Chapter 15, articles 9 and 11. Plats of subdivisions approved by the agent of a municipality designated pursuant to section 19-916 shall not be subject to the notice requirements in this section.

23-114.06. County planning commission; notice to military installation.

When a county planning commission appointed pursuant to section 23-114.01 is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the commission shall notify any military installation which is located within the county if the county has received a written request for such notification from the military installation. The county planning commission shall deliver the notification to the military installation at least ten days prior to the meeting of the county planning commission at which the proposal is to be considered.

Nebraska State Hazard Mitigation Plan

The Nebraska State Hazard Mitigation Plan establishes guidelines and procedures for hazardous responses. The plan identifies the potential risks that could occur and develops a mitigation process by coordinating with multiple governmental units, including the military department and US Army Corps of Engineers.

This is important for GTS because it allows for coordination with state and other governmental units on the mitigations to protect Nebraska communities from future impacts.

Real Estate Disclosures

Real estate disclosures are used in some Nebraska jurisdictions to notify potential homebuyers of conditions affecting the property that they should be aware prior to its purchase. Real estate disclosures are provided to the purchaser on or before the effective date of the contract binding the purchaser to purchase the property.

State Land Use Policy and Control

In 1967, the State of Nebraska granted individual counties and municipality's authority to develop comprehensive plans and zoning regulations. Additionally, zoning regulations can include control of subdivisions from one to three miles beyond the boundary. These policies allow for compatible jurisdictions to be developed between cities, while limiting sprawl outside of urban areas,

This plan shall include the general plan for improvement and developments for the city. The comprehensive plan among other things shall also include land use patterns and intensity of the proposed general distribution.

Zoning Exercise of Powers

During the adoption or amendment of a zoning ordinance or county resolution, or an approval of a platting/replatting of/or a development, a city or county must notify any military installation within its boundary limits or extraterritorial zoning jurisdiction. All notifications shall be delivered by the planning board to the military installation, at least 10 days before the proposal meeting

Nebraska Local Jurisdiction Planning Tools

The planning tools used by the Study Area jurisdictions were analyzed and categorized as permanent, semi-permanent, or conditional. In Nebraska, as in many other states, cities and counties may exercise land use and development regulatory authority. Cities and counties in Nebraska are legally required by statute to adopt general plans.

Building Codes

Building codes are intended to regulate building construction, materials, alteration and occupancy to ensure health, safety and welfare. Building codes can regulate building construction such that it is compatible with military operations, including sound attenuation for residences within applicable noise zones. Building codes, similar to other regulatory tools, are considered semi-permanent.

Annexation

Limits of a city are determined by the council of that city and may go through an annexation approval process to extend the limits as deemed necessary for future growth. The city council must provide the general plan with information stating the need for the proposed annexation and its land use.

Subdivision Regulations

While subdivision regulations typically define the standards, procedures, and other requirements for land division, they can also help to prevent or limit future encroachment into an installation or adjacent operational areas by specifying allowable types of infrastructure improvements associated with a subdivision, such as street lights. Subdivision regulations can be used as a foundation to ensure mission sustainability, particularly with dark sky provisions and development density.

4.4. State of Nebraska Departments

Nebraska Department of Environmental Quality

The Nebraska Department of Environmental Quality (NDEQ) was established after the Nebraska Environmental Protection Act in 1971.

The NDEQ is responsible for protecting, sustaining, and improving the environmental resources within the State of Nebraska. The department oversees numerous advisory councils; formulates policies on air pollution, clean water, oil resources, solid waste treatment, wastewater treatment, and water pollution; and coordinates with intergovernmental agencies and local businesses. The NDEQ is also responsible for planning, prevention, and assisting with environmental issues throughout the state and is responsible for data collection, plan development, and public engagement to carry out measures to protect environmental quality. The agency is also responsible for the enforcement of state and federal environmental regulations and works with military installations to ensure compliance.

Nebraska Department of Natural Resources

The Nebraska Department of Natural Resources (NDNR) provides guidance to balance the demands of natural resources and assesses the impacts for multiple governmental entities on topics such as water planning and integrated management, surface water, groundwater, floodplain management, dam safety, field offices, compacts, decrees and interstate water agreements, and natural resources.

The NDNR oversees all ground and surface water programs for GTS. These guidelines are important for GTS and its missions due to the sites natural resource constraints.

Nebraska Department of Roads

Nebraska Department of Roads is the state transportation agency responsible for planning, construction, maintenance, and regional coordination of Nebraska's roadway infrastructure, including airports, highways, and railways. Interstate 80 runs approximately 20 miles north of the Study Area, while several other highways pass through the City of Hastings, just northwest of the GTS, including Highways 6, 34, and 281.

Nebraska Forest Service

The Nebraska Forest Service (NFS) was established due to the need for forest protection and care. NFS provides guidance for tree harvesting and wildfire prevention throughout Nebraska. The NFS established the Forest Stewardship Management Plan, which provides assistance by developing comprehensive plans for landowners on how to manage the forests near or on their properties.

GTS has adopted a forestry management plan due to the need to protect the 197 acres of wooded areas on the site. The plan was designed to guide the activities and objectives for GTS and to improve the site through balanced environmental stability.

Additionally, the NFS has requested assistance from the Nebraska National Guard during multiple wildfire occasions. Due to these events the NFS established a wildland fire management plan as a portion of the INRMP. The NSF provides soldiers with forest wildland fire training to better protect the surrounding communities.

Nebraska Game and Parks Commission

The Nebraska Game and Parks Commission (NGPC) develops protocols when dealing with a wildlife issue that may encroach onto GTS and the surrounding communities. This includes activities such as annual deer hunting, as well as various other outdoor activities that may interfere with local wildlife. The Commission's efforts are to develop goals and objectives to address applicable policies and programs aiming to benefit the public's understanding and cooperation with these wildlife issues. Some of the goals of the commission include:

- providing opportunities to quality outdoor programs for the public, and
- establishing and enhancing recreational opportunities.

Additionally the Commission has established a Wildlife Damage Control Doctrine which identifies problems near properties that may threaten communities. Through consistent monitoring and hunting permits, improvements to the area can be established.

Nebraska Historic Preservation Office

As a result of the National Historic Preservation Act of 1966, Nebraska appointed a SHPO to manage the preservation efforts throughout the state. Within Nebraska, the director of the Nebraska State Historical Society serves as the SHPO. The State Historic Preservation Office is a division of the Nebraska State Historical Society. The State Historic Preservation Office mission is to promote, preserve and enhance the states cultural resources.

4.5. Adams County

Land Use Plan

Adams County understands the need to encourage development among the rural areas and has developed a land use plan to specify placements for all types of development to minimize any conflicting land uses.

Presented in the Adams County Land Use Plan (ACLUP)is the County Land Use Management Policy (CLUMP), which identifies the existing and future land uses and market demands so that a long range management policy could act as a guide for all future development. The purpose of the CLUMP is to establish a balance between the urban and non-urban demands while protecting the county's service responsibilities and agricultural production. The management policy consists of three study policy areas, including, Urban Reserve, Traditional Development, and Agricultural Preservation. The CLUMP policy does not include standards that would protect GTS and its mission critical activities from

encroachment, but should be identified for future development.

Agricultural production and livestock operations make up most of the land uses that exist throughout the county. Central areas of Adams County, the City of Hastings and Village of Juniata have been under the most growth pressure. These areas consist mostly of rural residential with the greatest density around Hastings' ETJ. With Hastings having a two-mile ETJ and the villages with one, the land use plan suggests to implement buffers along these perimeters, which can help to protect GTS.

Subdivision Regulations

Updated in 2010, the ordinance outlines requirements for orderly development and coordination of infrastructure services to properties.

Adams County's Subdivision Ordinance does not include specific direction that would protect GTS and mission-critical activities from encroachment.

Zoning Resolution

The purpose of the zoning resolution is to regulate and restrict the following development:

- location, height, bulk, number of stories, size of buildings and other structures, including tents, cabins, house trailers, and automobile trailers,
- the percentage of lot areas which may be occupied, building setback lines,
- size of yards, courts, and other open spaces,
- the density of population,
- the uses of buildings, and
- the uses of the land for agriculture, forestry, recreation, residence, industry, and trade, after considering factors relating to soil conservation, water supply conservation, surface water drainage and removal, or other uses.

The identified goal of the resolution is to divide the county into districts of such number, shape, and area as may be best suited to carry out the purposes to regulate, restrict, or prohibit the erection, construction, reconstruction, alteration or use of non-farm buildings or structures, and the use, conditions of use or occupancy of land in the unincorporated areas of the county. The Adams County Zoning Resolution identifies 19 districts within the county.

Building Codes

A copy of the Adams County Building Codes was not available to review at the time the Greenlief Training Site JLUS was written.

4.6. City of Hastings

Comprehensive Plan

The current City of Hastings Comprehensive Plan was adopted in 2009 with an array of topics, including transportation, water, the environment, mobility, development, future land use, growth, economic development, and more. Hastings values the protection of the natural environment and cultural activities that take place among the communities. By preserving these areas Hastings is able to provide its community with a strong small town character through the history that defined it.

The comprehensive plan is divided into three elements, the built, natural and human environments, all of which have guiding principles that reflect the vision for the future development of Hastings. With 26 percent of Hastings land use as agricultural, it is important for growth to occur strategically as stated in the Future Land Use Goal FLU.1, to "Create an orderly, efficient and supportive arrangement of land uses within Hastings". Policy 1.1 of the Future Land Use Goal states to "implement zoning and development that is consistent with the future land use map".

Other goals include Growth Goal G.1, which describes the city's obligation to protect the natural and agricultural resources that support the rural character of Hastings by implementing Growth Goal Policies 1.1 to "promote cluster development in rural areas that protect natural resources in and around Hastings", and 1.5 to "strategically annex land adjacent to the current Hastings city limits that is necessary to accommodate proposed growth and development".

While the City of Hastings Growth Policy does include language that seeks to protect, rural, urban, agricultural, and open space development, there is no specific language that relates to GTS.

Within the comprehensive plan, Hastings recognizes the need to encourage neighborhood identity by establishing formal neighborhood association programs. Policy 1.2 states the need to "establish a line of communication (e-mail list, website, etc.) between the City and the neighborhoods to inform each other of activities within or adjacent to the neighborhoods". This policy, even though it does not directly include GTS, still establishes formal communication between city officials and the citizens of Hastings which could be expanded upon to protect future missions and operations of GTS.

Additionally, the comprehensive plan established a goal involving development of wind energy systems for the city. Policies for wind development state the need to "amend city zoning and codes to regulate appropriate use of individual renewable energy sources". It is important that Hastings recognizes the need to regulate wind development to help ensure no incompatible development within proximity to GTS is established.

Annexation

Hastings is able to establish goals of the community's growth through annexation of land that surrounds the city through annexation. Policy G.1-5 of Growth Goal 1 states to "strategically annex land adjacent to the current Hastings city limits that is necessary to accommodate proposed growth and development". Hastings can annex land within its ETJ through an approval process.

Subdivision Regulations

The current subdivision regulations for the City of Hastings outline requirements for orderly development and coordination of infrastructure services to properties. These terms apply to all land within corporate city limits and all unincorporated land within the ETJ. The regulations encourage city staff and developers to work cooperatively during the subdivision approval process, ensuring that all requirements, including zoning, road improvement standards, and mitigation of off-site impacts, are adequately addressed. During this process, potential site problems, including circumstances unique to a specific site not anticipated by subdivision or zoning regulations, are addressed.

Subdivision regulations can help to protect GTS from incompatible development early in the development process. However, the subdivision ordinance does not specifically call out protections for GTS when subdividing land within the installation proximity.

Zoning Ordinance

The city's Zoning Ordinance provides regulation of development within the city and requires conformance with the system of available services. Though there are no compatibility requirements for the areas nearest to GTS, Hastings does designate agricultural districts for lands outside the corporate city limits and within the two-mile ETJ. This land use is subject to change as urban development for Hastings continues to expand.

Building Codes

City of Hastings Building Code, Chapter 28 through 31 details the city's building code, amended through 2010. This chapter describes that the City of Hastings has adopted the following building codes:

- 2009 International Mechanical Code
- 2009 International Building Code
- 2009 International Existing Building Code
- 2009 International Plumbing Code
- 2003 International Energy Conservation Code
- 2006 International Residential Code
- 2008 National Electric Code
- 2009 National Fuel Gas Code

These current building codes provide basic construction standards for structures and systems.

4.7. Clay County

Clay County Comprehensive Plan

A copy of the Clay County Comprehensive Plan was not available to review at the time the Greenlief Training Site JLUS was written.

Clay County Zoning Resolution

Clay County's Zoning Resolution provides protection and balanced development for the community's health, safety and general welfare. It has objectives stating "To foster a harmonious, convenient, workable relationship among local land uses…" to "ensure that public and private lands ultimately are used for the purposes which are most appropriate", and "to prevent excessive population densities and overcrowding of the land with structures". All of these objectives will help Clay County in respects to compatible development with GTS. In effort to maintain harmony among land uses, the agricultural district requires a minimum of three-acre parcels.

Subdivision Regulations

Clay County dissolved its subdivision regulations in 2006.

Building Codes

Clay County has not adopted any building codes.

4.8. Village of Glenvil

The village of Glenvil utilizes Clay County's planning documents as guidance for land use and development. Glenvil adopted Planning and Zoning Regulations and official maps in May 2006, which are based on Clay County planning documents. However, this document was not available for review at the time the JLUS was written.

4.9. Other References

Resources

In the interest of land use compatibility between the military and the local community, the DOD Office of Economic Adjustment (OEA) and other public interest groups, such as the National Association of Counties (NACo), have prepared educational documents and videos to educate and inform the public about encroachment issues and methods to address existing or future compatibility concerns. Five resources that have been published to inform the public on land use compatibility listed below.

Guides

The Practical Guide to Compatible Civilian Development near Military Installations (July 2007), OEA

This guide offers general information on community development and civilian encroachment issues. The guide can be found at: http://www.oea.gov/.

Joint Land Use Study Program Guidance Manual (November 2006)

This manual provides guidance on the JLUS program, process, and identifies efforts to support compatible development. This manual can be obtained on the OEA internet site at the following address: http://www.oea.gov/.

Encouraging Compatible Land Use between Local Governments and Military Installations: A Best Practices Guide (April 2007), NACo

This guidebook presents case studies of best practices between the military and communities through communication, regulatory approaches, and Joint Land Use Studies. The guide can be accessed on the NACo internet site at the following address: http://www.naco.org/.

Videos

The Base Next Door: Community Planning and the Joint Land Use Study Program, OEA

This informative video discusses the issue of encroachment near military installations as urban development occurs within the vicinity.

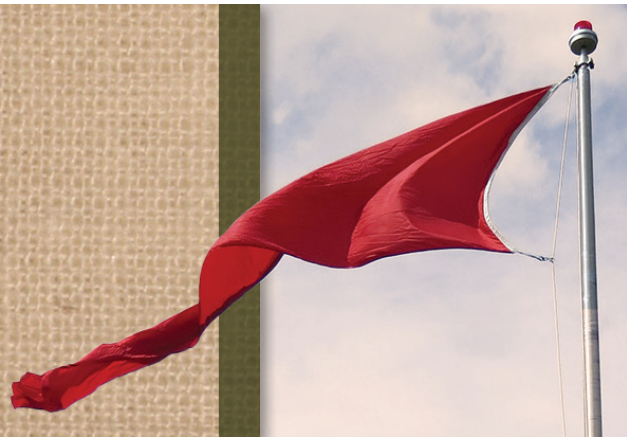
Managing Growth, Communities Respond, OEA

This video highlights the lessons learned from three communities (Kitsap Naval Base in Bangor, Washington; Fort Drum in Jefferson County, New York; and Fort Leonard Wood in Pulaski County, Missouri) that have successful programs for managing growth near their respective military installations.

Please see the next page.

Greenlief TRAINING SITE
JOINT LAND USE STUDY

5 COMPATIBILITY ASSESSMENT



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Compatibility

Compatibility, in relation to military readiness, can be defined as achieving a balance between the needs and interests of a military installation, including its operational areas, and the communities that surround it. The goal of compatibility planning is to promote an environment where both community and military entities communicate, coordinate, and implement mutually supportive actions that allow both to achieve their respective objectives.

A number of factors assist in determining whether community and military plans, programs, and activities are compatible or in conflict with joint land uses such as community activities and military installations. For this Joint Land Use Study (JLUS), the 25 compatibility factors below were reviewed to identify, determine, and establish a set of key JLUS compatibility issues. These compatibility factors are listed on the following page.

An action undertaken by either the military or community that minimizes, hinders or presents an obstacle to the action of the other is characterized as an issue. Issues arising on the part of either or both the military and community are grouped according to the relevant factor and listed in this chapter. For each identified issue, a compatibility assessment is provided discussing the nature and cause or source of the issue followed by applicable existing tools currently used or that may be used to mitigate encroachment or prevent the emergence of encroachment in the future including an assessment of their effectiveness.

COMPATIBILITY FACTORS			
AQ	Air Quality	LAS	Land / Air / Sea Spaces
AT	Anti-Terrorism / Force Protection	LU	Land Use
BIO	Biological Resources	LEG	Legislative Initiatives
CA	Climate Adaptation	LG	Light and Glare
COM	Coordination / Communication	MAR	Marine Environments
CR	Cultural Resources	NOI	Noise
DSS	Dust / Smoke / Steam	PT	Public Trespassing
ED	Energy Development	RC	Roadway Capacity
FSC	Frequency Spectrum Capacity	SA	Safety Zones
FSI	Frequency Spectrum Impedance / Interference	SNR	Scarce Natural Resources
		VO	Vertical Obstructions
HA	Housing Availability	V	Vibration
IE	Infrastructure Extensions	WQQ	Water Quality / Quantity

Methodology and Evaluation

The methodology for the Greenlief Training Site (GTS) JLUS consisted of a comprehensive and inclusive discovery process to identify key stakeholder issues associated with the compatibility factors. At the initial Policy Committee (PC) and Working Group (WG) workshops and public meetings, stakeholders were asked to identify the location and type of issue in conjunction with compatibility factors they thought existed today or could occur in the future. As a part of the evaluation phase, the PC, WG, and the public examined and prioritized the extent of existing and potential future compatibility issues that could impact land within or near the Study Area. Other factors and associated issues were analyzed based on available information and similarity with other community JLUS experiences around the country.

The evaluation of issues directly and indirectly affects the selection and inclusion of recommended strategies in the JLUS Report. When reviewing the assessment information in this chapter, it is important to note the following:

- This chapter provides a technical background on the factors and issues discussed based on available information. The intent is to provide an adequate context for awareness, education, and development of JLUS recommendations. It is not designed or intended to be utilized as an exhaustive technical evaluation of existing or future conditions within the Study Area.
- Of the 25 compatibility factors considered, several were determined to be inapplicable to this JLUS:
  - Air Quality
  - Anti-Terrorism / Force Protection
  - Biological Resources
  - Climate Adaptation
  - Frequency Spectrum Capacity
  - Frequency Spectrum Interference
  - Housing Availability
  - Legislative Initiatives
  - Marine Environments
  - Scarce Natural Resources
- Each issue has an accompanying set of existing tools. These existing tools are meant to show the reader what is currently in place that affects the specific compatibility issue. Existing tools will not always aid compatibility but can offer a certain relevancy that can be built off of to help create strategies for future implementation.

The following pages discuss the issues and existing tools by alphabetized factor.

5.1 Coordination / Communication

Interagency coordination and communication relates to the level of interaction on compatibility issues among military installations, jurisdictions, land and resource management agencies, and conservation authorities. Interagency communication serves the general welfare by promoting a more comprehensive planning process inclusive of all affected stakeholders. Interagency coordination also seeks to develop and include mutually beneficial policies for both communities and the military in local planning documents, such as comprehensive plans. Coordination and communication is a foundational compatibility factor that must be recognized to ensure successful balance and / or compromise between community and military needs and interests.

Compatibility Assessment

COM-1	**Improved communication from the Nebraska Army National Guard** There is a desire for improved communication procedures and awareness of military activities that occur at GTS to be relayed to the neighboring communities. Communities want to know when atypical activities will occur at GTS.

Jurisdictions recognize the importance of GTS and its role in enhancing the economy of the surrounding areas. However, the noise, traffic, and other operations at GTS can come as a surprise to civilians if they are not aware of range activities.

Mission operations at GTS include live fire activity along with other explosive activities. Some aircraft operations are also conducted at GTS. These activities cause noise that can potentially extend outside of the installation and impact the surrounding communities. There is a lack of awareness about training schedules and when noise will occur, which can increase annoyance and cause complaints. Noise that may extend off the installation is produced by operations that include land-based exercises, such as, live-fire and demolition training when using explosives, and air-based exercises, such as, cargo-drop training involving rotary wing aircrafts. The time of day or day of the week when the exercise is conducted can affect the perceived noise level heard outside GTS.

During the JLUS data collection and interview process, the committees and several members of the public expressed concern that they were not made aware of changes or activities occurring at GTS that would impact the community. Lack of notification has increased concerns about mission changes, loud noise events, and other impacts that could affect the neighboring communities. Additionally, a survey conducted at a public meeting found that most attendees did not know how to contact GTS personnel regarding concerns they had with operations. Currently there is no formal communication between the Nebraska Army National Guard (NEARNG) and the residents near GTS.

Greenlief JLUS Committee meeting, April 2014

Existing Tools

Social Media

The Nebraska National Guard run Facebook, Twitter, Flickr, and YouTube accounts to reach the general public. The accounts are used to announce achievements, news stories, and special events throughout the state. The NEARNG has over 80 units and detachments that are represented by the content. Posts are not specific to GTS and do not alert the community of future training activities. GTS does not

utilize any social media platforms to connect with the outside community.

Nebraska National Guard Website

Information pertaining to GTS can be found on the Nebraska National Guard website. The information can be difficult to navigate to, which is located under a resource center link and then under a Nebraska training sites link. The page provides contact information for ammunition supply operations, base operations, base scheduler, range control cell, and range operations. The page also includes range documents and scheduling.

Findings

- Without notification of the regular activities at GTS, new residents, business owners, and visitors to the area may be unaware of the operations and create an increase in complaints.

COM-2	Notification on unusual training events The NEARNG should provide better notification to nearby residents and landowners when unusual activities occur at GTS, such as explosive ordnance disposal and police car training, which involves the use of sirens.

Training at GTS includes the use of explosives, firearms, drones, and sirens, which could be mistaken as a real emergency situation. Residents nearby GTS who are unfamiliar with operations have the potential to be alarmed by the unusual training activity. Noise occurring from range testing may cause a disturbance to the residents and landowners causing an increase in complaints to and about GTS operations. Local jurisdictions need to be notified prior to testing in order to enhance awareness and reduce community concerns.

The training can be sporadically scheduled and often takes place in the late afternoon or evening hours, on the weekends, or during the summer months. Training may include longer than normal events and may have noise impacts greater than typical training events. When training is unusual or unexpected, nearby residents can be caught off guard increasing annoyance and causing complaints, which could potentially threaten the operations and mission at GTS.

Real estate disclosures are used in some Nebraska jurisdictions to notify potential homebuyers of conditions affecting the property that they should be aware prior to its purchase. However, real estate disclosures do not require sellers specify all the range impacts such as noise and potential hazard risks. Disclosure that a property is within a community shared with a military installation or that a property is within the GTS operational footprint is not mandated by state law.

Existing Tools

City of Hastings Comprehensive Plan

One of the Neighborhood and Housing Goals in the City of Hasting Comprehensive Plan is the creation of formal neighborhood associations. The purpose of the program is to establish formal communication between the communities and adjacent areas in the city. While the potential program is intended to improve communication, GTS is not directly included in the association or any of the associated coordination.

Findings

- Training activities may be mistaken as an emergency situation if the surrounding area is not notified.
- The neighborhood program mentioned within the City of Hastings Comprehensive Plan does not include any coordination with GTS.
- State law does not require real estate disclosures to include if a property is nearby a military installation.

COM-3	Information and training exchange for local agencies The military is trained and provided with the current information regarding anti-terrorism and force protection. To ensure local agencies are coordinated and respond appropriately to terrorist threats, guidance and information should be provided to local law enforcement agencies as well as other government agencies. There needs to be adequate information coordinated with local fire departments on ammunition supply points at Greenlief Training Site.

According to the Joint Publication 1-02, the DOD's Dictionary of Military and Associated Terms, Anti-terrorism (AT) defined are defensive measures used to reduce the vulnerability of individuals and property to terrorist acts, to include limited response and containment by local military and civilian forces. These measures include a variety of programs, including education and training to ensure our nation's defense and its partners are adequately equipped to recognize threats and respond to and manage them in an appropriate manner.

The purpose of AT education and training is to train military and civilian personnel in key components of AT education, they are:

- Awareness of surroundings,
- Recognize potential threats to avoid and/or respond appropriately.

It is required for all military personnel, DOD civilians and contractors to receive training on AT standards. Training of AT generally covers critical thinking or identification of a threat, the magnitude, capability, plan and intent of the threat, as well as a possible course of action. For the purposes of this JLUS, a concern about a complementary response from local law enforcement and emergency response teams in the case of an AT threat is desired to ensure maximum resources are deployed to an event including maintaining security of munitions storage capabilities (ammunition supply point – ASP) at GTS.

In addition to maintaining munitions storage security, there is a concern about the amount and type of ordnance that is used and trained with at GTS due to potential issues associated with accidental and / or intentional detonation. The primary concern is not only maintaining adequate security of such assets but also disaster / emergency response associated with an accident or purposeful event.

Existing Tools

Department of Defense Instruction, 2000.26: Suspicious Activity Reporting

The Department of Defense Instruction (DODI 2000.26): Suspicious Activity Reporting (SAR) establishes guidance for reporting suspicious activity on installations. This is an internal systems referred to as *eGuardian* that will serve as the DOD's unclassified system for reporting suspicious activities and enable enhanced force protection.

This *eGuardian* system is a good example of an integrated software accessible to many agencies / departments, regardless of level of government that establishes access levels. The Federal Bureau of Investigation (FBI) has ultimate access to this system, and there are procedures for gaining access and using the *eGuardian* system. Additionally, new users are required to complete a training for using the system within 30 days of gaining access to the system; otherwise their access will be terminated by the FBI. This is a good example of early reporting of strange activity where the information is shared throughout the military and federal criminal investigation departments. However, this is a good internal tool for military departments, it does not address the interface between military departments and local law enforcement agencies and emergency response teams.

Source: Department of Defense Instruction, 2000.26, September 2014, Suspicious Activity Reporting.

State and Local Anti-Terrorism Training Program

The State and Local Anti-Terrorism Training (SLATT) program provides on-site and online AT training for state and local law enforcement services. Funded by the United States (US) Department of Justice and Bureau of Justice Assistance, the program has been providing training and AT insight since 1966. State and local law enforcement agencies have partnered with SLATT in order to train individuals on criminal intelligence. Some of the training topics provided include:

- Domestic and international terrorism,
- Paths to violent criminal extremism,
- Special-interest/anarchist groups, and
- Terrorism overview.

While the SLATT program appears to be a tool that provides AT education and training for local law enforcement and emergency response teams, the SLATT program is only offered in New Mexico and Indiana limiting its reach and authority to other geographies.

Source: https://www.slatt.org/SLATT

Army Regulation 420-1: Facilities Engineering – Army Facilities Management

Army Regulation 420-1 (AR 420-1) authorizes the Garrison Commander for Army and National Installations to use alternative methods and sources to manage the facility, especially in the case of an emergency such as a fire caused by a detonation. These alternative resources and methods include but are not limited to:

- Partnerships, contracts, and mutual aid agreements with municipalities or other government agencies, including United States Army Corps of Engineers organizations.

This Army Regulation is a good tool to implement with local jurisdictions to ensure appropriate and adequate resources are utilized in the incident of a fire or accident caused by a detonation of ordnance at GTS as it is typical of National Guard installations not having enough permanent staff to support such emergency events. More importantly, these agreements delineate responsibilities, communication / coordination protocol, and reimbursement methods for such shared services. At the time this report was written, it was unknown whether GTS had employed any mutual or automatic aid agreements with the local jurisdictions.

Source: Army Regulation 420-1, February 2008. Facilities Engineering – Army Facilities Management.

Report of the DOD Independent Review – Protecting the Force: Lessons from Fort Hood

The Report of the DOD Independent Review – Protecting the Force: Lessons Learned from Fort Hood identified that Mutual / Automatic Aid Agreements were executed at Fort Hood; however, they were not current. These aid agreements assist the military and the community in responding to emergencies and threats and can be used effectively is kept current. Mutual aid agreements are required to comply with certain standards such as The Joint Commission for medical facilities in order for the agreement to be established.

While these agreements were executed, they were not tracked nor were they exercised sufficiently to ensure currency and effectiveness. These agreements can be effective is drafted, implemented, and maintained appropriately.

Findings

- It is unknown if NEARNG and local fire departments share education and training materials to respond to an incident at the ASP in the event of an accident or attack.
- There is Army Regulation established that authorizes GTS to develop a mutual response (Mutual or Automatic Aid Agreement) to an emergency or attack.
- The SLATT program is limited in reach as it has only been implemented in New Mexico and Indiana.
- There is precedent established for developing internal programs that assist law enforcement agencies with recognizing and reporting suspicious activity.

- Mutual / Automatic aid agreements can be effective in responding to and managing disaster if kept current.

COM-4	Communication between NEARNG and local communities when new projects occur There is a need to establish better communication between the NEARNG and local communities to communicate when new development projects occur.

When new development projects occur within a jurisdiction it is often the case that military installations are not consulted in a timely manner. While the National Environmental Policy Act (NEPA) requires notification, this should not be the only method of communication and coordination on proposed projects.

There are no general plan policies or inter-local agreements delineating points-of-contact for the base and communities for matters concerning interagency coordination and communication, e.g., proposed development applications, coordination with emergency response providers, or notification procedures in the incidence of found military equipment or unexploded ordnance (UXO). The counties have regulations for notifying property owners and individuals or stakeholders with a recorded interest of planning projects within unincorporated areas.

Identifying and involving all potential affected jurisdictions, agencies, and decision makers early in the process will help minimize the potential for incompatible development around GTS. Although the City of Hastings, counties of Adams and Clay, and Township of Glenvil have established a collaborative relationship with GTS, the parties do not have formal communication or review and response procedures.

This becomes an issue when key positions are vacated due to voluntary leave, retirement, or replacement. When this happens and due to the lack of a continuity plan or formal interagency communication protocol, coordination of planning matters can become fragmented and ultimately result in missed opportunities for the Nebraska National Guard to provide critical feedback. The lack of appropriate coordination procedures could lead to encroachment adversely impacting the GTS mission.

Later described in Issue-LU2, there are numerous areas available for military and non-military development. Collaboration with agencies is needed to improve awareness about priorities, needs, and procedures. Incompatible development near GTS could include zoning districts that allow high density residential or commercial and building regulations with no maximum height restrictions or sound attenuation standards.

Existing Tools

Nebraska Code § 23-114.06 (2014)

Chapter 23 of the 2014 Nebraska Revised Statues includes the county planning commission notice to military installations. When a county planning commission is considering the adoption or amendment of a zoning ordinance or the platting or replatting of a development, the commission must notify any military installation in the county. However, to receive the notification, the installation must submit a written request to the commission to receive notifications. If the commission receives the request, the notification must be delivered at least ten days prior to the commission meeting which the proposal will be considered.

The tool allows the installations to gather information to help determine with the county if the development has the potential to impact the installations missions and operations.

Findings

- The county planning commission is in charge of contacting the military installation when new development is proposed, but it does not require any coordination with cities, towns, or villages.

COM-5	Greenlief Training Site may not be notified when a conditional use permit is proposed When a conditional use permit is proposed for development in Adams and Clay counties, notification is sent to all landowners within one mile of the proposed development property. In the case of Greenlief Training Site, this notification would go to the Army Corps of Engineers, Omaha District as the property owner and may not be sent to the NEARNG or Greenlief Training Site in a timely manner.

A Conditional Use Permit (CUP) allows a jurisdiction to consider allowing a special land use that is not permitted by right in the zoning districts. Before any CUP is approved it must go through a public hearing process where it is then reviewed by city council and planning commission members to confirm that the permit still satisfies all other requirements.

Conditional use permits are required to meet specific conditions, but are able to give flexibility, that originally could be found incompatible, by allowing compatible uses within that district. CUP's however have the potential to cause adverse impacts on adjacent land uses if uncoordinated. Allowing extended heights of buildings, towers, or windmills can impact the airspace and flight operations for the base.

Adequate and timely communication of an application for a conditional use permit is vital for the protection of the GTS mission and the agencies and organizations engaged in planning and resource management within the Study Area. It is important for military installations to be notified of a change in land use. Planning commissions and governing bodies are not formally required to directly notifying GTS whenever a conditional use permit is proposed.

Existing Tools

Nebraska Revised Statutes

Nebraska law, through the Nebraska Revised Statutes, has several mechanisms in place for the notification of military installations on certain types of proposed land use changes. A summary of them is provided below.

14-407. Zoning; exercise of powers; planning board or official; notice to military installation.
A city of the metropolitan class shall exercise the powers conferred by sections 14-401 to 14-418 through such appropriate planning board or official as exists in such city.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the city shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning board shall deliver the notification to the military installation at least ten days prior to the meeting of the planning board at which the proposal is to be considered.

15-1103. Planning director; prepare comprehensive plan; review by commission; city council; adopt or amend plan; notice to military installation.
The planning director shall be responsible for preparing the comprehensive plan and amendments and extensions thereto and for submitting such plans and modifications to the city planning commission for its consideration and action. The commission shall review such plans and modifications and those which the city council may suggest and, after holding at least one public hearing on each proposed action, shall provide its recommendations to the city council within a reasonable period of time. The city council shall review the recommendations of the planning commission and, after at least one public hearing on each proposed action, shall adopt or reject such plans as submitted, except that the city council may, by an affirmative vote of at least five members of the city council, adopt a plan

or amendments to the proposed plan different from that recommended by the planning commission.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the planning director shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning director shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

19-923. Municipality; notify board of education; when; notice to military installation.
(1) In order to provide for orderly school planning and development, a municipality considering the adoption or amendment of a zoning ordinance or approval of the platting or replatting of any development of real estate shall notify the board of education of each school district in which the real estate, or some part thereof, to be affected by such a proposal lies, of the next regular meeting of the planning commission at which such proposal is to be considered and shall submit a copy of the proposal to the board of education at least ten days prior to such meeting.

(2) When a municipality is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the municipality shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the municipality if the municipality has received a written request for such notification from the military installation. The municipality shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

(3) The provisions of this section shall not apply to zoning, rezoning, or approval of plats by any city of the metropolitan or primary class, which has adopted a comprehensive subdivision ordinance pursuant to sections 14-115 and 14-116, or Chapter 15, articles 9 and 11. Plats of subdivisions approved by the agent of a municipality designated pursuant to section 19-916 shall not be subject to the notice requirements in this section.

23-114.06. County planning commission; notice to military installation.
When a county planning commission appointed pursuant to section 23-114.01 is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the commission shall notify any military installation which is located within the county if the county has received a written request for such notification from the military installation. The county planning commission shall deliver the notification to the military installation at least ten days prior to the meeting of the county planning commission at which the proposal is to be considered.

Adams County Zoning Resolution

According to the Adams County Zoning Resolution, the conditional use permit process begins with a public hearing that takes place in front of the County Planning Commission, which requires a 10 public notice before the hearing. The commission then forwards a recommendation to the appropriate governing body. Another public hearing is held with the governing body, with 10 days' notice and written notice to property owners within 300 feet of the proposed conditional use. If a majority approval is reached, the permit is granted. Aside from the public notification, there is no direct coordination with GTS.

City of Hastings Zoning Code

The City of Hastings zoning code outlines the process for conditional use permits. First, a public hearing is held in front of the planning commission. Notice of the hearing is to be published no less than 10 days prior to the date of the public hearing. The planning commission then makes a recommendation for approval or denial or the application to the city council. The city council then holds another public hearing, with 10 days' public notice. The council then determines if the CUP is

approved or denied. GTS is not directly involved in the CUP process and only receives the public notice.

Clay County Zoning Resolution

The granting of a conditional use permit procedure includes a Planning Commission meeting, which requires at least a 10 day public notice. A copy of the notice is to be mailed to all property owners within 300 feet of the proposed location of the conditional use. The Commission after public hearing and review either recommends approval, denial, approval with conditions, or table the application to provide for further study and review. The general public is notified, but GTS is not directly informed.

Findings

- All of the jurisdictions hold public hearings before approving CUPs, which require a 10 day public notice.
- None of the jurisdictions require formal notification or coordination with GTS regarding CUPs.
- Lack of formal coordination can potentially create incompatible land uses, which could interfere with GTS activities.

COM-6	**Need communication for responding to disaster at Greenlief Training Site** There is currently good communication between Greenlief Training Site and local emergency management groups, but there is a need for improved coordination between these entities on how to respond if a disaster or accident were to occur at Greenlief Training Site.

Currently, the NEARNG and the Nebraska Emergency Management Agency (NEMA) coordinate with state and county agencies on emergency response procedures in the event of natural disasters and accidents. Local jurisdictions respond to emergencies using their county/city services unless their resources are unobtainable or inadequate to properly assist the situation in the event of a disaster or accident occurs within the community, region, or state. If additional and more-skilled resources are needed to manage a particular type of emergency, then there is a protocol that is followed by the local jurisdictions and state agencies to deploy resources. This protocol also delineates the procedures to deploy certain types of resources and reimbursement rates and procedures. However, it is this protocol between GTS and the local and / or state agencies that is lacking when there is an emergency that occurs on GTS. Shared resources, in the event of a fire, are not formally memorialized to ensure GTS has the appropriate resources to manage incidents that occur at GTS.

Existing Tools

Department of the Army Pamphlet 525-27, Army Emergency Management Program

The Department of the Army Pamphlet 525-27 (DA PAM 525-27), Army Emergency Management Program establishes the authority for every installation within the army including National Guard installations to prepare and develop an emergency management program (EMP) controlled and deployed by, in most cases, by the Garrison Commander. The DA PAM 525-27 provides instruction on various categories that must be addressed in an EMP. Such categories include but are not limited to the following:

- Risk assessment,
- Hazard assessment,
- Capabilities assessment
- Organizational structure, and
- Community profiles.

This instruction also authorizes the Garrison Commander to budget for an EMP to which the EMP budget would be addressed in the program.

Source: Department of the Army Pamphlet 525-27, September 2012. Military Operations: Army Emergency Management Operations.

Army Regulation 420-1: Facilities Engineering – Army Facilities Management

Army Regulation 420-1 (AR 420-1) authorizes the Garrison Commander for Army and National Installations to use alternative methods and sources to manage the facility, especially in the case of an emergency such as a fire. These alternative resources and methods include but are not limited to:

- Rescheduling or deferring work of lower priority,
- Borrowing labor from, or transferring work to, another work center, and
- Partnerships, contracts, and mutual aid agreements with municipalities or other government agencies, including United States Army Corps of Engineers organizations.

This Army Regulation is a good tool to implement with local jurisdictions to ensure appropriate and adequate resources are utilized in the incident of a fire at GTS as it is typical of National Guard installations not having enough permanent staff to support such emergency events. More importantly, these agreements delineate responsibilities, communication / coordination protocol, and reimbursement methods for such shared services.

At the time this report was written, it was unknown whether GTS had employed any mutual or automatic aid agreements with the local jurisdictions.

Source: Army Regulation 420-1, February 2008. Facilities Engineering – Army Facilities Management.

Findings

- DA PAM 525-27 provides the authority for GTS to prepare and develop an EMP that identifies all the necessary resources needed to respond and manage an emergency; however, it is unknown if GTS has implemented this authority.
- AR 420-1 provides the authority for GTS to develop and implement partnerships to provide additional support for emergencies such as fires; however, it is unknown whether GTS has implemented this authority.

Please see the next page.

5.2 Cultural Resources

Cultural resources are an aspect of a cultural system that is valued by or significantly representative of a culture or contain significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as artifacts, records, districts, pre-contact archaeological sites, historic archaeological sites, buildings, structures, and objects. Historic properties are cultural resources that are eligible or listed on the National Register of Historic Places. Cultural resources may prevent development, require development constraints, or require special access by Native American tribal governments or other authorities.

The protection of prehistoric and historic resources is provided through the National Historic Preservation Act (NHPA) as a means to protect historical and cultural items within the United States. The NHPA addresses the preservation of cultural resources including cultural landscapes, traditional cultural properties, sacred sites, and historic and archaeological resources. Documentation of cultural resources and NHPA compliance activities must be coordinated through the State Historic Preservation Office (SHPO).

Cultural resources typically take one of four forms: archaeological, historical, architectural, or traditional cultural properties. Archaeological resources are considered material remains of past human life or activities that provide scientific or social insight into past human cultures. Architectural resources are structures including standing buildings, bridges, dams, canals, etc. of historical, architectural, or engineering significance. Traditional cultural properties are places where associations with cultural practices or beliefs of a living community occurred in the past or are presently occurring.

Special considerations must be made for any development or expansion of military mission activities within areas of cultural significance or sensitivity.

Compatibility Assessment

CR-1	**Old landfill in Glenvil** There is an old landfill that was used by the Village of Glenvil, which is located within the southern boundary of Greenlief Training Site that may include cultural or historical items.

The Village of Glenvil was founded in 1873 in the area southeast of GTS's current location. It was established when the St. Joseph and Denver City Railroad reached to this point in Nebraska. The village is less than 0.2 square miles in area, and is considered to be a part of the Hastings Micropolitan Statistical Area (which consists of both communities in Adams and Clay Counties).

Aside from the unregistered historic downtown area in Glenvil, the only remaining historical vestige of the Glenvil community is the landfill, which is located within the southern tip of GTS and is no longer operational. The landfill is currently owned by the US government, controlled by the Department of the Army, and licensed to the State of Nebraska. The landfill has decades' worth of debris which may include cultural and / or historic items and artifacts. Specific historic or cultural contents of the landfill are unknown. NEARNG has stated that land use of the landfill will be restricted to prevent disturbances in the area.

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- This issue is categorized as an awareness issue since it is primarily unaffected by military activity or operations at GTS.

- There were no existing tools for this issue which were relevant to the JLUS process.
- Specific contents of the landfill is unclear.
- The landfill is currently owned by the US government, controlled by the Department of the Army, and licensed to the State of Nebraska, and future land use of it is restricted to prevent disturbance of the area.

5.3 Dust, Smoke, and Steam

Dust results from the suspension of particulate matter in the air. Dust (and smoke) can be created by fire (controlled or prescribed burns, agricultural burning, and artillery exercises), ground disturbance (agricultural activities, military operations, grading), industrial activities, or other similar processes. Dust, smoke and steam are compatibility issues if sufficient in quantity to impact flight operations (such as reduced visibility or cause equipment damage).

Key Terms

Particulate Matter (PM). Particulate matter consists of fine metal, smoke, soot, and dust particles suspended in the air. Particulate Matter is measured by two sizes: Course particles (PM10), or particles between 2.5 and 10 micrometers in diameter in size, and fine particles (PM2.5), or particles less than 2.5 micrometers in diameter.

Technical Background

Particles of dust and other materials found in the air are referred to as particulate matter. The term PM-10 refers to particulate matter less than ten microns in size and more than 2.5 microns in size. At certain concentrations, this particulate matter can be harmful to humans and animals if inhaled causing strain on the heart and lungs which provide oxygen to the body. PM-10 can be caused by many activities, including driving on unpaved roads and surfaces, wind erosion from unpaved vacant lots, disruption of land from vehicle maneuvers, explosions, aircraft operations, and other earth-moving activities such as construction, demolition, and grading.

Compatibility Assessment

DSS-1	**Smoke from activities at Greenlief Training Site** Some instances have occurred in the past where smoke caused by explosive activities or other substances used in training on Greenlief Training Site have drifted off-base onto private property.

The GTS mission involves the use of ranges, helicopters, and other activities which generate dust and debris. Along with activities, most of the roads on the installation are unpaved, causing dust when driven on. The larger and faster the vehicle, the more dust it will create. In an effort to be a good neighbor, GTS should strive to prevent dust and debris from crossing the boundary.

Additionally, GTS permits nonmilitary users to utilize the installation for training activities. The local police departments have conducted these activities on GTS, and some have caused issues with the nearby residents. These training operations involve the use of tear gas, which is a chemical gas that can cause irritation to the eyes and lungs if inhaled. During one of the JLUS public workshops, farmers nearby the installation reported that they have had tear gas linger onto farms, interrupting activities and potentially harming the farm animals. They noted that this only occurred a couple times, and was not a common occurrence, but one that they noted as a concern.

Existing Tools

Title 129 Nebraska Air Quality Regulations, Chapter 32

Chapter 32 of the Nebraska Air Quality Regulations requires that proper action is taken to prevent dust from crossing property boundaries. The regulation applies to all individuals and businesses in Nebraska.

The chapter is also known as the fugitive dust regulation. Under this state regulation, GTS should take all reasonable and practical measure to prevent dust from leaving the installation.

Source: http://www.lincoln.ne.gov/city/health/environ/pollu/airregs/232.pdf

Findings

- Local police departments and GTS have not established any coordination or communication with local communities on tear gas activities.
- No mitigation plans have been established to prevent substances from leaving the installation.

5.4 Energy Development

Development of energy sources, including alternative energy sources (such as solar, wind, geothermal, or biofuels) could pose compatibility issues related to glare (solar energy), or vertical obstruction (wind generation).

The moving blades of a wind turbine create a Doppler effect that can interfere with radio transmissions between air traffic controllers and aircraft and other types of communications, such as satellites. Recent studies indicate that large numbers of wind turbines located between five and eight miles from a radar system can have a negative impact on the system and interfere with readings. The impacts on radar are increased with the height, number, and clustering of turbines. The greatest impact is caused by their location proximate to the radar system. Although research is still being conducted, it is not fully known how tall, large, or how many wind turbines must be present to compromise radar operations.

Relative to solar energy, solar facilities could cause substantial amounts of glare depending on their type, location, angle and direction, resulting in a reduction of a pilot's view, even at a very high altitude.

Key Terms

Alternative Energy. The term alternative energy is applied broadly to energy derived from nontraditional, renewable sources (e.g., solar, hydroelectric, wind).

Compatibility Assessment

ED-1	**Potential wind generation facilities in the region** There has been some discussion about the possibility of future windmill development in the region around Greenlief Training Site. Development of windmills could interfere with helicopter flight paths or alter bird flights that may redirect birds within helicopter flight routes. There is already a 1.7 megawatt wind turbine near Central Community College.

Wind energy is a growing interest in communities around the country. With wind turbines reaching heights of up to 500 feet, the height, numbers, and rotation of the turbines can cause a concern for nearby military installations. Due to the increase in wind development, local agencies and planning commissions need to be aware of the potential impacts the wind turbines have on a military installation. Wind turbines can potentially create vertical obstructions due to heights that often exceed several hundred feet for a commercial structure. Figure 5.4-1 illustrates the wind potential within the JLUS Study Area and the location of a wind turbine at Central Community College.

Generally, the installation of windmills on residential land is not a concern that would impact flight operations, provided they are not located within proximity to GTS helicopter flight paths.

Future commercial wind energy development presents possible threats to GTS:

- Vertical obstruction due to the heights of windmills which may impact helicopter flight routes.
- Moving blades of the windmill may interfere with bird flight paths in the area causing a potential increase in BASH incidents.

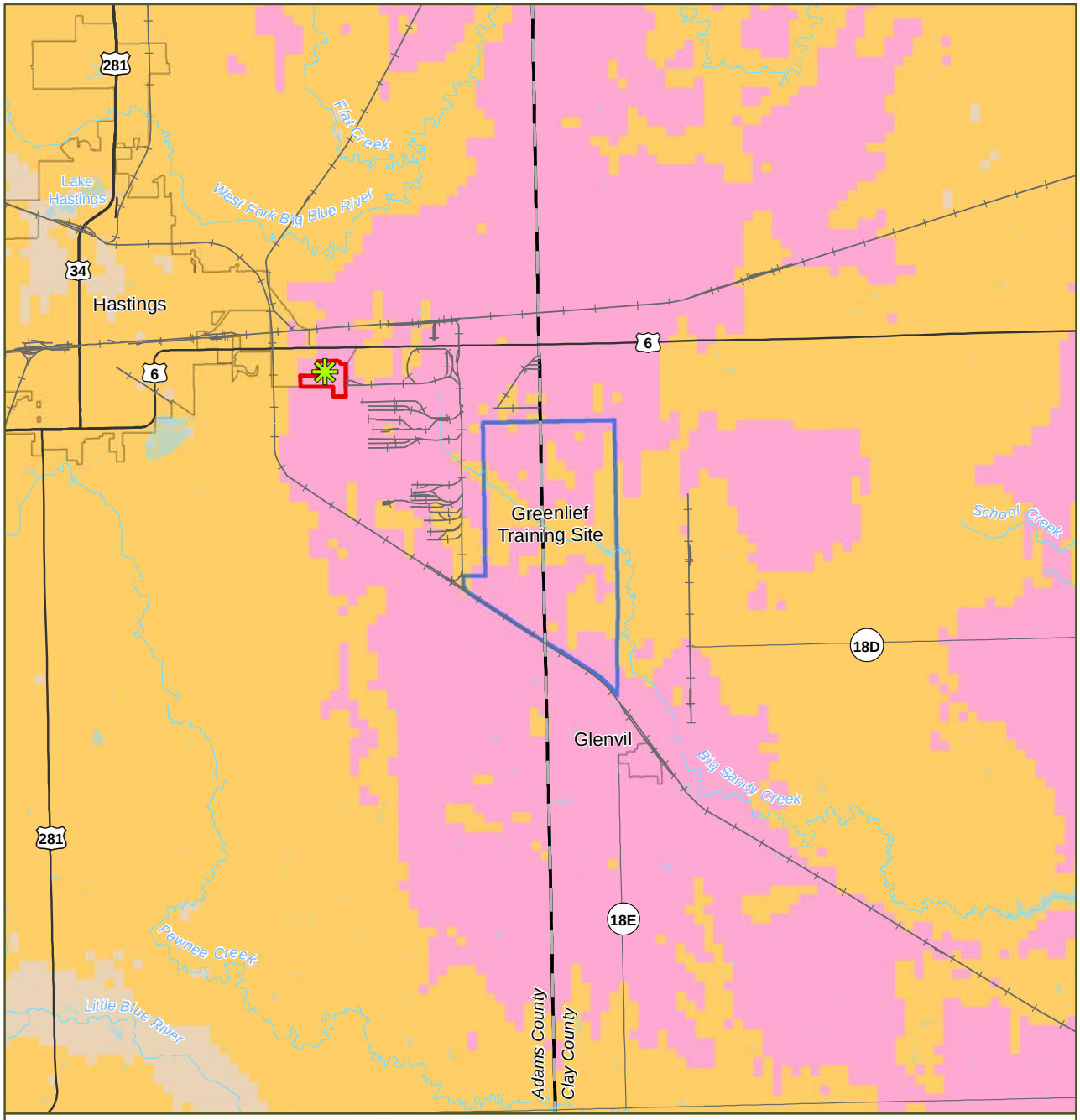


Figure 5.4-1
Wind Energy Potential Concerns

Nebraska community colleges have launched a $1.9 million dollar program in renewable energy courses that cover numerous sustainable topics, including wind energy development. Central Community College, located in the City of Hastings, four miles northwest of GTS, has already constructed a wind turbine on campus.

Existing Tools

The City of Hastings Comprehensive Plan

Policy WI. 1-2 states the following actions regarding Wind Energy Development:

> *"Amend city zoning and codes to regulate appropriate use of individual renewable energy sources."*

This existing tool is useful for the City of Hastings but needs to formally recognize military installations and local public / private airports, to reduce incompatible development.

City of Hastings Zoning Code

The City of Hastings Zoning Code classifies wind energy systems as Small Wind Energy Systems and Large Scale Wind Generator (Wind Farms). Small wind energy systems are considered a restricted use, allowed subject to specific use standards, within all of the zoning districts. The following are the permitted maximum heights, measuring to the blades highest point:

- 60 feet for residential
- 100 feet for agricultural
- 80 feet for commercial and industrial

All small wind energy systems are to be located, constructed, and operated to comply with any applicable FAA Regulations or Guidelines. The wind generator system must not have any illumination unless required by FAA regulations or guidelines.

Large Scale Wind Generator (Wind Farms) are conditional uses in the Agriculture, Heavy Industrial, and Light Industrial zoning districts. The zoning code does not establish any standards for Wind Farms, but wind farm development is subject to discretionary review as a conditional use.

Adams County Zoning Resolution

The Adams County Zoning Resolution classifies wind energy systems as Small Wind Energy Systems and Commercial/Utility Grade Wind Energy Systems. Small Wind Energy Systems are permitted accessory uses in the Agricultural, Transitional Agriculture, Residential Estates, Village Development, Highway Commercial, General Commercial, Mixed Use, Industrial, and Light Industrial zoning districts.

Small Wind Energy Systems tower height is limited to the following:

- For property sizes between ½ acre and one acre the tower height shall be limited to 80 feet.
- For property sizes of one acre or more, there is no limitation on tower height, except as imposed by FAA regulations.
- The height shall be determined by the fall zone requirement and shall not exceed 100 feet. FAA approval is required.

Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

Commercial/Utility Grade Wind Energy Systems are considered a conditional use in the Agriculture, Transitional Agriculture, Highway Commercial, Light Industrial, and Heavy Industrial zoning districts. The total height shall be determined by the fall zone requirement and shall not exceed four hundred (400) feet. Tower height shall not exceed 300 feet. FAA approval is required.

Clay County Zoning Resolution

The Clay County Zoning Resolution classifies wind energy systems as, Micro Wind Energy Conversion Systems, Small Wind Energy Conversion Systems, and Commercial/Utility Grade Wind Energy Conversion Systems. Micro Wind Energy Conversion Systems are limited to a 5 kilowatt capacity and are permitted as an accessory use within any zoning district. The tower

height is limited by the size of the property and is not to exceed the fall zone.

Small Wind Energy Conversion Systems are systems with a capacity between 5 kilowatts and 100 kilowatts. Small wind energy conversion systems shall be permitted as an accessory use within any district. The height limit is determined by the fall zone requirement and is not exceed 100 feet. FAA approval is required.

Commercial/Utility Grade Wind Energy Conversion Systems, generating more than 100 kilowatts, are considered a Conditional Use within the Agricultural District, Rural Residential District, and Rural Industrial Zone District.

Findings

- The City of Hastings, Adams County, and Clay County have established policies to regulate wind development. However, there is no coordination with GTS to ensure military compatibility.

5.5 Infrastructure Extensions

Infrastructure refers to public facilities and services such as sewers, water, electric, and roadways that are required to support development (existing and proposed).

Public facilities and services should be appropriate for the type of urban or rural development they serve, but also limited to the existing and planned needs and requirements of the area. For example, the provision of a safe transportation system, including all modes of transportation (automobile, mass transit, railway, highway, bicycle, pedestrian, air, water, etc.), is an important infrastructure component. Adequate transportation infrastructure contributes to local, regional, and state accessibility.

Infrastructure plays an important role in land use compatibility. Infrastructure can enhance the operations of an installation and community by providing needed services, such as sanitary sewer treatment and transportation systems. Conversely, infrastructure can create encroachment issues if expanded without consideration of the consequences of future development. The extension or expansion of community infrastructure to a military installation or areas proximate to an installation has the potential to induce growth, potentially resulting in incompatible uses and conflicts between a military mission and communities. Within comprehensive planning, infrastructure extensions can serve as a mechanism to guide development into appropriate areas, protect sensitive land uses, and improve opportunities for compatibility between community land uses and military missions.

Compatibility Assessment

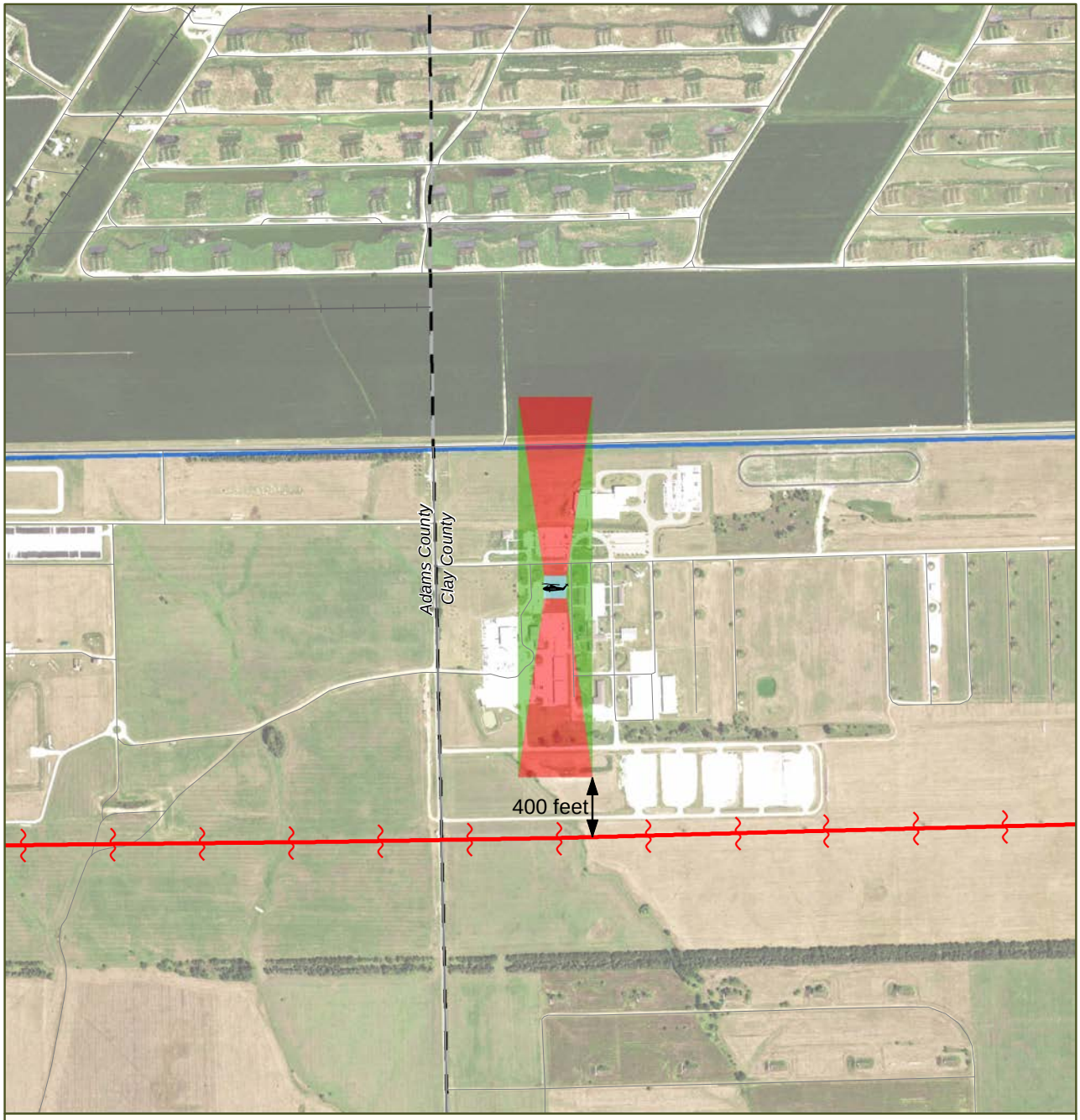
IE-1	**High tension wires run through Greenlief Training Site** There are high tension power lines that go through Greenlief Training Site. These can interfere with low level helicopter flights.

Just south of the cantonment area of GTS are a set of high tension utility power lines that traverse the installation from east to west (see Figure 5.5-1). The power lines, which are roughly 60-70 feet in height, have been identified as interfering with low level helicopter flight operations.

High Tension Power Lines on GTS

These power lines are a major provider of electrical power to the area proximate to GTS; however, they potentially limit future military operations.

The current helipad located at the cantonment area is near the location of the power lines, although due to the fact that GTS is only utilized by rotary wing aircraft and not fixed-wing aircraft, accident potential zones (APZs) on the base are relatively small in size. The power lines are not located within the Clear Zone (CZ) or the Accident Potential Zone (APZ), and to date no imaginary surfaces have been established for the GTS helipad. When imaginary surfaces are established for the helipad, it is possible that the power lines would fall within the approach – departure clearance surface, however, it is highly unlikely.



Legend

- Overhead Electric Cable Line

Imaginary Surface

- Primary Surface
- Transitional Surface
- Approach-Departure Clearance Surface

- Greenlief Training Site
- Greenlief Training Site Helipad
- County Boundary
- Local Road
- Railroad

Source: Greenlief TS, 2014.

0 500 1,000 Feet

Figure 5.5-1
Existing Utility Infrastructure Obstructions

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- This issue is categorized as an awareness issue since it is primarily unaffected by military activity at GTS.
- The power lines do not fall within current helipad safety zones, and would not fall within established imaginary surfaces either. The power line may limit the ability of GTS to expand future operations.

Please see the next page.

5.6 Land / Air / Sea Spaces

The military manages or uses land and air space to accomplish testing, training, and operational missions. These resources must be available and of a sufficient size, cohesiveness, and quality to accommodate effective training and testing. Military and civilian land and air operations can compete for limited air and sea space, especially when the usage areas are in proximate to each other. Use of this shared resource can impact future growth in operations for all users.

Key Terms

Impact Area. The impact area is an area with designated boundaries that identify the limits at which all ordnance fired from specified ranges and firing points will detonate or impact.

Ricochet. Ricochet refers to an ordnance (bullet, shell, or other projectile) rebounds off a surface one or more times.

Surface Danger Zone (SDZ). An SDZ is an area around a weapons' firing range from which the access of all military personnel and civilians is restricted due to the inherent dangers associated with the firing of live munitions. An SDZ can include the surface (and subsurface) of land and water, as well as the overhead air space that provides the medium for launched projectiles. An SDZ includes the weapons firing position, target impact area, and a secondary buffer area, which is an additional distance where errant projectile/munitions fragments may land without risking harm to life or property.

Unmanned Aerial Vehicles / Systems (UAV / UAS). UAVs are aircraft that are capable of operating without an internal pilot; are tethered by a radio control link; and can be preprogrammed for both flight and payload operations prior to launch.

Technical Background

The demands of extended operational reach, both in terms of breadth and depth, make the military installation, training area, and airspace of the region, and interconnected collaboration between the military training and test installations, more important as requirements and capabilities of weapons and command and control systems continue to improve.

The land and air spaces used by the military can be owned by the DOD, designated for DOD use by a federal or state agency, provided through easements or other agreements with public or private entities, or maintained as a historic usage right. Public and private requests to share or assume some of these resources may have a negative impact on military training and test objectives.

Controlled and Uncontrolled Airspace Descriptions

To help air traffic controllers and pilots manage varying traffic conditions, US airspace is divided into six different classes (A, B, C, D, E, and G). These classes each have different requirements for entry into the airspace, pilot qualifications, radio and transponder equipment, and Visual Flight Rules (VFR) weather minimums.

Compatibility Assessment

LAS-1	**Use of unmanned aerial systems (drones) in the region** The University of Nebraska wants to start using unmanned aerial systems on property leased from MARC to monitor crops and livestock, which could interfere with military helicopter operations. The RQ-11 Raven is used at Greenlief Training Site as well.

Technological advances in aviation have made it possible to introduce unmanned aerial systems (UAS) and/or unmanned aerial vehicles (UAV) into national airspace. UAS could be commercial or personal in use and be used to monitor storms or assist in rescue operations. There is a general concern that UAS in the skies over GTS could interfere with civilian and military airspace use.

UAS's are most commonly known as drones, and within the last decade their operations have drifted from just military use. Commercial activities involving drones have allowed for news reporters to capture images of natural disasters, agricultural monitoring, and other events for their readers benefit.

The University of Nebraska College of Journalism and Mass Communications (CoJMC) have established a Drone Journalism Lab to allow students to use drones as a new way to provide digital journalism. This new style of journalism was developed to see how a drone could benefit reporting. Some of the topics the journalism lab reports include wildfires, examples of fracking, regions that are experiencing droughts, and crop monitoring.

There are local concerns of the school being permitted to fly over agricultural areas near GTS. There is currently no formal communication between CoJMC and GTS to coordinate UAV activities.

Agricultural unmanned aerial system surveying corn field

Personnel at GTS also expressed some concern about the use of drones by civilians outside the installation, which currently primarily occur for monitoring agricultural crops and livestock. They do not wish to have drone usage banned from the area around GTS; they are more concerned with communication between users and the base so that base personnel will know when an outside user is activating a drone, both for safety reasons and security reasons.

Source: http://www.dronejournalismlab.org/about, http://mercatus.org/sites/default/files/Love-Commercial-Drone-Ban.pdf,

Existing Tools

Federal Aviation Administration

For all civil drone operations, a special airworthiness certificate is necessary to obtain before a drone can enter airspace. Any person handling the drone must also follow FAA regulations, which entail not flying above 400 feet, nor entering overpopulated areas, restricted airspaces and airports. Additionally to legally fly the drones, the school had to apply for a Certificate of Authorization (COA) which limits areas the drones can fly but grants the user legality to fly the drone. The certification is only for those who are using the drones "for purposes of research and development, marketing surveys, or crew training". Before Certification, all uses of the drones are to be reported to the FAA, these reasonings are then analyzed to determine if certification is to be approved. If a certificate is not approved the drone will not be permitted to fly again or else the operator will be fined.

Source
https://www.faa.gov/uas/legislative_programs/section_333/

Findings

- The FAA regulations and requirements for certification to operate a commercial use drone restrict drone usage.
- An operator of a drone is not permitted to fly within restricted airspaces.
- There are no coordination between CoJMC and GTS, which could potentially protect the installations flight operations.

LAS-2	Potential conflicts with nearby airports Pilots that fly into or out of Hastings Municipal Airport are notified when they are close to Greenlief Training Site, and are generally not a concern when they are operating correctly. Pilots from other airports in the region may not receive similar notification and could pose concerns for safety or interference with training activities.

The Hastings Municipal Airport is located two miles northwest of the City of Hastings central business district. With an average of 52 aircraft operations a day and the presence of GTS and other public and private airports in this region, there is constant competition for airspace and frequent issues regarding shared use of airspace. As the population continues to increase, the demand for commercial and general aviation services is likely to increase as well.

In addition to the Hastings Municipal Airport, the Central Nebraska Regional Airport is located approximately 40 miles north of GTS in the City of Grand Island. According to the FAA, the airport has been characterized as a non-primary commercial service airport, which means it comprises approximately 1,847 acres with two runways and provides over 24,000 aircraft operations (commercial and military) annually in 2011, with an average of 66 per day.

Helicopters that train at GTS are primarily those based at the NEARNG facility at the Nebraska Regional Airport. Helicopters fly from the airport in Grand Island to GTS for training. There are several other airports surrounding Grand Island and GTS. Helicopter flights between the two facilities avoid other aircraft, but it is important for civilian users of the airports to be aware of the helicopters as well. Figure 5.6-1 shows the general route that helicopters fly between Grand Island and GTS, but this flight path is estimated based on available information and flights may vary based on factors such as weather or other aircraft using the airspace.

The other consideration regarding competition for airspace is that GTS allows for small arms training capabilities—ground to ground weapons training. Thus, GTS is under Small Arms Range Safety Areas (SARSA) airspace control; this is not the same as a special use airspace (SUA). This means that airspace above GTS is controlled at the installation level. Due to GTS having a SARSA airspace control and because of the types of arms fired and trained with, the installation commander is required to ensure all above and adjacent ranges are monitored to protect aircraft operations from the ricochet factor. While there are SDZs that are established to account for ricochet and ordnance that is short of the target, this ground-control or installation-level control of the airspace above the range provides another measure of protection from ordnance ricochet or debris dispersion.

Aircraft entering GTS SARSA airspace are expected to notify Range Control prior to entering the airspace. However, if this notification does not happen or does not happen in a timely manner, then that can cause unnecessary safety hazards as well as delay and / or impede military training and ultimately degrading military readiness.

Upon an aircraft entering the SARSA-controlled airspace, military personnel on the ground will communicate with Range Control to inform them an aircraft is approaching. When this happens, all training operations must cease in order to provide for the safety of the trainees, pilots and aircraft, and others that may be impacted should a mishap occur. While the safety of aircraft pilots is a key concern, there is an impact to troop training on the ground when the firing ranges have to be shut down to ensure this safety. Depending on how long the ranges are shut down for, this can reduce the full training opportunity for troops, and they may have to reschedule their activity for another time."

Source: http://www.gcr1.com/5010web/airport.cfm?Site=HSI&AptSecNum=2

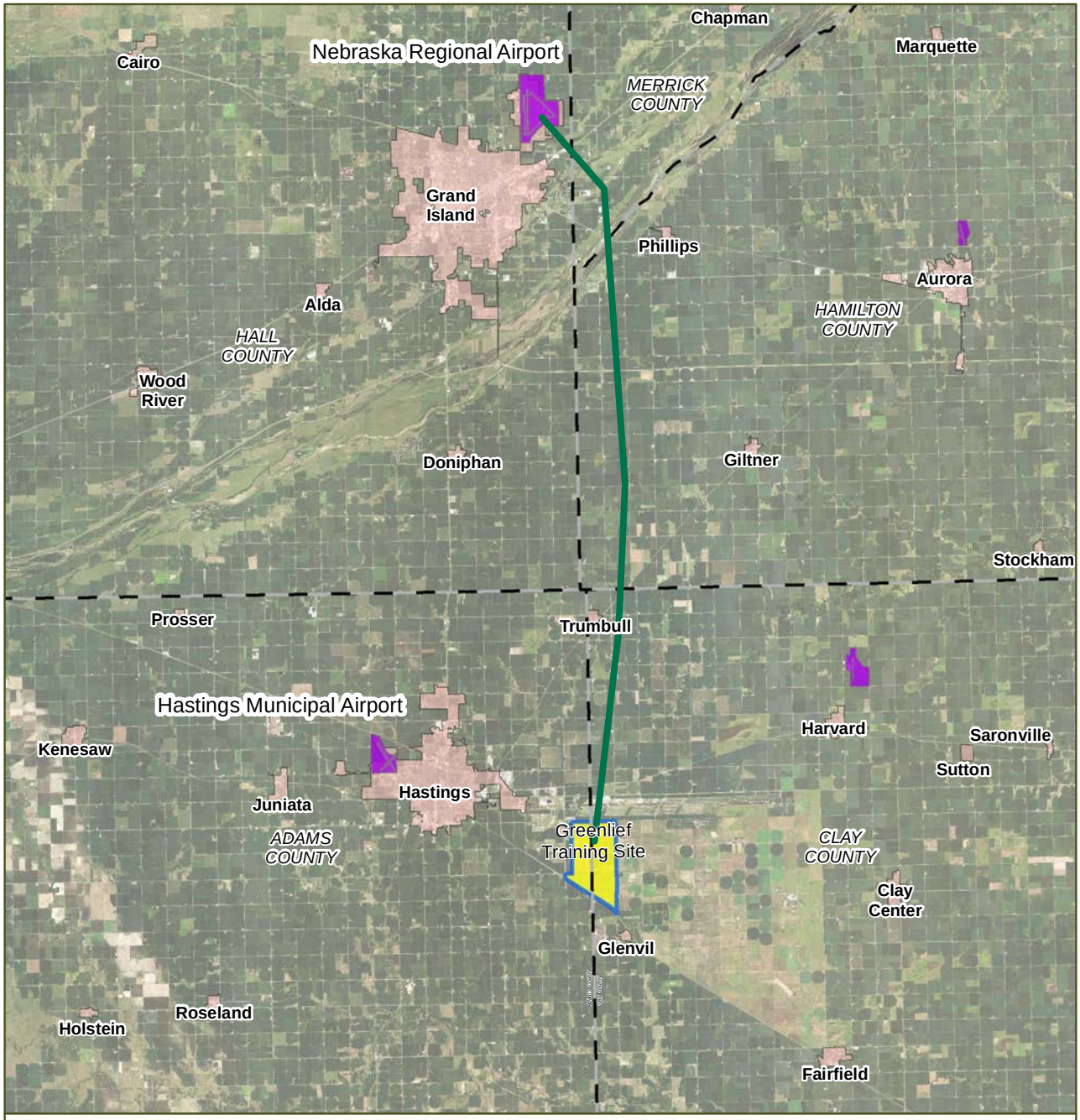


Figure 5.6-1

General Helicopter Flight Path and Nearby Airports

Existing Tools

Security Guidelines for General Aviation Airports: Information Publication A-001

The Transportation Security Administration (TSA) publication recognizes that military installations including airports are sensitive sites, or critical infrastructure. The Security Guidelines for General Aviation Airports: Information Publication A-001 (IP A-001) establishes guidelines for General Aviation (GA) owners and operators to coordinate with all sensitive sites or critical infrastructure. The IP A-001 indicates that military installations typically have unique needs to execute and carry out their mission, so it is incumbent on the GA owners and operators to coordinate appropriately and effectively with these critical infrastructure assets. Such coordination can include but not be limited to access points, areas of access, security patrol boundaries, and security response responsibilities. However, these guidelines do not include explicit instruction about notification to pilots or notice to airmen (NOTAMs). This NOTAM is critical in scenarios such as the one at GTS with the SARSA-controlled airspace.

Source: Security Guidelines for General Aviation Airport, 2004; https://www.tsa.gov/sites/default/files/assets/pdf/Intermodal/security_guidelines_for_general_aviation_airports.pdf

NEARNG Regulation 385-1 and Small Arms Range Safety Area

GTS airspace is controlled at the installation level by utilizing a Small Arms Range Safety Area (SARSA). SARSAs are similar to Controlled Firing Areas and are not considered SUAs. SARSAs are Army-established areas to contain small arms range activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. It is the Installation Manager's responsibility to provide for the safety of persons and property on the surface and in the air by ensuring that airspace above and adjacent to small arms ranges is monitored to prevent endangering nearby aircraft operations.

According to the NEARNG Regulation 385-1: Range and Training Facilities, firing activities on GTS ranges are not to be conducted if the cloud height is less than 305 meters above the maximum vertical limit of the ordnance being fired. It is the responsibility of the Range Officer in Charge (OIC) to have up to five miles of visible airspace from the boundaries of the SDZ with a maximum ceiling of 3,152 feet above ground level (AGL). This is determined based on the 7.62mm M80 ball ordnance that is fired at GTS. The maximum vertical limits is determined by various factors including type of ordnance fired, location of target, stationary or mobile targets, etc. The Department of Army Pamphlet 385-63: Range Safety (DA PAM 385-63) provides all the information for all the types of ordnance fired on training ranges including the vertical limits.

If an aircraft does enter, the OIC must call a cease fire until the aircraft has left visibility over the range.

Sources: NEARNG Regulation 385-1: Safety Range and Training Facilities, November 2011; Department of Army Pamphlet 385-63: Range Safety, April 2014.

Findings

- The NEARNG Regulation 385-1 provides guidance for range control in the incident of an unannounced aircraft enters the airspace above the range.
- The NEARNG Regulation 385-1 only protects aircraft by a visual recognition from the OIC. This does not address the concerns if visibility is limited.
- The TSA's IP A-001 document does not define a formal coordination process such as the use of NOTAMs for notifying airmen that could enter the airspace over GTS.

Please see the next page.

5.7 Land Use

The basis of land use planning relates to the government's role in protecting the public's health, safety, and welfare. County and local jurisdictions' growth policy plans, zoning ordinances, and subdivision regulations can be the most effective tools for preventing or resolving land use compatibility issues. These tools ensure the separation of land uses that differ significantly in character. Land use separation also applies to properties where the use of one property may impact the use of another. For instance, industrial uses are often separated from residential uses to avoid impacts related to noise, odors, lighting, etc.

Key Terms

Land Use Planning. Land use planning stems from the Supreme Court decision of *Euclid vs. Ambler* which enabled jurisdictions to regulate land use through zoning land in order to protect the public's health, safety, morals, and welfare. Zoning is a land use regulation tool used by local jurisdictions that generally controls for use, density, intensity, building heights, and setbacks on a parcel or lot. Most states, like California, enacted enabling legislation for local jurisdictions to also create and adopt general or comprehensive plans which are land use documents that broadly establish a vision, goals, policies, and implementation activities for a jurisdiction over a long range period of time, typically ten to twenty years, to promote compatible land use, guide growth and logical development.

Local jurisdictions' general plans and zoning ordinances are the most effective tools to avoid and resolve land use compatibility issues. These tools ensure similar and compatible land uses are properly located and can co-exist while separating land uses that differ significantly in use and potential nuisance.

Sensitive Land Uses. In terms of compatibility assessment, sensitive land uses are uses that are susceptible to, and effected by, nuisances such as noise, dust and air pollution. Sensitive land uses typically include residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

Technical Background

Land use planning around military installations is similar to the process for evaluating other types of land uses. For instance, local jurisdictions consider compatibility factors such as noise when locating residential developments near commercial or industrial uses. As the land between local municipalities is developed – or the land between a local municipality and the perimeter of a military installation is developed both entities are affected. New residents, tenants, or building owners are typically not fully aware of the implications of locating proximate to an active military installation and / or training area.

Among the most pressing factors causing incompatibility with installations containing a military airfield and weapons training are the proximate areas of encroaching development, as well as off-installation light pollution from that development which may impact the military operations. The development of land uses incompatible with the installations military operations threatens that installation's mission success and its continued existence.

Compatibility Assessment

LU-1	**Potential for incompatible land use adjacent to Greenlief Training Site** There is the potential for development of land uses adjacent to Greenlief Training Site that could be incompatible with training activities.

Areas surrounding military installations are constantly under pressure of development and sometimes resulting in encroachment from incompatible development. This development has the potential to threaten military installation operations and missions by jeopardizing the safety or degrading the quality of life for community activities in the adjacent areas. As development encroaches onto a military installation,

the development becomes more exposed to potential impacts from live fire activities such as impulse noise or loud booms and possible vibration, and aircraft noise to name a few.

There are numerous parcels of undeveloped land surrounding GTS. It should be noted that Clay County did not provide their GIS data so that explains the blanks in the maps. Complemented by the Pacific Railroad asset and the multiple agricultural production facilities surrounding the installation, there is potential for development to locate near the installation.

Adjacent properties to the north, south, and west of GTS are privately owned. The Meat and Animal Research Center is located to the east and is owned by the Department of Agriculture, property to the west of GTS is owned by the Four Rivers Sportsman's Club.

Currently there are areas to the east and west of GTS that have the potential to expand, specifically for GTS activities. Potential development is more applicable to the east because of the land use opportunities. Areas to the south of the training site consist of cultural resources. If the military operations and associated impacts are not considered during the planning phase of the potential / proposed development, then these areas can become areas of encroachment to the base. Thus, this encroachment could result in limitations or restrictions on military training at GTS, which would potentially degrade the long-term viability of the training center at GTS.

Source: Nebraska Army National Guard Real Property Development Plan, 2009

Existing Tools

Nebraska Revised Statutes

Nebraska law, through the Nebraska Revised Statutes, has several mechanisms in place for the notification of military installations on certain types of proposed land use changes. A summary of them is provided below.

14-407. Zoning; exercise of powers; planning board or official; notice to military installation.
A city of the metropolitan class shall exercise the powers conferred by sections 14-401 to 14-418 through such appropriate planning board or official as exists in such city.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the city shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning board shall deliver the notification to the military installation at least ten days prior to the meeting of the planning board at which the proposal is to be considered.

15-1103. Planning director; prepare comprehensive plan; review by commission; city council; adopt or amend plan; notice to military installation.
The planning director shall be responsible for preparing the comprehensive plan and amendments and extensions thereto and for submitting such plans and modifications to the city planning commission for its consideration and action. The commission shall review such plans and modifications and those which the city council may suggest and, after holding at least one public hearing on each proposed action, shall provide its recommendations to the city council within a reasonable period of time. The city council shall review the recommendations of the planning commission and, after at least one public hearing on each proposed action, shall adopt or reject such plans as submitted, except that the city council may, by an affirmative vote of at least five members of the city council, adopt a plan or amendments to the proposed plan different from that recommended by the planning commission.

When the city is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the planning director shall notify any military installation which is located within the corporate

boundary limits or the extraterritorial zoning jurisdiction of the city if the city has received a written request for such notification from the military installation. The planning director shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

19-923. Municipality; notify board of education; when; notice to military installation.
(1) In order to provide for orderly school planning and development, a municipality considering the adoption or amendment of a zoning ordinance or approval of the platting or replatting of any development of real estate shall notify the board of education of each school district in which the real estate, or some part thereof, to be affected by such a proposal lies, of the next regular meeting of the planning commission at which such proposal is to be considered and shall submit a copy of the proposal to the board of education at least ten days prior to such meeting.

(2) When a municipality is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the municipality shall notify any military installation which is located within the corporate boundary limits or the extraterritorial zoning jurisdiction of the municipality if the municipality has received a written request for such notification from the military installation. The municipality shall deliver the notification to the military installation at least ten days prior to the meeting of the planning commission at which the proposal is to be considered.

(3) The provisions of this section shall not apply to zoning, rezoning, or approval of plats by any city of the metropolitan or primary class, which has adopted a comprehensive subdivision ordinance pursuant to sections 14-115 and 14-116, or Chapter 15, articles 9 and 11. Plats of subdivisions approved by the agent of a municipality designated pursuant to section 19-916 shall not be subject to the notice requirements in this section.

23-114.06. County planning commission; notice to military installation.
When a county planning commission appointed pursuant to section 23-114.01 is considering the adoption or amendment of a zoning ordinance or the approval of the platting or replatting of any development of real estate, the commission shall notify any military installation which is located within the county if the county has received a written request for such notification from the military installation. The county planning commission shall deliver the notification to the military installation at least ten days prior to the meeting of the county planning commission at which the proposal is to be considered.

Adams County Land Use Plan

The Adams County Land Use Plan establishes a County Land Use Management Policy (CLUMP); its purpose is designed to acknowledge and recognize existing land use patterns, consider and accommodate for future demand and manage these factors in relation to each other. Thus, the CLUMP intent is to balance urban and non-urban development while preserving the agricultural culture and providing adequate public services in a fiscally responsible manner. The CLUMP has a foundation in Smart Growth principles in that growth and development are directed in a way that is fiscally beneficial to the municipalities and preserves the agriculture of this region.

While this smart growth idea is a good foundation, the CLUMP and the Adams County Land Use Plan does not recognize GTS on its maps or even that it is an economic generator for the area. In other words, the County's Land Use Plan does not necessarily characterize all its assets and the need to preserve the economic generator that GTS provides to the region. The Plan does recognize and report that agricultural preservation is an important culture of this area; however, it does not analyze impacts that some types of agriculture can have on military installations.

In addition, the Adams County Land Use Plan establishes guidelines for certain uses that are permitted by right in certain land use categories such as agricultural preservation district and the industrial

district. While agricultural uses are generally compatible with military operations, there are certain agricultural crops that attract birds and wildlife that could be impacted by rotary wing air operations and the noises resulting from weapons training at GTS. Additionally, the county land use plan indicates that wind energy conversion systems and public / quasi-public facilities are compatible in the agricultural district; these uses can represent encroachment to a military installation if located in a noise-impacted area or an aviation operational area.

Regarding the industrial uses, the county land use plan reports that public facilities, parks and recreational facilities, and mining operations are compatible in the industrial district. Depending on siting of these types of uses, these uses can adversely impact military operations and conversely, the military operations can adversely impact these uses degrading quality of life and potentially future economic development.

Source: Adams County Land Use Plan, 2010

Adams County Zoning Resolution

The purpose of the Adams County Zoning Resolution is to establish limitations for non-conforming uses, setbacks, and lot size as well as some other restrictions for land use. However, regarding permitted uses and prohibited uses, those are found in the County's Land Use Plan. The zoning regulations for Adams County do not recognize, reference, or appear to consider the military operations conducted at GTS or their associated impact on nearby land uses and vice versa, the community development on military operations at GTS.

Source: Zoning Regulations, Adams County, Nebraska, 2010.

Clay County Zoning Resolution

While the Clay County Zoning Resolution establishes regulations for balanced development by determining appropriate land uses for each district including establishing restrictions for certain uses, i.e. wind energy conversion systems (micro, small, and commercial grade systems), the ordinance does not recognize GTS or its operational areas as areas to protect from incompatible development.

Source: Clay County Zoning Resolution

Findings

- The Adams County Land Use Plan does not consider military compatibility in its strive for balance and achieving smart growth, nor does the plan recognize GTS as an economic generator in the region.
- Adams County Zoning Resolution does not consider military compatibility.
- Clay County Zoning Resolution does not consider military compatibility.

LU-2	**Location of fertilizer plants in proximity to Greenlief Training Site** Fertilizer plants and other agricultural accessory uses that have the potential for explosions located near Greenlief Training Site could pose concerns for safety of soldiers training there.

Fertilizer plants can create concern for local military installations due to the potential impacts that can occur from a plant explosion. Fertilizer plant explosions have recorded impacts reaching properties 80 miles away from the site and recording 2.1 magnitude tremors from the U.S Geological Survey. Most fertilizer plant explosions have been caused from the lack of regulations and policies for safety precautions within the plant facility.

Blick's Fertilizer Plant is located on the western side of GTS, along with a fertilizer storage facility which contains two large storage tanks just northwest of the installation. The plant is surrounded by large parcels of agricultural land, which is a geography ideal for wildland / natural fires.

Despite that the nearest local police station from the installation is located eight miles west of GTS, in the City of Hastings and numerous other fire stations surrounding GTS, including the Lincoln Park Fire Station

and Hastings Fire Department within Adams County, and the Shickley Fire Department, Harvard Fire Department and Fairfield Fire Department in Clay County, there is still concern about this type of land use located near a training center that conducts weapons firing and training with live ordnance, in some cases. Due to the geography and the potential for natural fires to ignite complemented by the ordnance and the explosive qualities of some fertilizer agents, the safety of the general public including military personnel training at GTS is of primary concern.

Fertilizer plant near northwest corner of Greenlief Training Site

Existing Tools

Adams County Land Use Plan

The Adams County Land Use Plan permits by right agri-businesses such as ethanol / bio-diesel plants and grain elevators. These uses, depending on siting and location, can pose unnecessary threats to the training at GTS and to personal property and the general public. These uses would not generally be recommended for areas near an active military training site that conducts weapons training in various ordnances.

Nebraska Hazard Mitigation Plan

The Nebraska Hazard Mitigation Plan provides guidelines for hazard response in the state. There are guidelines for hazardous materials incidents, which can strike anywhere in the state. The Nebraska Emergency Management Agency (NEMA) has established a system of Memorandum of Understandings (MOUs) with various hazardous materials response fire departments across the state. These MOU's are implemented to ensure the responding departments can operate within the various jurisdictions across the state.

Additionally, the plan identifies the various hazard groups and the Nebraska Military Department is identified as a member of the Drought Management Group and the Nebraska Wildfire Coordinating Council; however, there is no identification or reference to a Hazardous Materials Group.

This Nebraska Hazard Mitigation Plan lays the foundation for local emergency operations plans. Nebraska also has Local Emergency Operations Plans (LEOPs) put in place in all 93 counties in Nebraska. These plans provide more site specific guidance for hazard response at the county level, including hazardous materials accident response.

Local Emergency Operations Plan

In both the Adams and Clay County Local Emergency Operations Plan (LEOP), Annex F outlines the direction, control, roles and responsibilities for response to a hazardous materials incident. The plan acknowledges that agricultural and industrial chemicals, explosive and combustible materials are stored in the county.

The hazardous material response identifies the actions needed to be taken by organizations to minimize the damage caused by a hazardous materials incident. Assigned responsibilities guide the actions of the fire department, law enforcement agencies, Adams County Emergency Management Agency, radiological responders, Local Emergency Planning Committee, state agencies, federal government, and the owner or operator responsible for the incident.

The military or National Guard will be called to respond to such disasters upon initiation by the NEMA. The Adams County / Clay County Emergency Manager will coordinate such requests. While the Adams County Emergency Operations Plan identifies the military resources in the area, the plan does not consider the impacts from community activity / commercial explosions, such as fertilizer plant explosions.

Findings

- Adams County Land Use Plan indicates compatible uses in the agricultural preserve district include ethanol / bio-diesel plants, which have explosive qualities.
- Both Clay and Adams counties have a Local Emergency Operations Plan in place, which assigns actions and responsibilities to response organizations in the event of an incident.
- While there are plans that respond and organizational guidelines that delineate responses and responsibilities in the incident of hazardous materials situation, there are no preventative measures included in the plans, e.g., planning coordination with the appropriate agencies to ensure hazardous materials are stored and sited in a safe location in the counties.

LU-3	Current inability to fire .50 caliber weapons at Greenlief Training Site Due to the size of the safety zones associated with .50 caliber weapons firing, there is currently no location in Nebraska that these weapons systems can be trained within.

There is currently nowhere in Nebraska where NEARNG Soldiers can train in the firing of .50 caliber weapons. NEARNG troops have to go to other bases outside the state to train with these weapons. For the fiscal year of 2015 the units using GTS for training have 166 total days of machinegun training to complete in the year's training cycle. Of those 166 days approximately 40 of the days are for.50 caliber weapons. This is almost 25 percent of the training days for this caliber weapon. The remaining 126 days are with machine guns that are allowed to be fired on GTS.

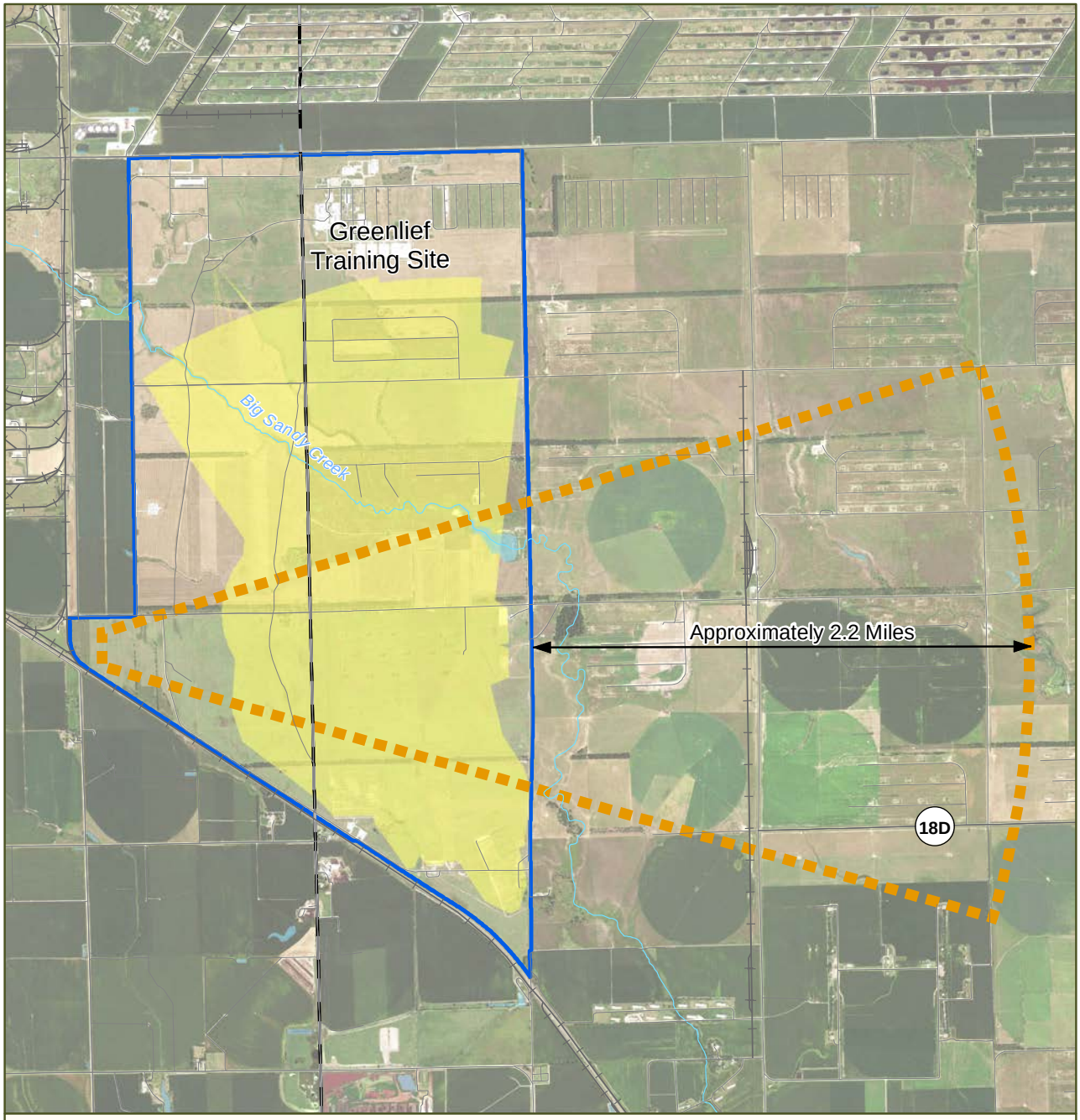
The longest distance a bullet shot from a .50 caliber weapon can travel is up to 6,500 meters or 19,500 feet, which translates to 3.7 miles. This distance was used to develop a potential SDZ for a .50 caliber firing range. Several configurations of a .50 caliber SDZ were overlaid on GTS to determine if the .50 caliber range would be feasible at GTS without the SDZ going outside the boundaries. Due to its size, there is no configuration that would keep a .50 caliber SDZ within the current boundaries of GTS. The most likely configuration would be to place the range at the western boundary of GTS and fire east across the base. This is illustrated on Figure 5.7-1. However, this would place a large portion of the SDZ onto land owned by the US Department of Agriculture (USDA) that is part of the Meat Animal Research Center. In order for the range to be feasible, the USDA would have to allow the NEARNG to use part of the land as an SDZ. Use of the range would also put some public roadways within the SDZ.

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- GTS does not have enough area on the installation to accommodate the SDZs associated with .50 caliber weapons.
- There is no facility in Nebraska that offers .50 caliber weapon training. Units must go elsewhere to receive this training.



Legend

- Potential .50 Caliber Surface Danger Zone
- Existing Surface Danger Zone
- Greenlief Training Site
- County Boundary
- Water Body
- River / Creek
- State Highway
- Local Road
- Railroad

Source: Nebraska Army National Guard, 2015

0 0.5 1 Miles

Figure 5.7-1
Greenlief Training Site Potential .50 Caliber Safety Zone

Please see the next page.

5.8 Light and Glare

This factor refers to man-made lighting (street lights, airfield lighting, building lights) and glare (direct or reflected light) that disrupts vision. Light sources from commercial, industrial, recreational, and residential uses at night can cause excessive glare and illumination, impacting the use of military night vision devices and air operations. Conversely, high intensity light sources generated from a military area (such as ramp lighting) may have a negative impact on the adjacent community.

Key Terms

Glare. The presence of excessively bright light, such as direct or reflected sunlight, or artificial light, such as sport field and stadium lights at night. Glare reduces visibility and can completely impair vision when very intense.

Light Pollution. This type of pollution is created by the artificial brightening of sky caused by development, including street lights and other man-made sources. This has a disruptive effect on the natural cycles and inhibits the observation of stars and planets and can render night vision devices ineffective.

Technical Background

Under dark sky conditions, the use of night vision goggles (NVG) allows military personnel to view objects up to a distance of 984 feet (300 meters); however, lighting located outside of an installation can decrease the NVG effectiveness to a distance of 164 feet (50 meters). Off-installation lighting, such as street lights or other elevated structures that are lit at night, also produce a halo effect around objects which further reduces visibility and resolution for air and ground personnel. The amount of ambient light experienced on the ground is a function of:

- Intensity of nearby light sources (up to 20 miles away);
- Distance from the sources;
- Spectra of the light sources (blue light decays faster in the atmosphere);
- Density of the cloud deck;
- Height of the cloud; and
- Relative humidity.

When measuring light pollution, the proximity to a community has a significant effect on the amount of light pollution that saturates the sky. Proximity twice as close to a community makes its sky glow appear approximately six times brighter.

Sky glow from communities typically diminishes in the later hours of the night, when businesses close and lights are turned off. As development expands outward from a community, the area and amount of light pollution can increase. Increased light pollution can cause an increase in the amount of sky glow, and ultimately create compatibility issues with military missions.

The impacts of outdoor lighting on the dark skies over GTS are primarily determined by two principal factors – the amount of developed land (density) and the distance of the developed land from the installation. The relationship between density and distance is best demonstrated using an estimate of urban sky glow called Walker's Law. The relationship captured through the use of this formula was developed based on measurements of sky glow for a number of cities in California. The following formula is used to estimate sky glow at an observing site looking at a zenith angle of 45 degrees toward an urban source:

$I=C \times P \times R(n)$

Where:

I = Percent increase of the night sky brightness above the natural background, at 45°down from directly overhead (facing the community, directly overhead is roughly ¼ of this value),

P = Population of the community,

R = Distance, in kilometers, from the observing site to the center of the community,

"C" = 0.01 for "R" values between 10 and 50 km, and

"n" = 2.5 for "R" values between 10 and 50 km

According to the National Oceanic and Atmospheric Administration (NOAA), the assumed radius of a community is a function of its population, ranging from 2.5 km to 24 km. Walker's law applies if the installation is outside the city radius. If located inside the community radius, the sky glow increases in a linear manner toward the center by another factor of 2.5.

Consider the following examples:

Scenario 1: A 100-acre development located two kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by over 260 percent (nearly 663 percent with NOAA factor).

Scenario 2: A 100-acre development located 20 kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by approximately less than 1 percent (just over 2 percent with NOAA factor).

If the density was decreased to one unit per acre, the resulting scenarios would result in the following increased sky glow:

Scenario 1: Approximately 44 percent (almost 111 percent with NOAA factor).

Scenario 2: Approximately less than 1 percent (still less than 1 percent with NOAA factor).

In general, the following trends are demonstrated:

- The more dense the urban development, the greater the potential for light intrusion.
- The closer development is to the installation, the greater the potential for light intrusion.

Compatibility Assessment

LG-1	**Lighting from newly built running track** A new running track with lighting was recently built near the northern boundary of Greenlief Training Site that may impact private lands outside the training site.

Recently, a running track was built just east of the cantonment area of GTS, along the northern perimeter of the base. While the track is meant for recreational purposes and serves all military personnel stationed at GTS, the track supports six high mast lighting poles which emit light that passes outside of the base. If this lighting is on at night, it may cause visual issues with drivers commuting along Road 316, which parallels the northern fence line. Taller structures such as lighting poles (and utility power lines) also have the potential to increase bird activity, possibly resulting in helicopter-BASH incidents.

Furthermore, the track and its associated lighting poles are close to the fence line and have the potential to encourage public trespassing if they are on at night and allow for passersby to see inside the base.

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- This issue is categorized as an awareness issue since it is primarily unaffected by military activity at GTS and vice versa.
- Adding bird spikes on top of the lighting masts could mitigate any BASH related concerns.
- Vegetative buffers along the northern fence line perimeter could potentially mitigate any concerns associated with public trespassing from the lights.

- If the track lighting was shut off after dark (on a timer, or when not in use), it would potentially mitigate the concerns associated with this issue.

LG-2	Future lighting at Greenlief Training Site The Nebraska Army National Guard is considering building new lighting systems around the cantonment area in 2015.

Unshielded lighting systems and lighting systems that are not planned with minimizing sky glow or excess or wasteful light emission on the installation can contribute to an increased amount of ambient light in the sky. This increase in ambient light in the sky can degrade the natural environment for stargazers, observatory operations, and night time flying operations or nighttime training. Adverse light impacts can be experienced both on-installation and off-installation coming from the community and vice versa, adverse light impacts can be experienced by the community coming from the installation.

It has been studied recently that installations and local government agencies that use efficient lighting systems accrue benefits and energy consumption savings immediately. These benefits accrue annually, rapidly recoup costs associated with the enhanced light fixtures including the maintenance and upkeep of the enhanced fixtures that reduce the overall light emission and energy waste. In addition, light pollution is minimized and in some cases reduced significantly so as to preserve the natural environment and maintain the dark skies for all inhabitants.

Existing Tools

Greenlief Training Site Installation Design Guide

Section 10 of the Greenlief Training Site Installation Design Guide outlines site element design standards, which include lighting standards. Exterior light on the installation must be controlled by a photocell or a time clock. Fixtures must be full cutoff type and should be either a metal halide or LED type fixture. Other features require lighting include flagpoles, exterior signs, and bollards.

Unified Facilities Criteria 3-530-01

The Department of Defense's Unified Facilities Criteria (UFC) 3-530-01 is the instruction manual for DOD installations regarding interior and exterior lighting systems. This UFC establishes guidelines and instructions for the DOD to renovate, construct, budget, and maintain the lighting systems on its installations. The utmost goal and priorities for both the exterior and interior lighting systems is:

> *Design exterior and interior lighting systems to minimize energy consumption, reduce maintenance costs, improve lighting quality on DoD Installations, at the lowest life cycle cost.*

Some renovations that the DOD requires includes but is not limited to timers for lights, utilizing fully cutoff fixtures, and using LED lighting fixtures to reduce energy consumption and wasteful light emission.

Any renovations or additions regarding lighting systems, GTS is required to comply with the guidelines established in the UFC 3-530-01.

Findings

- Installing efficient lighting systems can accrue benefits and savings.
- The Installation Design Guide instructs the installation to utilize full cutoff fixtures for lighting. Lights must also be on a timer, which can turn the lights off when not needed. These lighting control methods can help reduce light pollution and improve lighting efficiency.

LG-3	Lighting impacts from local communities Increased development and associated lighting outside of Greenlief Training Site could impact future ability to conduct night vision training.

Light pollution, the upward and outward distribution of light, either directly from fixtures or from reflection off the ground or other surfaces, can interfere with military installation mission activities such as night time training activities.

There are many factors that contribute to excess nighttime light that can interfere with nighttime training and night vision equipment. The types of exterior lights used, their distance from GTS training areas, and the times at which they are left on all play an important role in how much ambient light impacts activity at the installation. The amount of ambient light experienced on the ground is a function of:

- intensity of nearby light sources (up to 20 miles away);
- distance from the sources;
- spectra of the light sources (blue light decays faster in the atmosphere);
- density of the cloud deck;
- height of the cloud; and
- relative humidity.

Existing Tools

International Dark Sky Association

The International Dark Sky Association (IDA) is an organization dedicated to the education and promotion of dark skies and dark sky preservation. The IDA has worked with communities around the world to develop methods for reducing light pollution. IDA-approved light fixtures are typically more expensive than less efficient fixtures during initial purchase, which is one reason people chose not to install them; however, energy costs could be recovered as early as one year after installation.

Examples of poor street light fixtures that result in light spreading past where it is needed, and creating excess ambient light

An example of better street lighting and how it looks at night

Adams County Zoning Resolution

Zoning districts Village Development, Mixed Use, Flex Space, Light Industrial, and Industrial require that exterior lighting fixtures be shaded to prevent any light or glare on any residential property or public roadway. The Clustered Mixed Used Development zoning district requires lighting to be compatible with surrounding land uses. The Highway Corridor Overlay zoning district lighting is to be retrained and excessive brightness is to be avoided. Lighting also should not impact adjoining properties, especially residential areas.

Section 4.15 of the Adams County Zoning Resolution establishes the Dark Sky Overlay District. The section outlines standards for outdoor lighting within an area, as specified on Zoning Map, surrounding the Sachtleben Observatory of Hastings College in order to maintain a dark sky in the area around the Observatory. The intent of the district is to require appropriate lighting levels, full cut-off lighting and to minimize lighting glare,

lighting pollution and lighting trespass within the specified area by enforcing the regulations.

The overlay district is separated into a Primary Dark Sky Preserve and a Secondary Dark Sky Preserve. Both preserves have light control standards and regulations. The primary preserve requires all uses and outdoor signs to have full-cutoff lighting reflectors installed. Flashing lights of any type are prohibited. The primary preserve's standards and regulations are more rigid compared to the secondary preserve. The secondary preserve only applies to non-residential uses and only requires full-cutoff lighting reflectors on signs and billboards and where there are ten or more exterior luminaires.

When considering Conditional Use Permits (CUPs), the Planning Commission must consider the appropriateness of the exterior lighting of the proposed plan and the impact it may have on abutting properties and the overall neighborhood.

Off-street parking design criteria regulate artificial lighting, which is to be deflected so the light does not impact any adjacent residential use or district.

Clay County Zoning Resolution

The Clay County Zoning Resolution regulates tower and wind turbine lighting. Lighting on these structures must adhere to the FAA permits and regulations. Red strobe lights are to be used during the night to reduce impacts on neighboring uses and migratory birds. The zoning regulation also regulates the consideration of CUPs, and the Planning Commission must consider the appropriateness of the exterior lighting of the proposed plan and the impact it may have on abutting properties and the overall neighborhood.

City of Hastings Zoning

Section 34-305.5 of the City of Hasting Zoning Code regulates lighting design. The section includes two tables to guide lighting height and required shielding, shown in Table 5.8-1 and Table 5.8-2

Table 5.8-1 Maximum Lighting Mounting Height

Driveway and Parking Areas	37.5' in Village Development, Highway Commercial, General Commercial, Light Industrial, and Industrial Districts 25' in all other districts
Pedestrian Walkways, Plazas, or Courtyards	16'
Façade Lights	Below the eave or cornice line, provided the light is directed downward
Other Site Lighting	12'

Table 5.8-2 Required Shielding

Wattage or Mounting Height	*Shield Type*		
	Full Cutoff	Cutoff	Semi-Cutoff
All lights mounted above 25' or above 450 watts	Required	Prohibited	Prohibited
All lights between 100 watts and 450 lumens	Permitted	Required	Prohibited
All lights between 55 watts and 99 watts; or any light mounted between 12' and 25'	Permitted	Permitted	Required
All lights mounted below 12' and less than 55 watts	No shielding is required; all shielding types permitted		

Shielding is defined in the code as follows:

- Full cutoff fixtures emit zero percent of its light above 90 degrees and 10 percent above 80 percent from horizontal.
- Cutoff fixtures emit no more than 2.5 percent of its light above 90 degrees and 10 percent of its light above 80 percent from horizontal.
- Semi-cutoff fixtures emit no more than five percent of its light above 90 percent and 20 percent of its light above 80 degrees.

In addition to mounting heights and shielding standards, exterior lighting must not direct light or glare onto any

adjacent properties. Lighting must also be reduced to levels necessary only for security purposes within 1 hour after business closing. All façade lighting must use shielded, directional fixtures, designed and located to minimize uplighting and glare.

Findings

- Adams County has a Dark Sky Overlay District, which enforces separate lighting standards to maintain a dark sky south of the City of Hastings for the Sachtleben Observatory. Outdoor lighting in Adams County outside the overlay is regulated in select districts to prevent light or glare on adjoining properties.
- Clay County has limited lighting regulations and does not require any type of shielding on outdoor lighting.
- City of Hasting has shielding requirements depending on wattage or mounting height of the outdoor lighting.

5.9 Noise

Sound that reaches unwanted levels is referred to as noise. The central issue with noise is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a significant impact on human activity, health, and safety. The decibel (dB) scale is used to quantify sound intensity. To understand the relevance of decibels, a normal conversation often occurs at 60 dB, while an ambulance siren from 100 feet away is about 100 dB. Noise associated with military operations (arrival/departure of military aircraft, firing of weapons, etc.) may create noises in higher dB ranges.

Key Terms

Ambient Noise. The total noise associated with an existing environment (built or natural) and usually comprising sounds from many sources, both near and far, is referred to as ambient noise.

Attenuation. Attenuation is a reduction in the level of sound resulting from an object's distance from the noise source or absorption by the surrounding topography, the atmosphere, barriers, construction techniques and materials, and other factors. Sound attenuation in buildings can be achieved through the use of special construction practices that reduce the amount of noise that penetrates the windows, doors, and walls of a building. Sound attenuation measures may be incorporated during initial construction for new buildings or as additional construction for existing buildings.

Day-Night Average Sound Level (DNL). DNL represents an average sound exposure over a 24-hour period. During the nighttime period (10:00 p.m. to 7:00 a.m.), averages are artificially increased by 10 dB. This weighting reflects the added intrusiveness and the greater disturbance potential of nighttime noise events attributable to the fact that community background noise typically decreases by 10 dB at night.

Decibel (dB). A decibel is the physical unit commonly used to describe noise levels. It is a unit for describing the amplitude of sound, as heard by the human ear.

Noise. Defining noise from a technical perspective, sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. More simply stated, sound is what we hear. As sounds reach unwanted levels, this is referred to as noise.

Noise Contour. Noise contours consist of noise impact lines constructed by connecting points of equal noise level measured in dB and identify areas on a map that fall within that particular dB noise contour.

Noise Sensitive Receptors/Sensitive Land Uses. Sensitive receptors are locations and uses typically more sensitive to noise, including residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

Technical Background

Due to the technical nature of this resource topic and its importance to the JLUS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts.

Characteristics of Sound

It is important to understand that there is no single perfect way of measuring sound, due to variations used by different entities when conducting sound studies or sound modeling. Sound is characterized by various parameters that include the oscillation rate of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale, i.e. the dB scale, is used to present sound intensity levels in a convenient format.

The human ear is not equally sensitive to all frequencies within the entire spectrum, so noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called "A-weighting" written as dBA. The human ear can detect changes in sound levels of approximately 3-dBA under normal conditions. Changes of 1 to 3-dBA are typically noticeable under controlled conditions, while changes of less than 1dBA are only discernible under controlled, extremely quiet conditions.

A change of 5-dBA is typically noticeable to the average person in an outdoor environment. Figure 5.9-1 summarizes typical A-weighted sound levels for a range of indoor and outdoor activities.

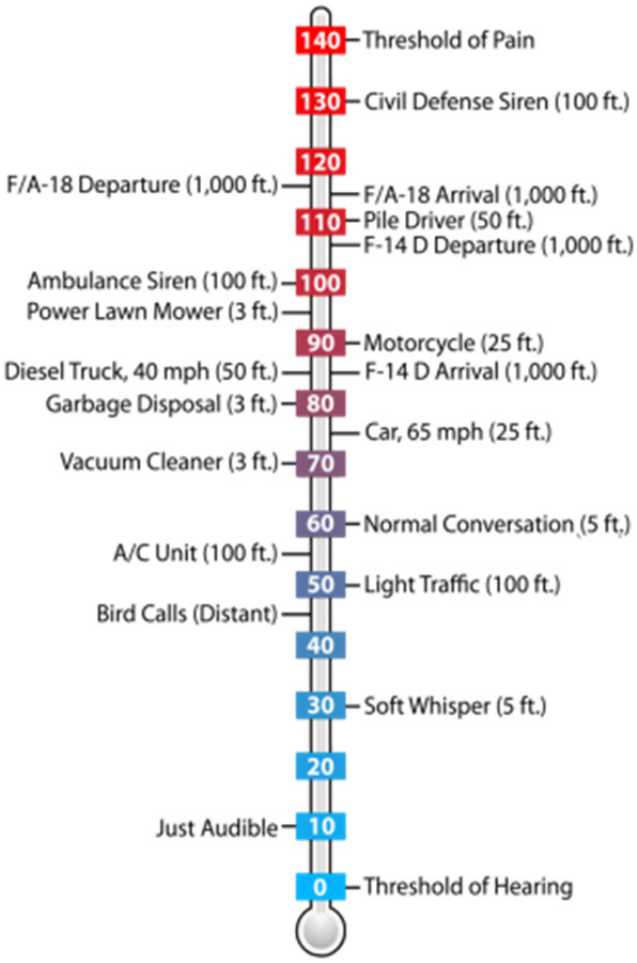


Figure 5.9-1 A-weighted Sound Levels

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be substantial. These fluctuations include regular and random patterns, how fast the noise fluctuates, and the amount of variation. Weather patterns can have a strong effect on how far sound travels and how loud it is. Certain weather events can change the consistency of the air and either cause sound to travel further and be louder or reduce the distance traveled and the level at which the sound can be heard. Temperature and wind velocity are prime examples of factors that can affect sound travel. Sound tends to travel further in cold temperatures. Specific combinations of temperature and wind direction can create atmospheric refraction. Atmospheric refraction occurs when atmospheric conditions bend and/or focus sound waves towards some areas and away from others. When describing noise impacts, it is common to look at the average noise levels over an entire average day.

Small arms are the most common type of weapons fired at training ranges. Weapons that fire rounds of a caliber less than 20 mm are considered small arms. The Small Arms Range Noise Assessment Model is the computer program used to model small arms Noise Zones. It uses the peak noise level and incorporates the most recent available information on weapons noise source models, sound propagation, ricochet barriers, noise mitigation, and safety structures, and the direction weapons are fired to create the Noise Zones. In general, once the sound is heard greater than 1,000 meters away, it is typically not loud enough to annoy most people. This can change based on terrain, weather, and other site specific conditions.

Sound associated with demolitions and other impulse noises are generally more likely to produce noise complaints. This is because these sounds tend to travel further, are harder to mitigate, and are often accompanied by vibrations that can impact quality of life or potentially cause structural damage to buildings, depending on how big and how close the demolitions / impulse activity are. Studies done on vibration have shown that homeowners typically become concerned about potential structural damage due to rattling when

the peak dB exceeds 120 dB peak (dBP). Actual damage is not likely to occur until a level of 150 dBP is reached.

According to the DOD and the FAA, 65 day-night average sound level dB (DNL) is defined as the threshold for significant noise exposure. Noise exposure within the 55 to 65 DNL noise contours is regarded as moderate and land use controls should be considered. Federal guidelines have been adopted to guide appropriate development and land use planning for noise contours greater than 65 DNL, and noise sensitive uses such as residential and schools should not be built in these areas without proper sound mitigation. It should be noted that the DNL contours represent an average sound level over a 24-hour period and that individual instances may be louder than the noise contour in which they are located. In addition, noise may still cause an annoyance if it is below 65 DNL.

Compatibility Assessment

NOI-1	**Noise Zones II and III go off installation** The contours of Noise Zone II and III associated with firing ranges at Greenlief Training Site go outside the boundaries of the installation.

The primary concern associated with the Noise Zones II and III (NZ) extending off installation are the existing land uses that the noise impacts. As identified in the Statewide Noise Operational Management Plan (SNOMP), the NZ III extends off GTS to the east of the firing ranges and southwest of the base over the area of the Union Pacific Railroad. While the NZs tend to go off installation, the concern is the residence that is located in NZ III along the corner of Oak Ridge Road and Riverview Avenue as illustrated in Figure 5.9-2. The NZ III has a noise level of 104 dB, which for the purposes of this study it translates to an impact of average day night level (ADNL) of 75 dB to 70 dB. This can impact noise sensitive land uses if located in the NZ III.

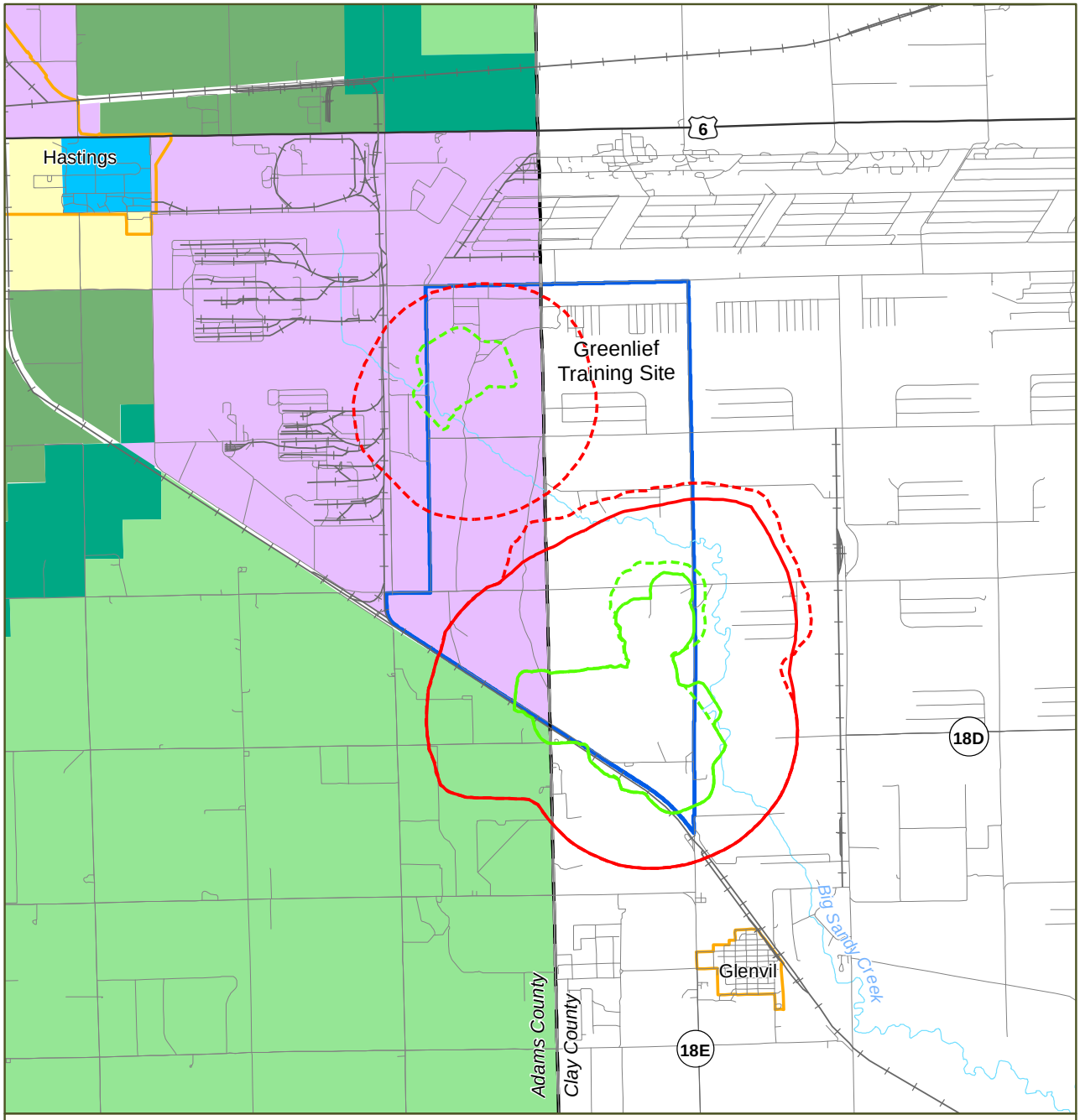
Additionally, the NZ II contour extends outside the installation to the east, southeast, and southwest encompassing a larger area of land. There are residences located within the NZ II, which has a noise level between 87 dB and 104 dB. This translates to roughly a 65 dB to 70 dB ADNL, which also tends to impact noise sensitive land uses without noise mitigation measures in place.

Soldier doing weapons firing training

Projections for the southern region of the installation are similar to the already existing impacts. The contours within the eastern zones have adjusted due to the proposed range modifications on GTS as illustrated in Figure 5.9-2. For NZ II the contours are to extend by 1,000 meters. GTS has proposed modification to ranges H9 and H20, which would result in the noise contour zones extending 100 meters beyond NZ III. Within the same zone, changes to range H6 would create an extension of 150 meters on the southwestern boundary, and 300 meters beyond the eastern boundary. The future land use designations of land under the existing and future NZ II and III are generally compatible.

Majority of the surrounding land uses are agricultural and include residential uses that are likely to be found in agricultural-type land use districts.

Figure 5.9-3 illustrates the zoning districts for land within the existing and future NZ II and III. The majority of the land is within zoning districts that was conditionally compatible with the NZs, meaning that they are generally compatible, but do allow certain uses that would be incompatible with the noise level and could potentially allow incompatible development.



Legend

Future Land Use - Hastings
- Agriculture
- Employment / Industrial
- Rural Residential
- Public / Semi-Public

Future Land Use - Adams County
- Transitional Agricultural
- Agricultural Preservation

Existing Small Arms Noise Contour
- Zone II (87 dB PK15[MET])
- Zone III (104 dB PK15[MET])

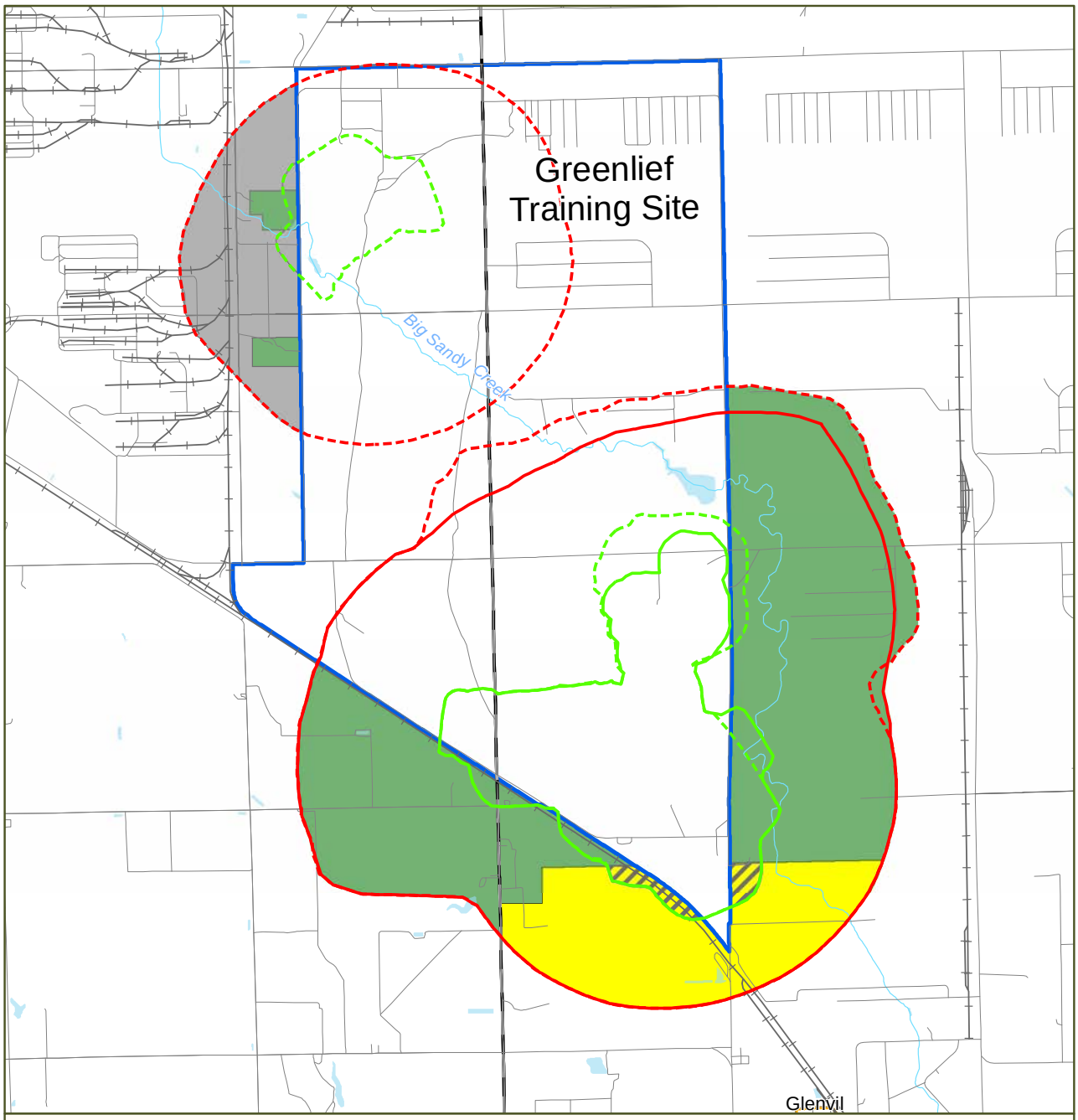
Projected Small Arms Noise Contour
- Projected Zone II
- Projected Zone III

- Greenlief Training Site
- County Boundary
- City / Village
- River / Creek
- Federal Highway
- State Highway
- Local Road
- Railroad

Note: Clay County does not have a future land use plan
Source: Greenlief TS, 2014. Adams County, City of Hastings

0 0.5 1 Mile

Figure 5.9-2
Evaluation of Future Land Use Under Existing and Future Noise Contours



Legend

Conditionally Compatible Zoning
- Employment/Industrial
- Agricultural
- Rural Residential

Not Compatible Zoning
- Rural Residential

Existing Small Arms Noise Contour
- Zone II (87 dB PK15[MET])
- Zone III (104 dB PK15[MET])

Projected Small Arms Noise Contour
- Projected Zone II
- Projected Zone III

- Greenlief Training Site
- County Boundary
- City / Village
- Water Body
- River / Creek
- State Highway
- Local Road
- Railroad

Source: Greenlief TS, 2014. Adams County

0 0.5 1 Mile

Figure 5.9-3
Evaluation of Zoning
Under Existing and Future Noise Contours

There is a small amount of Rural Residential zoned land along the southern boundary of GTS that, if developed with residential use, would be incompatible with the noise levels.

Source: Operational Noise Consultation, 2009

Existing Tools

Operational Noise Management Plan

GTS and NEARNG need to continue to maintain their operational noise management program. This program will continue to assess the noise operational footprint for GTS.

Source: NEARNG Statewide Operational Management Plan, 2007

Small Arms Range Land Use Compatibility Table for Noise

The Small Arms Range Land Use Compatibility Table for noise established recommended land use for areas around small ranges that may be impacted by noise resulting from weapons firing and impulse noise, such as large booms. Table 5.9-1 identifies the recommended land uses for the NZs for small arms ranges. As identified in the table, residential uses are not recommended for NZs greater than 70 dB, or the NZ III (140 dB). Residential land uses are not generally recommended in NZ II without conditions including sound mitigation measures installed in the construction of such homes.

Table 5.9-1 Recommended Land Uses for Small Arms Noise Zones

SLUCM No.	Land Use Name	Noise Zone II (87-104 dBP)	Noise Zone III (>104 dBP)
10	Residential		
11	Household units	N[1]	N
11.11	Single units: detached	N[1]	N
11.12	Single units: semidetached	N[1]	N
11.13	Single units: attached row	N[1]	N
11.21	Two units: side-by-side	N[1]	N
11.22	Two units: one above the other	N[1]	N
11.31	Apartments: walk-up	N[1]	N
11.32	Apartment: elevator	N[1]	N
12	Group quarters	N[1]	N
13	Residential hotels	N[1]	N
14	Mobile home parks or courts	N[1]	N
15	Transient lodgings	25	N
16	Other residential	N[1]	N
20	Manufacturing		
21	Food and kindred products; manufacturing	Y[2]	Y[3]
22	Textile mill products; manufacturing	Y[2]	Y[3]
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y[2]	Y[3]
24	Lumber and wood products (except furniture); manufacturing	Y[2]	Y[3]
25	Furniture and fixtures; manufacturing	Y[2]	Y[3]
26	Paper and allied products; manufacturing	Y[2]	Y[3]
27	Printing, publishing, and allied industries	Y[2]	Y[3]
28	Chemicals and allied products; manufacturing	Y[2]	Y[3]
29	Petroleum refining and related industries	Y[2]	Y[3]
31	Rubber and misc. plastic products; manufacturing	Y[2]	Y[3]
32	Stone, clay and glass products; manufacturing	Y[2]	Y[3]
33	Primary metal products; manufacturing	Y[2]	Y[3]
34	Fabricated metal products; manufacturing	Y[2]	Y[3]
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	25	35
39	Miscellaneous manufacturing	Y[2]	Y[3]

SLUCM No.	Land Use Name	Noise Zone II (87-104 dBP)	Noise Zone III (>104 dBP)
40	Transportation, communication and utilities		
41	Railroad, rapid rail transit, and street railway transportation	Y[2]	Y[3]
42	Motor vehicle transportation	Y[2]	Y[3]
43	Aircraft transportation	Y[2]	Y[3]
44	Marine craft transportation	Y[2]	Y[3]
45	Highway and street right-of-way	Y[2]	Y[3]
46	Automobile parking	Y[2]	Y[3]
47	Communication	25	35
48	Utilities	Y[2]	Y
49	Other transportation, communication and utilities	25	35
50	Trade		
51	Wholesale trade	Y[2]	Y[3]
52	Retail trade – building materials, hardware and farm equipment	25	35
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	25	35
54	Retail trade – food	25	35
55	Retail trade – automotive, marine craft, aircraft and accessories	25	35
56	Retail trade – apparel and accessories	25	35
57	Retail trade – furniture, home, furnishings and equipment	25	35
58	Retail trade – eating and drinking establishments	25	35
59	Other retail trade	25	35
60	Services		
61	Finance, insurance, and real estate services	25	35
62	Personal services	25	35
62.4	Cemeteries	Y[2]	Y[3]
63	Business services	25	35
63.7	Warehousing and storage	Y[2]	Y[3]
64	Repair services	Y[2]	Y[3]
65	Professional services	25	N
65.1	Hospitals, other medical facilities	N	N
65.16	Nursing homes	N	N
66	Contract construction services	25	35
67	Government services	25	35
68	Educational services	35	N
68.1	Child care services, child development centers, and nurseries	35	N
69	Miscellaneous services	35	N
69.1	Religious activities (including places of worship)	35	N
70	Cultural, entertainment and recreational		
71	Cultural activities	35	N
71.2	Nature exhibits	N	N
72	Public assembly	N	N
72.1	Auditoriums, concert halls	35	N
72.11	Outdoor music shells, amphitheaters	N	N
72.2	Outdoor sports arenas, spectator sports	N	N
73	Amusements	Y	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	N
75	Resorts and group camps	N	N
76	Parks	N	N
79	Other cultural, entertainment and recreation	N	N
80	Resource production and extraction		
81	Agriculture (except livestock)	Y[4]	Y[5]
81.5	Livestock farming	Y[4]	N

SLUCM No.	Land Use Name	Noise Zone II (87-104 dBP)	Noise Zone III (>104 dBP)
81.7	Animal breeding	Y[4]	N
82	Agriculture related activities	Y[4]	Y[5]
83	Forestry activities	Y[4]	Y[5]
84	Fishing activities	Y	Y
85	Mining activities	Y	Y
89	Other resource production or extraction	Y	Y

Notes for Table 5.9-1:

SLUCM – Standard Land Use Code Manual

dBP – unweighted Peak decibel level

Y (Yes) – Land use and related structures compatible without restrictions.

N (No) – Land use and related structures are not compatible and should be prohibited.

Y^X – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.

N^X – No, with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

25, 30, or 35 – The numbers refer to noise level reduction (NLR) levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures.

Note 1:

a. Although local requirements for on- and off-base housing may require noise-sensitive land uses within Noise Zone II, such land use is generally not recommended. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, non-conforming land uses.

b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 30 decibels (dB) in Noise Zone II should be incorporated into building codes and be considered in individual approvals.

c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 10 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round.

d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

| SLUCM No. | Land Use Name | Noise Zone II (87-104 dBP) | Noise Zone III (>104 dBP) |

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

4. Residential buildings require an NLR of 30.

5. Residential buildings are not permitted.

Source: Department of Defense Instruction, 4165.57, 2015.

Findings

- Modifications to the existing ranges are projected to increase the impacted areas to the northern boundary of the installation.
- Impacted residences include several single-family residential uses within NZ II, and one private residence within NZ III.
- Land uses such as residential, medical facilities, and schools are typically not recommended for Noise Zone II.
- The Adams and Clay Counties Zoning Ordinances do not consider military compatibility by not including the small arms ranges land use compatibility table for noise.

NOI-2	Explosives ordnance disposal noise Explosives ordnance disposal activities occur twice a year at Greenlief Training Site and may disrupt nearby communities.

Explosive ordnance disposal (EOD) occurs when explosive ammunition such as grenades, ballistic missiles, artillery, mines, or any other bombs, are prepared for destruction within designated explosive areas. This is to ensure the secure disposal of the explosive weapon.

EOD activity at GTS involves the use of a 40mm grenade launcher at the M203 range. The back of the range is located 400 meters from the boundary. The side of the range is less than 200 meters from the boundary. The 2009 Operational Noise Consultation found a moderate risk of generating noise complaints. However, noise complaints could be limited due to the lack of residences in the area.

Existing Tools

Greenlief Training Site Operational Noise Consultation

The 2009 Greenlief Training Site Operational Noise Consultation assessed the noise impact of the small arms and grenade launcher activity. The consultation found that complain risk behind the range would be minimal, but the complaint risk to the side would be moderate. However, due to the limited residential development near the installation, the consultation concluded that the grenade launcher activity should not generate noise complaints. Even though no federal laws prohibit DOD activities from making noise, the consultation does recommend being a good neighbor and monitor the noise environment outside of the installation.

Source: Operational Noise Consultation, 2009

NEARNG Statewide Operational Noise Management Plan

The NEARNG Statewide Operational Noise Management Plan provides GTS details on how encroaching development can be impacted from the firing activities on an installation. The document states where the different firing activities take place on the installation and developed noise contour zones based on the impacts each activity creates.

Source: NEARNG Statewide Operational Management Plan, 2007

Findings

- According to the Operational Noise Consultation document, a lack of residential development exposed to the activity limits noise complaints.
- The Operational Noise Consultation recommends maintaining noise management and outreach programs and monitoring any proposed land use changes outside GTS.

NOI-3	Quiet nature of Clay County It is quieter in Clay County than in Adams County and thus easier to hear the noise from Greenlief Training Site.

Clay County is located on the eastern border of GTS, and known for its agriculture and livestock production. Adams County borders the western border of GTS, with surrounding land uses such as industrial and agricultural land use districts.

Much of the existing land uses within Clay County are zoned for agricultural and natural open spaces. Agricultural land use zones are dedicated for the production of crops, livestock, forestry, and non-commercial storage of agricultural products. With less of a barrier between the firing ranges at GTS and the residential homes within Clay County, it is easier for sound to travel. This allows for residents within the county to experience a higher level of noise impact than in Adams County.

Existing Tools

Clay County Zoning Resolution

Clay County's zoning mission states the need to protect the peace and comfort of the area. To protect this initiative the ordinance states that:

- conflicting land uses should be redeveloped,
- private and public lands should be developed to ensure appropriate use of land and; and
- to conserve the natural assets of the area.

Clay County should recognize the GTS noise contour zones to determine land uses that can act as a buffer to protect the quite nature of the county.

Findings

- Clay County experiences a higher level of noise than in Adams County due to its rural and open landscape.
- A natural buffer of vegetation on the eastern side of GTS could decrease the distance the noise travels.

NOI-4	Low-level flight operations Helicopter flights create noise that is heard off-installation. This includes noise associated with transit to and from the installation, take-off and landing, and drop zone operations. This noise has the potential to affect nearby residents and livestock. Chinook helicopters were identified as a more prominent source of noise disturbance.

Chinook Helicopters are the loudest aircraft in the Army. With twin turbines and a tandem-rotor transport rotorcraft, this large helicopter is used primarily on missions to transport troops, weapon materials, and supplies to the battlefield. Many of the operations for this aircraft occur in Lincoln, Nebraska, Camp Ashland, and the Mead Training Site.

Military helicopter flight operations at GTS have the potential to generate noise during overflight, takeoffs, landings, and drop zone operations. Helicopter training at GTS occurs very seldom, approximately twice a month, day or night, with operations that last from an hour to six hours.

UH-60 Black Hawk helicopters flying at low level

The helicopter landing pad is located within the southeast corner of the main complex, surrounded by a few residential properties and farmlands. There are two drop zone locations on the installation and six maneuver training areas that assist in real life tactic field training. The use of simulators and helicopter traffic will contribute to the disturbing noise levels that may impact residents within proximity to the base.

Source: GTS INRMP, 2001; NE NGR, 2011

Existing Tools

2007 NEARNG Operational Noise Management Plan

By managing army operations and their impacts on neighboring communities, this plan could help GTS configure reasonable hours and time frames for helicopter operations to occur so that residents are not disturbed at inconvenient times.

Findings

- Helicopter operations at GTS do not occur regularly and shouldn't generate noise complaints.
- According to the Operational Noise Management Plan, Chinook Helicopter operations do not occur at GTS.

Please see the next page.

5.10 Public Trespassing

This factor addresses public trespassing, either purposeful or unintentional, onto a military installation. The potential for trespassing increases when public use areas are proximate to an installation.

Military areas that are located on, or adjacent to, public lands owned by other entities (i.e., federal, state, or local) that are designated for public access, recreation, or for livestock grazing often experience issues related to public trespassing into training ranges and other areas with safety hazards related to military operations.

Compatibility Assessment

PT-1	**Inadequate signage around the perimeter of Greenlief Training Site** There is not adequate signage on all of the fencing around Greenlief Training Site. The NEARNG ordered additional signage to place around the installation, but portions of the fence need to be improved before the sings can be put up.

Signage is an essential component of a military base that visually identifies installation zones, ultimately creating continuity that allows for identifiable orientation throughout the site.

The lack of signage around the GTS perimeter can allow for unauthorized access onto the installation placing the public at a safety risk if they enter a firing range or other training areas. Unauthorized access could also be a potential concern for threats, such as vandalism, to military personnel and assets.

Source: Greenlief Training Site Installation Design Guide

Existing Tools

Greenlief Training Site Installation Design Guide

The Greenlief Training Site Installation Design Guide (IDG) is intended to standardize improve visual order, functional coherence, and total environmental quality of GTS. The IDG establishes standards and general guidelines for the site, which includes signage. However, the guide mainly provides guidelines for signage within the installation, focusing on interior signage to provide a sense of orientation. The only recommended signage to identify and restrict access is for drop-off areas. The guide does not mention any perimeter signage suggestions.

United Facilities Criteria 4-022-03 Security Engineering: Fences Gates, and Guard Facilities

The fencing chapter in United Facilities Criteria 4-022-03 provides signage criteria for DOD installations. Signs are to be places at intervals no greater than 200 feet along the entire perimeter of the installation. Perimeter signs should read "US Government Property – No Trespassing." Restricted area warning signs are suggested to be placed at intervals of no more than 100 feet and where boundaries make abrupt changes in direction.

Findings

- UFC 4-022-03 requires signs to be placed at least every 200 feet along the perimeter of GTS. It is undetermined if GTS meets this requirement.

PT-2	**Trespassing onto Greenlief Training Site** There is occasional trespassing onto Greenlief Training Site on the south side of the installation near the railroad tracks.

Military areas that are located on, or adjacent to, public land owned by other entities (e.g., federal, state, or local) that are designated for public access, recreation, or for agricultural purposes often experience issues related to public trespassing into training ranges and other areas with safety hazards related to military operations.

On occasion residents and/or visitors that are unfamiliar with an area have trespassed onto military installation

boundaries. This is a rare occurrence, and is partially due to the lack of signage around the installation.

The concern about public trespassing is that maneuver training exercises occur on GTS. Not only is it a federal offense to trespass on GTS, trespassers are exposed to the risks associated with live-fire ranges and pose a major threat to public safety.

When security is breached by public trespassers, GTS Range Control personnel are notified and must institute an immediate cease fire while the trespasser is investigated, apprehended, and/or escorted to a safe location. This results in delays in training exercises, and ultimately hinders the ability of GTS in achieving its overall mission in preparing soldiers.

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- Trespassing usually occurs due to lack of signage, fencing, and security and often involves citizens unfamiliar with the area.
- When public trespassing occurs, training exercises are delayed, hindering the GTS mission.

5.11 Roadway Capacity

Roadway capacity relates to the ability of existing freeways, highways, arterials, and other local roads to provide adequate mobility and access between military installations and their surrounding communities.

As urban development expands into rural areas, roads once used primarily to provide access for agricultural uses and limited local traffic begin to function as urban major arterial roadways. These once rural roads often become the main transportation corridors for all types of traffic - from residential to commercial trucking – and can assist or impede access to military installations. As transportation systems grow and provide more capacity, these facilities induce and encourage growth as rural areas become more accessible.

Key Terms

Level of Service. A common measurement used by traffic engineers to determine the effectiveness of a traffic system is a grading system called Level of Service (LOS) which assigns a letter grade from A to F based upon traffic flow and safety characteristics as shown in Table 5.11-1.

Table 5.11-1 Level of Service of Roadway

LOS Rating	Definition
A	Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.
B	Represents reasonably free-flow operation. Ability to maneuver within the traffic stream is slightly restricted.
C	Represents a traffic flow with speeds near or at free-flow speed of the freeway. There is noticeable restricted ability to maneuver within the stream of traffic.
D	Speeds begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited.
E	Operation is at capacity. Vehicles are closely spaced within the traffic stream and there are no useable gaps to maneuver.
F	A breakdown of vehicle flow is present. This condition exists within the queues forming behind the breakdown points.

Roadway Capacity. Roadway capacity refers to the ability of existing freeways, highway, arterials and other local roads to provide adequate mobility and access among military installations and their surrounding communities.

Compatibility Assessment

RC-1	**Convoy usage on public roads** There are occasionally military convoys that travel to Greenlief Training Site from other military bases that may cause increased traffic on public roads.

The term convoy generally refers to a group of military vehicles traveling from one installation to another. For the purposes of this JLUS, convoys are groups of military vehicles traveling in and out of GTS.

The types of vehicles that are generally in convoys consist of various models of High Mobility Multipurpose Wheeled Vehicles (also known as Humvees), Palletized Load System trucks, Medium Tactical Vehicles, and 5-ton cargo trucks. Due to their size, some of these vehicles travel slower than civilian traffic and the size of a convoy may cause delays on roadways. Convoy travel is not a daily occurrence, so the delays are not a consistent concern, but some residents have identified delays as a potential issue.

Existing Tools

Nebraska Army National Guard Safety Range and Training Facilities

This NEARNG Regulation 385-1 establishes a set of guidelines for all vehicle use associated with GTS. The regulation requires submission of a route map and timeline for convoy operation, to Range Control, at least 24 hours in advance of any convoy. The document also states that additional risk assessment worksheets may be required prior to conducting vehicle movement.

Findings

- Convoys travelling at slow speeds have the potential to negatively impact traffic speeds.

RC-2	Traffic backup caused by train operations There is a railroad that runs along the southern boundary of Greenlief Training Site. Trains using this railroad have the potential to interrupt convoys traveling to or from Greenlief that may in turn cause traffic delays for civilian traffic.

The Union Pacific railroad is located adjacent to the southern border of GTS and runs northwest to southeast. The Union Pacific rail line intersects with US Route 6 just east of the installation, and is commonly used for transportation of agricultural products and coal. Due to the demand of these products as well as others, there is a potential for increased usage of the rail line. Convoys traveling to and from GTS may use the US Route 6 or other local roadways that surround the installation.

This issue was brought up as a future awareness issue rather than a current constraint. With the current level of rail activity, convoys have not experienced heavy delays or backups of traffic due to train crossings. If train operations increase in the future, it could become a greater concern for troops and civilian traffic, and the NEARNG may consider seeking alternate convoy routes to avoid impacts.

Existing Tools

As part of this JLUS effort, no existing tools were identified that address this compatibility issue.

Findings

- Trains have the potential to interrupt convoys, which could cause delays in civilian traffic.

5.12 Safety

Safety zones are areas in which development should be more restrictive, in terms of use and concentrations of people, due to the higher risks to public safety. Issues to consider include aircraft accident potential zones, weapons firing range safety zones, and explosive safety zones.

Military installations often engage in activities or contain facilities that, due to public safety concerns, require special consideration by local jurisdictions when evaluating compatibility. It is important to regulate land use near military installations in order to minimize the danger associated with range activities.

Compatibility Assessment

SA-1	**Aerial application of crop spraying near Greenlief Training Site** Crop dusting activities in the vicinity of Greenlief Training Site could cause safety concerns during weapons firing activities if the pilots fly near the ranges.

Interviews with GTS personnel did not reveal any recent incidents (or near miss occurrences) with military aircraft and crop dusters. However, due to the catastrophic nature of such an incident and the fact that aircraft used for aerial applications (crop dusting, etc.) can operate at low altitudes and with frequent passes in the area, it is important for all crop duster pilots to be aware of the daily operations at GTS.

According to FAA regulation, agricultural aircraft, over non-congested areas, are permitted to operate below 500 feet above the surface and 500 feet from individuals, vehicles, and structures. As discussed in issue LAS-2, the OIC has to maintain a clear vision during all firing activities to reduce the risk of impact with incoming flight operations.

Residents who operate agricultural aircraft need to have detailed coordination with GTS to ensure security procedures, responsibilities, and boundaries are established and maintained.

There is a need for awareness of safety hazards regarding pilots of agricultural aircraft near the training site, and the general public should be conscious of possible implications this concern may cause.

A red flag is flown when the ranges at Greenlief Training Site are active to alert both military personnel and civilians of the activity

Existing Tools

NEARNG Regulation 385-1 and Small Arms Range Safety Area

The NEARNG Regulation 385-1 outlines range and training facilities safety. Section 1-7 provides guidelines for control of airspace when the range is in use. GTS airspace is controlled at the installation level by utilizing a Small Arms Range Safety Area (SARSA). SARSAs are similar to Controlled Firing Areas and are not considered Special Use Airspace. The installation commander is required to ensure that airspace above and adjacent to small arms ranges is monitored to prevent endangering nearby aircraft operations, such as crop dusting activities.

The level of controlled airspace depends on the weapons systems being used. All scheduled aircraft must coordinate with Range Control prior to entering the restricted area. It is the responsibility of the Range Officer in Charge to maintain visibility of the airspace within 5 miles of the range and to order and ensure a "cease fire" before any aircraft enters the SARSA.

Findings

- SARSAs are utilized when the range is in use.
- Aircraft must coordinate with Range Control to enter the controlled airspace.
- It is the responsibility of the Range Officer to monitor a 5-mile range for potential approaching aircraft.

SA-2	Private gun club located next to Greenlief Training Site The Four Rivers Sportsman's Club, a private gun range, is located on the western border of GTS. There are concerns that bullets fired from weapons on the gun club ranges could pass onto Greenlief Training Site and put personnel at risk.

The Four Rivers Sportsman's Club is located on Maxon Ave. and abuts the western border of GTS. The outdoor range runs west to east, with patrons firing to the east, toward GTS. According to the Four Rivers Sportsman's Club website, the outdoor range is set in to a small manmade valley. It has an earthen back stop of 110 feet high and side walls averaging 20 feet. In addition to the back stop, the range is baffled to prevent projectiles from leaving the range.

The club has both an indoor and outdoor range. The outdoor range is utilized from April to September. The range maintains an event calendar on its website, but there is no coordination to inform GTS of when the range is active. The Four River Sportsman's Club and its general firing direction in relation to GTS activities are shown on Figure 5.12-1.

Source: http://4rsc.com/

Existing Tools

Four Rivers Sportsman's Club, Inc. By-laws

The gun club has established a list of by-laws, rules, and regulations that are agreed upon by all members before they can join the club and use the facility. Article 13, Section 11, of the by-laws identifies the club rules, specifically stating that "intentionally firing a bullet off club grounds or, permitting through carelessness, bullets to leave the club grounds shall be cause for expulsion." The by-laws also address other rules, such as firing at only authorized targets and knowing/obeying all range commands, that may act as supporting regulation in preventing firing from leaving the club's range.

Findings

- The safety of GTS personnel is a concern due to the potential for stray bullets to pass onto GTS.
- The gun range currently uses baffle and an earthen back stop to prevent bullet from leaving the range.
- GTS should coordinate with the range to be aware of when the range is being used and potentially avoid the area if possible.
- GTS does not coordinate with the gun club, nor does the gun club coordinate with GTS.

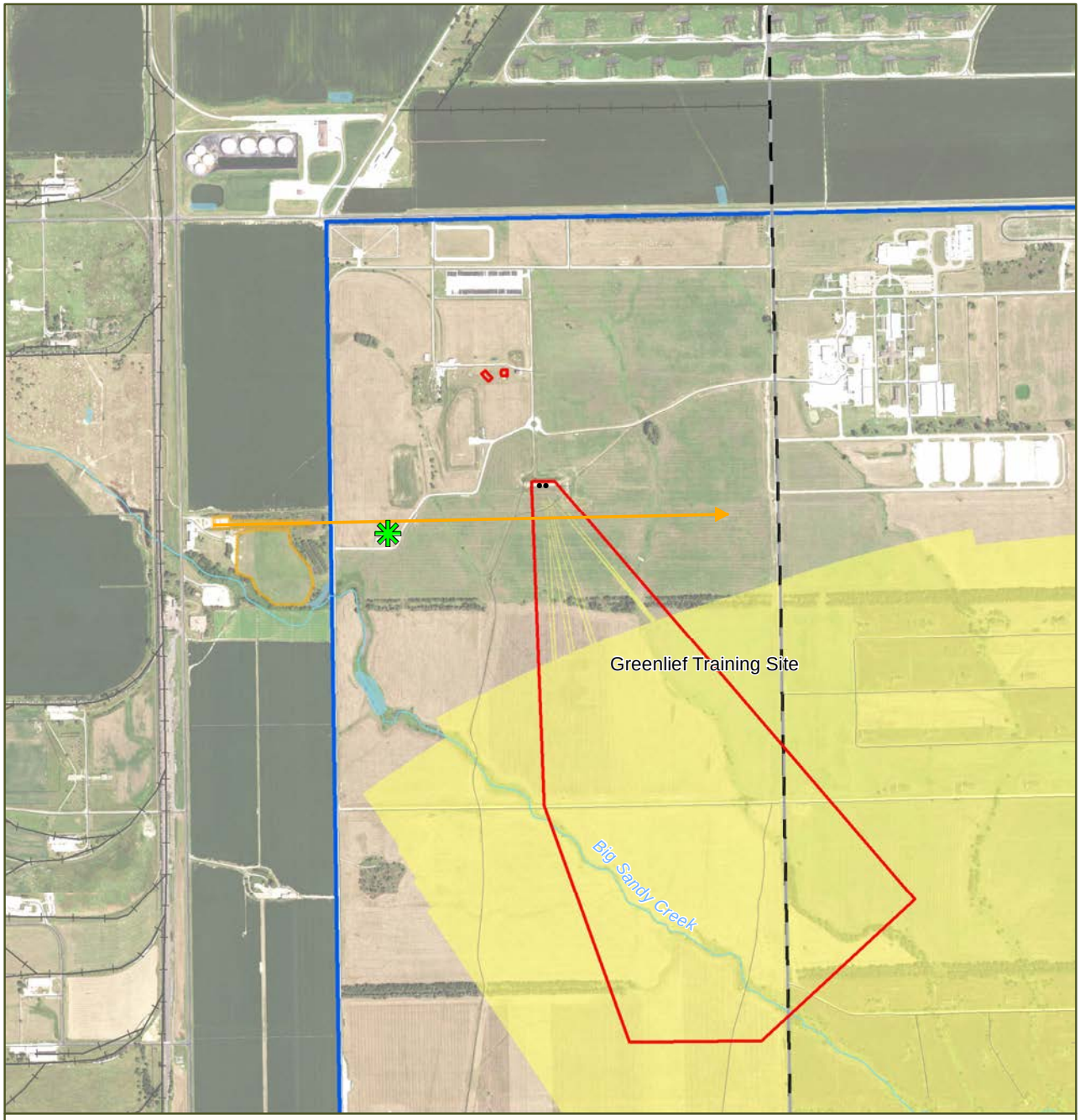


Figure 5.12-1

Private Gun Club Near Greenlief Training Site Firing Ranges

SA-3	Concern over fire coverage in the region There is a general concern in the region around Greenlief Training Site that a fire may occur due to military weapons firing activities or other occurrences such as natural wildfires that may impact military operations or civilian uses or property.

The region surrounding GTS consists of varying landscapes, most of which are agricultural farming and production, open space, and industrial. Any installation that conducts live fire training activities has the potential to increase the risk of a fire occurring.

The NEARNG State Safety Manager is responsible for the annual inspection of all ranges to determine if the site is in accordance with the regulations before the range can be certified for use. Duties of the troop's commander also involve the responsibility of ensuring fire safety by having firefighting equipment within proximity so that fires can be reached quickly. During seasons of dry weather it is directed that all units carry firefighting equipment such as shovels, burlap bags, fire beaters, and water filled fire extinguishers.

Despite the precautions that are taken to reduce the risk of fires occurring on the installations, the potential is still present. It is important to keep development around GTS to a minimum to reduce the potential risks to property, structures, and human lives. Figure 5.12-2 illustrates the fire potential for areas around GTS.

Existing Tools

Training Site Fire Prevention / Protection Plan

The purpose of this plan is to help NEARNG military installations to establish fire prevention policies, procedures, standards, and responsibilities. These regulations comprise the responsibilities of where to store equipment, how to execute fire plans, and how to ensure elimination of fire hazards. The procedures described in the safety regulation document will protect surrounding areas and individuals from the potential impacts caused by the military activities.

Source: Nebraska National Guard Range Safety Regulation, 1993

Integrated Natural Resources Management Plan

According to chapter seven under Land Use and Management Units, GTS has been conducting agricultural leasing since the 1960s. This program allows GTS to lease open areas to local farmers, reducing the amount of grasslands to maintain and ultimately decreasing the risks of potential fires.

Source: Integrated Natural Resources Management plan, 2001

Nebraska State Forestry Service

The Nebraska State Forestry Service has established a Forestry Management Plan (FMP) which is responsible for developing regulations for GTS in regards on how to maintain and improve forest areas that surround the installations boundaries.

Source: Integrated Natural Resources Management plan, 2001

Findings

- GTS has many provisions in place to protect the surrounding region in case of a fire that may occur from weapons firing activities.
- Within the 2001 INRMP, the FMP is stated to provide GTS with procedures to protect the base from forest fires, but to also keep the forest thriving to act as a buffer for the installation.
- There is no evidence that military personnel at GTS have attended training sessions on fire prevention hosted by the State Forestry Service.

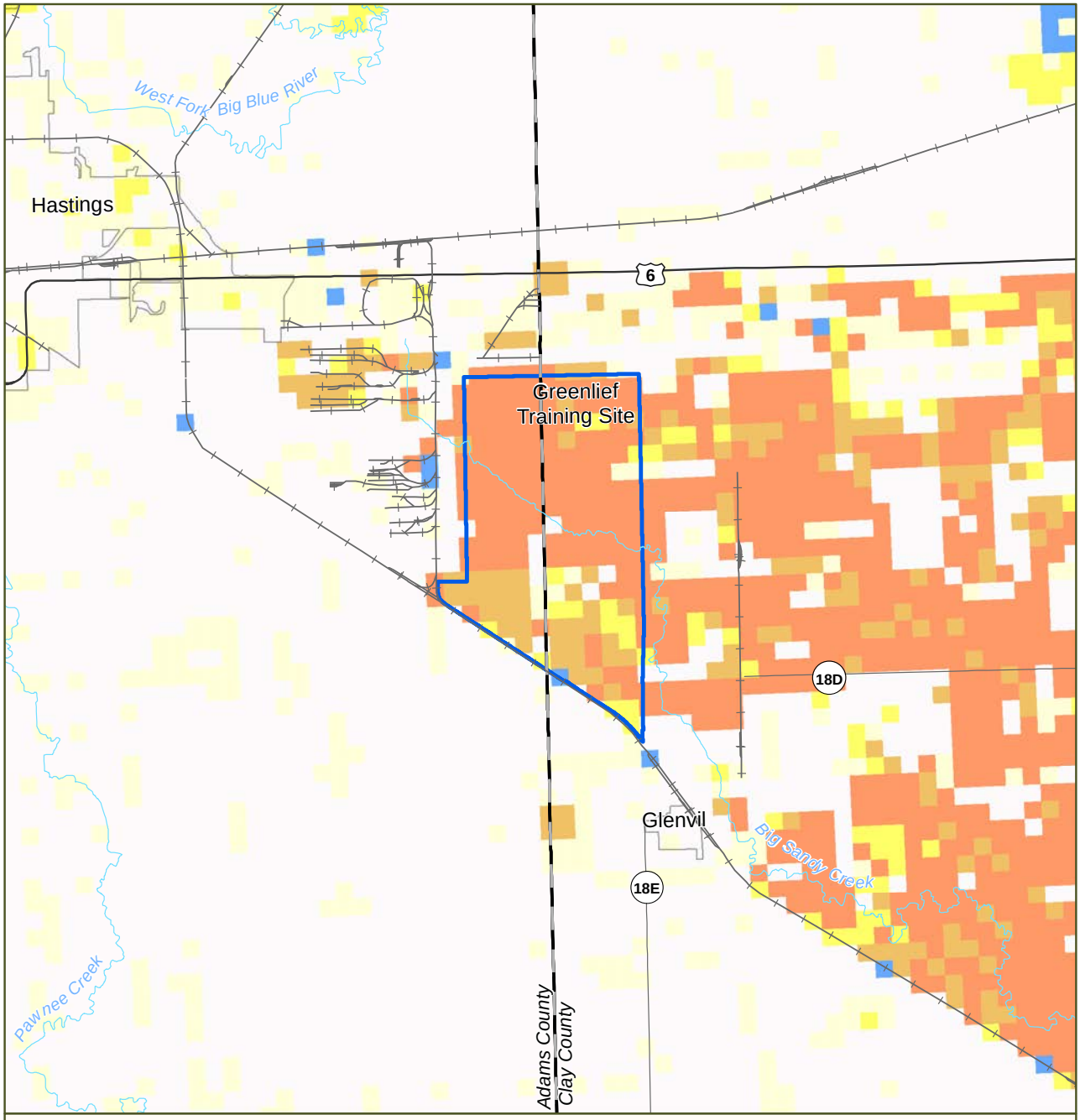


Figure 5.12-2

Potential for Wildland Fires Near Greenlief Training Site

SA-4	Maintaining Greenlief Training Site's role in emergency response Greenlief Training Site plays an important role in providing support during an emergency. The existing aid agreements should be reviewed and updated to ensure policies are current with State legislation and planning agencies. It is critical to maintain and enhance this State resource.

Aid agreements allow local government and military services to share the resources and burden in responding promptly in a rescue scenario caused by a disaster. These agreements identify the various agencies that would assist in an emergency situation as well as delineate the roles and responsibilities for providing aid in certain natural disaster situations. These agreements also outline the procedures for initiating the aid and responding to the event. Moreover, these agreements delineate the responsibility of reimbursement to responding agencies in the event of an emergency.

As discussed previously for issue COM-6, NEARNG and Nebraska's Military Department, and the NEMA are responsible for providing support during an emergency or disaster. NEARNG, Nebraska Military Department, and NEMA coordinate with various federal and local government agencies, to establish protocol and/or procedures to ensure a complete rapid response during an emergency.

Existing Tools

NEARNG Forestry Management Plan

The Forestry Management Plan (FMP) establishes procedures, identified by the NEARNG, for managing and improving the forest areas that surround GTS. With three types of forest resources, managing these areas is critical to support the military mission. Not only do the forest areas act as a buffer, but they contribute as an ecological benefit to the base by providing a quality environment. FMP analyzes these sites to establish a growing environment that is consistent throughout GTS.

These areas can provide shading, and better climate conditions for training operations. These areas are to be monitored in order to protect future military missions.

State of Nebraska Hazard Mitigation Plan

According to the Hazard Mitigation Plan, the state and local governments are responsible for reviewing all existing mitigation plans and determining necessary updates in order to effectively cover all current and future matters. Numerous federal and local agencies are involved in the update process, which allows for various mitigation strategies to be determined. It is stated that after an event, mitigation plans must be reviewed and updated as necessary.

Although the plan does not require the establishment of aid agreements, it does provide direction for local governments and GTS on identifying mitigation strategies.

Findings

- The Nebraska Hazard Mitigation Plan does not reference a direct coordination with NEARNG.
- According to the Nebraska Hazard Mitigation Plan, NEMA is to prepare any updates or revisions to the plan after a disaster or event.
- See Findings for COM-6 as well.

SA-5	Hazardous material transportation Hazardous material, such as some types of fertilizers or other agricultural products, that is transported via railroad or along the highways adjacent to Greenlief Training Site could pose safety concerns if something were to happen to them next to the installation.

Hazardous materials have the potential to create significant impacts on the health and safety of the environment and the community due to the chemical composition of the materials. Concerns have been raised due to the transportation, storage, and use of hazardous materials that are relatively close to GTS and adjacent or nearby land uses such as commercial, residential, and industrial areas.

GTS is bordered by the UP Rail Line to the south, running northwest to southeast, and US Highway 6 located just one mile north of GTS, running parallel with the GTS border. Rail transportation is recognized as the safest method of moving large quantities of chemicals or hazardous materials over long distances. According to the Federal Railroad Administration, rail industry's safety performance, as a whole, is improving. However, characteristics of hazardous materials, such as flammability or toxicity, have the potential to create safety and security risks in the event of a derailment, spill, or leak.

The railroad that transports materials past GTS does not communicate with the installation on a regular basis when hazardous materials are being shipped. This is generally not a problem, since the mere existence of materials traveling safely is not an issue. The concern arises in the event of an accident in which hazardous materials are spilled near or on GTS. GTS personnel responding to the emergency may not know if hazardous materials are present, and if they are, they may not know what kind or how to safely respond to the spill, fire, or other scenario. Railroad cars with hazardous materials have placards on them identifying the presence of materials, but do not identify what the materials are.

In the event of an emergency, GTS would be notified of the situation, but may not be provided with specifics on what the train was carrying. To be better prepared in the event of an emergency situation, Security Forces should know what is happening along the fence line. There is a need for improved coordination between the railroads and GTS regarding the transportation of hazardous materials.

Picture from a train derailment in Heimdal, North Dakota that shows an example of what can happen if a train carrying crude oil were to derail

Existing Tools

Nebraska Hazardous Materials Regulations

The Federal Hazardous Materials Regulations apply to persons who transport hazardous materials or cause hazardous materials to be transported in interstate or intrastate commerce. The State of Nebraska has adopted the following parts of the Federal Hazardous Materials Regulations:

(1) Part 107 - Hazardous Materials Program Procedures, subpart F-Registration of Cargo Tank and Cargo Tank Motor Vehicle Manufacturers, Assemblers, Repairers, Inspectors, Testers, and Design Certifying Engineers;

(2) Part 107 - Hazard Materials Program Procedures, subpart G-Registration of Persons Who Offer or Transport Hazardous Materials;

(3) Part 171 - General Information, Regulations, and Definitions;

(4) Part 172 - Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements and Security Plans;

(5) Part 173 - Shippers-General Requirements for Shipments and Packaging's;

(6) Part 177 - Carriage by Public Highway;

(7) Part 178 - Specifications for Packaging's; and

(8) Part 180 - Continuing Qualification and Maintenance of Packaging's.

These regulations apply to all motor carriers, including cars, trucks and rail cars. When a motor carrier performs a hazardous material transportation function, the carrier is responsible for performing that function in accordance with these regulations. The cargo space of the vehicle should be suitable for the material being shipped. The vehicle itself must be in sound mechanical condition. The carrier must check to insure that the material offered by the shipper is properly described and packaged.

Additionally, if any motor carrier will be carrying a hazardous material that is either a Class 7 (radioactive) material, over 25 kg, more than one liter, or a material poisonous by inhalation, they will be required to apply for a Hazardous Materials Safety Permit. In addition, they will be required to apply for a Hazardous Materials Registration prior to being issued a USDOT number for intrastate or interstate commerce.

Source: Nebraska State Patrol

State of Nebraska Hazard Mitigation Plan, 2014

The Nebraska Hazard Mitigation Plan included a risk assessment survey issued to jurisdictions throughout the state, in order to rate the magnitude, frequency, areas affected, and speed of potential hazards. Chemical Transportation was rated as a high risk, scoring an 80 or higher out of 100, meaning there is a high probability of occurrence within the jurisdiction over the next 10 years. Chemical transportation received an average score of 87.48 percent in region one, which includes Sarpy County. Other risk scores in region one for the transportation of hazardous materials include 55.81 for radiological transportation and 73.48 for (general) transportation of hazardous materials, both of which were rated medium risk hazards, meaning the probability of occurrence over the next 10 years is considered moderate. Public hazards associated with chemical transportation include housing contamination, possible causalities, and property damage, negative impacts on food or water, and possible evacuation of areas. Mitigation goals and objectives are also presented in the plan, with the purpose to protect property and individuals from local hazardous risks.

Source: State of Nebraska Hazard Mitigation Plan, 2014

Nebraska Department of Roads (NDOR)

The Nebraska Department of Roads has a Hazardous Materials Division, but it is does not regularly they monitor the transportation of hazardous materials proximate to GTS. NDOR's responsibility includes following federal, state and local laws and regulations that apply to hazardous materials. They also help regulate and maintain procedures in responding to and remediating transportation related to spills of hazardous waste or petroleum.

Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains Rule

On May 1, the US Department of Transportation announced that through the collaboration of the Pipeline and Hazardous Materials Safety Administration and the Federal Railroad Administration a new rule for "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains". This rule aims to strengthen standards for the transportation of crude oil and ethanol by rail. Among other items, this rule adds routing requirements, speed restrictions, and improved communications strategies with local government agencies to inform them about oil-by-rail activity.

Findings

- Nebraska has adopted several of the Federal Hazardous Materials Regulations.
- A new US Department of Transportation rule will require enhanced communication between rail operators and local government agencies about the transportation of crude oil and ethanol.
- NEMA is able to provide guidance and support by reviewing mitigation projects but does not provide funding.

SA-6	Potential for use of new type of bullets that have an increased safety footprint The new generation of bullets used at many firing range facilities has a larger surface danger zone (SDZ). If this type of ammo is used at Greenlief Training Site, it may increase the SDZs past the boundaries of the installation.

A surface danger zone (SDZ) is an area associated with weapons firing range where access by military personnel and civilians is not permitted due to the danger associated with the firing of live munitions. An SDZ can include the surface and subsurface areas of land and water as well as the overhead air space through which projectiles traverse. An SDZ typically includes the weapons firing position, target impact area, and a secondary buffer area. The secondary buffer area is an additional area where errant projectile / munition fragments may land without risking harm to life or property. The area of an SDZ can vary in size and shape and is specifically designed for the artillery / weapon type, distance, and firing charge.

As technology continues to advance military weaponry, existing ranges and training operations will have to be adjusted in order to continue ensuring the safety of military personnel. Concerns have been raised on the new generation of bullets and the adequacy of the existing SDZs.

Existing Tools

Army Regulation 385-63

AR 385-63 provides range safety protocols for active firing ranges. The purpose of the range regulation is to enhance and ensure the safety of the military personnel during range activities and operations. Additional responsibilities of the Army relative to SDZs include:

B (2) Ensure approved surface danger zones (SDZs) and weapon/ammunition safety characteristics are available prior to materiel release.

K (1) Establish SDZ development criteria based on weapon, munition capabilities, and user requirements. SDZ criteria established by the CG, AMC are applicable to Marine Corps installations.

(5) Establish a program to validate or amend existing SDZs, and provide recommendations to CG, TRADOC (Attention: ATIC–TCT), as required.

I (4) Prepare and recommend SDZ standards for nonstandard weapons/munitions systems used in CQC/AMOUT training and operations to CG, TRADOC.

(5) Approve new SDZs and/or weapon danger zones and changes to existing SDZs/weapon danger zones based on recommendations from the CG, AMC and others, as appropriate.

O (12) Coordinate with DOD laboratories to obtain technical data upon which to establish SDZs, weapon danger zones, and other range safety measures.

Regulations, standards and protocols stated within under the AR 385-63 will ensure that each firing range has proper SDZs before operations can continue.

Source: AR 385-63, January 2012

Findings

- The Army's assistant secretary is responsible for ensuring approved SDZs are established.
- The Commanding General of the US Army Materiel Command is responsible for establishing SDZ development criteria.
- Commanding General of the US Army Special Operations Command is responsible for appointing a technical consultant who then prepares and approves new SDZs
- Director of the US Army Training Support Center is responsible for appointing a technical consultant who must coordinate with the DOD in order to properly establish SZDs.

5.13 Vertical Obstructions

Vertical obstructions are created by buildings, trees, structures, or other features that may encroach into the navigable airspace or line-of-sight radar signal transmission pathways used by the military. These obstructions can be a safety hazard to both the public and military personnel and potentially adversely impact military readiness.

Vertical obstructions can compromise the value of low-level flight training by limiting the areas where such training can occur. These obstructions can include a range of items from man-made, such as telephone poles, utility transmission towers, and radio antennas, to natural, such as tall trees and land features. Vertical obstructions can also interfere with radar transmissions, compromising the integrity of data transmission between the transmitter and receiver. Though most critical near the transmitter, the geographic area impacting the transmissions, or radar viewshed, can be broad depending on the distance between the transmitter and receivers.

Key Terms

Imaginary Surfaces. The term imaginary surface refers to the areas surrounding a heliport or airfield that must be kept clear of objects that might pose a safety threat to aviation activities. A man-made or natural object that projects above an imaginary surface is an obstruction. See Chapter 3 for more information.

Vertical Obstructions. Vertical obstructions are objects or structures that exceed a specified height above ground level and extend into airspace. Vertical obstructions may be created by buildings, trees, structures, or other features that are of greater height than, and encroach into, the navigable airspace used for military operations (aircraft approach-departure surfaces, transitional surfaces, as well as military training or flight routes). These can present a safety hazard to both the public and military personnel and potentially impact military readiness.

Technical Background

The Federal Aviation Administration (FAA) has developed regulations, referred to as Part 77, which describe distances from airport and heliport sites that buildings, structures, or objects can be in height so that they do not interfere with aircraft takeoff and landing operations. Part 77 requires that for a ratio of "25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each [DoD] heliport" (airport), any structure being proposed must have a notice filed with the FAA. The FAA also states:

> *"The airport imaginary surfaces proposed for helicopters have been substantially revised for compatibility with the current ''Heliport Design Guide." The primary surfaces coincide in size and shape with the takeoff and landing area of each heliport. The designated approach clearance surfaces begin at the edge(s) of the primary surface and extend outward and upward at a slope of 8 to 1. The approach surface is a trapezoid whose inner width is coincident with the width of the primary surface and which extends to the minimum en route altitude where its width is 500 feet. Transitional surfaces extend outward and upward at a slope of 2 to 1 from the lateral boundaries of each primary surface and approach surface for a horizontal distance of 250 feet from the centerline of these surfaces."*

UFC 3.260-01, *Airfield and Heliport Planning and Design* serves as the official DoD document that describes requirements of heliports at military installations, which was updated in November 2008. This document sets forth requirements for military heliports and safety zones associated with takeoffs, landings, and hover points. According to the planning and design regulations, the following distances are suggested for VFR heliports:

- Size of heliport = 100 feet by 100 feet minimum
- Size of primary surface = 300 feet by 300 feet minimum
- Length of clear zone = 400 feet
- Width of clear zone = 300 feet
- APZ I length = 800 feet
- APZ I width = 300 feet

Compatibility Assessment

VO-1	**Potential future tower sites** There is a potential for future tower facilities, such as cellular and communications towers, to develop in the region around Greenlief Training Site, which may interfere with helicopter flight operations.

Future potential tower sites for new facilities such as communications towers have the potential to create vertical obstructions. There are several elements that are evaluated before a vertical obstruction is determined including the following:

- Type of development—telecommunications towers, antennae, wind turbines,
- Proximity / Location to the GTS helipad (including ground elevation at prospective site), and
- Height of the structure.

Although helipad safety zones and imaginary surfaces are not as expansive as ones associated with fixed-wing aircraft runways, taller structures such as communication towers have the potential to impact low level helicopter operations.

While FAA regulation requires prior notification for any construction and / or objects that will impact navigable airspace, notification with GTS personnel and their input on design review regarding these projects or their construction may not occur frequently.

Existing Tools

FAA Part 77

The Federal Aviation Act requires the Secretary of Transportation to make long-range plans which formulate policy for the orderly development and use of "navigable air space". Part 77 of the Federal Aviation Act establishes standards used to determine obstructions within navigable airspace, typically within a certain distance from an airport, airfield, or heliport. It defines an obstruction to air navigation as an object that is of greater height than the primary, approach, or transitional surfaces.

Example of a cellular communications tower built in an agricultural area, near Irvington, Nebraska

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has "a public right of freedom of transit in air commerce through the navigable air space of the United States". The rule was formally announced in the 1963 Court of Claims ruling in *Aaron v. United States* and states that flights 500 feet or more above ground level (AGL) do not represent a

compensable taking because flights 500-feet AGL enjoy a right of free passage without liability to the owners below. Part 77 also states:

- Any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA:
  - Any construction or alteration exceeding 200 feet above ground level
  - Any construction or alteration within 5,000 feet of a public use heliport which exceeds a 25:1 surface

The helipad imaginary surfaces extend off-base slightly at the northern portion of the installation. While the imaginary surfaces appear to extend off installation into Clay County (Note: Matrix does not have future land use or zoning GIS data for Clay County), the area that is impacted by the imaginary surfaces that go off installation appears to be agricultural land uses. Typically, agricultural land uses are not of major concern to flight operations unless tall structures in excess of 35 feet are permitted by right.

Clay County Zoning Resolution

Since the imaginary surfaces only impact Clay County, this is the only zoning ordinance assessed for compatibility regarding this issue. Thus, Clay County Zoning Resolution permits towers under 35 feet in all of the zoning districts. Communications, microwave, cellular communications or other towers in excess of 35 feet are conditional uses in all of the zoning districts, requiring a special review.

The granting of a conditional use permit (CUP) procedure includes a Planning Commission meeting, which requires at least a 10 day public notice. A copy of the notice is mailed to all property owners within 300 feet of the proposed location of the conditional use. The Commission after public hearing and review either recommends approval, denial, approval with conditions, or table the application to provide for further study and review. The general public is notified; however it is unknown if GTS is directly notified of proposed towers nearby the installation within 300 feet of GTS.

Findings

- The FAA requires coordination with any structure over 200 feet, or within 5,000 feet of the GTS heliport.
- It is unknown whether GTS is notified by Clay County or other near and adjacent communities of proposed tall structures near the helipad or the installation perimeter.

Please see the next page.

5.14 Vibration

Vibration is an oscillation or motion that alternates in opposite directions and may occur as a result of an impact, explosion, noise, mechanical operation, or other change in the environment. Vibration may be caused by military and /or civilian activities. Some studies have shown that homeowners become concerned about the structural rattling and potential damage when the peak decibels exceed 120 dBP, but actual damage is not likely to occur at decibels lower than 150 dBP.

Compatibility Assessment

V-1	**Explosive ordnance disposal** Occasional explosive ordnance disposal (EOD) operations occur at Greenlief Training Site that cause vibrations that can be felt by nearby residents.

Some nearby residents adjacent to GTS have expressed concerns about the vibrations associated with training operations at the base. These vibrations are generally the result of explosive detonations. Residents are concerned about potential damage to their homes or property. Under most circumstances, the distance between the source of the vibration and the structures that are off-installation would reduce the force generated by the vibration so that it would not cause any structural damage among the residential communities surrounding GTS.

As mentioned previously, studies have been conducted regarding the potential for structural damage resulting from vibration. When the sound that causes a vibration exceeds 120 dBP is when homeowners typically become concerned for structural damage occurrence due to the rattling effect. However, structural damage is not likely to occur until a level of 150 dBP is achieved (a level far exceeding those modeled for GTS). The weapons fired at GTS are small, and so are not likely to produce destructive vibrations. Similarly, the explosives used at GTS have a fairly small net explosive weight, which is not likely to exceed destructive levels off-installation. The unconsolidated nature of the soil in the region also helps to dampen vibration as it spreads away from the source.

Existing Tools

ATP 4-32: Explosive Ordnance Disposal (EOD) Operations

ATP 4-32 provides guidance to the Army National Guard on various responsibilities and procedures for the disposal of explosive ordnance. EOD procedures were established to ensure the safe disposal of explosive ordnance so that potential hazards are eliminated.

According to chapter two of the Explosive Ordnance Disposal Operations document, an EOD team determines if the unexploded ordnance (UXO) can be moved and disposed of before actual detonation can be carried out. Additionally the document state that:

> *2-146. All bases should have a dud pit where explosive ordnance that has been recovered from weapons caches, or turned in should be stored until EOD can destroy them. The dud pit should be located in a place that is far enough from living and work areas that there will be minimal damage in the event of an explosion. In cases where a base is not large enough for a dud pit, a place outside the gate, but within site of the gate guards, should be established. EOD teams should advise on where to place dud pits and should check them regularly.*

These EOD operations are established to prevent unnecessary vibration impacts to sensitive land uses inside and outside the GTS perimeter.

Source: Explosive Ordnance Disposal (EOD) Operations, 2013

Findings

- The EOD unit has explicit instructions to detonate any UXOs as the last resort and in an appropriate location away from sensitive land uses both inside and outside the installation.
- The tools identified here address the issue, it is not necessary for any additional assessment of this issue.

5.15 Water Quality / Quantity

Water quality / quantity concerns include the assurance that adequate water supplies of good quality are available for use by the installation and surrounding communities as the area develops. Water supply for agriculture and industrial use is also considered.

Key Terms

Groundwater. Groundwater is water held underground in the soil or in pores and crevices in rock.

Point-Source Pollution. This term refers to water pollution that comes from a single, discrete place, such as a factory drainage pipe.

Wetlands. Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands are those that are regulated by the US Army Corps of Engineers under Section 404 of the Clean Water Act.

Compatibility Assessment

WQQ-1	**Groundwater pollution from historical military activities** There is a groundwater plume in the region around Greenlief Training Site that is related to historical military activities that occurred in the area.

The former US Naval Ammunition Depot (NAD) encompasses approximately 48,800 acres located directly east of Hastings, Nebraska, within eastern Adams County and western Clay County, which includes GTS. The facility was active during World War II and the Korean Conflict. Environmental contamination at the Naval Ammunition Depot resulted from poor waste management practices during the facility's operation and decommissioning period.

Since 1995, the Corps of Engineers (COE) have conducted a number of cleanups. These cleanup activities have remediated all known surface sources of contamination. This effort has eliminated future release of contamination into the groundwater. However, groundwater contaminated with Volatile Organic Compounds (VOCs) and explosives remains above cleanup levels. A Record of Decision was established in August 2010 to remedy the groundwater pollution. The selected remedy is expected to take up to 95 years to reach final cleanup levels.

Potable water is currently supplied to the affected area by the City of Hastings from wells located outside the former NAD boundary. The distribution system is operated by Hastings Utilities. The polluted groundwater is used for irrigation and most industrial activities.

Source: Final Record of Decision Site wide Groundwater, Former Naval Ammunition Depot Hastings, Nebraska

Existing Tools

Record of Decision Sitewide Groundwater, Former Naval Ammunition Depot Hastings, Nebraska

This Record of Decision (ROD) provides an overview of the Hastings Groundwater Contamination Site, identifies a preferred remedy for the issue, and explains how that remedy fulfills statutory and regulatory requirements. The site, as identified in the ROD, consists of approximately 48,800 acres located immediately east of Hastings, Nebraska, in eastern Adams County and western Clay County.

The purpose of the remedial action is to mitigate future potential risks to workers and residents. Major components of the selected remedy include the following:

- Hydraulic containment of contaminated groundwater.
- Focused extraction within the groundwater contaminant plumes.
- Treatment of extracted groundwater by granular-activated carbon, air stripping, advanced oxidation techniques, and/or other appropriate technologies.

- Disposal of extracted treated groundwater through beneficial reuse or surface discharge.
- Monitored natural attenuation.
- Groundwater monitoring.
- Alternate water supplies if drinking water wells are impacted by groundwater contamination.

Based on modeling studies, the remediation time period is estimated to be 50 years for the semi-confined aquifer and 95 years for the unconfined aquifer. Five-year reviews are required to evaluate the implementation and performance of the remedy until final cleanup levels are achieved.

Although federal agencies control the majority of land on the former NAD, the privately owned land is subject to the zoning laws of Adams and Clay Counties. Adams County rezoned the contaminated area in November 1998, from mixed use to heavy industrial land use. Current nonindustrial properties were "grandfathered," but future residential land development will be restricted.

Findings

- Groundwater a non-suitable source of potable water for GTS due to pollution from previous military operations. The City of Hastings supplies potable water to GTS and other areas affected by the groundwater pollution.
- A Record of Decision has been established to take remedial action to improve the groundwater pollution.

Greenlief TRAINING SITE

JOINT LAND USE STUDY

Matrix DESIGN GROUP

Matrix
DESIGN GROUP