

**FINAL**

# Site Inspection Report

## Passage Key Air-to-Ground Gunnery

Manatee County, Florida

**U.S. Army Corps of Engineers**  
**Southeast and Pacific IMA Region**

FUDS Project No. I04FL040101

Contract: W912DY-04-D-0005

Task Order: 0008



*Prepared For:*

U.S. Army Corps of Engineers, Jacksonville District

701 San Marco Boulevard

Jacksonville, Florida 32207

and

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5390 Triangle Parkway, Suite 100

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March 2008

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**FINAL**



**Site Inspection  
Report**

**Passage Key Air-to-Ground Gunnery**

**Manatee County, Florida**

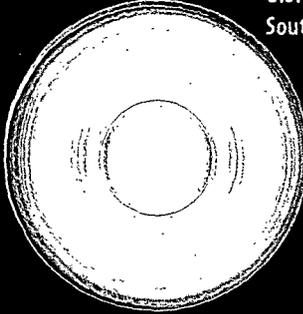
**U.S. Army Corps of Engineers Southeast and Pacific IMA Region**

FINAL  
Site Inspection Report  
**Passage Key**  
**Air-to-Ground Gunnery**  
Manatee County, Florida

U.S. Army Corps of Engineers  
Southeast and Pacific IMA Region



*Prepared For:*  
U.S. Army Corps of Engineers  
Jacksonville District  
and  
U.S. Army Engineering and  
Support Center, Huntsville



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Norcross, Georgia 30092

March 2008

FUDS Project No. 104FL040101  
Contract: W912DY-04-D-0005  
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The views, opinions, and/or  
findings contained in this report  
are those of the author(s) and  
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unless so designated by other  
documentation.



# Florida Department of Environmental Protection

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2600 Blair Stone Road  
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January 10, 2008

Michael A. Ornella  
Department of the Army  
Jacksonville District Corps of Engineers  
P.O. Box 4970  
Jacksonville, Florida 32232-0019

Re: Draft Final Site Inspection Reports

Dear Mr. Ornella:

The Department has received the Draft Final Site Inspection Reports for the following sites:

- Fort Spencer Bomb Target Site (dated November 2007, received December 10, 2007)
- Fort Clinch (dated December 2007, received December 10, 2007)
- Black Creek Bomb Target Range (dated December 2007, received December 10, 2007)
- Bartow Army Airfield (dated December 2007, received December 11, 2007)
- Passage Key Air-to-Ground Gunnery Range (dated December 2007, received December 11, 2007)

The documents are adequate for their stated intent. It is acknowledged that future removal actions, though not immediate, are warranted at Fort Spencer and Fort Clinch, and an RI/FS at Black Creek, Passage Key, and Bartow.

If I can be of any further assistance with this matter, please contact me at (850) 245-7504.

Sincerely,

Jeffrey D. Lockwood, P.E., BCEE  
Professional Engineer III  
Federal Programs Section

**CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW**

Parsons has completed the Final Site Inspection report for the Passage Key Air-to-Ground Gunnery Range, Manatee County, Florida. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.



March 19, 2008

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Study/Design Team Leader and Team Members



March 19, 2008

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Independent Technical Review Team Leader

Significant concerns and the explanation of the resolution are as follows:

None

As noted above, all concerns resulting from independent technical review of the project have been considered.



March 19, 2008

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Parsons Program Manager(s)

# PARSONS

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March 19, 2008

U.S. Army Engineer Center Huntsville  
CEHNC-OE-DC (Mr. Doug Garretson)  
4820 University Square  
Huntsville, AL 35816-1822  
(256)895-1066

Subject: Contract W912DY-04-D-0005, Delivery Order 0008  
MMRP SI for SE and Pacific IMA Region - Final SI Report  
Passage Key Air to Ground Gunnery Range, Manatee County, Florida

Dear Mr. Garretson:

Parsons has prepared this Final Site Inspection (SI) Report in accordance with the Performance Work Statement (PWS) to include the completed Munitions Response Site Prioritization Protocol (MRSPP). The MRSPP notification announcement was prepared with coordination with USACE, Jacksonville District (CESAJ) Public Affairs Office (PAO) and Project Manager (PM) and appeared in the agreed newspaper prior to the second (closeout) TPP Meeting held at Fort DeSoto Park, Tierra Verde, Florida on March 5, 2008. The comments received during the second TPP Meeting have been incorporated into the Final as discussed at the meeting.

Two copies have been provided for your records. We have simultaneously forwarded five copies of the document to Mr. Charles Fales of the USACE Jacksonville District for distribution to the regulators and other key project stakeholders. We have simultaneously submitted single copies of this Final document to EM CX. Electronic copies have also been provided.

If you have any questions or comments, please contact me at (678) 969-2384 or (404) 606-0346 (cell) or the Project Manager (Ms. Laura Kelley) at (678) 969-2437.

Sincerely,

**PARSONS**



Don Silkebakken, P.E.  
MMRP SI Program Manager

cc: Charles Fales – 5 copies/5 CDs  
Jeff Waugh (HQ) – 1 CD  
Bradford McCowan /Deborah Walker (EM CX) – 1 copy/1 CD  
Heidi Novotny (EM CX) - 1 CD  
Laura Kelley/Project File (744647.43000)





**U.S. Army Corps of Engineers  
Southeast and Pacific IMA Region**

***FINAL***  
**Site Inspection Report**  
**Passage Key Air-to-Ground Gunnery**  
**Range**  
**Manatee County, Florida**

**FUDS Project No. I04FL040101  
March 2008**

*In Support of*  
**FUDS MMRP Site Inspections Project**

*Prepared by:*

**PARSONS**

**5390 Triangle Parkway, Suite 100  
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**Prepared for:**

**U.S. Army Corps of Engineers, Jacksonville District  
701 San Marco Boulevard  
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Huntsville, Alabama 35816**

**Contract: W912DY-04-D-0005  
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The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation

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## ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
AAB	Army Air Base
AAF	Army Air Field
ADR	Automatic Data Review
ARC	Annual Report to Congress
ASR	Archive Search Report
bgs	Below Ground Surface
BTAG	U.S. Army Biological Technical Assistance Group
CCV	Continuing Calibration Verification
CEMVS	USACE St. Louis District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESAJ	USACE Jacksonville District
CFR	Code of Federal Regulations
COC	Chain-of-Custody
CSEM	Conceptual Site Exposure Model
CSM	Conceptual Site Model
CWM	Chemical Warfare Material
CZMP	Coastal Zone Management Program
DEP	Defense Environmental Programs
DERP	Defense Environmental Restoration Program
DOACS	Department of Agriculture and Consumer Services
DoD	Department of Defense
DQO	Data Quality Objective
DT	Dilution Test
EDD	Electronic Data Deliverable
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPD	Environmental Protection Division
ER	Engineer Regulation
ERA	Ecological Risk Assessment
ESV	Ecological Screening Values
FAC	Florida Administrative Code
FDE	Findings and Determination of Eligibility
FDEP	Florida Department of Environmental Protection
FL SHPO	Florida State Historic Preservation Office
FNAI	Florida Natural Areas Inventory

**ACRONYMS AND ABBREVIATIONS (CONTINUED)**

FTL	Field Team Leader
FTM	Field Team Member
FTS	Field Team Safety
FUDS	Formerly Used Defense Site
FUDSMIS	FUDS Management Information System
FWC	Fish and Wildlife Conservation Commission
GIS	Geographic Information System
GPS	Global Positioning System
HRS	Hazard Ranking System
ICAL	Initial Calibration
IH	Interstate Highway
INPR	Inventory Project Report
LCS	Laboratory Control Sample
MC	Munitions Constituent
MD	Munitions Debris
MDL	Method Detection Limit
MEC	Munitions And Explosives Of Concern
mg/kg	Milligrams Per Kilograms
MQL	Method Quantitation Limit
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MRSP	Munitions Response Site Prioritization Protocol
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSSL	Media-Specific Soil Screening Level
NAD	North American Datum
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No DoD Action Indicated
NHA	National Heritage Areas
NHL	National Historic Landmarks
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
NRIS	National Register Information System
NTCRA	Non- Time Critical Removal Action
NWI	National Wetlands Inventory
NWRS	National Wildlife Refuge System

**ACRONYMS AND ABBREVIATIONS (CONTINUED)**

OCHP	Office of Cultural and Historical Programs
Parsons	Parsons Corporation
PCL	Protective Concentration Level
PSAP	Programmatic Sampling And Analysis Plan
PRG	Preliminary Remediation Goal
PWP	Programmatic Work Plan
QA	Quality Assurance
QC	Quality Control
QR	Qualitative Reconnaissance
RAC	Risk Assessment Code
RI/FS	Remedial Investigation/Feasibility Study
RL	Reporting Limit
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SI	Site Inspection
SLRA	Screening Level Risk Assessment
SOP	Standard Operating Procedure
SPD RSC	South Pacific Division Range Support Center
SSL	Soil Screening Level
SS-WP	Site-Specific Work Plan
STL	Severn Trent Laboratories
SVT	Site Visit Team
T&E	Threatened And Endangered
TCRA	Time Critical Removal Action
TESS	Threatened And Endangered Species System
TPP	Technical Project Planning
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAESCH	United States Army Engineering and Support Center, Huntsville
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance

## GLOSSARY OF TERMS

<b>Anomaly</b>	Any item that deviates from the expected subsurface ferrous and non-ferrous material at a site ( <i>i.e.</i> , pipes, power lines, <i>etc.</i> ).
<b>Inhabited structure</b>	Permanent or temporary structure, other than military munitions-related structures, routinely occupied by one or more persons for any portion of a day.
<b>Magnetometer</b>	An instrument for measuring the strength of a magnetic field; used to detect buried iron and other metal objects.
<b>Military munitions</b>	All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof.
<b>Munitions and explosives of concern (MEC)</b>	Military munitions that may pose unique explosives safety risks, including unexploded ordnance, discarded military munitions, or munitions constituents present in high enough concentrations to pose an explosive or other health hazard.
<b>Munitions constituents (MC)</b>	Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.
<b>Munitions debris</b>	Remnants of munitions ( <i>e.g.</i> , penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

**GLOSSARY OF TERMS (CONTINUED)**

<b>Munitions response</b>	Response actions, including investigation, removal actions, and remedial actions, to address the explosive safety, human health, or environmental risks presented by unexploded ordnance, discarded military munitions, or munitions constituents, or to support a determination that no removal or remedial action is required.
<b>Munitions response site (MRS)</b>	A discrete location that is known to require a munitions response.
<b>Projectile</b>	Object projected by an applied force and continuing in motion by its own inertia. This includes bullets, bombs, shells, grenades, guided missiles, and rockets.
<b>Unexploded ordnance (UXO)</b>	Military munitions that have been primed, fuzed, armed, or otherwise prepared for action; that have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and that remain unexploded whether by malfunction, design, or any other cause.

## EXECUTIVE SUMMARY

ES.1 The objective of this site inspection (SI) was to determine whether the former Passage Key Air-to-Ground Gunnery Range site in Manatee County, Florida warrants further evaluation under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 beyond the SI stage. The work was performed under Contract No. W912DY-04-D-0005, Task Order No. 0008 from the United States Army Corps of Engineers, Engineering and Support Center, Huntsville (USAESCH). The site is comprised of one Munitions Response Site (MRS), the 13,146.72-acre Air-to-Ground Gunnery Range MRS. Practice munitions known or suspected to be used on site include AN-Mk 5, AN-Mk 23, and AN-Mk 43 Practice Bombs with Mk 4 Practice bomb spotting charge; Small Arms; 50 Cal. Machine Gun; M-30 General Purpose Bombs, 100-lbs; AN-M46 Photoflash Bombs, 100-lbs; M38A2 Practice Bombs with M1A1 spotting charge, and 2.25-inch Practice Rockets. The Headquarters 3rd Fighter Command used the Air-to-Ground Gunnery Range MRS as a ground strafing and dive bombing range from 1943 until 1945, at which time they requested action to relieve them of their responsibility for the land. The site was subsequently declared a Formerly Used Defense Site (FUDS) and assigned FUDS project #I04FL040101. The SI was performed to confirm the MRS location and to evaluate the evidence for the presence of munitions and explosives of concern (MEC) and munitions debris (MD) at the site. To accomplish this objective, qualitative reconnaissance (QR) at the single MRS was performed. Figure ES.1 shows the overall Passage Key Air-to-Ground Gunnery Range site.

ES.2 Outcomes for the MRS could include no Department of Defense (DoD) action indicated (NDAI) or other MEC response actions (time-critical removal action [TCRA], remedial investigation and feasibility study [RI/FS], non-time critical removal action [NTCRA]). If NDAI status is recommended and approved after evaluation of the SI data, the process for closeout of the site from the FUDS inventory will be initiated. If an imminent threat is identified to the public or the environment, a TCRA may be performed as an interim action; otherwise a RI/FS or NTCRA will be initiated.

ES.3 The Technical Project Planning (TPP) Team agreed upon the SI technical approach at the March 1, 2007 TPP meeting. It was determined during the TPP process that QR and the collection of two biased surface soil samples and up to three discretionary surface soil samples (not including QA/QC samples) would be sufficient to meet the SI project objectives. A QR length was not proposed in the Site-Specific Work Plan (SS-WP) Addendum due to the unknown size of the Passage Key island at the time of the SI field effort.

ES.4 The site visit was conducted on July 31, 2007. The SI evaluation included approximately 1.02 miles of QR by boat (Figure ES.1). At the time of the SI field effort

(during low tide), the island was completely submerged under water. The only portion of the island that was visible was a long, shallow sand bar approximately 1 to 2 feet of below the water surface. Due to safety concerns regarding the turbulent water and the numerous reports of sharks in the area, the SVT did not leave the boat to collect samples. Therefore, no samples were collected during the SI field effort.

ES.5 No MEC or MD was observed during the SI field effort. However, visibility below the water surface was limited due to the turbidity of the water. Table ES.1 summarizes the results of the SI for the Passage Key Air-to-Ground Gunnery Range site. Figure ES.1 provides a general site overview.

ES.6 MEC have historically been observed on or around the island of Passage Key. During the SI field effort, limited QR was conducted along the shallow sandbar of the Passage Key Air-to-Ground Gunnery Range site. No MEC or MD were identified at the site; however, the entire island was submerged under water at the time of the SI field effort. Based on the MEC identified subsequent to the SI field activities, it is possible that additional MEC exist on or around the site. The evaluation of MEC exposure (Subchapter 6.1) concluded that based on previous discoveries of MEC, the MEC exposure pathway *may potentially be complete* for the MRS within the Passage Key Air-to-Ground Gunnery Range. Due to the fact that there is a continued potential presence of MEC, a RI/FS is recommended. An immediate removal action is not warranted at this time.

ES.7 An exposure pathway is not considered to be completed unless all four of the following elements are present (USEPA, 1989):

- A source and mechanism for chemical release;
- An environmental transport/exposure medium;
- A receptor exposure point; and
- A receptor and a likely route of exposure at the exposure point.

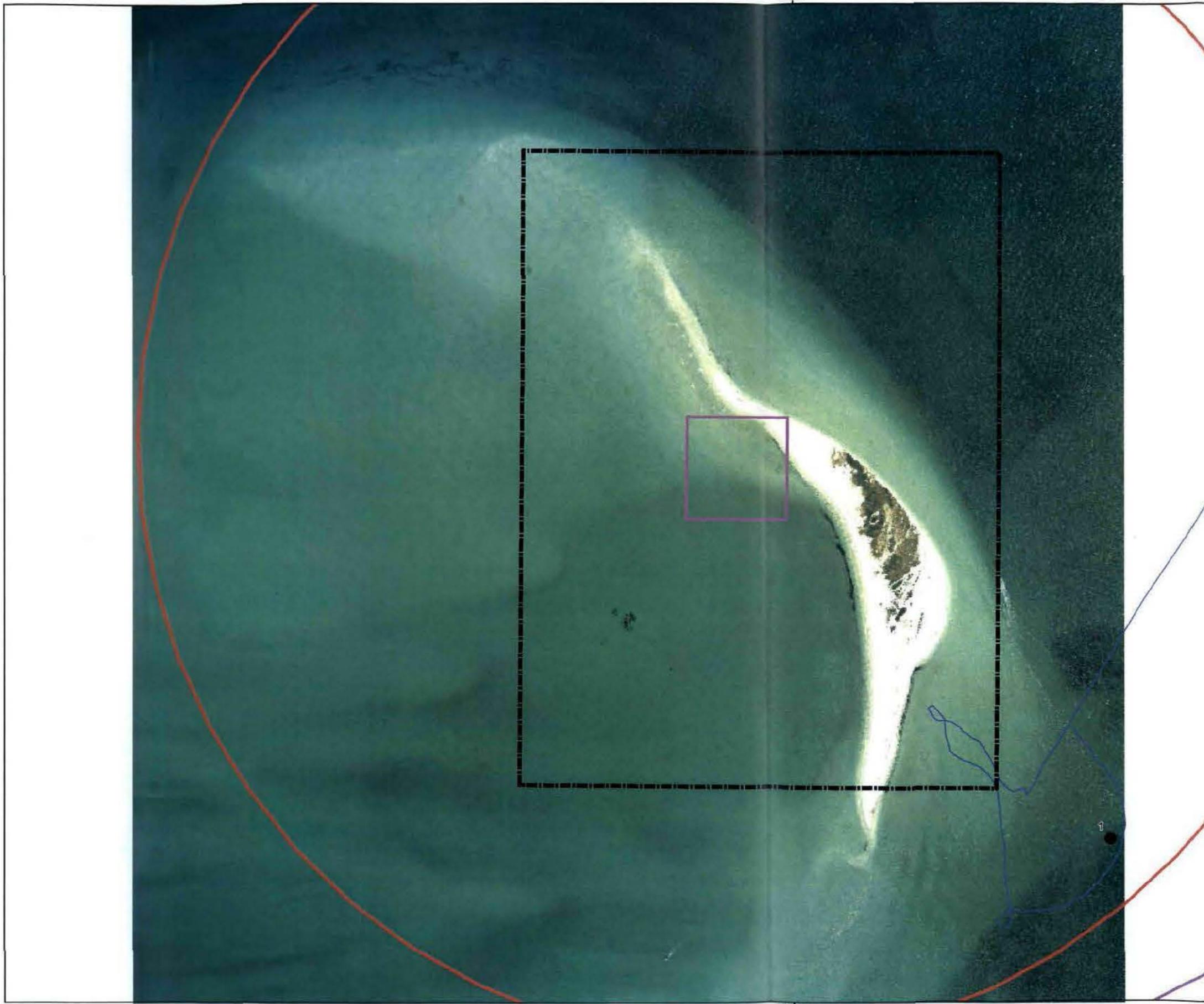
ES.8 Soil is the primary exposure pathway at the former Passage Key Air-to-Ground Gunnery Range site. No soil samples were collected due to site conditions at the time of the SI field effort due to site conditions. Due to the constant shifting of the island, the presence of MC would be difficult to evaluate except in isolated areas where MEC is located.

ES.9 Based on the historical discovery of MEC/MD within the Air-to-Ground Gunnery Range MRS, the MEC exposure pathway is complete, indicating potential for human risk. Due to site conditions at the time of the SI field effort, no surface soil samples were collected at the site. Therefore, this MRS is recommended to proceed to RI/FS status with no further MC analyses recommended. A removal action is not warranted for the Air-to-Ground Gunnery Range MRS at this time.

**Table ES.1  
Summary of Results  
Passage Key Air-to-Ground Gunnery Range**

<b>MRS</b>	<b>Acreage</b>	<b>MEC/MD Found</b>	<b>MC Contamination</b>	<b>Recommendation</b>
Air-to-Ground Gunnery Range	13,146.72	No indications of MEC or MD; Site conditions at the time of the SI field effort limited visibility beneath water	No indications of MC	RI/FS – A removal action is not warranted at this time. No additional MC sampling recommended.

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Figure ES.1

**General Site Overview**  
**Passage Key Air-to-Ground Range**  
**FUDS Project No. I04FL040101**

Manatee County

**Legend**

- Field Observation Location
- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- - - Approximate FUDS Boundary
- Qualitative Reconnaissance Track



Image Source: Orthophotos, 2002  
 Projection: UTM Zone 17 NAD83, Map Units in Meters



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 U.S. ARMY CORPS OF ENGINEERS  
 HUNTSVILLE CENTER

DESIGNED BY BT	<b>General Site Overview</b>	
DRAWN BY BT		
CHECKED BY JU	SCALE As Shown	PROJECT NUMBER 744647.43000
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## CHAPTER 1 INTRODUCTION

### 1.1 BACKGROUND

1.1.1 Parsons Corporation (Parsons) received Contract No. W912DY-04-D-0005, Task Order No. 0008, from the United States Army Corps of Engineers (USACE), Engineering and Support Center, Huntsville (USAESCH) to perform a Site Inspection (SI) at the Passage Key Air-to-Ground Gunnery Range Formerly Used Defense Site (FUDS) located in Manatee County, Florida. In February of 1943, the 3<sup>rd</sup> Fighter command requested acquisition of the then 36.37 acre sand bar in Tampa Bay for use as a ground strafing range for their Replacement Training Unit program. The 337<sup>th</sup> Fighter Command had also used the island as a dive bombing range. It was agreed that use of the bombing and gunnery range would discontinue for three months each summer during the wild fowl nesting season. The 3<sup>rd</sup> Air Force continued to use the island as a bombing range for practice skip bombing, dive bombing and strafing until October 1945. By 1946, the War Department relinquished the permit for Passage key and the island was returned to the Department of Interior. The U.S. Fish and Wildlife Service now manages the island as a wildlife refuge for migratory birds.

1.1.2 As such, the Passage Key Air-to-Ground Gunnery Range has been declared FUDS #I04FL040101. For the purposes of this SI Report, the Air-to-Ground Gunnery Range has been established as the only Munitions Response Site (MRS) at the FUDS property. Figure 1.1 depicts the FUDS boundaries for the overall range. The coordinates for the center point of the MRS is listed in Table 1.1. The coordinates are in meters [Universal Transverse Mercator (UTM) Zone 11 North American Datum (NAD) 83].

**Table 1.1**  
**Passage Key Air-to-Ground Gunnery Range MRS**

MRS	MRS Acreage <sup>1</sup>	X-Coordinate (meters)	Y-Coordinate (meters)
Air-to-Ground Gunnery Range	13,146.72	322624.04	3048380.80

1- Acreage based on review of Annual Report to Congress (ARC), Archives Search Report (ASR) Supplement, and FUDS Management Information System (FUDSMIS).

### 1.2 PROJECT OBJECTIVES

1.2.1 The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the USACE is conducting environmental response activities at FUDS for the Army, DoD's Executive Agent for the FUDS program.

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1.2.2 Pursuant to USACE's Engineer Regulation (ER) 200-3-1 (USACE, 2004) and the Management Guidance for the Defense Environmental Response Program (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001), USACE is conducting FUDS response activities in accordance with the DERP statute (10 United States Code [USC] 2701 et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC §9620), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). As such, USACE is conducting remedial SIs, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

1.2.3 While not all MEC/MC constitute CERCLA hazardous substances, pollutants or contaminants, the DERP statute provides DoD the authority to respond to releases of MEC/MC, and DoD policy states that such responses shall be conducted in accordance with the NCP.

1.2.4 The primary objective of the MMRP SI is to determine whether a FUDS project warrants further response action under CERCLA or not. The SI collects a sufficient amount of information necessary to make this determination. Additionally, it (i) determines the potential need for a removal action (ii) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (USEPA); and (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the Remedial Investigation and Feasibility Study (RI/FS). An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSPP).

1.2.5 The SI was performed as a result of the potential for MEC/MC contamination at the MRS. All work adhered to the DERP for FUDS and relevant U.S. Army regulations and guidance for MMRP programs. As specified in the task order, this report is prepared to summarize the SI sampling events and for the Passage Key Air-to-Ground Gunnery Range presents an accounting of the MEC/MC contamination within the MRS at the site.

### **1.3 PROJECT SCOPE**

1.3.1 Four ordnance items were found on or near Passage Key Air-to-Ground Gunnery Range in 1998. Three of the ordnance items were 100-lb general purpose bombs, and the other ordnance item was a 100-lb photoflash bomb. All of the items were detonated by either Navy or Air Force Explosive Ordnance Disposal (EOD) units. No MEC or munitions debris (MD) were found during the ASR site visit conducted in April 2001. As a result, the Technical Project Planning (TPP) Team concurred that the SI would proceed in a manner to support a RI/FS. The 2007 Field SI for the Passage Key Air-to-Ground Gunnery Range evaluated the potential presence of MEC but could not evaluate the presence of MC in the MRS due to the island being submerged (described below in paragraph 1.3.4).

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1.3.2 The USACE Jacksonville (CESAJ) facilitated a TPP meeting on March 1, 2007 that included representatives of CESAJ, USACE Huntsville (CEHNC), Parsons, Florida Department of Environmental Protection (FDEP), U.S. Fish and Wildlife Service (USFWS), Chassahowitzka National Wildlife Refuge Complex, and Fort DeSoto Park.

1.3.3 The TPP Team concurred that the SI data collection efforts would focus on screening for MC contamination in soil. The TPP Team developed and unanimously concurred with the final Technical Approach presented in the Final TPP Memorandum (Parsons, 2007a), including the locations of the two surface soil samples, collection of up to three discretionary surface soil samples, sampling methods, and laboratory analyses for explosives and metals constituents. The TPP Team concurred that the comparison criteria for soil sample results would be the Florida Administrative Code (FAC) 62-777, FDEP Soil Cleanup Target Levels for Direct Residential Exposure, U.S. Environmental Protection Agency (USEPA) Region 9 Residential Preliminary Remediation Goals (PRGs), and ecological screening values will be used for comparison of explosives and metals contamination on all samples.

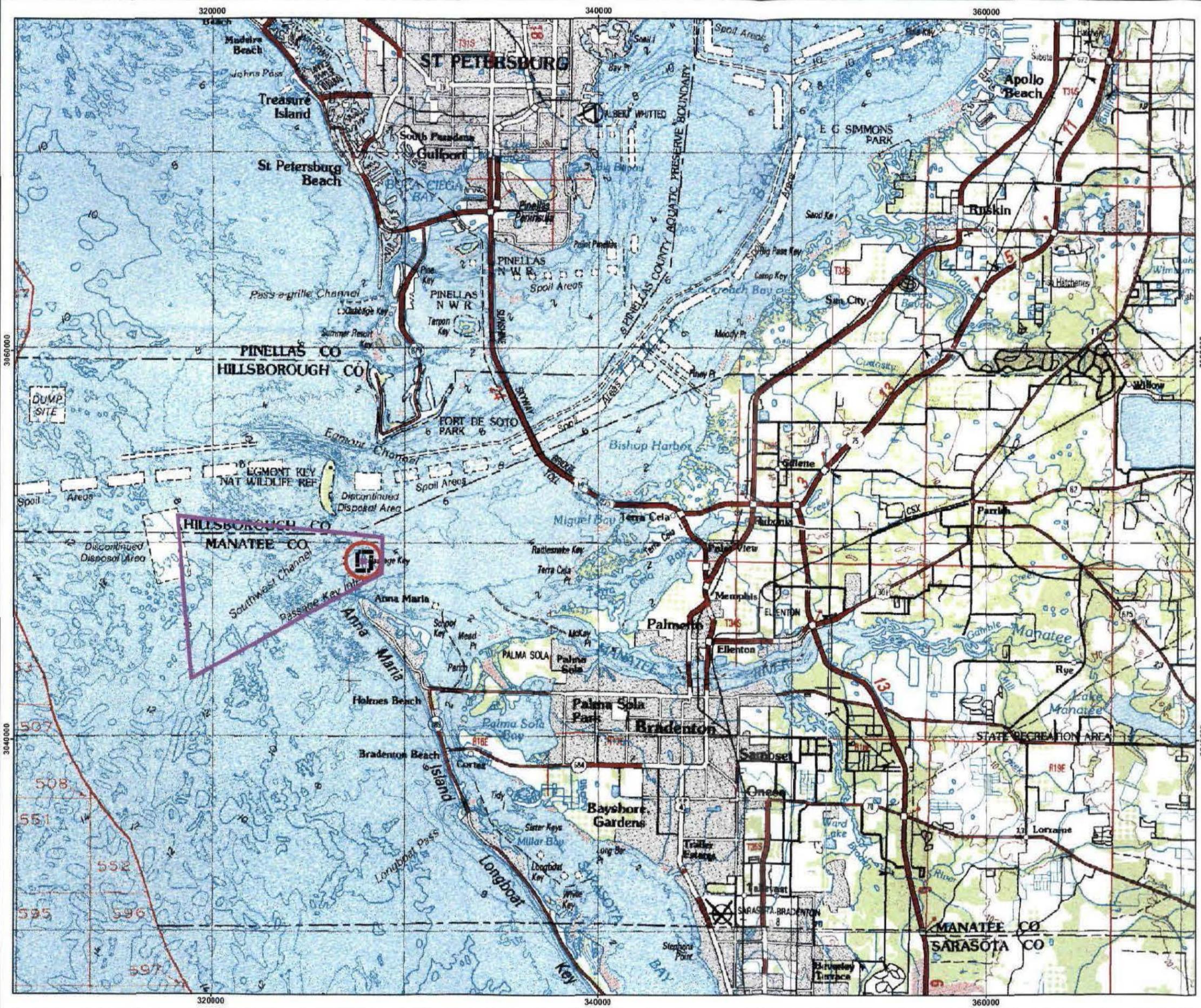
1.3.4 At the time of the 2007 SI field effort, all of Passage Key was submerged under water. According to the U.S. Fish and Wildlife Services officer that participated in the field SI, the last hurricanes that came through the area destroyed any remaining vegetation on the island. Without vegetation, the gulf currents have eroded the former island to a submersed sand bar approximately 1 to 2 feet below water surface. Because of this and the rough seas encountered during the field visit, collection of surface soil samples was not possible. Only one site observation was collected from near where the island once was. Photos were collected showing only the surface water splashing up against what resembles a submersed barrier island effect.

1.3.5 The primary project planning documents used to perform the SI include the Site-Specific Work Plan (SS-WP) Addendum for the Passage Key Air-to-Ground Gunnery Range (Parsons 2007b), the USACE Engineering and Support Center (USAESCH) Programmatic Work Plan (PWP) (Parsons, 2005), the Programmatic Sampling and Analysis Plan (PSAP) (USACE, 2005), and the PSAP Addendum (Parsons, 2006). The performance work statement for this project is in Appendix A.

Figure 1.1

**Site Location**  
**Passage Key Air-to-Ground Range**  
**FUDS Project No. I04FL040101**

Manatee County



**Legend**

- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- Approximate FUDS Boundary



Image Source: USGS 7.5' Topo Quadrangles, 1981  
 Projection: UTM Zone 17 NAD83, Map Units in Meters



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## CHAPTER 2 PROPERTY DESCRIPTION AND HISTORY

### 2.1 SITE DESCRIPTION

The former Passage Key Air-to-Ground Gunnery Range at one time comprised of approximately 36.37 acres of island at the mouth of Tampa Bay, about 10 miles northwest of Bradenton, Manatee County, Florida. Currently the island is completely cleared of all vegetation from past hurricane activity and is submerged below approximately 1 to 2 feet of water at low tide. The location and boundaries of the range are shown on Figure 2.1.

### 2.2 SITE LOCATION AND SETTING

#### 2.2.1 Topography and Vegetation

There is currently no vegetation or island due to past hurricane activity in the area. The island is now approximately 1 to 2 feet below the water surface level at low tide.

#### 2.2.2 Soil

The soils, when not submerged, of the former Passage Key Air-to-Ground Gunnery Range are composed mainly of sand and sandy material. There are two basic types of soil. The first type is beach sand. This soil is composed of slightly alkaline sand and shell fragments along the Gulf of Mexico shoreline. The majority of the beach deposits are under water during high tides. The second soil type is very similar. It typically has a surface layer that is seven inches thick. It is composed of fine sand and about 10 percent sand-size shell fragments. There is little or no potential for frost development in the soils on the range.

#### 2.2.3 Climate

The climate in the former Passage Key Air-to-Ground Gunnery Range is part of the humid region of the United States and is sunny for 65 percent of the year, with the sunniest months being April and May. Afternoon humidity's are usually 60 percent or higher in the summer months, but range from 50 to 60 percent the remainder of the year. Prevailing winds are easterly, but westerly afternoon and early evening sea breezes occur most months of the year. The outstanding feature of the areas climate is the summer thunderstorm season. Thunderstorms occur in the late afternoon hours from June through September. The maximum temperature for the area was recorded at 99°F during the month of June, while the minimum temperature was 18 degrees in December. During the summer months, some 30 inches of rain falls, which is about 60 percent of the annual

total. The greatest risk of hurricanes has been during the months of June and October. The highest frequency of dangerous lightning occurs during the months of June, July, and August.

#### **2.2.4 Significant Structures**

There are no significant structures located at the former Passage Key Air-to-Ground Gunnery Range. The current land use is described below in Subparagraph 2.2.6.

#### **2.2.5 Demographics**

2.2.5.1 The nearest city to the former Passage Key Air-to-Ground Gunnery Range is Bradenton, Florida. The site is located approximately 10 miles northwest of the City of Bradenton (Figure 2.2) in Manatee County, Florida. The demographics information for Manatee County was obtained from the 2000 United States Census Bureau website (Manatee County - <http://quickfacts.census.gov/qfd/states/12/12081.html> and from the American Fact Finder Fast Access to Information link on the United States Census Bureau website (<http://factfinder.census.gov/home/saff/main.html?lang=en>) (US Census Bureau, 2000). Based on census data for the year 2000, the population of Manatee County, Florida is approximately 313,298, which estimates to approximately 356.3 persons per square mile. The City of Bradenton has an estimated population of 52,498 (2003 estimate), making up approximately 6% of the total population of Manatee County, Florida (U.S. Census Bureau, 2000).

2.2.5.2 The segment of the population in Manatee County under the age of 18 is 21.4%, while 22.5% are over the age of 65. Approximately 88.8% of the population is White, 8.7% Black or African American, 1.3% Asian, and 0.3% American Indian and Alaska Native. There are 112,460 households within the county with an average household size of 2.29. The occupational breakdown in the county is as follows:

- Management, professional, and related occupations – 29.1%
- Service occupations – 16.9%
- Sales and office occupations – 28.2%
- Farming, fishing, and forestry occupations – 1.4%
- Construction, extraction, and maintenance occupations – 11.2%
- Production, transportation, and material moving occupations – 13.2%

2.2.5.3 As noted in Table 2.1, approximately 5,720 individuals live within a 4-mile buffer of the former Passage Key Air-to-Ground Gunnery Range. Figure 2.2 depicts the 2000 Census Bureau census blocks and population in the vicinity of the site.

**Table 2.1**  
**Population within 4-mile Buffer of the Site**

Range	0 to 1 mile	1 to 2 miles	2 to 3 miles	3 to 4 miles	Total
Entire Site	149	1,620	2,370	1,581	5,720

Source: U.S. Census data. The population within the site, MRS, or within any buffer area is determined using a conservative approach to calculate the population of an area by including the total number of people for any census block that falls within or overlaps the site boundary, MRS boundary, or buffer line.

2.2.5.4 As discussed in Subparagraph 2.2.4, there are no significant structures located at the former Passage Key Air-to-Ground Gunnery Range. Additionally, there are no inhabited structures located at the site. Anna Maria Island is located approximately one mile south of the Passage Key, and is mostly developed with commercial and residential property.

**2.2.6 Current and Future Land Use**

The former Passage Key Air-to-Ground Gunnery Range is owned by the Department of the Interior (DOI). The site is operated by the U.S. Fish and Wildlife Service (USFWS) as a national wildlife refuge for migratory birds. During the TPP meeting, the USFWS officer brought to the attention of the TPP Team that the island is now too small to support migratory birds, but is still under their jurisdictional control and public access is restricted at the site. The entire area of the island is very shallow and is now used as a recreational area for boaters.

**2.3 SITE OWNERSHIP AND HISTORY**

2.3.1 The former Passage Key Air-to-Ground Gunnery Range site was requisitioned from the DOI in February 1943 for use as a ground strafing and dive bombing range by the Headquarters 3<sup>rd</sup> Fighter Command for their Replacement Training Unit program. Sarasota Air Base was assigned the responsibility for constructing, maintaining, and operating the bombing and strafing targets. Two banks of targets were constructed at the site facing north and south, 500 feet apart, each having six targets. In accordance with the Use Permit for Passage Key Air-to-Ground Gunnery Range, use would be discontinued for three months each summer during the wild fowl nesting season.

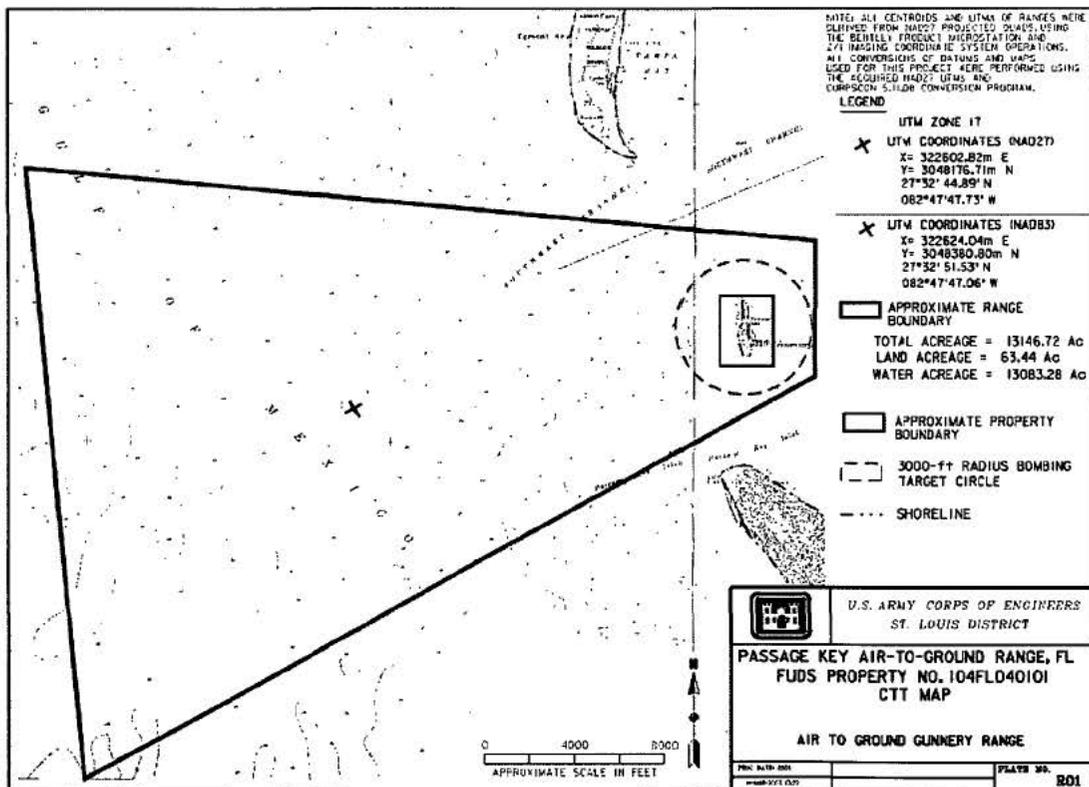
2.3.2 The Headquarters 3<sup>rd</sup> Fighter Command continued to use the island for practice skip bombing, dive bombing, and strafing until October 1945, at which time they requested action to relieve them of their responsibility for the land. The War Department relinquished the permit for the Passage Key Air-to-Ground Gunnery Range on March 1946 back to the DOI, which then reverted back to a National Wildlife Refuge for migratory birds.

**2.4 SITE OPERATIONS AND WASTE CHARACTERISTICS**

**2.4.1 Munitions Response Site-Specific Descriptions/Operations**

2.4.1.1 The description of the MRS at the former Passage Key Air-to-Ground Gunnery Range was obtained from the 2002 Archives Search Report (ASR) and 2004 ASR Supplement.

2.4.1.2 The Air-to-Ground Gunnery Range MRS is a 13,146.72-acre area. The MRS contained two banks of targets facing north and south, 500 feet apart, each having six targets. Three 100-lb general purpose bombs and one 100-lb photoflash bomb were discovered on or near the island in 1998. The bombs were detonated by either the U.S. Air Force or U.S. Navy Explosive Ordnance Disposal (EOD) unit. The ASR Supplement indicated a risk assessment code (RAC) score of 2, indicating elevated risk, for this MRS based on a critical hazard severity and a probable hazard probability (CEMVS, 2004).



Map excerpt from 2004 ARS Supplement

**2.4.2 Regulatory Compliance**

The USACE conducted the SI at the former Passage Key Air-to-Ground Gunnery Range as part of FUDS response activities pursuant to and in accordance with the guidance, regulations, and legislation listed in Subchapter 1.2.

## **2.5 PREVIOUS INVESTIGATIONS**

Parsons performed a historical document review for the former Passage Key Air-to-Ground Gunnery Range which was used as a strafing and bombing range from 1943 to 1945 (CEMVS, 2002). Documents reviewed included the 1993 and 2000 Inventory Project Reports (INPR; Appendix D in CEMVS, 2002), the 2002 ASR (CEMVS, 2002), and the 2004 ASR Supplement (CEMVS, 2004).

### **2.5.1 1993 and 2000 (Revised) Inventory Project Report**

The Inventory Project Report (INPR) was completed by CESAJ on September 17, 1993. The INPR established the Passage Key Air-to-Ground Gunnery Range as a FUDS, established the preliminary site boundary, and assigned the FUDS Project Number I04FL040101. The 1993 INPR recommendation gave the range a RAC score of 3 with a no further action. In 2000 the INPR amended the RAC score to 2 due to the findings of bombs at the site. The INPR recommended an ordnance and explosives (OE) investigation into the site which led to the 2002 Archives Search Report (ASR).

### **2.5.2 2002 Archives Search Report**

The ASR was completed by USACE, St. Louis District (CEMVS) in August 2002. The ASR was prepared after reviewing available records, interviews, site inspection, analysis and reports that documented the history of the site. The ASR is the source of most of the historical information pertaining to site operations and identifies the key areas of focus for the SI. As part of the ASR, a site inspection was conducted to assess the site for OE presence and potential. No MEC/MD was found during this site visit. A rectangular, concrete structure was observed in approximately six feet of water and located several hundred feet west of the island. This structure was thought to possibly be the remains of one of the former targets. Three 100-lb general purpose bombs and one 100-lb photoflash bomb were identified off the shore of the island in 1998. The bombs were destroyed by Explosive Ordnance Disposal (EOD) units.

### **2.5.3 2004 Archives Search Report Supplement**

2.5.3.1 The ASR Supplement was prepared by CEMVS as a supplement to the 2002 ASR. This document identified range areas and types of munitions that may have been used, for the list of ranges and munitions refer to the ASR Supplement found in Appendix L of this report.

2.5.3.2 The ASR Supplement was performed in 2004 (CEMVS, 2004) and summarizes the information from the 2002 ASR and other associated inspections. The ASR Supplement provides a summary of the retained MRS, the acreage for the MRS, and other pertinent information. The ASR Supplement provided a breakdown for the MRS with the standard range configuration based on the use of the MRS. The MRS identified in the ASR Supplement for the former Passage Key Air-to-Ground Gunnery Range, its suspected acreage, and the types of munitions used include:

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- Air-to-Ground Gunnery Range (RAC: 2) with 13146.72 acres; suspected use of small arms, general; 50 caliber machine gun; AN-M30, general purpose bomb, 100 lbs; AN-M46, photoflash bomb, 100 lbs; AN-Mk 5, AN-Mk 23, AN-Mk 43, practice; signal, practice bomb, Mk 4; M38A2, practice bomb, 100 lbs; spotting charge, M1A1; 2.25-inch, practice rocket

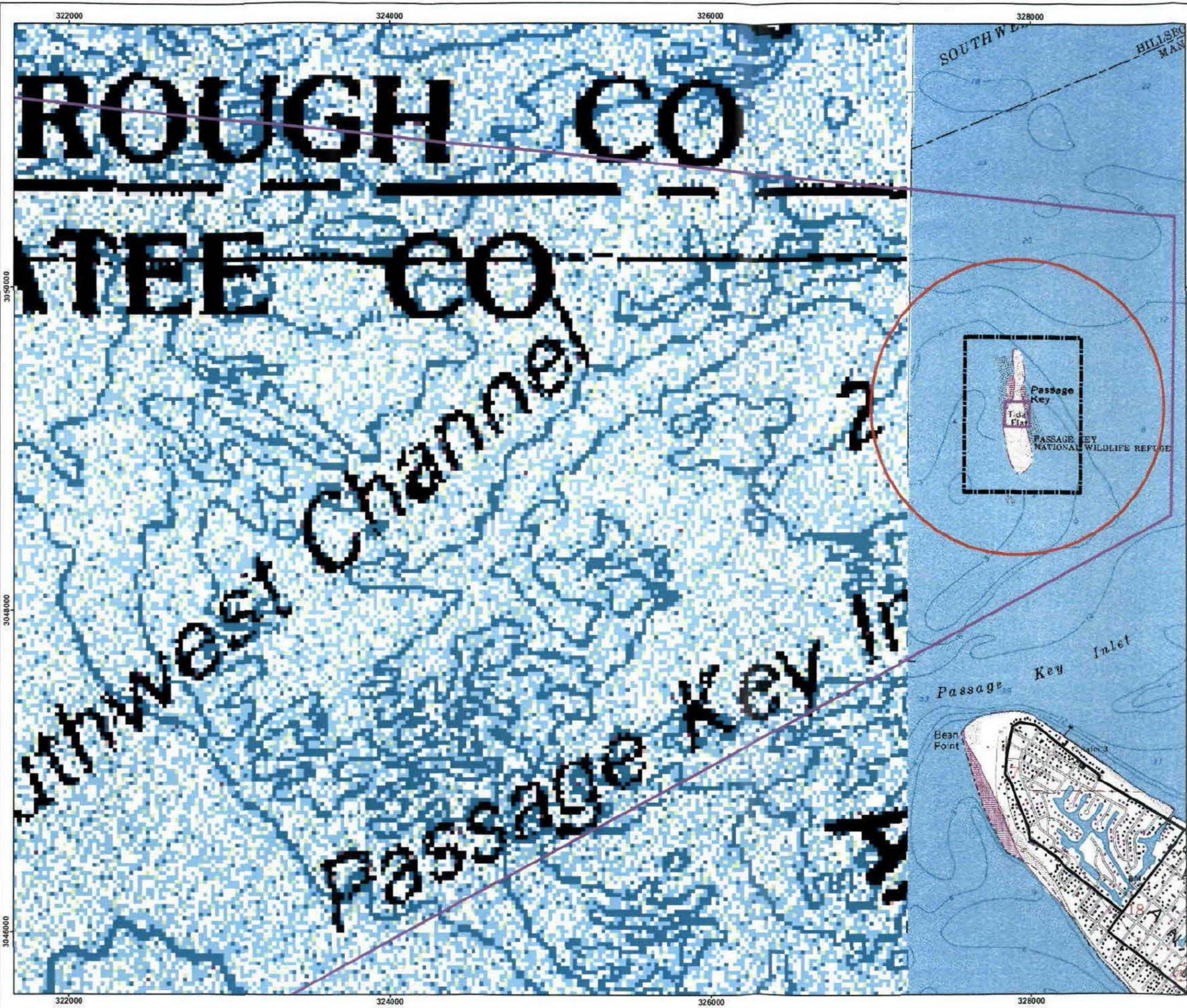


Figure 2.1

**Site Setting**  
**Passage Key Air-to-Ground Range**  
**FUDS Project No. I04FL040101**

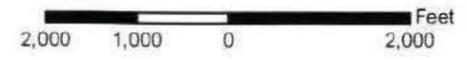
Manatee County

**Legend**

- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- Approximate FUDS Boundary



Image Source: USGS 7.5' Topo Quadrangles, 1981  
 Projection: UTM Zone 17 NAD83, Map Units in Meters



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Figure 2.2

# 2000 Census Data Passage Key Air-to-Ground Range FUDS Project No. I04FL040101

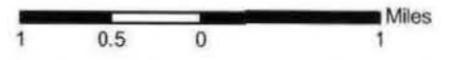
Manatee County

## Legend

-  2000 Census Block Boundary with Total Population
-  Buffer (Mile)
-  Air-to-Ground Gunnery Range Boundary
-  Bombing Range Boundary
-  Approximate FUDS Boundary



Projection: UTM Zone 17 NAD83, Map Units in Meters



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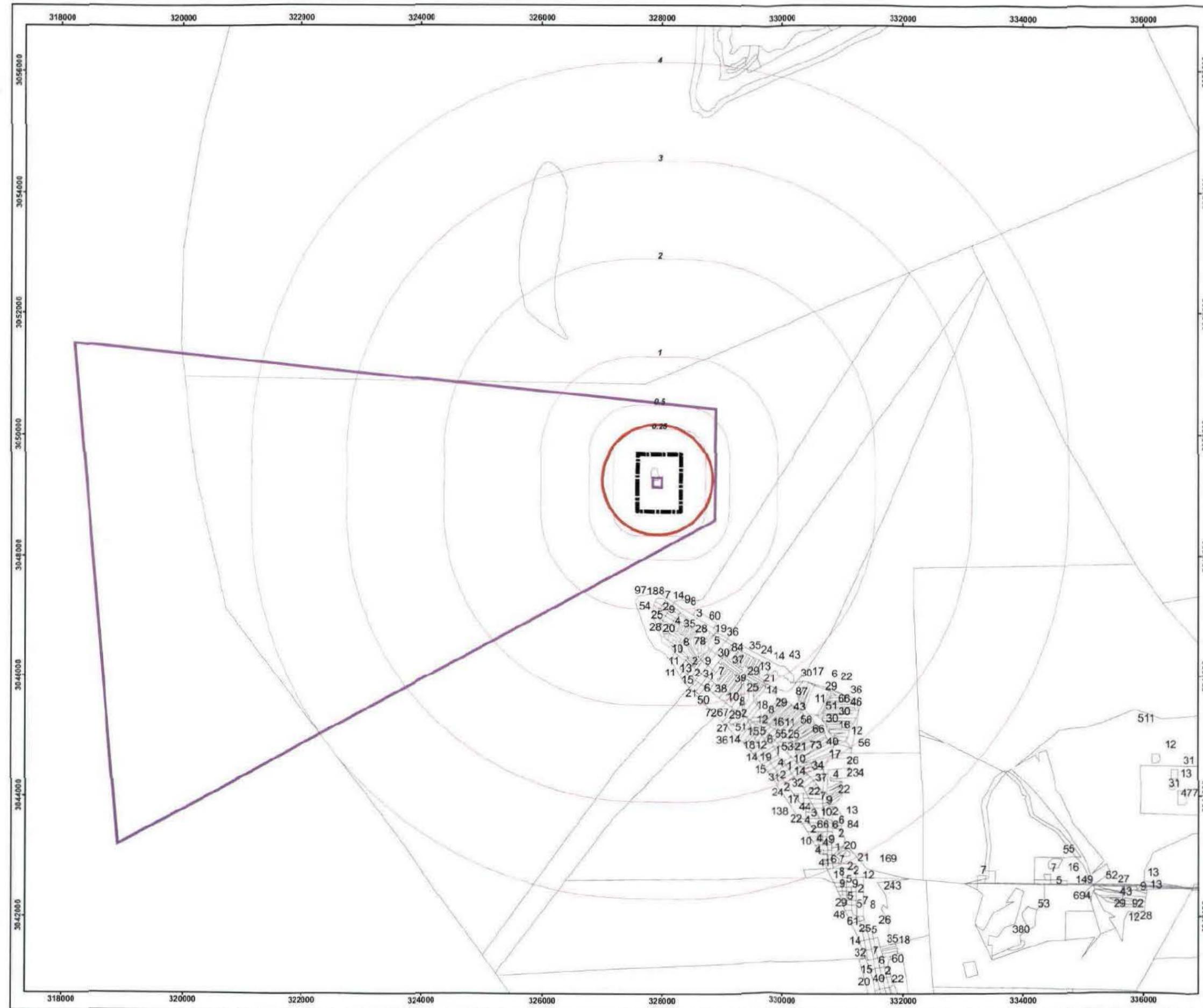
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## CHAPTER 3 SITE INSPECTION TASKS

### 3.1 HISTORICAL RECORD REVIEW

Parsons performed a document review for the former Passage Key Air-to-Ground Gunnery Range. Documents reviewed included the 1993 INPR, the 2002 ASR (CEMVS, 2002), and the 2004 ASR Supplement (CEMVS, 2004).

### 3.2 TECHNICAL PROJECT PLANNING

The former Passage Key Air-to-Ground Gunnery Range falls under the purview of the CESAJ, which facilitated a TPP meeting on March 1, 2007. Participants included representatives of the CESAJ, CEHNC, Parsons, Florida Department of Environmental Protection (FDEP), U.S. Fish and Wildlife Service, Chassahowitzka National Wildlife Refuge Complex, and Fort DeSoto Park. The purpose of the TPP meeting was to develop the technical approach presented in the Final TPP Memorandum (Parsons, 2007a) (see Appendix B). Key TPP findings and decisions are summarized below:

- The TPP Team concurred with the Technical Approach (likely an anticipated RI/FS) inclusive of number, type, and location of samples as well as sampling methodology and laboratory analyses.
- The TPP Team agreed to not collect ambient samples or surface water samples. No composite sampling would be collected but would be replaced with discrete sampling.
- The TPP Team agreed to remove all but two samples and add three discretionary samples (if needed) from the sampling list due to the drastic reduction in the size of the island. Due to recent visual observations by the U.S. Fish and Wildlife Service (USFWS) officials, the island has been reduced by gulf current erosion to a size of 20 feet x 20 feet during high tide. The SI field team would attempt to visit the island during low tide.
- Comparison criteria for sample results would be the Florida Administrative Code (FAC) 62-777, FDEP Soil Cleanup Target Levels for Direct Residential Exposure, U.S. Environmental Protection Agency (USEPA) Region 9 Residential Preliminary Remediation Goals (PRGs), and the Ecological Screening Values would be used for comparison of explosives and metals contamination on all samples.

### 3.3 NON-MEASUREMENT DATA COLLECTION

3.3.1 Site information presented in this report was prepared by reviewing existing site documents, doing research via the Internet, and requesting information from agency contacts. The following sources were consulted for identifying environmental and cultural resources at the former Passage Key Air-to-Ground Gunnery Range SI:

- Topographic Map – U.S. Geological Survey (USGS)
- Wetlands Online Mapper – National Wetlands Inventory (NWI), U.S. Fish and Wildlife Service (USFWS)
- Threatened and Endangered Species System (TESS) – Endangered Species Program, U.S. Fish and Wildlife Service
- National Wildlife Refuge System (NWRS) – USFWS
- Florida Endangered and Threatened Species – Florida Fish and Wildlife Conservation Commission (FWC)
- Florida Fish and Wildlife Conservation Commission (FWC)
- Florida Department of Agriculture and Consumer Services (DOACS)
- Florida Natural Areas Inventory (FNAI) – Manatee County
- National Register Information System (NRIS) – National Register of Historic Places (NRHP), National Park Service (NPS)
- List of National Historic Landmarks (NHL) – National Historic Landmarks Program, NPS
- List of National Heritage Areas (NHA) – National Heritage Areas Program, NPS
- Florida State Historic Preservation Office (FL SHPO) – Florida Office of Cultural and Historical Programs (OCHP)
- National Oceanic and Atmospheric Administration (NOAA) - Coastal Zone Management Program (CZMP)
- September 2002 ASR Findings for Bartow Army Airfield, Polk County, Florida

3.3.2 According to the NRIS, NHL, NRHP, and NHA databases there are no recorded archaeological or cultural areas within the former Passage Key Air-to-Ground Gunnery Range. Currently, according to the SHPO FMSF the area has not been completely surveyed; however, there are no previously recorded cultural resources on site.

3.3.3 Ecological resources are identified in Subchapter 5.2 of this report.

#### **3.4 SITE-SPECIFIC WORK PLAN ADDENDUM**

3.4.1 The SS-WP Addendum (Parsons, 2007b) augments the PWP and PSAP, as warranted, to present pertinent site-specific information and procedural adjustments that could not be readily captured in the programmatic documents or that resulted from TPP Team agreements that required modifying the preliminary SI technical approach.

3.4.2 The PWP and PSAP are intended to be umbrella documents that set overall programmatic objectives and approaches, whereas the SS-WP Addendum provides site-specific details and action plans. The PWP, PSAP, and SS-WP Addendum were taken to the site for reference by the site visit team (SVT) during SI field activities.

3.4.3 The SS-WP Addendum includes the project description, the field investigation plan, the sampling and analysis plan, the environmental protection plan, and the health and safety plan specific to the former Passage Key Air-to-Ground Gunnery

Range site. The field investigation plan developed a technical approach to guide sample collection and analysis for MEC and MC to ensure that the results were sufficient to determine whether additional investigations or implementation of a remedy are necessary for the site. Key elements of the technical approach include the CSEM to help determine types of samples and their locations, data quality objectives (DQO) to ensure the data acquired are sufficient to characterize MEC and MC at the site, and QR to confirm known target locations and evaluate the presence or absence of MEC/MC in remote portions of the site. The SS-WP Addendum included a sampling rationale for each sample location and the latitude and longitude of the sample locations. No samples were collected as part of the SI field effort as discussed in Subchapter 3.5. The sampling rationale has been updated to show actual conditions observed by the SVT and is included in Table 3.1

3.4.4 The sampling and analysis plan discusses procedures for soil sample acquisition from locations biased toward the highest potential for MEC contamination; QC and QA for the sampling process; sample shipment to an approved, independent laboratory; and analysis of the samples by the laboratory. The environmental protection plan evaluates compliance with the National Environmental Policy Act and Army Regulation 200-2 by presenting procedures for avoiding, minimizing, and mitigating potential impacts to environmental and cultural resources during site field activities. The accident prevention plan supplements the programmatic accident prevention plan with site-specific emergency contact information and directions to the nearest hospital.

### **3.5 DEPARTURES FROM PLANNING DOCUMENTS**

No surface soil samples were collected during the SI field effort. The SVT arrived at the site during low tide, as agreed to by the TPP Team. The entire island of Passage Key was submerged under approximately 1 to 2 feet of water at the time of the SI field effort. The only portion of the island that was noticeable was a long, shallow barrier type sand bar. The water was turbulent during the site visit, and visibility was limited due to the turbidity of the water. Due to safety concerns regarding the water conditions and the numerous reported shark sightings in the area, the SVT did not leave the boat to collect soil samples. Because the boat limited how near the team could approach the sand bar, QR was conducted around the barrier type sand bar from the boat as well as an observation point and photos. The actual QR path is discussed in more detail in the MRS-specific sections in Chapter 5.

**Table 3.1**  
**SAMPLING RATIONALE**  
 Former Passage Key Air-to-Ground Gunnery Range  
 Manatee County, Florida

Sample ID	Sample Coordinates		Media	Analysis	Munitions Found	Rationale
	Longitude	Latitude				
N/A	N/A	N/A	N/A	N/A	None	Samples were not collected due to site conditions at the time of the SI field effort. The entire island was submerged below the surface water level.

## CHAPTER 4 MUNITIONS AND EXPLOSIVES OF CONCERN FINDINGS

### 4.1 GENERAL INFORMATION

#### 4.1.1 Qualitative Reconnaissance

4.1.1.1 As stated previously, the primary task of the SI was to assess the presence of MEC, MD, or MC. To assess the presence of MEC and MD, the SVT conducted approximately 1.02 miles of QR by boat around the site on July 31, 2007.

4.1.1.2 The QR consisted of visual reconnaissance of the site surface to identify indicators of suspect areas, including earthen berms, distressed vegetation, stained soil, ground scars or craters, target remnants, and visible metallic debris. One MRS is located within the range: Air-to-Ground Gunnery Range. QR activities focused on the area within the MRS with the most likely to contain MEC contamination.

4.1.1.3 The QR involved a three-person SVT not including the U.S. Fish and Wildlife Service officer who piloted the small water craft along the track shown on Figure 4.1. The SVT stopped occasionally to note field observations. Due to site conditions at the time of the SI field effort, QR was conducted by boat. Soil samples were not collected as part of this SI (see paragraph 4.1.2.2. and 4.1.2.3, below). ***The SVT did not find any earthen berms, distressed vegetation, stained soil, ground scars or craters, target remnants, or visible metallic debris.*** However, visibility beneath the water surface was limited due to the turbidity.

4.1.1.4 Figure 4.1 shows the QR paths and observation locations. If MEC or MD was observed along the path, the SVT stopped to note an observation. The SVT also stopped at other locations to take photographs and to note field conditions, areas where subsurface anomalies were identified, or other features of interest. As discussed in the SS-WP Addendum (Parsons, 2007b), the QR route was not limited to the proposed path, but was determined in the field by the field team leader (FTL) based on the baseline QC procedures described in Chapter 3 of the PWP (Parsons, 2005), visual observations, and areas of predetermined focus. Table 4.1 presents the potential MEC anticipated to be present at the site based on the ASR and ASR Supplement. The MEC CSEM is included in Appendix J.

**Table 4.1  
Chemical Composition of MEC and Potential Munitions Constituents  
Former Passage Key Air-to-Ground Gunnery Range, Manatee County, Florida**

General Munition Type	Type/Model	Case Composition	Filler	Potential Constituent
Small Arms Ammunition .50 cal with gilding metal jacket	M2 Ball M2 Armor Piercing (AP) M1 Tracer M10 Tracer M17 Tracer M21 Tracer M1 Incendiary M23 Incendiary M1 Blank Propellant Primer, Percussion	Brass, steel, aluminum	Lead antimony Tungsten chrome steel Tracer Composition Tracer Composition Tracer Composition Tracer Composition Incendiary Composition Incendiary composition Single based powder Primer Composition	Calcium, iron, strontium, lead, magnesium, molybdenum, antimony, potassium, perchlorate
Miniature Practice Bomb,	AN-Mk 5, AN-Mk 23, AN-Mk 43	Cast Iron, Cast Lead, Zinc Alloy, Aluminum,	Inert	Lead, Iron, Aluminum, Zinc
Miniature Practice Bomb Signal	AN-Mk 4		Titanium Tetrachloride, Smokeless Powder, Red Phosphorus, Zinc Oxide	Nitrocellulose, Dinitrotoluene, Dibutylphalate, Diphenylamine, Zinc
100-lb Practice Bomb	M38A2	Sheet Metal	Sand, wet sand, or water	Iron
Spotting Charge	M1A1 M3 M5	Tin Tin Glass	3-lbs Black powder FS smoke mix	Potassium nitrate, Sodium nitrate, Charcoal, Sulfur, Titanium Tetrachloride
100-LB Bomb, GP	AN-M30	Steel	TNT	Trinitrotoluene

<b>Table 4.1</b> <b>Chemical Composition of MEC and Potential Munitions Constituents</b> <b>Former Passage Key Air-to-Ground Gunnery Range, Manatee County, Florida</b>				
General Munition Type	Type/Model	Case Composition	Filler	Potential Constituent
Photoflash Bomb, 100-lb	M46	Metal	Magnesium dust, Mg Oxide, petroleum distillate, asphalt, gasoline, white phosphorus	Mg, Ph
2.25-inch Practice Rocket	Warhead: Mk1 Mod 0 Mk3 Mod 2 Rocket Motor: Mk 11 Mod 0&1 Igniter: Mk 112 Propellant: Mk 16, Mod 0	Steel, cast iron or zinc	Inert warhead (steel, cast iron or zinc)	Iron, zinc, magnesium, Nitrocellulose, nitroglycerin, potassium, strontium, calcium

4.1.1.5 As shown in Appendix E, the SVT noted one discrete field observation throughout the course of the SI, including detail on topography, drainage, the presence of any barriers, and indications of surface MD. No MEC, MD, or indications of MEC or MD were noted by the field team. Although the field visit was made during low tide, Passage Key was submerged by approximately 1 to 2 feet of water. The field team did not wade to the sand bar due to safety concerns (turbulent ocean conditions and shark reports). Pertinent field observations are summarized in Table 4.2. Appendix D includes related field forms.

**Table 4.2  
Summary of Qualitative Reconnaissance Observations,  
Passage Key Air-to-Ground Gunnery Range**

MRS	MEC	MD	Munitions- Related Features
Air-to-Ground Gunnery Range	None	None	None

**4.1.2 Data Quality Objectives**

**4.1.2.1 Introduction**

4.1.2.1.1 DQOs are qualitative and quantitative statements that clarify study objectives and specify the type and quality of the data necessary to support decisions. The development of DQOs for a specific site takes into account factors that determine whether the quality and quantity of data are adequate for project needs, such as data collection, uses, types, and needs. While developing these DQOs in accordance with the process presented in Chapter 3, paragraph 3.1.2 of the PWP, Parsons followed the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, USEPA QA/G-4, USEPA/240/B-06/001 (USEPA, 2006).

4.1.2.1.2 The goal of the TPP process is to achieve stakeholder, USACE, and applicable state and federal regulatory concurrence with the DQOs for a given site. The TPP Team discussed the Passage Key Air-to-Ground Gunnery Range DQOs at the TPP meeting held on February 28, 2007. Appendix B of this SI Report presents the TPP documentation, including the DQO worksheets.

4.1.2.1.3 As stated in Subchapter 1.2 of this SI Report, data must be sufficient to do the following: 1) determine whether a removal action is necessary; 2) enable HRS scoring by the USEPA; 3) characterize the release for initiation of an RI/FS; and 4) complete the MRSPP.

4.1.2.1.4 DQOs cover four project objectives that SI data must satisfy: 1) evaluate potential presence of MEC; 2) evaluate potential presence of MC; 3) collect data needed to complete MRSPP scoring sheets; and 4) collect information for HRS scoring.

**4.1.2.2 Munitions and Explosives of Concern Data Quality Objective**

Not applicable. During the TPP meeting conducted on March 1, 2007, the USFWS official stated that due to the constant gulf currents moving through Tampa Bay, the

island of Passage Key shifts in size approximately every three months. During high tide, the size of the island is reportedly 20 feet by 20 feet. Because of this, the SVT traveled to the island during low tide. During the SI field effort, the SVT encountered very turbulent water. No remaining land was visible with the exception of a long sand bar approximately 1 to 2 feet below the water surface. Due to safety concerns regarding reports of numerous sharks in the area and turbulent water conditions, the SVT did not leave the boat to collect samples.

#### **4.1.2.3 Munitions Constituents Data Quality Objective**

Not applicable. During the TPP meeting conducted on March 1, 2007, the USFWS official stated that due to the constant gulf currents moving through Tampa Bay, the island shifts in size approximately every three months. During high tide, the size of the island is reportedly 20 feet by 20 feet. Because of this, the SVT traveled to the island during low tide. During the SI field effort, the waters were very turbulent, and no remaining land was visible with the exception of a long shallow sand bar. Due to safety concerns regarding the numerous reported sharks in the area and the water conditions, the SVT did not leave the boat to collect samples. The complete list of munitions potentially used at the Passage Key Air-to-Ground Gunnery Range and their chemical composition is provided in Table 4.1.

#### **4.1.2.4 Munitions Response Site Prioritization Protocol Data Quality Objective**

The MRSPP DQO was achieved by obtaining sufficient information to complete the MRSPP scoring sheets. Specific input data were collected, and the three modules for the MRSPP were populated as part of the SI. The scoring sheets for the MRSPP are included in Appendix K.

#### **4.1.2.5 Hazard Ranking System Data Quality Objective**

The HRS DQO was achieved by including information in the SI report necessary for the USEPA to populate the HRS score sheets. Source documents for the HRS information include the INPR, ASR, and ASR Supplement documents, as well as information from local and state agencies regarding population, groundwater well users, and drinking water well use. The HRS score sheets are included in Appendix K.

### **4.2 AIR-TO-GROUND GUNNERY RANGE MUNITIONS RESPONSE SITE**

#### **4.2.1 Historical Munitions and Explosives of Concern**

4.2.1.1 The Air-to-Ground Gunnery Range MRS is comprised of 13,146.72-acres used for a ground strafing and dive bombing range from 1943 to 1945. The MRS consists of the island of Passage Key and the open water surrounding the island. The island is currently under the jurisdiction of the USFWS. A certificate of clearance dated October 24, 1945 stated that a thorough search had been made and that all duds, unexploded projectiles and bombs were disposed of and that decontamination of the island was unnecessary.

4.2.1.2 According to the ASR, four ordnance items were discovered on or around the island in 1998. One 100-lb (AN-M30) General Purpose Bomb was found in 10 feet of water, approximately 150-yards west of the center of Passage Key. A 100-lb (AN-

M36) Photoflash Bomb was discovered on the north tip of the island. Two additional 100-lb General Purpose Bombs were discovered at the site, one of which was located approximately 30 yards west of the island. All of the items were detonated by either U.S. Navy or U.S. Air Force Explosive Ordnance Disposal (EOD) units.

#### **4.2.2 Inspection Activities**

The SI field effort for the FUDS property was conducted on July 31, 2007 and included QR activities within the Air-to-Ground Gunnery Range MRS. QR was conducted by boat in areas surrounding the island; no QR was conducted on the island. *No MEC/MD was identified within the MRS.*

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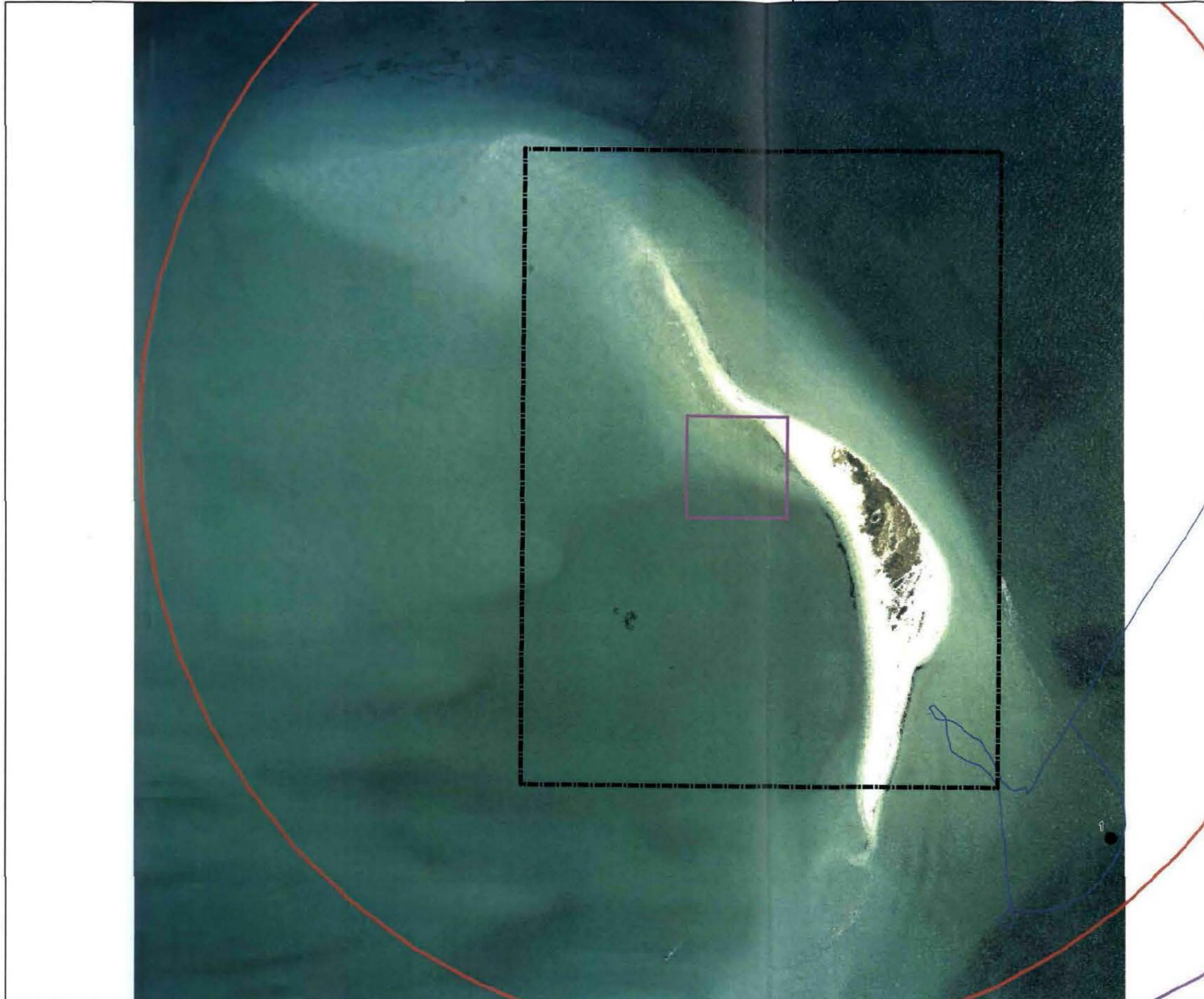


Figure 4.1

**Qualitative Reconnaissance and  
Field Observation Locations  
Passage Key Air-to-Ground Range  
FUDS Project No. 104FL040101**

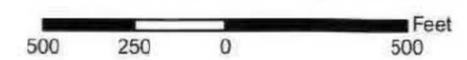
Manatee County

**Legend**

- Field Observation Location
- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- - - Approximate FUDS Boundary
- Qualitative Reconnaissance Track



Image Source: Orthophotos, 2002  
Projection: UTM Zone 17 NAD83, Map Units in Meters



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DESIGNED BY BT	<b>Qualitative Reconnaissance and Field Observation Locations</b>		PROJECT NUMBER 744647.43000
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5.1.1.2 The soils, historically (see paragraph 5.1.1.3), of the former Passage Key Air-to-Ground Gunnery Range are composed mainly of sand and sandy material. There are two basic types of soil. The first type is beach sand. This soil is composed of slightly alkaline sand and shell fragments along the Gulf of Mexico shoreline. The majority of the beach deposits are under water during high tides. The second soil type is very similar. It typically has a surface layer that is seven inches thick. It is composed of fine sand and about 10 percent sand-size shell fragments. There is little or no potential for frost development in the soils on the range.

5.1.1.3 Due to the combination of vegetation destruction during storm activity and gulf currents, Passage Key has eroded significantly. At the time of the SI field visit (during low tide), Passage Key consisted of a sand bar approximately 1 to 2 feet below water surface. As such, historical soil conditions described above have been altered.

### **5.1.2 Regional Hydrogeologic Setting**

5.1.2.1 The former Passage Key Air-to-Ground Gunnery Range site is located above the Floridan aquifer system, which underlies an area of about 100,000 square miles in southern Alabama, southeastern Georgia, southern South Carolina, and all of Florida. The Floridan aquifer system is comprised of a thick sequence of carbonate rocks (limestone and dolomite) of Tertiary age. The rocks within it generally vary in permeability. The top of the Floridan aquifer is defined as the first consistent limestone below which no clay confining beds occur. The configuration of the top of the aquifer is highly variable due to erosion and dissolution of the limestone that forms its upper surface. The elevation of the top aquifer ranges from 300-450 feet below sea level. The regional direction of groundwater movement in the Floridan aquifer is from east to west.

5.1.2.2 In most places, the aquifer system can be divided into the Upper and Lower Floridan aquifers, separated by a less permeable confining unit. In most areas, the Upper Floridan is highly permeable and yields sufficient water supplies for most purposes. The confining unit separating the Upper and Lower Floridan aquifers is different at different altitudes and consists of different rock types. The Lower Floridan aquifer is located further below the ground surface, and the properties of the aquifer are not as well known.

### **5.1.3 Regional Groundwater Use**

5.1.3.1 The Floridan aquifer is one of the most productive aquifers in the world in terms of total water yield, and the aquifer is a multiple use aquifer system. Where it contains freshwater, it is the principal source of water supply for several large cities as well as hundreds of thousands of people in smaller communities and rural areas. During 1985, an average of about 3 billion gallons per day of freshwater was withdrawn from the aquifer for all purposes. Withdrawals during 1988 were somewhat greater. In several places where the aquifer contains saltwater, such as along the southeastern coast of Florida, treated sewage and industrial wastes are injected into it. Some of the saltwater is withdrawn for cooling purposes and some is withdrawn and converted to freshwater by desalinization plants (Miller, 1990).

5.1.3.2 One water well is known to exist within a 4-mile buffer zone from the site, as shown on Figure 5.1. Information regarding the type of well (domestic, industrial,

agricultural, or other) and a specific number of individuals using the groundwater well was not available. The well extends 450 feet below ground surface (bgs) and into the Floridan aquifer. Based on the well ownership, the well is owned by a golf and country club located on Anna Maria Island. Using available population information based on U.S. Census data for the year 2000 (Figure 2.2), the SI assumes that approximately 5,720 people living within the 0- to 4-mile buffer may use the well.

#### **5.1.4 Regional Hydrologic Setting**

5.1.4.1 The western shoreline of Florida has a mixed tide, which consists of two unequal high waters and/or two unequal low waters each tidal day. In the Gulf of Mexico, the spring tide usually ranges between one and two feet. The surface currents in the Gulf of Mexico at the former Passage Key Air-to-Ground Gunnery Range flow in a northwestern direction with a mean speed of about 0.9 miles per hour. The primary type of sediment along the western shoreline of Florida consists of sand. In shallow waters, the dominant minerals are quartz, feldspar, concentrations of heavy minerals, or shell sands. In deeper water are foraminiferal remains.

5.1.4.2 Surface drainage in most of the area is poorly developed. Runoff predominately drains directly into the Gulf of Mexico or to lesser extents, into sinks, closed depressions or marshes. Rainfall percolates through the unconsolidated sands to recharge the underlying Upper Floridan aquifer.

#### **5.1.5 Regional Sensitive Ecological Resources**

5.1.5.1 The site is located within the Passage Key National Wildlife Refuge; however, it is not located within a national park, national forest, or county park. The refuge was previously used for migratory birds but has become too small to support them. The island is now completely submerged, and there is no potential avian habitat present at all. Also, because the site is currently submerged, there are no wetlands present at the site.

5.1.5.2 While five federally listed threatened and endangered species are known to potentially exist within the vicinity of the former Passage Key Air-to-Ground Gunnery Range site, none are confirmed to be present. Furthermore, the habitat necessary to support these species is not present at the site as it is completely submerged. These species are presented in Table 5.1. The field team did not observe any of these species during the SI field effort.

5.1.5.3 Based on the above information and a review of the Army Checklist for Important Ecological Places (BTAG 2005), this site is determined not to be an important ecological place. While the site is part of a national wildlife refuge, there is no longer any avian habitat present because the island is now submerged. For this reason, ecological receptors are not considered to be present at the former Passage Key Air-to-Ground Gunnery Range.

#### **5.1.6 Sample Locations/Methods**

Soil sampling was proposed as part of this SI. However, the former Passage Key Air-to-Ground Gunnery Range site is currently submerged; therefore, it was not possible to collect soil samples at the site.

Table 5.1 Federally and State Listed Threatened and Endangered Species in Manatee County, Florida

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat	Habitat Present at Site?
Piping Plover	<i>Charadrius melodus</i>	Threatened	Threatened	Sandy upper beaches, especially where scattered grass tufts are present, and sparsely vegetated shores and islands of shallow lakes, ponds, rivers, and impoundments. Nests may also be built on sandy open flats among shells or cobble behind fordunes.	No
Green Sea Turtle	<i>Chelonia mydas</i>	Endangered	Endangered	Most commonly feeds in shallow, low-energy waters with abundant submerged vegetation. Migrates across open seas. Adults are tropical in distribution, whereas juveniles range into temperate waters. Hatchlings often float in masses of sea plants in convergence zones. Coral reefs and rocky outcrops near feeding pastures often are used as resting areas. Nests on beaches, usually on islands but also on mainland. Sand may be coarse to fine, has little organic content. Prefers high energy beaches with deep sand.	No
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened	Threatened	Open sea to more than 500 miles from shore, mostly over continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers; mainly warm temperate and subtropical regions not far from shorelines. Nesting occurs usually on open sandy beaches above high-tide mark, seaward of well-developed dunes. Nests primarily on high-energy beaches on barrier strands adjacent to continental land masses in warm temperate and subtropical regions; steeply sloped beaches with gradually sloped offshore approaches are favored.	No
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered	Marine; open ocean, often near edge of continental shelf, also seas, gulfs, bays, and estuaries. Mainly pelagic, seldom approaching land except for nesting. Concentrates in summer in waters mostly 20-40 meters deep near Cape Canaveral, Florida. May linger at the surface at midday but spends most of time submerged. Nests on sloping sandy beaches backed up by vegetation, often near deep water and rough seas. Largest colonies use continental, rather than insular, beaches. Deposits eggs in moist sand.	No
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered	Endangered	Shallow coastal and estuarine waters, usually over sand or mud bottoms where crabs are numerous. Often associated with subtropical shorelines of red mangrove. Post-hatchlings apparently spend many months as surface pelagic drifters in weedlines of offshore currents. Primary summer range of juveniles seems to be northern estuaries. Adults and subadults occur mainly in coastal waters or shallow banks offshore. Nests on well-defined elevated dune areas, especially on beaches backed up by large swamps or bodies of open water having seasonal, narrow ocean connections.	No

### **5.1.7 Background Concentrations**

As described in Subchapter 5.1.6, no surface soil, sediment, groundwater, surface water, or air samples were collected from the former Passage Key Air-to-Ground Gunnery Range site. Therefore, use of background concentrations for comparison is unnecessary.

### **5.1.8 Source Evaluation**

As discussed earlier in this chapter, an exposure pathway is not considered to be complete unless there is a source of contamination present. To make this determination, analytical results for MC are screened against several criteria to evaluate whether or not a source of MC contamination is present. However, no samples were collected at the Passage Key Air-to-Ground Gunnery Range site so a source evaluation could not be performed for this site.

## **5.2 AIR-TO-GROUND GUNNERY RANGE MUNITIONS RESPONSE SITE**

5.2.1 This Subchapter of the SI Report evaluates exposure pathways for the Air-to-Ground Gunnery Range MRS. The analysis of each pathway is described in detail. The related Conceptual Site Exposure Model (CSEM) for this MRS is provided in Appendix J.

5.2.2 The refuge is owned by DOI and was previously used by USFWS for migratory birds but has become too small to support them. The island is now completely submerged, and there is no potential avian habitat present at all. Although the island is no longer used by migratory birds, it is still under the jurisdiction of USFWS. No one lives at the Air-to-Ground Gunnery Range MRS or within any part of the site.

### **5.2.1 Historical MC Information**

To date, no data exist to indicate that MC related to the use of munitions has impacted the Air-to-Ground Gunnery Range MRS.

### **5.2.2 Groundwater Migration Pathway**

#### **5.2.2.1 Geologic and Hydrogeologic Setting**

As described in Subchapter 5.1, the soils at the site area are historically composed of sand and sandy material. The site is located above the Floridan aquifer, and groundwater flows east to west. Groundwater in the area is mainly used for domestic and industrial purposes, though the elevation of the top aquifer ranges between 300-450 feet below sea level.

#### **5.2.2.2 Releases and Potential Releases to Groundwater**

There are no known releases or potential releases of MC to groundwater at the Air-to-Ground Gunnery Range MRS. Groundwater would not have been directly affected by strafing and bombing activities. If there were releases of MC to soil as a result of the munitions-related activities, it is unlikely that the constituents would migrate to groundwater at the site because of the depth of the aquifer (i.e., 300-450 feet below sea level).

### **5.2.2.3 Groundwater Migration Pathways and Receptors**

Groundwater can serve as a contaminant transport mechanism that may affect surface water bodies, drinking water supplies, vegetation, and sensitive environments such as wetlands. The likelihood of exposure is influenced by such factors as the volume and concentration of contaminated soil at the ground surface that can be transported to the groundwater, site-specific geology, climate, and the expected future land use. There are no groundwater wells in the immediate vicinity of this site, and the depth to groundwater is 300-450 feet below sea level so the groundwater migration pathway is unlikely to be complete.

### **5.2.2.4 Groundwater Sample Locations/Methodologies**

There are no groundwater wells within this MRS and, therefore, no groundwater samples were collected at the MRS as part of this SI.

### **5.2.2.5 Groundwater Migration Pathway Analytical Results**

Not applicable. No groundwater samples were collected at the Air-to-Ground Gunnery Range MRS as part of this SI.

### **5.2.2.6 Groundwater Migration Pathway Conclusions**

No drinking water wells are located at the site, and only one well is known to exist within 4 miles of the site. It is unlikely that there will be any wells installed at the site in the future given the anticipated continued use of the site and quality of the aquifer. In addition, the local depth to groundwater is 300-450 feet below sea level; therefore, it is unlikely that contaminants in the soil or sediments at the site could migrate into the underlying aquifer. Based on the groundwater depth and the absence of wells in the immediate vicinity, the groundwater migration pathway is considered to be incomplete for the Air-to-Ground Gunnery Range MRS.

## **5.2.3 Surface Water and Sediment Migration Pathway**

### **5.2.3.1 Hydrologic Setting**

As described previously in Subchapter 5.1 the Air-to-Ground Gunnery Range MRS is now completely submerged in the Gulf of Mexico.

### **5.2.3.2 Releases and Potential Releases to Surface Water and Sediment**

There are no known releases or potential releases of MC to surface water or sediment at the Air-to-Ground Gunnery Range. With the constant changing of the barrier sands from the tidal movements, the possibility of finding any contaminants in the sand would be near impossible unless an intact MEC was located near the shallow barrier.

### **5.2.3.3 Surface Water and Sediment Migration Pathways and Receptors**

Human receptors may come into contact with surface water or sediments at the MRS. Possible receptors are commercial/industrial workers (i.e., USFWS personnel) and site visitors or recreational users. These receptors could be exposed to MC in surface water or sediment through direct contact, including incidental ingestion and dermal contact. Surface water is not used as a drinking water source, so the ingestion as drinking water pathway is not present for human receptors at the site.

#### **5.2.3.4 Sample Locations/Methodologies**

Surface water and sediment sampling was not performed as part of this SI.

#### **5.2.3.5 Surface Water and Sediment Analytical Results**

Not applicable. Surface water and sediment sampling was not performed as part of this SI.

#### **5.2.3.6 Surface Water and Sediment Migration Pathway Conclusions**

Exposure pathways for surface water and sediment are present at this MRS for commercial/industrial workers (i.e., USFWS personnel) and site visitors or recreational users. While the ingestion as drinking water pathway is incomplete for human receptors, all other exposure pathways are complete. However, because no surface water or sediment samples were collected, a quantitative assessment of these potentially complete migration pathways was not possible. Therefore, based on the information currently available for the site, these surface water and sediment migration pathways for the Air-to-Ground Gunnery Range MRS are considered to be potentially complete, but not quantitatively assessed.

### **5.2.4 Soil Exposure Pathway**

#### **5.2.4.1 Physical Source Access Conditions**

The island was operated by the USFWS as a national wildlife refuge for migratory birds. The island is now completely submerged, and there is no potential avian habitat present. The location of the former island of Passage Key is still under the jurisdiction of USFWS. Currently, the primary use of the former Passage Key Air-to-Ground Gunnery Range is as a recreational area for boaters. The Air-to-Ground Gunnery Range MRS includes the former location of the island of Passage Key and the surrounding open water.

#### **5.2.4.2 Actual or Potential Contamination Areas**

Prior to the SI, there were no known contamination areas within the Air-to-Ground Gunnery Range MRS. However, strafing and bombing activities could have directly affected surface soils. The most likely location for contamination is considered to be the target areas at the MRS. Three 100-lb (AN-M30) General Purpose Bombs and one 100-lb (AN-M36) Photoflash Bomb were identified on or around the site in 1998. Therefore, there exists a potential for other ordnance within the MRS.

#### **5.2.4.3 Soil Exposure Pathways and Receptors**

Possible receptors are commercial/industrial workers (i.e., USFWS personnel) and site visitors or recreational users. However, the island is now completely submerged so there are no longer any site soils present within the Air-to-Ground Gunnery Range MRS.

#### **5.2.4.4 Sample Locations/Methodologies**

As described in Subchapter 5.1.6, soil sampling was proposed as part of this SI but no samples could be collected because the island is now completely submerged.

**5.2.4.5 Soil Analytical Results**

Not applicable. Soil sampling was not performed as part of this SI.

**5.2.4.6 Soil Exposure Pathway Conclusions**

Exposure pathways for soil are not present at this MRS because the site is currently submerged. Therefore, based on the information currently available for the site, the soil migration pathways for the Air-to-Ground Gunnery Range MRS are considered to be incomplete.

**5.2.5 Air Migration Pathway**

**5.2.5.1 Climate**

The climate at the site is described in Subchapter 2.2.3.

**5.2.5.2 Releases and Potential Releases to Air**

There are no known direct releases of MC to air at Air-to-Ground Gunnery Range MRS.

**5.2.5.3 Air Migration Pathways and Receptors**

Receptors potentially affected by the air migration pathway are commercial/industrial workers (i.e., USFWS personnel) and site visitors or recreational users. The inhalation of fugitive dust is addressed under the soil exposure pathway. No volatile contaminants are expected at this site so no other inhalation pathways are present at this MRS.

**5.2.5.4 Sample/Monitoring Locations/Methodologies**

No air sampling is known to have been previously performed at the Air-to-Ground Gunnery Range MRS and the TPP Team agreed that air sampling would not be conducted as part of this SI.

**5.2.5.5 Air Analytical Results**

Not applicable. Air sampling was not conducted as part of this SI.

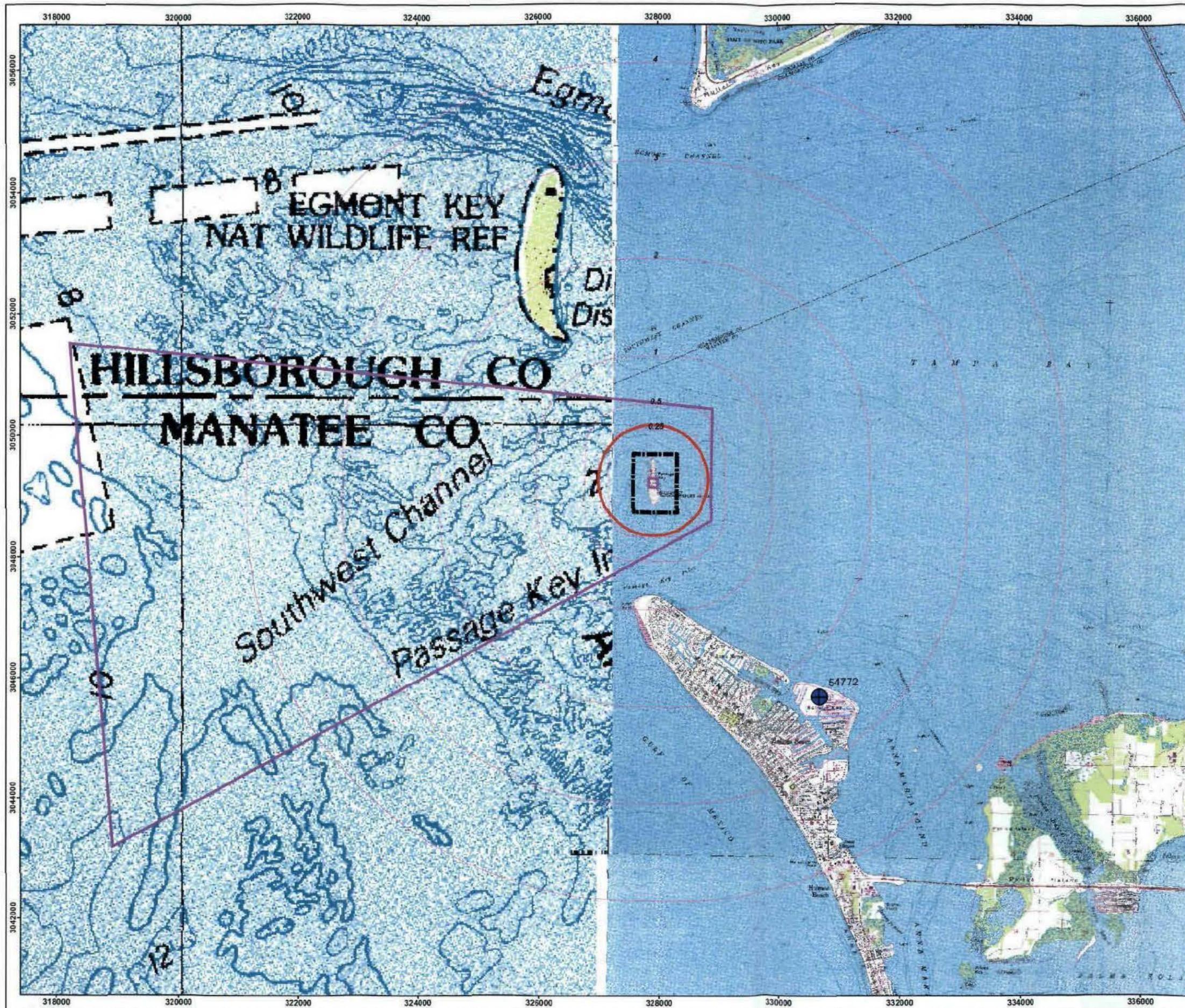
**5.2.5.6 Air Migration Pathway Conclusions**

The inhalation of fugitive dust is addressed under the soil exposure pathway (Subchapter 5.2.4). There are no other air migration pathways present at the Air-to-Ground Gunnery Range MRS because there are no volatile MC present.

Figure 5.1

**Water Wells within 4-Mile Buffer  
Passage Key Air-to-Ground Range  
FUDS Project No. I04FL040101**

Manatee County



**Legend**

- Drinking Water Well Location
- Buffer (Mile)
- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- - - Approximate FUDS Boundary



Projection: UTM Zone 17 NAD83, Map Units in Meters

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U.S. ARMY CORPS OF ENGINEERS  
HUNTSVILLE CENTER

DESIGNED BY BT	<b>Water Wells within 4-Mile Buffer</b>	
DRAWN BY BT		
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SUBMITTED BY DS	DATE: March 2008	PAGE NUMBER 5-9
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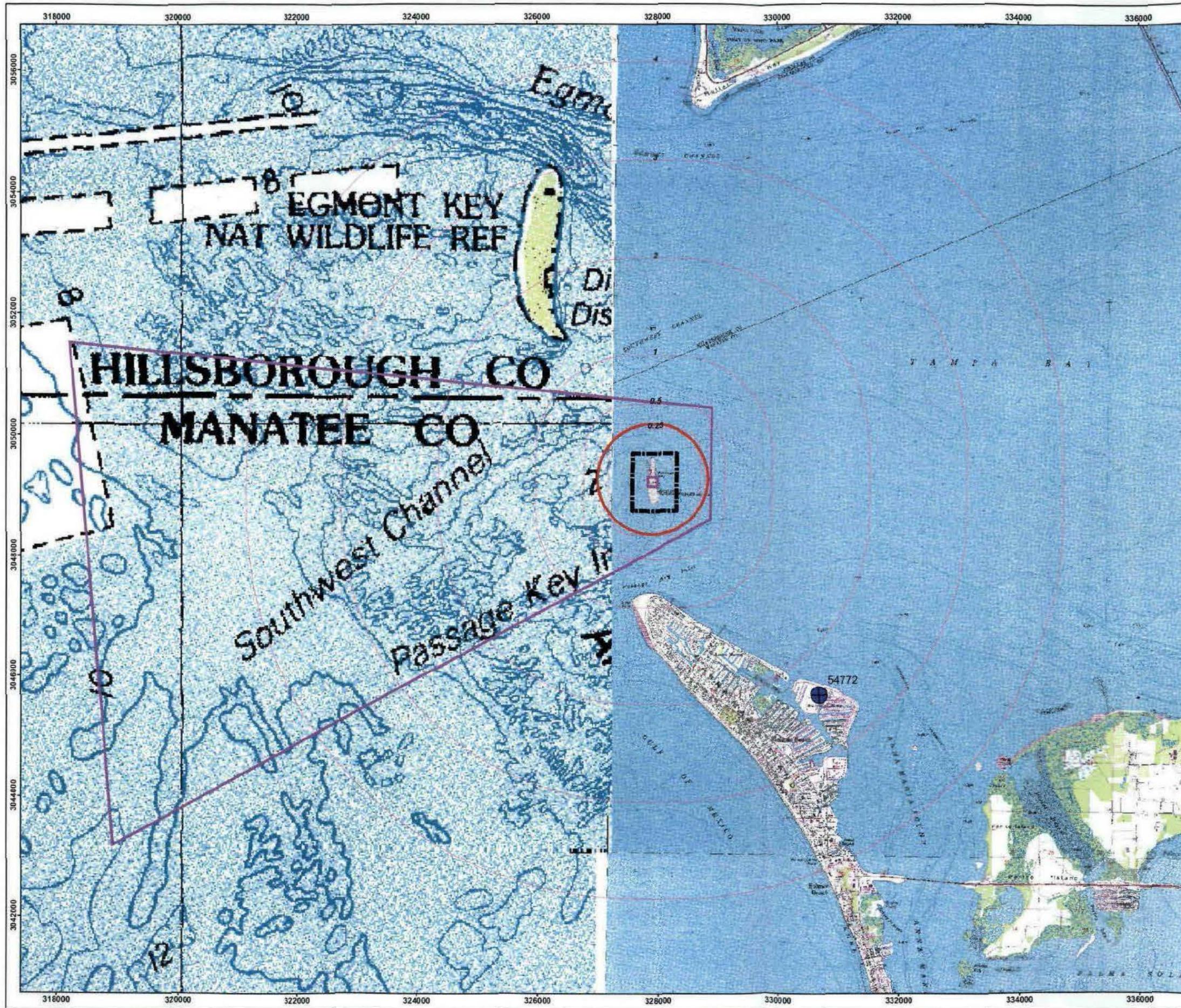


Figure 5.2

**Water Wells within 4-Mile Buffer  
Passage Key Air-to-Ground Range  
FUDS Project No. I04FL040101**

Manatee County

**Legend**

- Drinking Water Well Location
- Buffer (Mile)
- Air-to-Ground Gunnery Range Boundary
- Bombing Range Boundary
- Approximate FUDS Boundary



Projection: UTM Zone 17 NAD83, Map Units in Meters



PARSONS

U.S. ARMY CORPS  
OF ENGINEERS  
HUNTSVILLE CENTER

DESIGNED BY  
BT

DRAWN BY  
BT

CHECKED BY  
JU

SUBMITTED BY  
DS

<b>Water Wells within 4-Mile Buffer</b>		
SCALE	As Shown	PROJECT NUMBER 744647.43000
DATE	March 2008	PAGE NUMBER 5-10
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## CHAPTER 5

### MIGRATION/EXPOSURE PATHWAYS AND TARGETS

5.0.1 This Subchapter of the SI report evaluates the potential release of munitions constituents to the environment, based on site-specific conditions. It is necessary to evaluate site-specific conditions and land use to evaluate risks posed to potential receptors under current and future land use scenarios. This Subchapter of the SI Report evaluates exposure pathways for groundwater, surface water, sediment, soil, and air. The CSEM for the former Passage Key Air-to-Ground Gunnery Range site (Appendix J) summarizes which potential receptor exposure pathways are (or may be) complete and which are (and are likely to remain) incomplete. An exposure pathway is not considered to be complete unless all four of the following elements are present (USEPA 1989). An example regarding a hypothetical groundwater pathway is included herein to illustrate how a pathway is deemed complete.

- *A source and mechanism for contaminant release:* e.g., a site has known MEC from which MC have leached and contaminated surface soil.
- *An environmental transport and/or exposure medium:* e.g., the MC in soil is mobile and can contaminate groundwater.
- *A point of exposure at which the contaminant can interact with a receptor:* e.g., a drinking water well drawing from the contaminated aquifer is located at the site.
- *A receptor and a likely route of exposure at the exposure point:* e.g., the resident lives onsite and drinks water from the well.

5.0.2 In the hypothetical example above, all four conditions are present and, therefore, the groundwater exposure pathway is complete. If any single factor were absent (e.g., MC contamination was not present in soil, or the resident obtained drinking water from another source), the pathway would be incomplete.

## 5.1 GENERAL INFORMATION

### 5.1.1 Regional Geologic Setting

5.1.1.1 The former Passage Key Air-to-Ground Gunnery Range site is located in the Floridian Section of the Coastal Plain physiographic province. This peninsular area of Florida has been divided into three physiographic zones; the Southern or Distal Zone, the Central or Mid-peninsular Zone, and the Northern or Proximal Zone. The site falls within the Central Zone. The Ocala Uplift, one dominant geologic feature, controls the subsurface bedrock topography in this area. It is a gentle anticlinal flexure about 230 miles long and 70 miles wide exposed near the surface in west-central Florida. The Ocala Uplift is not expressed at the surface as the bedrock surface is buried beneath several hundred feet of unconsolidated sand deposits.

## **CHAPTER 6 SCREENING-LEVEL RISK ASSESSMENT**

### **6.1 MUNITIONS AND EXPLOSIVES OF CONCERN SCREENING-LEVEL RISK ASSESSMENT**

6.1.1 A qualitative risk evaluation was conducted to assess potential explosive safety risk to the public at the former Passage Key Air-to-Ground Gunnery Range site and associated MRS. The purpose of the risk evaluation is to qualitatively communicate the magnitude for the Air-to-Ground Gunnery Range MRS at the site and the primary causes of that potential risk. The risk evaluation presented below was developed using the Interim Guidance for Ordnance and Explosive Risk Impact Assessment (USACE, 2001) and historical information presented in prior studies noted in Chapter 2 and on the QR observations for the MRS.

6.1.2 An explosive safety risk is the likelihood for MEC to detonate as a result of human activities and potentially cause harm. An explosive safety risk exists if a person can come near or into contact with MEC and act on that item to cause a detonation. The potential for an explosive safety risk depends on the presence of three critical elements: a source (presence of MEC), a receptor or person, and interaction between the source and receptor (such as picking up the item or disturbing the item). There is no risk if any one element is missing. Each of the three elements provides a basis for implementing effective risk-management response actions.

6.1.3 The exposure route for MEC receptors is primarily direct contact as a result of some human activity. Agricultural or construction activities involving subsurface intrusion are examples of human activities that will increase the likelihood for direct contact with buried MEC. MEC will tend to remain in place unless disturbed by human or natural forces, such as erosion. Movement of MEC may increase the probability for direct human contact but will not necessarily result in direct contact or exposure.

#### **Munitions and Explosives of Concern Conceptual Site Exposure Model**

6.1.4 CSMs can help identify risks to human health by identifying complete exposure pathways between physical media affected by site-related contamination and potential human receptors. Appendix J contains the MEC CSM at the Air-to-Ground Gunnery Range MRS.

#### **Definition of Risk Evaluation Factors, Categories, and Subcategories**

6.1.5 The potential risk posed by MEC was characterized qualitatively by evaluating three primary risk factors: 1) presence of MEC sources, 2) site characteristics that affect the accessibility or pathway between the source and human receptor, and 3)

human factors that define the receptors and types of activities that may result in direct contact between receptors and MEC sources. By performing a qualitative assessment of these three factors, an overall assessment of the safety risk posed by MEC may be evaluated. The following sections describe the components of each primary risk factor.

**Presence of Munitions and Explosives of Concern**

6.1.6 Four categories can be used to evaluate the risk from the presence of MEC: MEC type, MEC sensitivity, MEC density, and MEC depth distribution. At the SI stage, MEC density and MEC depth are generally unknown; they are evaluated during the RI/FS stage.

6.1.7 MEC type affects the likelihood of injury and the severity of exposure. If multiple MEC are identified in an area, the item posing the greatest risk to public health is selected for risk evaluation. Table 6.1 shows the four subcategories of MEC type, presented in order of severity from highest to lowest risk.

**Table 6.1  
MEC Type Subcategories**

Subcategory	MEC Type Description
Most severe	MEC that may be lethal if detonated by an individual's activities
Moderately severe	MEC that may cause major injury to an individual if detonated by an individual's activities
Least severe	MEC that may cause minor injury to an individual if detonated by an individual's activities
No injury	Munitions debris (inert) that will cause no injury

6.1.8 **MEC sensitivity** affects the likelihood of detonation and the severity of exposure. Factors considered in evaluating sensitivity include fuzing and environmental factors such as weathering. The category of sensitivity is based on the results of the SI field QR as well as the results of archival studies. When multiple subcategories of MEC types are discovered in an area, the highest risk subcategory is used in the risk evaluation. Table 6.2 defines the four subcategories of sensitivity, presented in order from highest to lowest.

**Table 6.2**  
**MEC Sensitivity Subcategories**

<b>Subcategory</b>	<b>MEC Sensitivity</b>
Very sensitive	MEC that is very sensitive, <i>i.e.</i> , electronic fuzing, land mines, booby traps
Less sensitive	MEC that has standard fuzing
Insensitive	MEC that may have functioned correctly or is unfuzed but has a residual risk
Inert	Munitions debris (inert) that will cause no injury

6.1.9 **MEC Density** affects the likelihood that an individual will be exposed to MEC. There exists a direct relationship between density and potential for harm. For example, the more munitions per acre, the greater the likelihood of exposure to MEC and thereby an opportunity to create an incident. Given the absence of reliable and confirmed subsurface data at the SI stage, MEC density will not be evaluated during the SI. However, where appropriate, discussion of inferred residual MEC presence may be discussed based on munitions types and field findings.

6.1.10 **MEC Depth Distribution** refers to where the MEC is located vertically in the subsurface. The MEC depth distribution affects the likelihood that an individual will be exposed to MEC. There exists an inverse relationship between the depth at which MEC are found and the likelihood of exposure to the MEC. That is, the greater the depth where the MEC are found, the lower the risk of exposure. There are two subcategories within the MEC depth distribution category: surface and subsurface. The surface subcategory includes those items recovered either on the ground surface, protruding from the ground surface, or beneath the leaf litter. Given the absence of reliable and confirmed subsurface data at the SI stage, the subsurface category will not be evaluated during the SI. However, where appropriate, discussion of inferred residual MEC presence may be discussed based on munitions types and field findings.

### **Site Characteristics**

6.1.11 The two categories evaluated in the site characteristics risk factor are site accessibility and site stability.

6.1.12 **Site accessibility** affects the likelihood of encountering MEC. Natural or physical barriers can limit the accessibility. Natural barriers can include the terrain or topography of the site as well as the vegetation. Physical barriers can include walls and fences that limit the public's accessibility to the sector. Both the physical and natural barriers found at a sector are considered when evaluating this category. Site accessibility has three subcategories, presented in Table 6.3.

**Table 6.3**  
**Site Accessibility Subcategories**

Subcategory	Accessibility Description
No restriction to site access	No man-made barriers, gently sloping terrain, no vegetation that restricts access, no water that restricts access
Limited restriction to access	Man-made barriers, vegetation, water, snow or ice cover, and/or terrain restrict access
Complete restriction to access	All points of entry are controlled

6.1.13 **Site stability** relates to the probability of exposure to MEC by natural processes, including recurring natural events (e.g., erosion and frost heave) or extreme natural events (e.g., severe wind and flash floods). The local soil type, topography, climate, and vegetation affect stability of the site. The soil type and climate primarily affect the depth of penetration of the MEC. Over time, the soil type and climate will also affect the degree of erosion that takes place at a site. Topography and vegetation in the area will also affect the rate of erosion that takes place in an area. Site stability has three subcategories, described in Table 6.4.

**Table 6.4**  
**Site Stability Subcategories**

Subcategory	Accessibility Description
Stable site	MEC should not be exposed by natural events
Moderately stable site	MEC may be exposed by natural events
Unstable site	MEC most likely will be exposed by natural events

#### **Human Factors**

6.1.14 The human risk factor evaluates site activities and population.

6.1.15 **Types of activities** conducted at a site affect the likelihood of encountering MEC. Activities may be generally classified as recreational and occupational. This category examines whether the impact from an activity on MEC is significant, moderate, or low. To assign such a score, the general guidelines presented in Table 6.5 are considered. First, the type of activity is identified. Second, the depth of the activity is considered. For example, at a site where MEC is at the surface, all activities that can impact MEC at the surface are considered activities that have significant impact or contact level. Conversely, if all MEC is located at depths greater than 1 foot and only surface impact activities are being performed, then the activities are considered as moderate or low impact. Third, a score of significant, moderate, or low may be assigned. Given the absence of reliable and confirmed subsurface data at the SI stage, the subsurface category cannot be evaluated during the SI.

**Table 6.5**  
**MEC Contact Probability Levels**

<b>Examples of Activities</b>	<b>Actual Depth of MEC</b>	<b>Contact Level</b>
Child play, picnic, short cuts, hunting, hiking, jogging, surveying, off-road driving	Surface Below surface to 12 inches >12 inches	Significant Low Low
Camping, campfires, metal detecting	Surface Below surface to 12 inches >12 inches	Significant Moderate Low
Intrusive work	Surface Below surface to 12 inches >12 inches	Significant Significant Moderate

6.1.16 **Population** refers to the number of people that potentially access the MRS on a daily basis. A direct relationship exists between the number of people and the risk of exposure. An estimate of the number of people accessing the MEC on a daily basis was made using best professional judgment based on knowledge of the type of site, land use, and site accessibility.

#### **Application of Risk Evaluation Factors, Categories, and Subcategories**

6.1.17 An evaluation of MEC risk was performed for the single identified MRS at the former Passage Key Air-to-Ground Gunnery Range site.

#### **Presence of Munitions and Explosives of Concern**

6.1.18 No MEC or MD was identified during SI field effort; however, three 100-lb (AN-M30) General Purpose Bombs and one 100-lb (AN-M36) Photoflash Bomb were found on or around the island in 1998. Based on Table 6.1 and the ordnance items observed at the MRS, an MEC type subcategory of “moderate severity” was assigned to the MRS.

6.1.19 Based on the former use of the MRS as a strafing and bombing range and documented findings of ordnance items, the type of MEC present within this MRS was assigned a subcategory of “less sensitive”.

6.1.20 MEC density and depth cannot be evaluated during the SI. MEC density and depth were inferred based on historical findings at the site that included three (AN-M30) General Purpose Bombs and one 100-lb (AN-M36) Photoflash Bomb. Based on these findings, MEC is assumed to be present at the site and subsurface MEC is possible.

#### **Site Characteristics**

6.1.21 The Air-to-Ground Gunnery Range MRS is completely surrounded by the Gulf of Mexico. Access to the site can only be completed by boat. Public access is restricted, but no physical barriers exist at the Air-to-Ground Gunnery Range. Per Table 6.3, the Air-to-Ground Gunnery Range MRS was assigned a site accessibility subcategory of “no restriction to site access”.

6.1.22 The Air-to-Ground Gunnery Range MRS contains no vegetation and is easily impacted by tides and storms. Therefore, per Table 6.4, the MRS was assigned a site stability subcategory of “unstable” based on the potential for MEC to be exposed by erosion from the tides.

**Human Factors**

6.1.23 The type of activities conducted within the Air-to-Ground Gunnery Range MRS in combination with the potential presence of MEC is related to the likelihood of individuals encountering MEC.

6.1.24 The island of Passage Key is owned by DOI and is managed by USFWS. Public access to the island is prohibited. However, the shallow area surrounding the island is a popular location for recreational boaters. Based on the known uses of the Air-to-Ground Gunnery Range MRS, the number of people potentially exposed to MEC at this MRS on a daily basis is estimated to be less than five.

**Hazards Assessment**

6.1.25 Each of the primary risk factors identified above was evaluated using the data collected during the SI field investigation and the historical data available from other studies. Table 6.6 summarizes the MEC risk evaluation for the Air-to-Ground Gunnery Range MRS.

**Munitions and Explosives of Concern Risk Summary**

6.1.26 The potential risk to public safety associated with the presence of MEC, and with the possibility of subsurface MEC was evaluated for the Air-to-Ground Gunnery Range MRS. The MEC safety risk is due to a combination of the primary risk factors presented above.

6.1.27 No MEC were observed during the SI field effort in July 2007 or during any prior field visit (USACE, 2002). However, MEC in the form of 100-lb General Purpose and 100-lb Photoflash Bombs were historically discovered at the site. The majority of Passage Key was submerged underwater at the time of this SI field effort. The SVT was not able to conduct QR on the island and visibility was limited in the shallow waters surrounding Passage Key; therefore, it is possible that MEC are present in other portions of the target used in past DoD training and were just not observed by the SI team. Based on previous discoveries of MEC, the MEC exposure pathway may potentially be complete at the Air-to-Ground Gunnery Range MRS (shown on Figure 4.1):

**Table 6.6  
Site Inspection MEC Risk Evaluation  
Former Passage Key Air-to-Ground Gunnery Range, Florida**

MRS	Presence of MEC Factors					Site Characteristics Factors		Human Factors	
	Type	Sensitivity	MEC Density	MEC Depth Distribution	Accessibility	Stability	Contact Level / Activities	Population (Daily)	
Air-to-Ground Gunnery Range	Suspected use of small arms, general; 50 caliber machine gun, AN-M30, general purpose bomb, 100 lbs; AN-M46, photoflash bomb, 100 lbs. AN-Mk 5, AN-Mk 23, AN-Mk 43, practice; signal, practice bomb, Mk 4; M38A2, practice bomb, 100 lbs; spotting charge, M1A1; 2.25-inch, practice rocket (reported in ASR)	Moderate Severity	Less Sensitive	MEC is Assumed to be Present	Possible Subsurface Presence	No Restriction to Site Access	Unstable	Low	<5

## **6.2 MUNITIONS CONSTITUENT HUMAN HEALTH SCREENING LEVEL RISK ASSESSMENT**

### **6.2.1 Conceptual Site Exposure Model**

Potential human receptors for the Air-to-Ground Gunnery Range MRS include site workers, and site visitors or recreational users; both currently and in the future. Access to the site is not controlled and can only be accessed by boat. The future use of the site is projected to stay the same. The MC CSEM identifies affected media, transport mechanism, exposure routes, and potential receptors. A CSEM has been developed for the MRS and is included in Appendix J.

### **6.2.2 Affected Media**

Direct release of MC from munitions activities at the site would have been to surface water, sediment, and soil. However, the site is now completely submerged, so soils are no longer present at the site. Migration of MC to groundwater is unlikely at this site (see Subchapter 5.2.2). Based on decisions made at the TPP meeting, two soil samples were proposed for the Air-to-Ground Gunnery Range MRS during the SI at the former Passage Key Air-to-Ground Gunnery Range site, but could not be collected because the site is now submerged under water. No other media (e.g., groundwater, sediment, surface water, or air) were sampled at the site.

### **6.2.3 Screening Values**

No samples were collected from this site and, therefore, comparison with screening values was not conducted.

### **6.2.4 Risk Characterization**

No samples were collected from this site; therefore, a risk characterization could not be conducted for the Air-to-Ground Gunnery Range MRS.

### **6.2.5 Discussion**

A risk characterization could not be conducted for the Air-to-Ground Gunnery Range MRS because no samples were collected. For this reason, it is not possible to assess risks to human health that might result from possible MC contamination at the Air-to-Ground Gunnery Range MRS.

## **6.3 MUNITIONS CONSTITUENT SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT**

As described in Subchapter 5.1.5, the Air-to-Ground Gunnery Range is not considered to be an important ecological place. For this reason, it is not necessary to conduct a SLERA for this site.

## CHAPTER 7 SUMMARY AND CONCLUSIONS

### 7.1 SUMMARY

7.1.1 The Air-to-Ground Gunnery Range MRS at the former Passage Key Air-to-Ground Gunnery Range site was identified and evaluated to determine the potential to cause significant contamination to the environment or to adversely affect human and ecological receptors. The Passage Key Air-to-Ground Gunnery Range operated as a ground strafing and bombing range. The reported munitions used include small arms, general; 50 caliber machine gun; AN-M30, general purpose bomb, 100 lbs; AN-M46, photoflash bomb, 100 lbs; AN-Mk 5, AN-Mk 23, AN-Mk 43, practice; signal, practice bomb, Mk 4; M38A2, practice bomb, 100 lbs; spotting charge, M1A1; 2.25-inch, practice rocket.

7.1.2 The site is owned by the DOI and is operated by USFWS as the Passage Key National Wildlife Refuge for migratory birds. The island is now completely submerged approximately 1 to 2 feet below water surface at low tide; therefore, there is no potential avian habitat present at the site. The island remains under the jurisdiction of USFWS. The area of the former Passage Key Air-to-Ground Gunnery Range is very shallow and is now used as a recreational area for boaters throughout the week with the largest population on the weekends. Public access to the island remains restricted.

7.1.3 The SVT traveled to the location of the Passage Key Air-to-Ground Gunnery Range site on July 31, 2007; however, at the time of the SI field effort, the entire island was submerged under water (during low tide). A long, shallow sandbar was visible beneath the water surface. The SVT conducted a limited QR from the boat near the shallow sandbar, but visibility below the water surface was limited due to water turbidity and turbulence. The SVT did not leave the boat to collect soil samples due to safety concerns regarding the water conditions and the numerous reported shark sightings in the area. Therefore, the proposed soil samples were not collected for this SI due to conditions during the field effort.

### 7.2 CONCLUSIONS REGARDING POTENTIAL MUNITIONS AND EXPLOSIVES OF CONCERN EXPOSURE PATHWAYS

An MEC Screening Level Risk Assessment was conducted based on the QR conducted in the field and historical data regarding previous field visits (Chapter 6). MEC [100-lb (AN-M30) General Purpose Bombs and 100-lb (AN-M36) Photoflash Bombs] have historically been observed on or around the island of Passage Key. During the SI field effort, limited QR was collected along the shallow sandbar of the former island. No MEC or MD were identified at the site; however, the entire island was submerged under water. Based on the MEC identified subsequent to the SI field activities, it is possible that additional MEC exist on or around the site. The MEC

exposure pathway at the Air-to-Ground Gunnery Range MRS of the former Passage Key Air-to-Ground Gunnery Range site is *complete*.

### **7.3 CONCLUSIONS REGARDING POTENTIAL MUNITIONS CONSTITUENTS EXPOSURE PATHWAYS**

7.3.1 An exposure pathway is not considered to be completed unless all four of the following elements are present (USEPA, 1989):

- A source and mechanism for chemical release;
- An environmental transport/exposure medium;
- A receptor exposure point; and
- A receptor and a likely route of exposure at the exposure point.

7.3.2 The groundwater pathway is incomplete due to the lack of known wells within the Air-to-Ground Gunnery Range MRS. Surface water and sediment sampling were not conducted during this SI. Therefore, conclusions regarding the presence or absence of surface water or sediment contamination cannot be made at this stage of the SI. Two surface soil samples along with three discretionary surface soil samples were proposed for the MRS; however, the island is now completely submerged so there are no longer any site soils present within the Air-to-Ground Gunnery Range MRS. Because of this, the surface soil pathway is incomplete. Additionally, due to the constant shifting of the island, the presence of MC would be difficult to evaluate except in isolated areas where MEC is located.

## CHAPTER 8 RECOMMENDATIONS

Due to historical MEC discovered at this site, it is recommended that the MRS at the former Passage Key Air-to-Ground Gunnery Range proceed to RI/FS status (Table 8.1). Additional evaluation of MC is not recommended at this site during the RI/FS stage due to site conditions at the time of the SI field effort that prevented soil sample collection. An immediate removal action is not warranted at this time. The supporting evidence for these recommendations is as follows:

- Historical documentation indicates that the site was used as a bombing and strafing range from 1943 to 1945.
- Although MEC and MD were not observed at the site during previous site visits (including the 2007 SI field visit), multiple items of MEC in the form of three 100-lb (AN-M30) General Purpose Bombs and one 100-lb Photoflash Bomb (AN-M36) were discovered at the site in 1998.
- Public access to the site remains restricted (accessible by boat only) but no physical barriers exist at the site. The shallow area surrounding the island is a popular gathering location for recreational boaters. Concerns regarding the use of the site for this purpose still arise because of the possibility of a boater dropping anchor and striking MEC and the possibility of a member of the public discovering MEC at the site.

**Table 8.1  
Recommendations  
Former Passage Key Air-to-Ground Gunnery Range**

MRS	Recommendation	Justification
Air-to-Ground Gunnery Range	RI/FS	Past history of MEC finding with EOD response in 1998. Public access to the island is restricted but no physical barriers exist on the island. The shallow are surrounding the island is now a popular gathering spot for recreational boaters.

## CHAPTER 9 REFERENCES

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**APPENDIX A**  
**Performance Work Statement**  
**Electronic Only**

**APPENDIX B**

**TPP Session Documentation/Meeting Minutes  
Electronic Only**

**APPENDIX C**

**Interview Documentation  
Not Applicable**

**APPENDIX D**  
**Field Notes and Field Forms**

**DAILY FIELD REPORT  
MMRP SITE INSPECTION**

CONTRACT NO.	W912DY-04-D-0005	DELIVERY ORDER NO.	0008
JOB NO:	744647-43000	DATE/DAY:	31-Jul-07
SITE NAME:	Passage Key, FL	REPORT NO:	1
USACE DISTRICT:	CESAJ	SHEET:	1
WEATHER:	Partly Cloudy, Mid 90's, 3-5mph winds, afternoon showers		

**WORK IN PROGRESS OR COMPLETED:**

1. Mobilization/Demobilization		CUMULATIVE
40	Miles Driven 12 mile by boat	40
0	Number of Flights/Miles Flown	0
3	Personnel:	3

2. Reconnaissance Acreage		CUMULATIVE
5,395	QR data in feet	5,395
Discussion -		

3. MC Sampling Details		CUMULATIVE
0	Soil Samples	0
0	Water Samples	0
Sampling Notes: See Attached DQCR		

4. QC Activities		CUMULATIVE
0	Soil Samples	0
0	Water Samples	0
Sampling Notes: See Attached DQCR		

5. QA Activities		CUMULATIVE
0	Soil Samples	0
0	Water Samples	0
Sampling Notes: See Attached DQCR		

**6. Safety Activities**  
Morning safety briefing conducted covering weather, terrain, biological elements, heat/cold stress, and personal awareness.

PARSONS WORKFORCE			On-site Yes/No	Tailgate Brief Yes/No
Parsons FTL -	Jeff Ulmer	Cell Phone: 770-634-8561	Yes	Yes
Parsons UXO TechIII/SSHO -	Frank Cota	Cell Phone: 623-680-0878	Yes	Yes
Parsons FTM -	Joe Scott	Cell Phone: 678-925-3456	Yes	Yes
VISITORS				

**EQUIPMENT LIST:**  
 Schonstedt, Geo XT Data Logger, Rhino hand held Garmins, Field Computer

**ADDITIONAL INFORMATION:**  
 Parsons SI Field Team departed Mullet Key to the boat dock on Eckert College where the Department of Fish and Game store their boats. Proceeded to Passage Key in very rough water. When arrived at the location of Passage Key there was no remaining land to be seen except for a long shallow sand bar. We arrived at low tide but in very rough seas. Due to safety concerns, the Field Team could not leave the boat to collect samples. The Field Team conducted some QR by boat and recorded observations and took photos of the water breaking over the shallow sand bar. Parsons SI Team considered wading to the shallow sand bar but were advised not to by the Fish and Game Officer due to numerous reported sharks in the area. Visibility was very low due to the turbid water from the approaching storm.

*All other site details recorded in Pathfinder data as site observations.*

ACTIVITIES SCHEDULED FOR NEXT WORK DAY:

None. Project activities completed.

REQUEST FOR PROJECT ACTION:

ACCIDENTS REPORTED TODAY:

0

ACCIDENTS TO DATE:

0

Prepared By Field Team Leader:

Signed by:

Name Jeffrey Ulmer

Date: 31-Jul-07

Phone Mobile: 770-634-8561

Office#: 678-969-2398

Copies sent to:

Deborah Walker (MM CX)

Doug Garretson (OE DC PM)

Heidi Novotny (HTRW CX)

Becky Terry (USAESCH)

Don Silkebakken (Parsons PM)

Teresa Carpenter (USAESCH)

Laura Kelley (Parsons DPM)

Charles Fales (CESAJ PM)

Tammy Chang (Parsons)

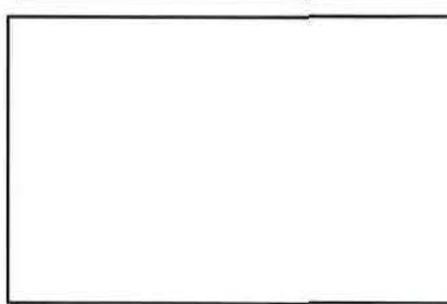
Jeff Ulmer (Parsons Project Coordinator)

**APPENDIX E**  
**Photo-documentation Log**

**Field Team Leader's Site Observations**  
**Passage Key Air-to-Ground Gunnery Range, Manatee County, Florida**

**Tuesday, July 31, 2007**

<b>Property:</b> <input type="text" value="Passage Key ATG GR"/>		<b>Area:</b> <input type="text" value="ATG Gunnery Range"/>		<b>Time</b> <input type="text" value="10:47:21 AM"/>	<b>Point_ID:</b> <input type="text" value="1a"/>
<b>Team Leader</b> <input type="text" value="Jeff Ulmer"/>	<b>MRSPP Menu:</b> <input type="text" value="None"/>		<b>Latitude:</b> <input type="text" value="27.550854617"/>		
<b>Sampler:</b> <input type="text" value="None"/>	<b>MRSPP Note:</b> <input type="text" value="No island remains."/>		<b>Longitude:</b> <input type="text" value="-82.737163394"/>		
<b>Sample ID:</b> <input type="text" value="None"/>					
<b>Barrier:</b> <input type="text"/>	<b>Topography:</b> <input type="text" value="Target"/>				
<b>Vegetation:</b> <input type="text"/>	<b>Surface Feature:</b> <input type="text" value="None"/>				
<b>Drainage:</b> <input type="text" value="18.998939646979"/>	<b>Surface Debris:</b> <input type="text" value="None"/>				
<b>SoilType:</b> <input type="text" value="None"/>	<b>Subsurface Met:</b> <input type="text" value="None"/>				
<b>SoilColor:</b> <input type="text" value="Ocean"/>	<b>MECMD:</b> <input type="text" value="Flat"/>				
					
No island remains.	No island remains.	No island remains.			

<b>Property:</b> <input type="text" value="Passage Key ATG GR"/>		<b>Area:</b> <input type="text" value="ATG Gunnery Range"/>		<b>Time</b> <input type="text" value="10:47:21 AM"/>	<b>Point_ID:</b> <input type="text" value="1b"/>
<b>Team Leader</b> <input type="text" value="Jeff Ulmer"/>	<b>MRSPP Menu:</b> <input type="text" value="None"/>		<b>Latitude:</b> <input type="text" value="27.550854617"/>		
<b>Sampler:</b> <input type="text" value="None"/>	<b>MRSPP Note:</b> <input type="text" value="No island remains."/>		<b>Longitude:</b> <input type="text" value="-82.737163394"/>		
<b>Sample ID:</b> <input type="text" value="None"/>					
<b>Barrier:</b> <input type="text"/>	<b>Topography:</b> <input type="text" value="Target"/>				
<b>Vegetation:</b> <input type="text"/>	<b>Surface Feature:</b> <input type="text" value="None"/>				
<b>Drainage:</b> <input type="text" value="18.998939646979"/>	<b>Surface Debris:</b> <input type="text" value="None"/>				
<b>SoilType:</b> <input type="text" value="None"/>	<b>Subsurface Met:</b> <input type="text" value="None"/>				
<b>SoilColor:</b> <input type="text" value="Ocean"/>	<b>MECMD:</b> <input type="text" value="Flat"/>				
					
No island remains.	No island remains.				

**APPENDIX F**

**Analytical Data  
Electronic Only  
Not Applicable**

## **APPENDIX G**

**Analytical Data QA/QC Report and USACE-prepared  
Chemical Data Quality Assurance Report  
Not Applicable**

## **APPENDIX H**

### **Geographic Information Systems Data Electronic Only**

**APPENDIX I**  
**Geophysical Data**  
**Not Applicable**

**APPENDIX J**  
**Conceptual Site Model**

**CONCEPTUAL SITE MODEL – MUNITIONS AND EXPLOSIVES OF CONCERN  
PASSAGE KEY AIR-TO-GROUND GUNNERY RANGE  
MANATEE COUNTY, FLORIDA**

Munitions Response Site	Acreage	Suspect Past DoD Activities	Potential MEC/MD Presence	MEC/MD Found Since Closure	Previous Investigation/Clearance Actions	Post-DoD Land Use and Current Land Use	Potential Receptors	Potential Source and Receptor Interaction	Field Sampling/Qualitative Reconnaissance
AIR TO-GROUND	36.37 (island)	Strafing and bombing target	Small Arms General; 50 Cal. Machine Gun AN-M30, General Purpose Bomb, 100 lbs AN-M46, Photoflash Bomb, 100 lbs AN-Mk 5, AN-Mk 23, AN-Mk 43, Practice M38A2, Practice Bomb, 100 lbs Signal, Practice Bomb, Mk 4 Spotting Charge, M1A1 2.25-inch, Practice Rocket	USAF EOD detonated 1 100 lb photoflash bomb and 1 100 lb General Purpose bomb Nov, 1998  US Navy EOD detonated 2 projectile Dec, 1998	None	Wildlife Refuge	Commercial or industrial workers, visitors or recreational users, ecological receptors.  US Fish and Wildlife attempt to restrict Public Access due to the nesting birds on the island, but the island remains an open area.	Yes - Intrusive or non-intrusive activity, MEC at surface and subsurface, access available.	Soil sampling was not conducted as island was entirely submerged / Limited QR was conducted.
ACRES OF RANGE IN WATER	13,110.35								
TOTAL ACREAGE OF RANGE	13146.72								

Source  
1 = Private account - nonconfirmed  
2 = EOD response  
3 = ASR  
4 = ASR Supplement  
5 = Other government correspondence

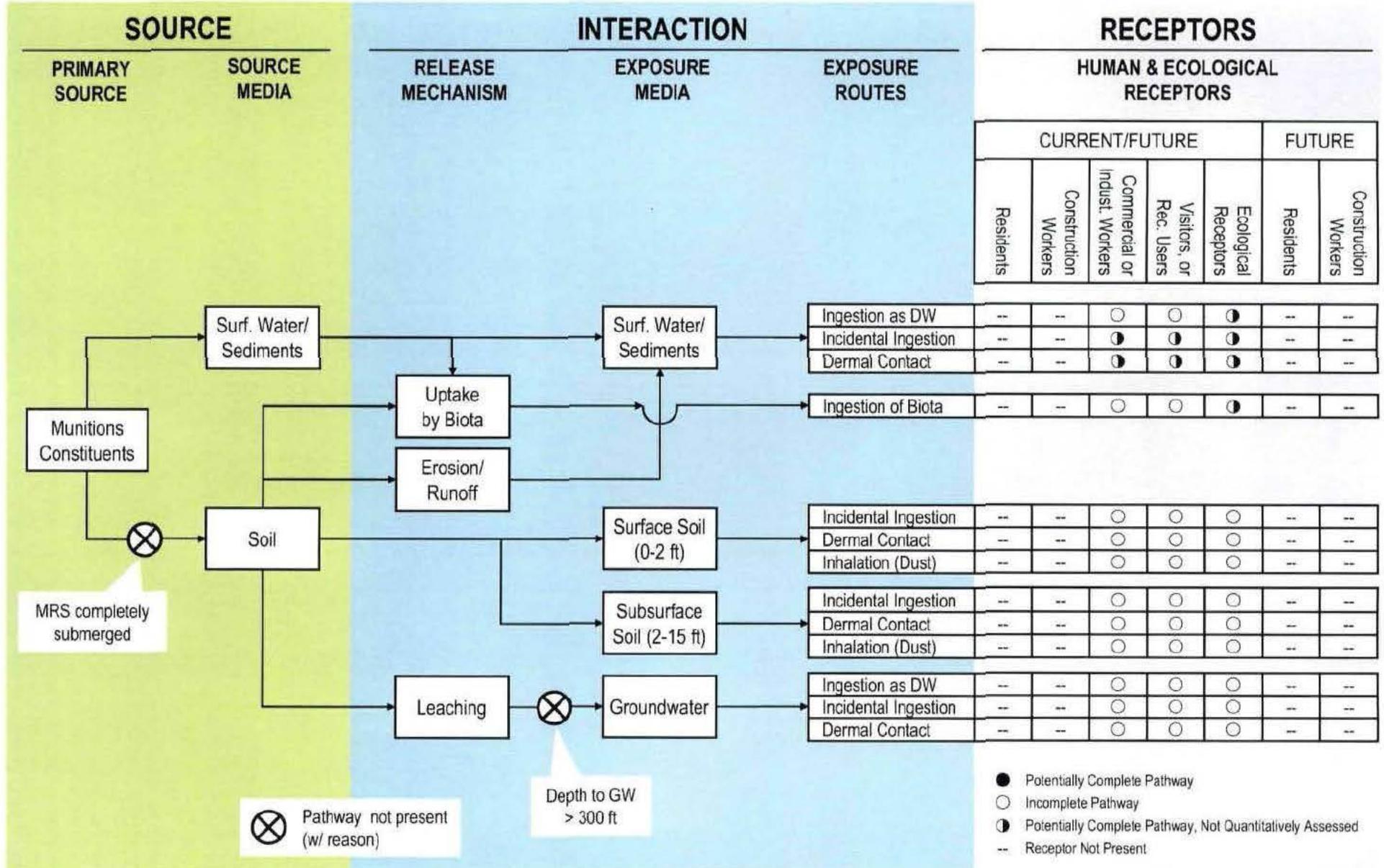
ASR = Archives Search Report  
DoD = Department of Defense  
EOD = Explosives Ordnance Disposal  
MEC = Munitions and explosives of concern  
N/A = Not Available  
TBD = To be determined  
QR = Qualitative Reconnaissance

# CONCEPTUAL SITE EXPOSURE MODEL

MRS Name: PASSAGE KEY AIR-TO-GROUND GUNNERY RANGE - Air-to-Ground Gunnery Range MRS

Completed By: James Salisbury, PARSONS

Date Completed: March 19, 2008



## **APPENDIX K**

### **Munitions Response Site Prioritization Protocol Evaluations (MRSPP)**

## Table A

### MRS Background Information

**DIRECTIONS:** Record the background information below for the MRS to be evaluated. Much of this information is available from DoD databases, such as RMIS. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the MRS summary, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental non-munitions related contaminants found at the MRS (e.g., benzene, trichloroethylene), and any potentially exposed human and ecological receptors. Include a map of the MRS, if one is available.

**Munitions Response Site Name:** Passage Key Air to Ground Gunnery Range

**Component:** U.S. Army

**Installation/Property Name:** Passage Key Air to Ground Gunnery Range

**Location (City, County, State):** Manatee County, Florida

**Site Name (RMIS ID)/Project Name (Project No.):** RMIS Project No. I04FL040101R01 / I04FL040101.

**Date Information Entered/Updated:** 10/02/07

**Point of Contact (Name/Phone):** Mr. Charles Fales (904) 232-1017

**Project Phase (check only one):**

<input type="checkbox"/> PA	<input checked="" type="checkbox"/> SI	<input type="checkbox"/> RI	<input type="checkbox"/> FS	<input type="checkbox"/> RD
<input type="checkbox"/> RA-C	<input type="checkbox"/> RIP	<input type="checkbox"/> RA-O	<input type="checkbox"/> RC	<input type="checkbox"/> LTM

**Media Evaluated (check all that apply):**

<input type="checkbox"/> Groundwater	<input type="checkbox"/> Sediment (human receptor)
<input type="checkbox"/> Surface soil	<input type="checkbox"/> Surface Water (ecological receptor)
<input type="checkbox"/> Sediment (ecological receptor)	<input type="checkbox"/> Surface Water (human receptor)

**MRS Summary:**

**MRS Description:** Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM (by type of munitions, if known) or munitions constituents (by type, if known) known or suspected to be present):

The Passage Key Air-to-Ground Gunnery Range is a small island at the mouth of Tampa Bay in Manatee County, Florida. The 37-acre island was used for practice dive bombing, skip bombing, and strafing from 1943 to 1945. The MRS consists of the island of Passage Key and the open water surrounding the island. Munitions used on the range include small arms, 100 lb general purpose bombs, 100 lb, photoflash bombs, 100 lbs practice bombs with signals and spotting charges, and practice rockets. Three 100-lb general purpose bombs and one 100-lb photoflash bomb were discovered on or near the island in 1998. The bombs were detonated by either the U.S. Air Force or U.S. Navy Explosive Ordnance Disposal. No MEC or MD was observed during the QR conducted in July 2007 for the SI Report.

**Description of Pathways for Human and Ecological Receptors:**

At the time of the SI field effort, the majority of Passage Key was completely inundated with water. Because of this, collection of sediment samples was not possible.

**Description of Receptors (Human and Ecological):**

The island is currently under the jurisdiction of the USFWS. Public access to the island is prohibited. However, the shallow area surrounding the island is a popular location for recreational boaters. Potential receptors include USFWS workers, site visitors or recreational users, and ecological receptors.

# Table 1

## EHE Module: Munitions Type Data Element Table

**DIRECTIONS:** Below are 11 classifications of munitions and their descriptions. Circle the score(s) that correspond with all munitions types known or suspected to be present at the MRS.

**Note:** The terms *practice munitions*, *small arms*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
<b>Sensitive</b>	<ul style="list-style-type: none"> <li>♦ All UXO that are considered likely to function upon any interaction with exposed persons [e.g., submunitions, 40mm high-explosive (HE) grenades, white phosphorus (WP) munitions, high-explosive antitank (HEAT) munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions].</li> <li>♦ All hand grenades containing energetic filler.</li> <li>♦ Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard.</li> </ul>	30
<b>High explosive (used or damaged)</b>	<ul style="list-style-type: none"> <li>♦ All UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive."</li> <li>♦ All DMM containing a high-explosive filler that have:                             <ul style="list-style-type: none"> <li>▪ Been damaged by burning or detonation</li> <li>▪ Deteriorated to the point of instability.</li> </ul> </li> </ul>	<u>25</u>
<b>Pyrotechnic (used or damaged)</b>	<ul style="list-style-type: none"> <li>♦ All UXO containing pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades).</li> <li>♦ All DMM containing pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades) that have:                             <ul style="list-style-type: none"> <li>▪ Been damaged by burning or detonation</li> <li>▪ Deteriorated to the point of instability.</li> </ul> </li> </ul>	<u>20</u>
<b>High explosive (unused)</b>	<ul style="list-style-type: none"> <li>♦ All DMM containing a high explosive filler that:                             <ul style="list-style-type: none"> <li>▪ Have not been damaged by burning or detonation</li> <li>▪ Are not deteriorated to the point of instability.</li> </ul> </li> </ul>	15
<b>Propellant</b>	<ul style="list-style-type: none"> <li>♦ All UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor).</li> <li>♦ All DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are:                             <ul style="list-style-type: none"> <li>▪ Damaged by burning or detonation</li> <li>▪ Deteriorated to the point of instability.</li> </ul> </li> </ul>	15
<b>Bulk secondary high explosives, pyrotechnics, or propellant</b>	<ul style="list-style-type: none"> <li>♦ All DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor), that are deteriorated.</li> <li>♦ Bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard.</li> </ul>	10
<b>Pyrotechnic (not used or damaged)</b>	<ul style="list-style-type: none"> <li>♦ All DMM containing a pyrotechnic fillers (i.e., red phosphorous), other than white phosphorous filler, that:                             <ul style="list-style-type: none"> <li>▪ Have not been damaged by burning or detonation</li> <li>▪ Are not deteriorated to the point of instability.</li> </ul> </li> </ul>	10
<b>Practice</b>	<ul style="list-style-type: none"> <li>♦ All UXO that are practice munitions that are not associated with a sensitive fuze.</li> <li>♦ All DMM that are practice munitions that are not associated with a sensitive fuze and that have not:                             <ul style="list-style-type: none"> <li>▪ Been damaged by burning or detonation</li> <li>▪ Deteriorated to the point of instability.</li> </ul> </li> </ul>	<u>5</u>
<b>Riot control</b>	<ul style="list-style-type: none"> <li>♦ All UXO or DMM containing a riot control agent filler (e.g., tear gas).</li> </ul>	3
<b>Small arms</b>	<ul style="list-style-type: none"> <li>♦ All used munitions or DMM that are categorized as small arms ammunition [Physical evidence or historical evidence that no other types of munitions (e.g., grenades, subcaliber training rockets, demolition charges) were used or are present on the MRS is required for selection of this category].</li> </ul>	2
<b>Evidence of no munitions</b>	<ul style="list-style-type: none"> <li>♦ Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present.</li> </ul>	0
<b>MUNITIONS TYPE</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<u>25</u>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Munitions Type* classifications in the space provided.

Historical evidence indicates that ordnance used on this range included general small arms, 100 lb general purpose bomb, 100 lbs; photoflash bomb, 100 lbs; miniature practice bombs with signal, 100 lb practice bombs, with spotting charges, and 2.25-inch, practice rockets. (2007 SI Report Subchapter 2.5 )

**Table 2****EHE Module: Source of Hazard Data Element Table**

**DIRECTIONS:** Below are 11 classifications describing sources of explosive hazards. Circle the score(s) that correspond with all sources of explosive hazards known or suspected to be present at the MRS.

**Note:** The terms *former range*, *practice munitions*, *small arms*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Former range	The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include: impact or target areas, associated buffer and safety zones, firing points, and live-fire maneuver areas.	<u>10</u>
Former munitions treatment (i.e., OB/OD) unit	The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal.	8
Former practice munitions range	The MRS is a former military range on which only practice munitions without sensitive fuzes were used.	6
Former maneuver area	The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category.	5
Former burial pit or other disposal area	The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment.	5
Former industrial operating facilities	The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility.	4
Former firing points	The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range.	4
Former missile or air defense artillery emplacements	The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range.	2
Former storage or transfer points	The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system).	2
Former small arms range	The MRS is a former military range where only small arms ammunition was used [There must be evidence that no other types of munitions (e.g., grenades) were used or are present to place an MRS into this category.].	1
Evidence of no munitions	Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present.	0
<b>SOURCE OF HAZARD</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	<b>10</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Source of Hazard* classifications in the space provided.

The area was used as a ground strafing and dive bombing range from 1943 to 1945.(2007 SI Report Subchapter 4.2)

**Table 3**  
**EHE Module: Location of Munitions Data Element Table**

**DIRECTIONS:** Below are eight classifications of munitions locations and their descriptions. Circle the score(s) that correspond with all locations where munitions are located or suspected of being found at the MRS.

**Note:** The terms *surface*, *subsurface*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
<b>Confirmed surface</b>	Physical evidence indicates that there are UXO or DMM on the surface of the MRS Historical evidence (e.g., a confirmed incident report or accident report) indicates there are UXO or DMM on the surface of the MRS.	<u>25</u>
<b>Confirmed subsurface, active</b>	Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost, heat heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost, heat heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM.	<u>20</u>
<b>Confirmed subsurface, stable</b>	Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed.	15
<b>Suspected (physical evidence)</b>	There is physical evidence (e.g., munitions debris, such fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS.	10
<b>Suspected (historical evidence)</b>	There is historical evidence indicating that UXO or DMM may be present at the MRS.	<u>5</u>
<b>Subsurface, physical constraint</b>	There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM.	2
<b>Small arms (regardless of location)</b>	The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability [There must be evidence that no other types of munitions (e.g., grenades) were used or are present at the MRS to place an MRS into this category.].	1
<b>Evidence of no munitions</b>	Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present.	0
<b>LOCATION OF MUNITIONS</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 25).	<b>25</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Location of Munitions* classifications in the space provided.

According to the ASR, four ordnance items were discovered on or around the island in 1998. Three of the items were 100-lb general purpose bombs, and one of the items was a photoflash bomb. No MEC or MD was observed during the QR conducted for the 2007 SI Report. There is a potential for MEC to be exposed by erosion from tidal forces. (2007 SI Report Subchapters 4.2 and 6.1.22)

**Table 4****EHE Module: Ease of Access Data Element Table**

**DIRECTIONS:** Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to any explosive material. Circle the score that corresponds with the ease of access to the MRS.

**Note:** The term *barrier* is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	<ul style="list-style-type: none"> <li>There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible).</li> </ul>	10
Barrier to MRS access is incomplete	<ul style="list-style-type: none"> <li>There is a barrier preventing access to parts of the MRS, but not the entire MRS.</li> </ul>	8
Barrier to MRS access is complete but not monitored	<ul style="list-style-type: none"> <li>There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS.</li> </ul>	<u>5</u>
Barrier to MRS access is complete and monitored	<ul style="list-style-type: none"> <li>There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS.</li> </ul>	0
<b>EASE OF ACCESS</b>	<b>DIRECTIONS:</b> Record <b>the single highest score</b> from above in the box to the right (maximum score = 10).	<b>5</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the **Ease of Access** classification in the space provided.

The Air-to-Ground Gunnery Range MRS is completely surrounded by the Gulf of Mexico and can only be accessed by boat. (2007 SI Report, Subchapter 2.2.6)

**Table 5**  
**EHE Module: Status of Property Data Element Table**

**DIRECTIONS:** Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
<b>Non-DoD control</b>	The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies.	<u>5</u>
<b>Scheduled for transfer from DoD control</b>	The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the rule is applied.	3
<b>DoD control</b>	The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year.	0
<b>STATUS OF PROPERTY</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<b>5</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Status of Property* classification in the space provided.

The Passage Key Air-to-Ground Gunnery Range site is owned by the Department of the Interior and is operated by the U.S. Fish and Wildlife Service. (2007 SI Report, Subchapter 2.2.6).

**Table 6**

**EHE Module: Population Density Data Element Table**

**DIRECTIONS:** Below are three classifications of population density and their descriptions. Determine the population density per square mile in the vicinity of the MRS and circle the score that corresponds with the associated population density.

**Note:** If an MRS is located in more than one county, use the largest population density value among the counties. If the MRS is within or borders a city or town, use the population density for the city or town, rather than that of the county.

Classification	Description	Score
> 500 persons per square mile	<ul style="list-style-type: none"> <li>There are more than 500 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.</li> </ul>	5
100–500 persons per square mile	<ul style="list-style-type: none"> <li>There are 100 to 500 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.</li> </ul>	<u>3</u>
< 100 persons per square mile	<ul style="list-style-type: none"> <li>There are fewer than 100 persons per square mile in the county in which the MRS is located, based on U.S. Census Bureau data.</li> </ul>	1
<b>POPULATION DENSITY</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<b>3</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Population Density* classification in the space provided.

The population density of Manatee County, Florida is 356.3 persons per square mile. (2007 SI Subchapter 2.2.5)

Table 7

## EHE Module: Population Near Hazard Data Element Table

**DIRECTIONS:** Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the population near the hazard. Determine the number of inhabited structures within two miles of the MRS boundary and circle the score that corresponds with the associated population near the known or suspected hazard.

**Note:** The term *inhabited structures* is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	♦ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	<u>5</u>
16 to 25 inhabited structures	♦ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	♦ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	3
6 to 10 inhabited structures	♦ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	♦ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	♦ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
<b>POPULATION NEAR HAZARD</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<b>5</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Population Near Hazard* classification in the space provided.

There are no inhabited structures located at the Passage Key Air-to-Ground Gunnery Range site. Anna Maria Island, located approximately one mile south of the Passage Key, is mostly developed with commercial and residential property.(2007 SI Report, Subchapter 2.2.5).

**Table 8**

**EHE Module: Types of Activities/Structures Data Element Table**

**DIRECTIONS:** Below are five classifications of activities and/or inhabited structures near the hazard and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the score(s) that correspond with all the activities/structure classifications at the MRS.

**Note:** The term *inhabited structure* is defined in Appendix C of the Primer.

Classification	Description	Score
<b>Residential, educational, commercial, or subsistence</b>	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering.</li> </ul>	<b><u>5</u></b>
<b>Parks and recreational areas</b>	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses.</li> </ul>	<b><u>4</u></b>
<b>Agricultural, forestry</b>	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry.</li> </ul>	3
<b>Industrial or warehousing</b>	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing.</li> </ul>	2
<b>No known or recurring activities</b>	<ul style="list-style-type: none"> <li>There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary.</li> </ul>	1
<b>TYPES OF ACTIVITIES/STRUCTURES</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<b><u>5</u></b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Types of Activities/Structures* classifications in the space provided.

The site is operated as a national wildlife refuge for migratory birds; however the island is currently too small to support migratory birds. Anna Maria Island, located approximately one mile south of the Passage Key, is mostly developed with commercial and residential property. (2007 SI Report, Subchapter 2.2.5 and 2.2.6).

**Table 9****EHE Module: Ecological and/or Cultural Resources Data Element Table**

**DIRECTIONS:** Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resource classifications at the MRS.

**Note:** The terms *ecological resources* and *cultural resources* are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	♦ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	♦ There are ecological resources present on the MRS.	<u>3</u>
Cultural resources present	♦ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	♦ There are no ecological resources or cultural resources present on the MRS.	0
<b>ECOLOGICAL AND/OR CULTURAL RESOURCES</b>	<b>DIRECTIONS:</b> Record <b>the single highest score</b> from above in the box to the right (maximum score = 5).	<b>3</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Ecological and/or Cultural Resources* classification in the space provided.

Ecological resources are present on the MRS. (2007 SI Report Subchapter 5.1.5)

There are no recorded archaeological or cultural areas within the Passage Key Air-to-Ground Gunnery Range. (2007 SI Report Subchapter 3.3.2)

# Table 10

## Determining the EHE Module Rating

Source      Score      Value

### DIRECTIONS:

1. From Tables 1–9, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **EHE Module Total** box below.
4. Circle the appropriate range for the **EHE Module Total** below.
5. Circle the **EHE Module Rating** that corresponds to the range selected and record this value in the **EHE Module Rating** box found at the bottom of the table.

### Note:

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

Explosive Hazard Factor Data Elements			
Munitions Type	Table 1	25	35
Source of Hazard	Table 2	10	
Accessibility Factor Data Elements			
Location of Munitions	Table 3	25	35
Ease of Access	Table 4	5	
Status of Property	Table 5	5	
Receptor Factor Data Elements			
Population Density	Table 6	3	16
Population Near Hazard	Table 7	5	
Types of Activities/ Structures	Table 8	5	
Ecological and /or Cultural Resources	Table 9	3	
<b>EHE MODULE TOTAL</b>			<b>86</b>
EHE Module Total		EHE Module Rating	
92 to 100		A	
82 to 91		<b>B</b>	
71 to 81		C	
60 to 70		D	
48 to 59		E	
38 to 47		F	
less than 38		G	
Alternative Module Ratings	Evaluation Pending		
	No Longer Required		
	No Known or Suspected Explosive Hazard		
<b>EHE MODULE RATING</b>		<b>B</b>	

**Table 11**  
**CHE Module: CWM Configuration Data Element Table**

**DIRECTIONS:** Below are seven classifications of CWM configuration and their descriptions. Circle the score(s) that correspond to all CWM configurations known or suspected to be present at the MRS.

**Note:** The terms *CWM/UXO*, *CWM/DMM*, *physical evidence*, and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
<b>CWM, explosive configuration either UXO or damaged DMM</b>	The CWM known or suspected of being present at the MRS is: <ul style="list-style-type: none"> <li>Explosively configured CWM that are UXO (i.e., CWM/UXO).</li> <li>Explosively configured CWM that are DMM (i.e., CWM/DMM) that have been damaged.</li> </ul>	30
<b>CWM mixed with UXO</b>	<ul style="list-style-type: none"> <li>The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged, or nonexplosively configured CWM/DMM, or CWM not configured as a munition, that are commingled with conventional munitions that are UXO.</li> </ul>	25
<b>CWM, explosive configuration that are undamaged DMM</b>	<ul style="list-style-type: none"> <li>The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged.</li> </ul>	20
<b>CWM, not explosively configured or CWM, bulk container</b>	The CWM known or suspected of being present at the MRS is: <ul style="list-style-type: none"> <li>Nonexplosively configured CWM/DMM.</li> <li>Bulk CWM/DMM (e.g., ton container).</li> </ul>	15
<b>CAIS K941 and CAIS K942</b>	<ul style="list-style-type: none"> <li>The CWM/DMM known or suspected of being present at the MRS is CAIS K941-toxic gas set M-1 or CAIS K942-toxic gas set M-2/E11.</li> </ul>	12
<b>CAIS (chemical agent identification sets)</b>	<ul style="list-style-type: none"> <li>Only CAIS, other than CAIS K941 and K942, are known or suspected of being present at the MRS.</li> </ul>	10
<b>Evidence of no CWM</b>	<ul style="list-style-type: none"> <li>Following investigation, the physical evidence indicates that CWM are not present at the MRS, or the historical evidence indicates that CWM are not present at the MRS.</li> </ul>	<b>0</b>
<b>CWM CONFIGURATION</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<b>0</b>

**DIRECTIONS:** Document any MRS-specific data used in selecting the **CWM Configuration** classifications in the space provided.

- There is no indication of any CWM at this site in any historical materials or from the Site Investigation. (2007 SI Report Subchapters 2.5 and 4.2) Tables 12 through 19 have been omitted.

**Table 20**  
**Determining the CHE Module Rating**

Source      Score      Value

**DIRECTIONS:**

1. From Tables 11–19, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **CHE Module Total** box below.
4. Circle the appropriate range for the **CHE Module Total** below.
5. Circle the **CHE Module Rating** that corresponds to the range selected and record this value in the **CHE Module Rating** box found at the bottom of the table.

**Note:**

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

<b>CWM Hazard Factor Data Elements</b>			
CWM Configuration	Table 11	0	0
Sources of CWM	Table 12	0	
<b>Accessibility Factor Data Elements</b>			
Location of CWM	Table 13	0	0
Ease of Access	Table 14	0	
Status of Property	Table 15	0	
<b>Receptor Factor Data Elements</b>			
Population Density	Table 16	0	0
Population Near Hazard	Table 17	0	
Types of Activities/ Structures	Table 18	0	
Ecological and /or Cultural Resources	Table 19	0	
<b>CHE MODULE TOTAL</b>			0
<b>CHE Module Total</b>		<b>CHE Module Rating</b>	
92 to 100		A	
82 to 91		B	
71 to 81		C	
60 to 70		D	
48 to 59		E	
38 to 47		F	
less than 38		G	
Alternative Module Ratings	Evaluation Pending		
	No Longer Required		
	<b>No Known or Suspected CWM Hazard</b>		
<b>CHE MODULE RATING</b>	<b>No Known or Suspected CWM Hazard</b>		

# Table 21

## HHE Module: Groundwater Data Element Table

### Contaminant Hazard Factor (CHF)

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the MRS's groundwater and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard present in the groundwater, select the box at the bottom of the table.

**Note:** Use dissolved, rather than total, metals analyses when both are available.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum The Ratios</b>	
CHF > 100	<b>H (High)</b>		
100 > CHF > 2	<b>M (Medium)</b>		
2 > CHF	<b>L (Low)</b>		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
<b>Migratory Pathway Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the groundwater migratory pathway at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the groundwater is present at, moving toward, or has moved to a point of exposure.		H
<b>Potential</b>	Contamination in groundwater has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.		M
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the groundwater to a potential point of exposure (possibly due to geological structures or physical controls).		L
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		L
<b>Receptor Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the groundwater receptors at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Identified</b>	There is a threatened water supply well downgradient of the source and the groundwater is a current source of drinking water or source of water for other beneficial uses such as irrigation/agriculture (equivalent to Class I or IIA aquifer).		H
<b>Potential</b>	There is no threatened water supply well downgradient of the source and the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture (equivalent to Class I, IIA, or IIB aquifer).		M
<b>Limited</b>	There is no potentially threatened water supply well downgradient of the source and the groundwater is not considered a potential source of drinking water and is of limited beneficial use (equivalent to Class IIIA or IIIB aquifer, or where perched aquifer exists only).		L
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		H
No Known or Suspected Groundwater MC Hazard			<input checked="" type="checkbox"/>

No groundwater samples were collected at the MRS as part of this SI. If there were releases of MC to soil as a result of the munitions-related activities, it is unlikely that the constituents would migrate to groundwater at the site. (2007 SI Report, Subchapter 5.2.2)

Table 22

**HHE Module: Surface Water – Human Endpoint Data Element Table**  
**Contaminant Hazard Factor (CHF)**

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the MRS's surface water and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for human endpoints present in the surface water, select the box at the bottom of the table.

**Note:** Use dissolved, rather than total, metals analyses when both are available.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum The Ratios</b>	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
<b>Migratory Pathway Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.			
<b>Classification</b>	<b>Description</b>	<b>Value</b>	
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H	
<b>Potential</b>	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M	
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L	
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
<b>Receptor Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the surface water receptors at the MRS.			
<b>Classification</b>	<b>Description</b>	<b>Value</b>	
<b>Identified</b>	Identified receptors have access to surface water to which contamination has moved or can move.	H	
<b>Potential</b>	Potential for receptors to have access to surface water to which contamination has moved or can move.	M	
<b>Limited</b>	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L	
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
No Known or Suspected Surface Water (Human Endpoint) MC Hazard			<input checked="" type="checkbox"/>

Surface water contamination is not anticipated as the Air-to-Ground Gunnery Range MRS is now completely in the Gulf of Mexico. (2007 SI Report, Subchapter 5.2.2.7)

## Table 23

### HHE Module: Sediment – Human Endpoint Data Element Table

#### Contaminant Hazard Factor (CHF)

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the site's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for human endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum The Ratios</b>	
CHF > 100	H (High)		
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
<b>Migratory Pathway Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.		H
<b>Potential</b>	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.		M
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).		L
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
<b>Receptor Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the sediment receptors at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Identified</b>	Identified receptors have access to sediment to which contamination has moved or can move.		H
<b>Potential</b>	Potential for receptors to have access to sediment to which contamination has moved or can move.		M
<b>Limited</b>	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.		L
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
No Known or Suspected Sediment (Human Endpoint) MC Hazard			<input checked="" type="checkbox"/>

No sediment samples were collected from the Air-to-Ground Gunnery Range MRS. Human health risk from MC is not expected due to the constant shifting to sediment at the Air-to-Ground Gunnery Range MRS. (2007 SI Report, Subchapter 6.2.4.1).

**Table 24**

**HHE Module: Surface Water – Ecological Endpoint Data Element Table**

**Contaminant Hazard Factor (CHF)**

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the MRS's surface water and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for ecological endpoints present in the surface water, select the box at the bottom of the table.

**Note:** Use dissolved, rather than total, metals analyses when both are available.

Contaminant	Maximum Concentration (µg/L)	Comparison Value (µg/L)	Ratios
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum the Ratios</b>	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <b>the CHF Value</b> from above in the box to the right (maximum value = H).		

**Migratory Pathway Factor**

**DIRECTIONS:** Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.

Classification	Description	Value
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.	H
<b>Potential</b>	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <b>the single highest value</b> from above in the box to the right (maximum value = H).	

**Receptor Factor**

**DIRECTIONS:** Circle the value that corresponds most closely to the surface water receptors at the MRS.

Classification	Description	Value
<b>Identified</b>	Identified receptors have access to surface water to which contamination has moved or can move.	H
<b>Potential</b>	Potential for receptors to have access to surface water to which contamination has moved or can move.	M
<b>Limited</b>	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.	L
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <b>the single highest value</b> from above in the box to the right (maximum value = H).	

No Known or Suspected Surface Water (Ecological Endpoint) MC Hazard

Surface water contamination is not anticipated as the Air-to-Ground Gunnery Range MRS is now completely in the Gulf of Mexico. (2007 SI Report, Subchapter 5.2.2.7).

**Table 25**

**HHE Module: Sediment – Ecological Endpoint Data Element Table**

**Contaminant Hazard Factor (CHF)**

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the MRS's sediment and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard for ecological endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratios
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum the Ratios</b>	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
<b>Migratory Pathway Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.		H
<b>Potential</b>	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.		M
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).		L
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
<b>Receptor Factor</b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the sediment receptors at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Identified</b>	Identified receptors have access to sediment to which contamination has moved or can move.		H
<b>Potential</b>	Potential for receptors to have access to sediment to which contamination has moved or can move.		M
<b>Limited</b>	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.		L
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
No Known or Suspected Sediment (Ecological Endpoint) MC Hazard			<input checked="" type="checkbox"/>

No sediment samples were collected from the Air-to-Ground Gunnery Range MRS. Human health risk from MC is not expected due to the constant shifting to sediment at the Air-to-Ground Gunnery Range MRS. (2007 SI Report, Subchapter 6.2.4.1).

## Table 26

### HHE Module: Surface Soil Data Element Table

#### Contaminant Hazard Factor (CHF)

**DIRECTIONS:** Record the **maximum concentrations** of all contaminants in the MRS's surface soil and their **comparison values** (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the **ratios** for each contaminant by dividing the **maximum concentration** by the **comparison value**. Determine the **CHF** by adding the **ratios** for each medium together, including additional contaminants recorded on Table 27. Based on the **CHF**, use the **CHF Scale** to determine and record the **CHF Value**. If there is no known or suspected MC hazard present in the surface soil, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratio
<b>CHF Scale</b>	<b>CHF Value</b>	<b>Sum the Ratios</b>	
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
<b>CONTAMINANT HAZARD FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).		
<b><u>Migratory Pathway Factor</u></b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Evident</b>	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.		H
<b>Potential</b>	Contamination in surface soil has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.		M
<b>Confined</b>	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to presence of geological structures or physical controls).		L
<b>MIGRATORY PATHWAY FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
<b><u>Receptor Factor</u></b>			
<b>DIRECTIONS:</b> Circle the value that corresponds most closely to the surface soil receptors at the MRS.			
<b>Classification</b>	<b>Description</b>		<b>Value</b>
<b>Identified</b>	Identified receptors have access to surface soil to which contamination has moved or can move.		H
<b>Potential</b>	Potential for receptors to have access to surface soil to which contamination has moved or can move.		M
<b>Limited</b>	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.		L
<b>RECEPTOR FACTOR</b>	<b>DIRECTIONS:</b> Record <u>the single highest value</u> from above in the box to the right (maximum value = H).		
No Known or Suspected Surface Soil MC Hazard			<input checked="" type="checkbox"/>

Due to the constant shifting of the shallow barrier island, the presence of MC would be difficult to find except in isolated areas where MEC could be found. (2007 SI Report, Subchapter 5.2.3)



**Table 28**

**Determining the HHE Module Rating**

**DIRECTIONS:**

1. Record the letter values (H, M, L) for the **Contaminant Hazard, Migration Pathway, and Receptor Factors** for the media (from Tables 21–26) in the corresponding boxes below.
2. Record the media's three-letter combinations in the **Three-Letter Combination** boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
3. Using the reference provided below, determine each media's rating (A–G) and record the letter in the corresponding **Media Rating** box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)					
Surface Water/Human Endpoint (Table 22)					
Sediment/Human Endpoint (Table 23)					
Surface Water/Ecological Endpoint (Table 24)					
Sediment/Ecological Endpoint (Table 25)					
Surface Soil (Table 26)					

**DIRECTIONS (cont.):**

4. Select the single highest Media Rating (A is highest; G is lowest) and enter the letter in the **HHE Module Rating** box below.

**Note:**

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

**HHE MODULE RATING**

**HHE Ratings (for reference only)**

Combination	Rating
HHH	A
HHM	B
HHL	C
HMM	
HML	D
MMM	
HLL	E
MML	
MLL	F
LLL	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	<b>No Known or Suspected MC Hazard</b>

**Table 29**  
**MRS Priority**

**DIRECTIONS:** In the chart below, circle the letter **rating** for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical **priority** for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS priority is the single highest priority; record this number in the **MRS or Alternative Priority** box at the bottom of the table.

**Note:** An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating		Priority		CHE Rating		Priority		HHE Rating		Priority	
				A		1					
A		2		B		2		A		2	
<b>B</b>		<b>3</b>		C		3		B		3	
C		4		D		4		C		4	
D		5		E		5		D		5	
E		6		F		6		E		6	
F		7		G		7		F		7	
G		8						G		8	
Evaluation Pending				Evaluation Pending				Evaluation Pending			
No Longer Required				No Longer Required				No Longer Required			
No Known or Suspected Explosive Hazard				<b>No Known or Suspected CWM Hazard</b>				<b>No Known or Suspected MC Hazard</b>			
<b>MRS or ALTERNATIVE PRIORITY</b>								<b>3</b>			

**APPENDIX L**  
**Reference Copies**



# Water Well Report<sup>TM</sup>

August 31, 2007

## CLIENT

**PARSONS, INC.-NORCROSS**  
5390 Triangle Pkwy, Suite 100  
Norcross, GA 30092

## SITE

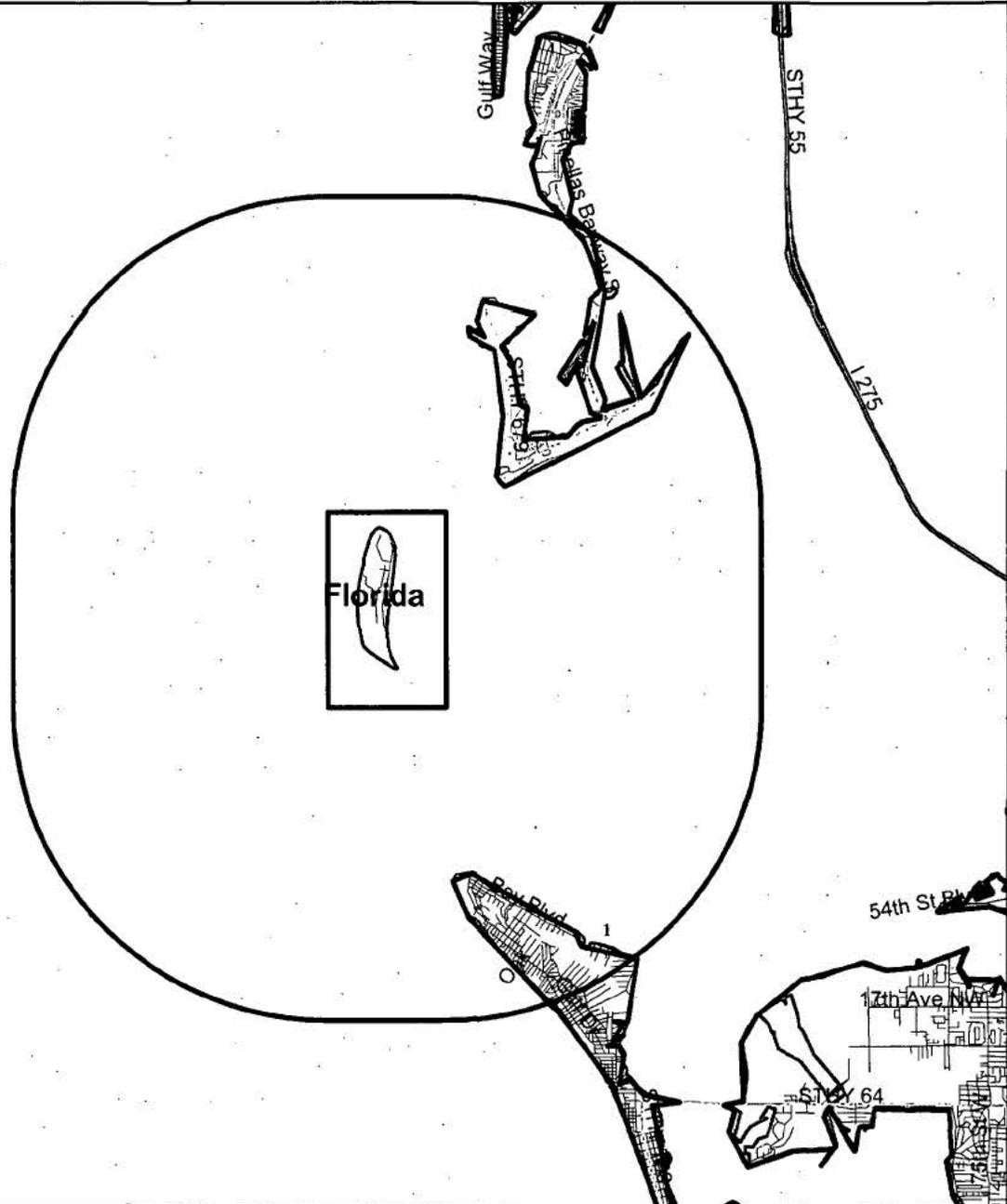
**Passage Key Air-to-Ground Base**  
Manatee County, Florida  
744647-43000  
083107-112

P.O. Box 12851, Capitol Station, Austin, TX 78711  
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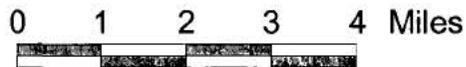


# Water Well Report™

## Map of Wells within Four Miles



- Subject Site
- Ground Water Wells (Cluster)
- Ground Water Well
- Airport
- Hospital
- Highway
- Primary road
- Secondary and connecting road
- Local road
- Access road
- Water body
- Park
- State



Banks Environmental Data, Inc.  
 P.O. Box 12851, Capitol Station Austin, Texas 78711  
 512-478-0059 FAX 512-478-1433 E Mail: BANKS@BANKSINFO.COM  
 August 31, 2007

BANKSID	STATEID	NAME	PROPUSE	COMPLETED	TOTDEPTH	X	Y	ORDLABEL
54772	3	KEY ROYALE CLUB INC	EXISTING		450	-82.71437	27.52426	1



## **Water Well Report™ Research Mapping Protocol**

**Banks Environmental Data, Inc. Water Well Report™ is prepared from existing state water well databases and additional file data/records research conducted at the Southwest Florida Water Management District located in Brooksville, Florida. With this information, groundwater wells are geocoded/geoplotted according to the latitude/longitude of the well using a GIS application, ArcView 3.2.**

**Banks Environmental Data, Inc. has performed a thorough and diligent search of all groundwater well information provided and recorded with the Southwest Florida Water Management District. All mapped locations are based on information obtained from the SWFWMD. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Environmental Data, Inc. cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the Florida regulatory authorities.**