FINAL TECHNICAL PROJECT PLANNING MEMORANDUM AND ASSOCIATED DOCUMENTATION

In Support of

Remedial Investigation/Feasibility Study

Project Site:

Former Conway Bombing and Gunnery Range Horry County, South Carolina

U.S. Army Corps of Engineers

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

Prepared by: HydroGeoLogic, Inc.
5030 Bradford Drive, Building 1, Suite 230
Huntsville, Alabama 35805

Contract No. W912DY-10-D-0023
Task Order No. 0018

October 2014

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LIST OF ACRONYMS AND ABBREVIATIONS

AAB	Army Air Base
AAF	Army Air Field
ASR	Archive Search Report
BIP	blow-in-place
CA	Cost Analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
COR	Contract Officer Representative
CRP	Community Relations Plan
CSM	Conceptual Site Model
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Programs
DD	Decision Document
DGM	digital geophysical mapping
DID	Data Item Descriptions
DMM	discarded military munitions
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
ESP	Explosives Site Plan
FS	Feasibility Study
FUDS	Formerly Used Defense Site
GIS	Geographical Information System
GSV	Geophysical System Verification
HE	High Explosives
HGL	HydroGeoLogic, Inc.
IAW	In Accordance With
IGD	Interim Guidance Documents
ISM	incremental sampling method
ISO	industry standard objects
IVS	instrument verification strip

MC	munitions constituents
MD	munitions debris
MDAS	Material documented as safe
MEC	munitions and explosives of concern
MG	Machine Gun
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NDAI	No Department of Defense Action Indicated
PM	Project Manager
PMP	Project Management Plan
POC	Point of Contact
PP	Proposed Plan
PWS	Performance Work Statement
QA	Quality Assurance
QASP	Quality Assurance Surveillance Plan
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RI	Remedial Investigation
RPM	Remedial Project Manager
RR	Rifle Range
RTS	Robotic Total Station
SAA	Small arms ammunition
SCDHEC	South Carolina Department of Health and Environmental Control
TCRA	time critical removal action
TO	Task Order
TP	Technical Paper
TPP	Technical Project Planning
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
USAESCH	U.S Army Engineering and Support Center, Huntsville
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
VSP	Visual Sampling Plan
WERS	Worldwide Environmental Remediation Services
WP	Work Plan

FINAL TECHNICAL PROJECT PLANNING MEMORANDUM AND ASSOCIATED DOCUMENTATION

1.1 INTRODUCTION

This document provides a record of Technical Project Planning (TPP) for four munitions response sites (MRS) within the Former Conway Bombing and Gunnery Range (BGR), Horry County, South Carolina. The meeting occurred November 21, 2013 at the Courtyard Myrtle Beach, in Myrtle Beach, South Carolina. This TPP meeting was held to familiarize the TPP team with the site background and the proposed Technical Approach, and ultimately, facilitate planning of the Remedial Investigation/Feasibility Study (RI/FS) at the Former Conway BGR. The meeting was attended by the Project Team members listed in Table 1.1. Attendees were presented with an Advance Summary that included HGL's initial RI/FS Technical Approach for purposes of discussion with stakeholders. The TPP Team discussed the initial Technical Approach for implementation of the RI/FS at the four MRSs. The Technical Approach will be further detailed in the forthcoming Draft RI/FS Work Plan. The Draft Work Plan will be submitted to the TPP Team members for review to ensure that the key aspects of the TPP Meeting resolutions are fully captured. The list of key contacts is provided in Section 2. The sign-in sheet for the meeting is provided in Section 3. The details of the TPP meeting incorporated into this TPP Memorandum are also provided in the Conceptual Site Model (CSM), Data Quality Objectives (DQO), TPP Worksheets, and figures provided in Section 4. The TPP Meeting presentation slides are provided in Section 5. The SCDHEC review of the Advance Summary is provided in Section 6.

Table 1.1 Technical Project Planning Participants

Shawn Boone U.S. Army Corps of Engineers (USACE) Charleston District Project Manager	Julie Hiscox USACE Savannah District FUDS Program Manager
Chris Cochrane U.S Army Engineering and Support Center, Huntsville (USAESCH) Contracting Officer's Representative	Kelly Longberg USACE Technical Manager
Debra Edwards USAESCH Geophysicist	Susan Byrd South Carolina Department of Health and Environmental Control SCDHEC Project Manager
Kimberly Vaughn HGL Project Manager	Neil Feist HGL MMRP Operations Manager

1.1 SITE HISTORY

The area that became the former Conway BGR was used for timber harvest and farming prior to 1940. From June 1940 to December 1941, the Army Air Corps conducted aerial photographing and charting and in 1941 support operations for a bombing and gunnery range were set up. In March 1942, the Savannah Army Air Base (AAB) and the Myrtle Beach municipal airport became the Myrtle Beach General BGR (renamed Myrtle Beach Army Air Field [AAF] in November 1943). Myrtle Beach AAF consisted of a cantonment area in Myrtle Beach, air-to-ground gunnery ranges in the Myrtle Beach area, the bombing and gunnery range in the Conway area (Conway BGR), a bombing and gunnery range in the Georgetown area, and crash target boats at Murrells Inlets. Other airfields/bases may also have utilized Conway BGR, including Columbia AAB, Greenville AAB, Florence AAF, Morris Field and Charleston AAB. By 1948, the leases for the majority of the property had been terminated and land had been returned to private ownership.

The former Conway BGR historically consisted of 55,854 acres in Horry County, South Carolina, immediately southeast of Conway, South Carolina. There are nine MRSs included within Conway BGR; however, only four are being addressed by this TO. The four MRSs which are included in this TO scope of work are: MRS-R01, MRS-R02, MRS-R03, and MRS-R09. Figure 1 shows the regional location of the former Conway BGR and the location of the four subject MRSs.

1.2 TPP DISCUSSION TOPICS

In addition to the summary of TPP Team determinations included in Sections 2 through 6, the following issues and resolutions were identified and discussed:

- The TPP group reviewed the webmap "live" during the meeting to facilitate discussion of each MRS. The GIS-based webmap shows site boundaries, historical features and current site conditions. The webmap can be accessed by all stakeholders, similar to browsing an online map such as Google Maps. The webmap login instructions are:

  http://gis.hgl.com/conway
  username "HGL\giswebmap"
  password "Gwm2011" -- if using Internet Explorer.
  If using Firefox or Chrome, "HGL\" before username should be omitted.

  - An additional webmap has been created: http://gis.hgl.com/conway/roe/ for coordination of ROE status with CESAC. This webmap allows CESAC personnel to change the status (Yes, Refused, Pending) on individual parcels.

- Ms. Byrd asked a question about landowner involvement and whether landowners were included for purposes of the current meeting. Ms. Cochrane and Mr. Boone noted that the specific parcels are still being identified that will be included in the current project field activities. Separate meetings, such as public meetings, will be held to include landowners and county officials. The future TPP meetings, ROE negotiations, and

public meetings will be held both for public educational purposes and to facilitate negotiation of rights-of-entry.

- Ms. Byrd and Ms. Cochrane discussed the status of some third party removals that have been performed previously. Ms. Byrd had information for the group on other third-party removals that may have been performed and are not included in the site history (see Tables 4.2 through 4.5). For instance, the Presbyterian Church across from the Goodson property (a site visit stop) will probably have third-party removal actions performed. There was also privately funded work performed on a LandBank, LLC, owned parcel to the west and south of the church property, near the Goodson property. Marie Stephens (previously with Kestrel) and currently with Meridian Energy and Environment, Inc.is representing LandBank and the New Harmony Presbytery for the private party removal actions at MRS-02/Range III. Ms. Byrd noted there were also Tetra Tech reports for various phases from Phase 1 through possibly Phase 20 that Ms. Byrd may have as hard copy reports.
    - *Following the TPP Meeting, HGL contacted SCDHEC to request copies of the Tetra Tech reports, to ensure all existing data is captured in the project GIS. HGL will continue to coordinate obtaining these documents during the work plan development.*
- Ms. Byrd and Ms. Cochrane also discussed the DR Horton owned properties agreement with the HTC. DR Horton is anticipated to participate by granting ROE for this project. DR Horton is not pursuing a cost recovery. Ms. Byrd noted that the DR Horton lawyer has attended public meetings in the past, for example they attended the previous RI public meeting. Ms. Byrd noted for the group that DR Horton does provide public educational awareness materials to its residents.
- Ms. Vaughn asked to confirm that HGL currently has the most recent version of the project GIS. Ms. Cochrane stated that the final 2012 RI report GIS submittal may be available, and she will follow up. She believes that the GIS provided at the proposal stage is the most current.
- Ms. Byrd requested that the laboratory sampling approach ensure that the data is from a South Carolina certified laboratory. Ms. Vaughn stated that test America is the laboratory HGL intends to use. Ms. Byrd and Mr. Boone discussed that biased, discrete samples be used to characterize for metals instead of the incremental sampling method for metals evaluation. Any potential source areas will need sampling conducted by biased, discrete sampling of the soil. This approach has been used on other sites, Mr. Boone summarized, and will be appropriate for these MRSs.
- Mr. Boone noted that with the prevalence of golf courses on these four MRSs, it may be beneficial to conduct fieldwork during the winter. The coldest time of the year would be more reasonable for gaining access to the golf courses.
- Ms. Vaughn summarized that during the proposal site visit, Horry County landfill employees reported that there had been a prior MEC clearance. HGL will follow up with Horry County landfill personnel to try to evaluate the date conducted and who performed the removals.
    - *Following the TPP meeting, HGL contacted Horry County Solid Waste Authority, Deputy Director, Mr. Wayne Martin, to request additional*

information. Mr. Martin stated that during dredging/expansion of the pond performed by landfill personnel projectile casings and cartridges were recovered. He believes these were of military origin. He believes this was in the mid-1990s. He is unaware that any "live" munitions have been found in the past on landfill property. He is not aware of any removal actions performed by the government or a private contractor. He stated that there was also an archeologist survey performed by either a private firm or the federal government during the 1990s. HGL will continue to follow up with Mr. Martin during the work plan phase, to obtain copies of any relevant documents that may exist.

- Ms. Cochrane and Mr. Boone noted that rainfall will drastically affect performance of the field activities. Rainfall and the resulting water, is a seasonal occurrence, but is also affected by hurricanes, and can be hard to predict. Ms. Vaughn noted that HGL proposes to use shallow water (amphibious) methods to conduct geophysical survey operations. An ongoing evaluation of rainfall, and levels of standing water, will need to occur as field activities approach. HGL will need to remain flexible in the approach, to adapt to changing site conditions.

- Ms. Cochrane, Ms. Hiscox, and Ms. Byrd discussed the LandBank settlement. Ms. Byrd asked if the International Paper, LandBank, and Goodson properties were excluded or included in this project. Ms. Hiscox stated this depends on the terms of the settlement, and she or Ms. Cochrane will need to follow up to confirm. At the current time the Goodson property is excluded. The DR Horton settlement is different from the Goodson settlement in that the DR Horton settlement did not mean they could not participate in future clearances. The local homeowners associations have intrusive and nonintrusive deed restrictions for the common land areas. DR Horton obtained additional private party investigations and removals for a portion of land, referred to as the Farm, which was purchased from International paper. A settlement for cost recovery with the Federal Government was never reached for this portion of land. DHEC issued an agreement with DR Horton concerning the Farm which included regulatory oversight and land use controls. The LandBank settlement with the Federal Government is also complete. LandBank is currently negotiating with DHEC for regulatory oversight for their private party removal action. The wetlands portion of the LandBank property was excluded from the settlement and should be investigated as part of the RI at the Former Conway Bombing and Gunnery Range site or under another settlement agreement. The LandBank should be participating in investigations (by granting ROE) going forward.

- Mr. Boone and Ms. Vaughn discussed the right of entry support that HGL will provide. HGL has evaluated the current Horry County parcel data, and developed a list of transects to be completed. HGL will evaluate where transects cross a parcel by a small amount, so that extra parcels will not be included in ROE requests, when they do not provide a significant amount of data to meet project goals.

    - *HGL continued transect placement evaluation against current Horry County parcel data following the TPP meeting, adjustments continue to be made.*

- The format for public meetings was discussed. There are currently three public meetings anticipated, one in support of the proposed plan and the others to support right of entry negotiations. Mr. Boone asked if it were possible to hold public meetings at each MRSs, individually. In the past landowners have objected to attending public meetings where more sites are being discussed in a group, rather than the one site that is closest to their parcel. Ms. Cochrane and Ms. Vaughn stated that additional public

meetings can be discussed if the currently funded amount is not sufficient. Ms. Cochrane and Ms. Vaughn also discussed the recommended format for public meetings, as an open house. An open house forum at public meetings would allow unique topic stations to be set up to meet landowners concerns. If a dedicated discussion area is set up for each individual MRS, the landowner can go to the booth that interests them alone. An overview of the entire project can be presented at one booth. Other areas can be set up to summarize each individual MRS. HGL can provide staff at each booth to discuss landowners concerns specifically.

- The hunting seasons that are in effect near these MRSs were also discussed. HGL will include more information on the hunting seasons and any threatened or endangered species that may be present onsite, in the draft work plan.
- The site closeout statement was presented to the group for consideration: "To reduce the potential MEC and MC risk and ensure hunters, workers, residents, and farmers are aware of the risk of MEC. After completion of the Decision Document requirements the potential risk to human health and the environment from MEC or MC will be reduced to the extent practical."

Following the RI fieldwork, all results will be fully documented in an RI/FS Report for the TPP Team and other stakeholder review. The finalized RI/FS Technical Approach will not be modified without consultation and agreement by the TPP Team listed in Table 1.1.

2.0 LIST OF KEY CONTACTS

Key Contacts
Remedial Investigation/Feasibility Study
at the Former Conway Bombing and Gunnery Range

Name/Organization	Address	Telephone/Email
USAESCH Contracting Officer's Representative Chris Cochrane	USAESCH 4820 University Square Huntsville, AL 35816-1822	(o) 256-895-1696 (c) 256-990-0888 chris.cochrane@usace.army.mil
USAESCH Technical Manager Kelly Longberg	USAESCH 4820 University Square Huntsville, AL 35816-1822	(o) 256-895-1408 (c) 256-541-0907 kelly.d.longberg@usace.army.mil
USAESCH Geophysicist Debra Edwards	USAESCH 4820 University Square Huntsville, AL 35816-1822	(o) 256-895-1626 debra.l.edwards@usace.army.mil
USACE Savannah District FUDS Program Manager Julie Hiscox	USACE Savannah District 100 W. Oglethorpe Avenue Savannah, GA 31401-0889	(o) 912-652-5363 (c) 912-429-1474 julie.a.hiscox@usace.army.mil
~~USACE Charleston District Project Manager Shawn Boone~~	~~USACE Charleston District 69 A Hagood Avenue Charleston, SC 29403~~	~~(o) 843-329-8158 shawn.a.boone@usace.army.mil~~
Please note that following this TPP-1 Meeting, Mr. Ray Livermore has replaced Mr. Boone:		
U.S. Army of Corps of Engineers, Wilmington District Project Manager Ray Livermore	Attn: CESAW-TS-EG (Ray Livermore) 69 Darlington Avenue Wilmington, NC 28402-1890	910-251-4702 Raymond.R.Livermore@usace.army.mil
SCDHEC Land and Waste Management Division Project Manager Ms. Susan Byrd	SCDHEC Land and Waste Management Division 2600 Bull Street Columbia, SC 29201	(o) 803-898-0308 byrdks@dhec.sc.gov
Horry County Administrator's Office	Horry County Administrator's Office 1301 Second Avenue Conway, SC 29526	(o) 843-915-5020
HydroGeoLogic, Inc. Program Manager Timothy P. Hiles	HydroGeoLogic, Inc. 5030 Bradford Drive Building 1, Suite 230 Huntsville, AL 35805	(o) 256-970-2102 (c) 256-541-0944 thiles@hgl.com
HydroGeoLogic, Inc. Project Manager Kimberly Vaughn	HydroGeoLogic, Inc. 1403 Balmorhea Lane Round Rock, TX 78664	(o) 512-828-6684 (c) 512-658-6828 kvaughn@hgl.com
HydroGeoLogic, Inc. MMRP Operations Manager Neil Feist	HydroGeoLogic, Inc. 5030 Bradford Drive Building 1, Suite 230 Huntsville, AL 35805	(o) 256-970-2103 (c) 256-714-5808 nfeist@hgl.com

3.0 TPP MEETING ATTENDANCE SIGN IN SHEET

TPP-1 Meeting Sign-in Sheet

Thursday, November 21, 2013

Initial	Name	Role	Phone Numbers	E-Mail Address
	Shawn Boone	USACE Charleston District PM	843-329-8158	shawn.a.boone@usace.army.mil
JH	Julie Hiscox	USACE SAD FUDS Program Manager	912-652-5363 (o) 912-656-1183 (m)	julie.a.hiscox@usace.army.mil
	Chris Cochrane	USAESCH Contracting Officers Representative	256-895-1696 (o) 256-990-0888 (m)	chris.cochrane@usace.army.mil
	Kelly Longberg	USACE Technical Manager	256-895-1408	Kelly.d.longberg@usace.army.mil
	Debra Edwards	USAESCH Geophysicist	256-895-1626	Debra.L.Edwards@usace.army.mil
via teleco	Susan Byrd	SCDHEC Project Manager	803 898-0308	
	Kimberly Vaughn	HGL Project Manager	512-828-6684	kvaughn@hgl.com
	Neil Feist	HGL MMRP Operations Manager	256-970-2103	Nfeist@hgl.com

4.0 TECHNICAL APPROACH

4.1 INTRODUCTION

HydroGeoLogic, Inc. (HGL) is providing support for environmental remediation services to the U.S. Army Engineering and Support Center, Huntsville (USAESCH) under a firm fixed price performance-based TO under the Worldwide Environmental Remediation Services (WERS) Contract No. W912DY-10-D-0023, Task Order (TO) No. 0018. The remedial investigation (RI) / feasibility study (FS) at the Former Conway Bombing and Gunnery Range (BGR) munitions response sites (MRSs) is being implemented under the Military Munitions Response Program (MMRP), which was created by the FY02 National Defense Authorization Act by modifying the Defense Environmental Restoration Programs (DERP) to address munitions and explosives of concern (MEC) and munitions constituents (MC) contamination on inactive, non-operational military ranges.

The Conway BGR RI/FS will be conducted for four MRSs: MRS-R01 (former Range II), MRS-R02 (Range III), MRS-R03 (Range IV), and MRS-R09 (Machine Gun/Rifle Range). The objective of this RI/FS is to characterize the nature and extent of MEC and MC at these four MRS in compliance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended and Department of Defense (DoD), Army, and USACE regulations and guidance to include Interim Guidance Documents (IGDs) and Data Item Descriptions (DIDs). Under this TO, HGL will design and complete the RI, evaluate alternatives for each MRS and document the results in an FS, prepare a Proposed Plan (PP) that provides rationale for selection of the recommended alternative to the public, and submit a DD describing the decisions made by stakeholders and document acceptance of the selected remedy.

The primary goals of a CERCLA-based MMRP RI are:

i. To collect and analyze the data necessary to determine the nature and extent of MEC and MC contamination, and
ii. To conduct a baseline risk assessment to quantify risk and explosives safety concerns to human health and the environment.

The primary objective of an MMRP FS is to ensure that appropriate remedial alternatives are developed and evaluated and that an appropriate remedy is selected. For the MMRP, the FS is the mechanism in the remedial process for the development, screening, and detailed evaluation of alternative munitions response options that will result in timely and appropriate decisions for protecting human health, safety, and the environment. The accuracy and completeness of the RI characterization of the site conditions with respect to MEC and MC is critical to the evaluation of available technologies performed during the FS. The scope of work for the Conway BGR project also includes preparation of a PP and a DD for each MRS.

HGL has developed this technical approach based on the historical site-specific information provided by USAESCH, including prior Engineering Evaluation/Cost Analysis (EE/CA), MEC removal actions activities, and the prior RI/FS. HGL's proposed approach to the investigation is to perform a combination of instrument-assisted intrusive investigations

(referred to as mag-and-dig), instrument-assisted surface reconnaissance, and digital geophysical mapping (DGM) across select grids to characterize the nature, density, and extent of MEC at each MRS. Locations and spacing of transects and sampling grids is based upon statistical analysis performed with the Visual Sampling Plan (VSP) and UXO Estimator tools. MC sampling will be performed at applicable MRSs to augment existing environmental sampling data to fully characterize the nature and extent of MC in the RI in order to support the FS and follow-on DD. HGL understands that this technical approach for MEC investigations and MC sampling are subject to change during discussion and review as part of the TPP process. The following provides a summary of the proposed technical approach for the sites.

4.2 SITE DESCRIPTION AND HISTORY

The area that became the former Conway BGR was used for timber harvest and farming prior to 1940. From June 1940 to December 1941, the Army Air Corps conducted aerial photographing and charting and in 1941 support operations for a bombing and gunnery range were set up. In March 1942, the Savannah Army Air Base (AAB) and the Myrtle Beach municipal airport became the Myrtle Beach General BGR (renamed Myrtle Beach Army Air Field [AAF] in November 1943). Myrtle Beach AAF consisted of a cantonment area in Myrtle Beach, air to ground gunnery ranges in the Myrtle Beach area, the bombing and gunnery range in the Conway area (Conway BGR), a bombing and gunnery range in the Georgetown area, and crash target boats at Murrells Inlets. Other airfields/bases may also have utilized Conway BGR, including Columbia AAB, Greenville AAB, Florence AAF, Morris Field and Charleston AAB. By 1948, the leases for the majority of the property had been terminated and land had been returned to private ownership.

The former Conway BGR historically consisted of 55,854 acres in Horry County, South Carolina, immediately southeast of Conway, South Carolina. There are nine MRSs included within Conway BGR; however, only four are being addressed by this TO. The four MRSs which are included in this TO scope of work are: MRS-R01, MRS-R02, MRS-R03, and MRSR09. Figure 1 shows the regional location of the former Conway BGR and the location of the four subject MRSs.

4.3 DESCRIPTION OF EACH MRS AND PREVIOUS INVESTIGATIONS

4.3.1 MRS-R01, Range II

This site was identified in the EE/CA conducted previously (Parsons, 2003). Various historical investigations on some portions of the MRS have been conducted and are summarized in Table 4.1. Based on the information provided in the Archives Search Report (ASR) Supplement (USACE, 2004), the historical usage of MRS-R01, Range II, was practice bombing, including high- and medium-altitude bombing, skip bombing, parafrag bombing, and rocket firing.

4.3.2 MRS-R02, Range III

A time critical removal action (TCRA) was performed on 45 acres within this site and summarized in a TCRA Report (Parsons, 2002). Various MEC were identified during the TCRA. Additional historical investigations were conducted as summarized in Table 4.2. Based on information in the ASR Supplement (USACE, 2004), the historical usage of MRSR02, Range III, was high- and medium-altitude bombing, skip bombing, and rocket firing including demolition bombing, dive bombing, strafing, rocket firing, and incendiary bombing. Historical evidence at this MRS indicates that 100-pound practice bombs and 2.25-inch rockets were used.

4.3.3 MRS-R03, Range IV

This site was identified in the previously conducted EE/CA (Parsons, 2003). However, no further investigations have been performed at this MRS since that time (see Table 4.3). Based on the information in the ASR Supplement, the historical usage of MRS-R03, Range IV was for practice bombing, including medium-altitude bombing.

4.3.4 MRS-R09, Machine Gun / Rifle Range

This site was identified during the EE/CA (Parsons, 2003) and was included in the RI conducted by EODT (EODT, 2012). The presence of MEC has been confirmed at this site; however, not MC characterization has been conducted (Table 4.4). Historical documentation indicates that activities at the Machine Gun (MG) Range were limited to firing bomber turrets and MGs in a ground-mounted mode, and that those at the Rifle Range (RR) were limited to basic rifle marksmanship training.

4.4 TECHNICAL APPROACH

4.4.1 Technical Project Planning

The TPP-1 meeting was part of the TPP process and was conducted to facilitate discussion of questions and comments among the stakeholders. The objective of the TPP memorandum is to document stakeholder agreements and/or comments made during the meeting regarding data quality objectives (DQOs) established for the site. Following review and approval of the memorandum by the stakeholders, the Work Plan (and other associated plans) will be developed and submitted for review.

4.4.2 Right-of-Entry Negotiation

USACE will be responsible for obtaining ROE; with HGL support for development of maps and lists of relevant parcels and landowner contact information. HGL will maintain the ROE status tracking in the project geographical information system (GIS) and on the team webmap, for coordination with USACE.

Table 4.1
MRS-R01 (Range II) Previous Investigations

Investigation/Report	MRS-R01 (Range II)
2003 EE/CA, Parsons	Identified the potential presence of MEC in Area A, a 425-acre area established at the center of Range II. No risk identified in Area A-1 (a buffer around Area A). Recommended clearance to depth only at planned construction sites for the 425 acre Area A; recommended surface clearance elsewhere and institutional controls throughout. Munitions debris (MD) identified included: • 100-lb practice bomb • Small arms ammunition (SAA)
2005 Final Sampling Report (Removal Action), Area A and A-1, EODT	EODT performed a geophysical sampling subsurface investigation for Sun Star, LLC. The investigation covered 439 acres at the Wild Wing Plantation (including the Avocet, Wood Stork, and Hummingbird golf courses, as well as the clubhouse). No MEC were identified, however MD found included: • 100-lb practice bomb pieces (Wood Stork Hole #2) • 100-lb practice bomb (tail fin only) (Avocet Hole #4) • Bomb rack 20 lbs (Wood Stork Hole #5) • Expended .50-cal cartridge (Wood Stork Hole #15) • Bomb lugs (Wood Stork Hole #16) • Expended .50-cal cartridge (Avocet Hole #3) Recommended 70 acres for subsurface clearance.
July 2012 RI, EODT, Revision 1	Potential for MEC hazard determined “Unlikely”. Concluded no MC contamination present. Stated MEC not delineated. Recommends further investigation. No rights-of-entry granted.

Table 4.2
MRS-R02 (Range III) Previous Investigations

Investigation/Report	MRS-R02 (Range III)
2002 TCRA, Parsons	TCRA performed on 45-acres of Range III. MEC found included MK II 1.1-inch projectile, M38A2 100-lb sand-filled practice bombs, M48 practice 20-lb fragmentation bomb, practice 5" HVAR warhead, M69 6-lb incendiary bomb, fuzes, M16 fuze burster, M16 igniter, AN-M16 white phosphorus igniter, M57 250-lb general purpose bomb. MC sampling for cadmium.
2003 EE/CA, Parsons	Confirmed the presence of MEC only at Area B. Recommended clearance to depth and ICs for Area B. Recommended clearance to depth only at planned construction sites within buffer surrounding Area B (Area B-1); recommended surface clearance elsewhere along with ICs. MEC identified included: • 4-lb incendiary bombs MD identified included: • 2.25-inch rockets • 4-lb incendiary bombs • 20-lb fragmentation bombs • 100-lb practice bomb • SAA
2005, August, ERM Removal Report at Parcel 22b (within Area B-1)	ERM performed for International Paper Realty Company (property owner) Removal Action Report covering 231 acres in Range III. Geophysical survey – 100%.
2005 Removal Actions (Phase I, II, and III), Kestrel	Kestrel (with others) performed clearance covering 456 acres (Parcels A and B) in Range III. MEC contamination confirmed. No MC contamination identified. Soil sampling conducted for explosives.
2006 MC Sampling, Parsons	Soil and surface water sampling. No explosives detected. Metals detected (lead, zinc, cadmium, and mercury) only were related to MC potentially present.
2006 Phase I Ordnance Removal, TetraTech	Removal conducted for D.R. Horton on 114 acres immediately east of and outside the Area B-1 safety zone established during the EE/CA. MD found included: • 100-lb practice bomb • 5-inch ZUNI rocket warhead • 2.75-in rocket
2007, Site Specific Final Report, Kestrel	Removal conducted for Landbank, LLC, on 336 acres (Tracts 15, 16A, and 16B) within the buffer safety zone. DGM was conducted, wetlands (83 acres) excluded from removals. MEC contamination confirmed, and 221 unexploded ordnance (UXO) items reported destroyed. No MC contamination reported. Soil sampling conducted and analyzed for explosives, metals, and semi-volatiles.
July 2012 RI, EODT, Revision 1	MEC presence confirmed. Concluded no MC contamination present. Stated MEC was delineated. Recommends further investigation.

Table 4.3
MRS-R03 (Range IV) Previous Investigations

Investigation/Report	MRS-R03 (Range IV)
2003 EE/CA, Parsons	Identified the potential presence of MEC in both Area C and Area C-1. Recommended clearance to depth only at planned construction sites; surface clearance elsewhere for both. MD identified included: • 4-lb incendiary bombs • 20-lb fragmentation bombs • 100-lb practice bomb
July 2012 RI, EODT, Revision 1	Concluded that the possibility of MEC hazards is unknown, but unlikely. Concluded no MC contamination is present. Recommends further investigation.

Table 4.4
MRS-R09 (Machine Gun/Rifle Range) Previous Investigations

Investigation/Report	MRS-R09 (Machine Gun/Rifle Range)
2003 EE/CA, Parsons	No Department of Defense Action Indicated (NDAI) recommended for this MRS.
July 2012 RI, EODT, Revision 1	MEC presence confirmed. No MC characterization. Stated MEC was delineated. Recommends further investigation.

4.5 DATA QUALITY OBJECTIVES

4.5.1 Introduction for DQOs

To generate data that will meet the project objectives, it is necessary to define the types of decisions that will be made, identify the intended use of the data, and design the requisite data collection program in an effort to characterize the residual hazards/risk remaining at the project site. DQOs are statements defining the quality, quantity, and type of data required (e.g., geophysical), the manner in which data may be collected, and the acceptance criteria for those data, to provide an adequate database to support project decisions. DQO worksheets addressed during the TPP meeting and DQOs established during the TPP process are listed in Section4. As a summary of the DQO development conducted during the TPP process and to present the site-specific DQO statements developed for the site, Table 4.5 provides an overview of the DQOs. Table 4.5 also provides a cross walk for each DQO to the development steps from both the USEPA Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4, EPA/240/B-06/001, February 2006, and USACE Technical Project Planning Process, EM 200-1-2, 31 August 98. The data collected under the DQOs summarized in Table 4.5 will be continuously evaluated against the appropriate decision rule. The anticipated decision rules are included in Table 4.6. HGL will solicit project team

concurrence and input during evaluation of the RI data collected against the project DQOs and decision rules.

4.5.2 MPPEH Characterization DQOs

The purpose of the MPPEH DQOs is to evaluate the nature and extent of MPPEH contamination and determine if further response actions are required to support current and future residential, commercial, agricultural, and recreational land use. The MPPEH DQOs in this section cover explosively hazardous items: (1) MEC (including UXO; (2) DMM; and (3) explosively hazardous concentrations of MC. The MPPEH DQOs in this section also cover non-explosively hazardous items: MD.

A. State the Problem

- Previous investigations have determined the site is potentially contaminated with MPPEH. The lateral extent of MPPEH is unknown. The nature and lateral/vertical extent within the four MRSs requires definition.

B. Identify the Decision

- The MPPEH potentially present at the MRSs requires the investigations planned in this project. Will the nature and extent of MPPEH require future response actions? If so, where? What future response actions may be appropriate for the land use?

C. Identify Inputs to the Decision: The inputs to the decision are designed to answer the following questions: What is the distribution density of MPPEH? What type of MPPEH is present? What is the depth of the MPPEH? The inputs include:

- All historical data from prior investigations
- All data generated from the project field activities, including the current and future conceptual site model inputs, intrusive results, excavation results, geophysical surveys, and environmental sampling.
- Data collected may be limited by right-of-entry refusals, available detection technologies, etc.

D. Define Boundaries of Study

- The MRS-R01, MRS-R02, MRS-R03, and MRS-R09.

E. Develop a Decision Rule for MPPEH (see Table 4.6). The RI/FS field activities decision rules are listed in Table 4.6.

- Is the MPPEH material documented as explosive hazard (MDEH)/MEC or material documented as safe (MDAS)/MD? Depending upon the documented status (MDEH or MDAS), the below decision rules will apply:
  i. If MDEH, then does the MDEH or MEC (which may be either UXO, DMM, or MC) need to be blown-in-place (BIP)?

ii. If MDAS or MD, then does material need to be moved for stockpiling and/or recycling?

F. Specify Tolerable Limits of Decision Error

- Tolerable limits of decision error are the applicable accuracy requirements for the location and lateral extent of anticipated contamination areas to be located (reacquired) and intrusively investigated. All accuracy requirements for data to be obtained will be defined in the draft work plan.

G. Optimize the Design for confirming MPPEH presence

- RI/FS field activities will be conducted in accordance with the performance and data quality metrics that will be outline in the Quality Control Plan of the draft work plan, and in compliance with the performance work statement.

4.5.3 MC Contaminants DQOs

The purpose of the MC DQOs is to determine the nature and extent of potential contamination; verify any future response action for confirmed contamination will be adequate; and determine if further response actions are required to support current and future land use.

A. State the Problem

- Previous investigations have determined the site is potentially contaminated with MC contaminants. The nature and lateral/vertical extent of MC contaminants requires definition. If MC contaminants are present, it is not known whether concentrations could potentially pose an unacceptable risk to human or ecological receptors.

B. Identify the Decision

- Is there evidence of MC contamination within the MRSs (incremental sampling method sampling)?
- Based on results of sampling, determine whether concentrations in soil exceed screening levels and whether receptors could potentially be affected.
- What is the nature and extent of any MC contamination determined to be present?

C. Identify Inputs to the Decision. The inputs to the decision are designed to answer the following questions: Where is MC contamination, if present? What is the extent? What are the MC contaminant concentrations, if present? The inputs include:

- All historical data from prior investigations
- All data generated from the RI/FS field activities, including the current and future conceptual site model inputs, intrusive results, excavation results, geophysical surveys, and environmental sampling. These inputs will identify presence of MEC within the MRSs that potentially released MC contamination to the environment.
- Establish analytical methods for MC contaminants.

- Laboratory analytical data to determine MC contaminant concentrations through chemical analysis.
- Site-specific screening levels for MC contaminants. Identify background metal concentrations.
- Data collected may be limited by right-of-entry refusals, available detection technologies, etc.

D. Define Boundaries of Study

- The MRS-R01, MRS-R02, MRS-R03, and MRS-R09.
- Areas where MEC is discovered within the MRSs.
- Areas where evidence of MC contamination are observed.

E. Develop a Decision Rule for Soil (see Table 4.6). The RI/FS findings and appropriate Decision Rules for MC are listed in Table 4.6.

- If maximum concentrations of MC contaminants within a source area exceed screening levels and a complete contaminant pathway and receptor exist, the source area where MEC and/or MD item(s) were found will be delineated for MC contamination during these field activities.

F. Specify Tolerable Limits of Decision Error for Soil

- Tolerable limits of decision error will be specified in the draft work plan UFP-QAPP, based on method detection limits and quantitation limits for analytical methods.
- Constituent screening levels are based on USEPA regional screening levels (RSLs) where no established South Carolina levels exist. A discussion of screening levels and associated tables will be presented in the project-specific UFP-QAPP.

G. Optimize the Design for Collecting Soil Data

- Sample numbers and positions will be calculated to most efficiently investigate potential MC contamination at the MRSs.

Table 4.5, Site-Specific Data Quality Objectives Summary

DQO Criteria from USEPA [1]	Problem Statement / Problem Goals	Required Information Inputs			Input Boundaries	Analytical Approach	Performance Criteria	Plan for Obtaining Data	
DQO Criteria from USACE	**Project Objectives Satisfied**	**Data User Perspectives**	**Contaminant or Characteristic of Interest**	**Media of Interest**	**Required Locations or Areas**	**Number of Samples Required**	**Reference Concentration of Interest or Other Performance Criteria**	**Sampling Method**	**Analytical Method**
MPPEH response	Evaluate the nature and extent of MPPEH and determine if further response actions are required to support current and future residential, commercial, agricultural, and recreational land use.[2]	Risk, Remedy	MPPEH – whether MEC (UXO, DMM, or explosively hazardous MC) and MD	Surface and Subsurface soil	Within MRS-R01, MRS-R02, MRS-R03, and MRS-R09. Focus on areas not previously characterized, to include delineate of lateral extent.	Surface clearance, DGM transects and grids, mag and dig transects and intrusive investigations are detailed in Section 4.5.4. Section 4.5.4 lists all inputs to be generated from the RI/FS field activities.	All investigations shall be conducted IAW the performance and data quality metrics outlined in the QCP (Chapter 4 of the draft work plan) and IAW the performance standards of the PWS: Demonstrate that all areas with elevated anomaly density or with potential to contain MEC have been traversed at the completion of fieldwork and that there is at least 90% chance of detecting these areas. Demonstrate in areas outside of the MEC contaminated areas that there is a 90% confidence there is less than or equal to 0.1 UXO per acre in residential areas, 0.5 UXO per acre in low use areas, and 1.0 UXO per acre in areas without intrusive activities. Demonstrate that the boundaries of all identified MEC-contaminated areas have been delineated to an accuracy of a maximum 250 feet, and demonstrate that at least 90% confidence has been achieved for bounding the potential depth of MEC. Demonstrate that data inputs from the RI into the FS will enable remediation cost estimates with an accuracy of +50%/-30%.	Evaluations of the presence of MPPEH, (MEC/UXO), MD, frag, and anomaly density will be used to indicate the likelihood of UXO contamination.	Not applicable.
MC Contamination	Evaluate and determine nature and extent of MC contamination [3]	Risk, Remedy	Sampling (as set out in Section 4.5.4.2.1) to include: Metals and explosives	Soil, sediment, and groundwater	Within MRS-R01, MRS-R02, MRS-R03, and MRS-R09. Focus on areas not previously characterized, to include delineate of lateral extent.	See sampling rationale in Section 4.5.4.2.1	If MC analytes are detected, results will be compared against site-specific background levels and screening levels to determine if contamination is present. Site-specific background samples will be used to assess metals concentrations. Based on evaluation of the IS sample results, shallow subsurface soil samples or groundwater samples may be collected.	Includes collection of incremental soil samples or biased, discrete surface soil samples	IS will be analyzed for explosives (8330B). Biased, discrete soil samples will be analyzed for select metals (6020A/7471B).

(1) This table provides a summary of the DQO development for this project. This table provides a cross walk for each DQO element to the development steps from both the USEPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process* USEPA, USEPA QA/G-4, USEPA/240/B-06/001, February 2006, and USACE's *Technical Project Planning Process*, EM 200-1-2, 31 August 1998. The data collected under the DQOs summarized will be continuously evaluated during field activities against the appropriate decision rules.

(2) The project objectives include development of future response actions to limit the interaction between potential MEC present and the anticipated receptors accessing the site.

(3) The preliminary remediation objective for MC contaminants are based on the appropriate screening levels.

Table 4.6, Decision Rules for Conway RI/FS

	Preliminary Status	Investigation	Decision Rule	Intermediate Status	Decision Rule	Intermediate Status	Decision Rule	Final Status and Recommendation
1	MPPEH known or potentially present; Areas where MPPEH (including MEC) is anticipated	Conduct surface clearance, DGM transects and grids, mag and dig transects, anomaly reacquisition, intrusive investigation of DGM survey grids.	If MPPEH categorized as MDEH is located: Modify MRS boundary to improve boundary accuracy. Expand investigation (if needed).	**MEC contamination** is confirmed.	Evaluate nature and extent of MDEH/MEC, as appropriate. Expand investigation area (if needed).	MDEH/MEC contamination confirmed, extent delineated to performance criteria.	**MDEH/MEC contamination confirmed and delineated.**	**Recommended for evaluation in FS**
			If MPPEH categorized as MDAS/MD is located: Expand investigation (if needed).	**No MEC contamination**. **MDAS/MD contamination confirmed** (The presence of more than 2 pieces of confirmed MD will be considered "MD contamination.")	Complete evaluation for other exposure hazards (MC), and for presence of MDAS/MD or CD, as required.	MDAS/MD contamination confirmed.	**No MEC present; MDAS/MD confirmed to be present.**	**MDAS/MD extent delineated** **No MEC contamination.** No FS evaluation required, potential NDAI.
			If no MPPEH is located:	**No MEC or MD contamination.**				No FS evaluation required, potential NDAI.
2	MC contaminants	Sampling as outlined in Section 4.5.4.2.1	MC contaminants are not detected or concentrations are less than screening levels	**No MC Contamination** Recommended for NDAI	**NDAI for MC contamination.**			
			MC contaminants are detected at concentrations exceeding the screening levels.	**MC contamination is confirmed.**	If MC contamination is present, additional evaluation of the area (additional soil sampling and/or a risk assessment) will be conducted and the contamination delineated.	No MC contamination present in additional sampling results and all contaminated soils are removed.	**MC contamination.** Recommended for FS.	

4.5.4 RI/FS Field Activities

HGL's technical approach for each MRS is based on the anticipated MEC or MC contaminated area size, suspected past DoD activities, potential MEC/MD, previous investigation/removal activities, current and future land use, and the planned field investigation activities. Highlights of HGL's field investigation approach are provided in Figure 2 through Figure 5 and can be viewed on the project webmap. The preliminary conceptual site models for MEC and MC are included in Figures 6 and 7.

4.5.4.1 Site-Specific Technical Approaches

After review of available historical data and additional historical aerial research conducted for this proposal, HGL has defined areas of expected MEC contamination within each MRS. The MRSs are composed of various types and sizes of ranges. The investigation strategy proposed for portions of each MRS where MEC contamination is expected to be present consists of the following:

- Conduct DGM along transects of appropriate spacing at various widths (person portable single sensor and array transects) based on the suspected target area characteristics to define areas containing elevated concentrations of anomalies.
- Following evaluation of DGM person portable and towed array transect data, propose locations for DGM grids, within the elevated anomaly density areas. A minimum of 20% of the golf course, residential, wetland and overland transect acreage will be investigated using grids (with intrusive investigation).
- Following evaluation of person portable DGM transect data, propose locations for DGM grids for intrusive investigation in areas containing relatively low concentrations of anomalies to confirm interpreted transect data.
- If land owners are agreeable (i.e. golf course), specific transect anomalies may be evaluated instead of installing and intrusively investigating full coverage grids, assuming an even acreage / anomaly trade-off.
- Delineate the boundaries of resulting munitions use areas defined by person portable and array transects with intrusive mag and dig transect segments, as necessary. A buffer area of the MRS outside of the expected MEC areas will be characterized using a grid sampling approach to confirm that MEC is not present. HGL proposes 100 grids (100-ft x 100-ft size), to be placed in these outlying areas based on TPP discussions and confirmed during WP preparation. The site-specific technical approach for each MRS is presented below. The general methods for accomplishing the field activities are described in Section 4.4.3.2.

4.5.4.1.1 MRS-R01, Range II, Site-Specific Technical Approach

Given the lack of historical investigation data for this MRS, HGL proposes to investigate the area within the footprint shown in Figure 2. The investigation proposed will combine golf course coverage (to be negotiated with the golf course using HGL's proposed alternative methods to minimize impacts to course usage) and residential and open lands investigations.

HGL proposes 1.29 miles of residential area transects, 9.31 miles of golf course transects, 9.31 miles of overland transects, and 4.87 miles of wetland/ponds transect investigations. Spacings for these transects will be 500 feet, unless smaller spacings are used as adapted to golf course investigation. Additionally, based on the 2.25-inch SCAR observed by the HGL site visit team, HGL proposes to investigate the Horry County landfill present north of the MRS. These proposed transects will provide additional delineation north, northwest and east.

4.5.4.1.2 MRS-R02, Range III, Site-Specific Technical Approach

HGL proposes to investigate the area within the footprint shown in Figure 3. Review of historical data shows that 20-lb bomb fragments were located at the previously identified northeast boundary and that 100-lb sand-filled bomb fragments were present at the previous northwest boundary. HGL's historical aerial photographic analysis identified features outside the south and southwest boundaries. Based on these evaluations, HGL proposes to investigate 16.29 miles of overland transects and 4.31 miles of wetland/ponds transects, outside historically investigated areas, as shown. HGL also proposes to investigate 2.47 miles of mag and dig transects within the known target areas.

4.5.4.1.3 MRS-R03, Range IV, Site-Specific Technical Approach

The RI includes extensive historical data for Range IV generated from privately funded RAs conducted by private developers in the central and southern portions of the MRS. Based on this data, HGL proposes to investigate the 2.54 miles golf course transects, 4.45 mi overland transects, and 8.66 miles wetland/ponds of transects as shown on Figure 4. Review of historical data shows that the extent of the MRS is delineated to the northwest, but not to the northeast, southeast, or southwest. The proposed transects will accomplish the delineation to PWS requirements. HGL also proposes to investigate 7.89 miles of mag and dig transects within the known target areas.

4.5.4.1.4 MRS-R09, MG/RR, Site-Specific Technical Approach

HGL proposes to use transects spaced at a 500 feet and concentrated in the undeveloped areas of the MG/RR. At this time, HGL does not propose any investigation of the residential areas, or of the golf course, as data from the previous investigations and historical photographic analysis indicate a low potential for MEC to be present. Proposed investigations are targeted in the outer edges of the MRS on the open, undeveloped land, to determine the presence of MPPEH within the range and include 7.49 miles of overland transects and 2.20 miles of wetlands transects.

4.5.4.2 Field Investigation Activities

Safety: Safety is the greatest concern for all HGL activities. Before any field operations begin, a site-safety briefing will be provided to all field personnel. This will include a discussion of Activity Hazard Analyses for assigned tasks, a description of potential biological, physical, and meteorological hazards, and a presentation of the hazards presented by MEC potentially present within the work areas.

Project Site Setup: HGL will establish a field office at a centrally located area. HGL will site an explosives magazine IAW the approved ESP at the approved location. Existing or newly established temporary Class I, 3rd Order survey control monuments will be used to provide location survey control for the investigative teams. Additional GPS survey control will be established by HGL across the site as needed for data collection, evaluation of the requirements and applicability of professional land survey data will be performed during WP development.

Brush Clearing: HGL recognizes that limited brush clearing may be required and will attempt to conduct site activities in a manner such that brush clearing is minimal. As necessary, and where practical and feasible, the HGL team will clear undergrowth along transects and within grids that will be investigated during the RI, and will leave flagging and survey stakes to mark transect paths and grids. Vegetation removal will be coordinated with the individual landowners and the PDT. Additional coordination may be required to ensure that operations do not disturb endangered species. HGL is aware that some property owners may have concerns that transect paths cut through wooded areas may promote trespassing. When transect pathway clearance is required, pathways will be limited to the width of the anticipated tow vehicle (such as the amphibious vehicle proposed). Brush clearing will be accomplished by a two-person brush clearing team consisting of a UXO Technician II and a heavy equipment operator using a tracked loader with mulching head or brush-hog attachment. Brush clearing personnel will don appropriate personal protective equipment during brush clearing activities. Any discovered surface MEC items will be documented for inclusion in the RI report and disposed of.

Basis for MEC Investigation: HGL will utilize three different approach techniques/methods to define the nature and extent of MEC present at Conway BGR. These approaches include variations of both transect and grid-based investigation strategies and are summarized below:

i. **Historical Use Transect Bias:** Site-specific data and information identifying munitions formerly used at the MRSs will be used to define the proposed geophysical transect investigation strategy across the area. Historical information will be used to outline the general distribution of potential MEC items. Specifically, this method will allow HGL to identify target areas and other areas of high anomaly density. The transect spacing (sampling density) for each area will be based on the activities that reportedly took place within them and/or munition items recovered during previous investigations and RAs. Factors such as historical range use, ordnance type, and range size and shape were incorporated into the strategy to determine probable target size and representative transect spacing. The VSP module “Transect Spacing Needed to Locate a UXO Target Area” was used to quantitatively validate the transect spacing and orientation that is necessary to detect target areas with 90% confidence. These data will be detailed in the CSM. During the completion of field activities, HGL will also incorporate collected empirical data into the VSP software to generate estimates of anomaly density for identifying areas of elevated anomaly concentrations.

ii. **Historical Use, Transect Data, and Grid Bias:** Grid locations will be distributed throughout the area based on person portable overland and array golf course, residential, and wetland transect data to refine the extent of the MEC and determine its nature. The grids will be of various sizes depending on the anomaly density of the "target" areas, but will average 2,500SF. These grids will be mapped using DGM to identify potential MEC items. Targets identified within the grids will be evaluated and MEC-like anomalies intrusively investigated by UXO-qualified technicians. All that could potentially represent MEC/MD and 10% of the residual anomalies not thought to be related to MEC/MD will be investigated within each grid to adequately determine the nature of MEC within the grid. Once a munitions contaminated area has been identified, the boundaries of the area (initially determined during transect data analysis) will be validated with intrusive transect segments, as necessary. The intrusive transect segment will assist in accurately defining the extent of the munitions contaminated area.

iii. **Non-Biased Grids:** Grid locations will be distributed throughout areas less likely to contain munitions to confirm the absence of MEC. These grids will be mapped using DGM to identify potential MEC items as discussed above. Grid coverage will be selected based on the UXO Estimator software and ensure a 90% confidence that the residual UXO density will be less than 0.1, 0.5, or 1 UXO item per acre depending on site-specific land use. If munitions are found during the grid investigation in presumed "no MEC present" areas, additional characterization (DGM transects, DGM grids, intrusive transect segments) may be required to verify the extent of residual MEC.

VSP Methodology for Transect Design: HGL's approach involves selecting the optimum transect spacing to determine the necessary area for investigation at each MRS. The VSP tool provides a transparent and real-time means of testing the effect of assumptions on the transect planning. Assumptions about target size, density, and usage can be varied in order to produce a sampling design that achieves the project objectives and can be implemented with the available resources. Successful application of VSP requires a reasonable hypothesis describing the target area size, density, and the background density. During project planning, HGL will apply the appropriate module within VSP to detect target areas of interest for this project with a 90% confidence. As part of this process, HGL will include a range of anomaly densities to ensure an adequate transect spacing based on the anticipated anomaly density.

VSP Methodology Post Transect Survey Analysis: Geophysical sensors are capable of detecting significant target types listed in the ASR to common depths of interest for this project. Ground transects using geophysical sensors are effective for detecting concentrations of munitions and fragments or metal scrap of relatively small size. Transect data will be used to estimate the extent and anomaly density patterns of the presumed target area requiring further evaluation. VSP is a useful tool for analyzing transect coverage and anomalies detected along transects in a quantitative manner. The results can provide quantifiable determination and confidence that a postulated target area may or may not be present. Analysis of the data can provide estimates of the number of anomalies that will ultimately require investigation and the size of area to be remediated.

After survey data have been collected, HGL will utilize VSP's target-identification algorithms ("Geostatistical Mapping of Anomaly Density" and/or "Locate and Mark Areas Based on Elevated Anomaly Density"), which uses a user-defined window that systematically moves along each transect surveyed, to identify locations that have an anomaly density greater than expected from background. An estimate of the background anomaly density is obtained by examining the histogram distribution of densities found during the survey. Based on both quantitative and visual tools within VSP, HGL will determine the significant density above the background (the critical density) that is potentially related to historical target area use. Geostatistical estimation (Kriging) will be used to produce a color-coded image of anomaly density across the MRS, and areas of significant anomaly density above background will be defined and shared with the client for acceptance.

Digital Geophysical Mapping: DGM will be conducted using both linear transects and full coverage grids to identify potential subsurface MEC/MD items. The DGM program will be consistent with USACE DID WERS- 004.01, including the deliverables defined in Attachment C to the DID and general performance requirements provided in Attachment D to the DID. Positioning instrumentation used for the DGM investigation will consist of a combination of wheel/fiducial mode for grids in dense canopy, RTK GPS or Robotic Total Station (RTS) in "open" areas, and WAAS-capable GPS for use along density transects in wooded and "open" areas. Prior to production DGM activities, an instrument verification strip (IVS) test will be performed and the results provided to the client for acceptance.

Geophysical sensors anticipated for use on the project include the EM61-MKII (single-sensor, two-sensor and three-sensor array), or equivalent. The use of the EM61 time-domain electromagnetic technology is warranted because of its ability to detect the munitions of interest at the required depths and the actual results of the past DGM investigations at or near some of the project sites. The tow vehicle anticipated for use for the multiple sensor array is a specially configured Hydratek XA66. The Hydratek is designed to work in the marine and terrestrial environments and will be fitted with special tires to mitigate environmental damage in the wetlands and golf courses.

The EM61-MKII single-coil unit will primarily be used along transects in wooded areas and over full coverage DGM grids in wooded and open rural areas to detect and accurately locate subsurface anomalies for subsequent intrusive investigation. The EM61-MKII three sensor array will be utilized over golf course and residential transects areas. The array collects a swath of data 10 feet wide that essentially represents a "grid" along the transect path, which will permit accurate reacquisition of anomalies and subsequent intrusive investigation.

Geophysical System Verification: Geophysical System Verification (GSV) is a process that combines appropriate instrument testing on a daily basis and a blind seeding program to ensure that the data collected are of sufficient quantity and quality to meet project objectives. EM61-MKII physics-based models are used to verify that the instrument's responses are within specifications. The blind seed program verifies that data collection, processing, and reacquisition methodologies meet requirements set forth by USACE. Blind seed items will consist of a small industry standard objects (ISO) placed within 6 inches of the surface within

the full coverage DGM grids and along portions of transects covered with the three-coil array. The blind seed items will be placed to ensure that the data acquisition team encounters a minimum of one blind seed item per full coverage grid and one blind seed item per day for the transects surveyed with the array. The HGL QC Geophysicist will review the interpretation and subsequent dig results to ensure the dynamic position and signal response metrics prescribed by the USACE for the blind seed items are achieved.

Data Acquisition Methodology over Transects (Overland Wooded and Open Rural Areas): HGL will use DGM data acquired along transects to identify areas with elevated anomaly concentrations that may correlate with the extent of potential MEC contaminated areas. The detection footprint for the transects is 3 feet wide using a single-sensor EM61-MKII metal detection system on a wheeled cart equipped with WAAS-capable GPS for positioning. The WAAS-capable GPS will be used to record the track of the transect surveys to within ± 3 to 10 meters, which will be adequate to define the initial distribution of densities. Along DGM transects, crews will also record the position of any MEC and MD encountered, and any other features that might be related to the munitions features of interest (e.g., fragmentation, berms, high explosive [HE] craters).

Data Acquisition Methodology over Grid Areas (Golf Course, Residential, Wetland, Overland Wooded and Open Rural Areas): HGL will place grids in high-, medium- and low-density areas to effectively characterize the nature of the MEC distribution. The grid sizes may be different depending on their intended location and purpose. The grids may also be used in "transect-like" configurations (e.g., 25 by 200 feet), centered on the boundary of the presumed target as determined from the anomaly density distribution as defined by VSP. Grid sizes will average 50 by 50 feet in most areas, and the final locations and distribution of grid types will be determined in consultation with the PDT. A single-sensor EM61-MKII on a wheeled cart will be used to collect full coverage DGM data within the grids at a line spacing determined from the results of the IVS. The anticipated line spacing is 2.5 to 3 feet. Positioning in wooded areas will be accomplished using wheel/fiducial mode; if numerous grids are located in "open" areas, RTK GPS or RTS may be used to provide accurate positions for the geophysical measurements.

Data Acquisition Methodology over Golf Course and Residential Transects: HGL will utilize a three-sensor EM61-MKII array (10-foot coverage swath) with RTK GPS along transects in Golf Course and Residential areas to accurately locate and detect anomalies. These data will be assessed along with the transect DGM data collected in wooded and wetland areas using VSP to determine the anomaly density distribution across the areas of interest. Along DGM transects, crews will also record the position of any MEC and MD encountered, and any other features that might be related to the munitions features of interest (e.g., fragmentation, berms, high explosive [HE] craters).

Data Acquisition Methodology over Wetland Transects ("Wetlands"): HGL will utilize a two- or three-sensor EM61-MKII array with an appropriate platform and positioning system along transects in wetlands areas to detect anomalies. These data will be assessed along with the transect DGM data collected in other project areas using VSP to determine the anomaly

density distribution across the areas. Along DGM transects, crews will also record the position of any MEC and MD encountered, and any other features that might be related to the munitions features of interest (e.g., fragmentation, berms, HE craters).

Data Acquisition Methodology over Existing Ponds (as necessary): HGL will utilize a Geometrics 882 TVG (6- foot swath) over existing ponds that may have been used as bombing targets based on a review of historical information. The data in the ponds will supplement the terrestrial DGM data and permit a more comprehensive evaluation of the historical uses related to MEC. HGL anticipates collecting data across ponds using parallel lines spaced at intervals of approximately 10 to 12 feet. RTK GPS or RTS will be used to provide accurate positions for the geophysical measurements. A marine "drop camera" may be used to identify the origin of some anomalies that are determined to be proud of the bottom.

Intrusive Investigation and Removal of Anomalies: The data obtained from mag-and-dig activities will augment the digital geophysical data and aid in the characterization of MEC/MD extent. These data will also be used to determine grid placement for intrusive investigation. Grids will be placed in areas of high, medium, and low concentrations of MEC and/or MD to characterize the nature of munitions.

HGL will intrusively investigate all subsurface anomalies identified along mag-and-dig transects. In addition, HGL will intrusively investigate all MEC-like anomalies within grids and along array transects, and the source of large area anomalies will be identified and characterized. Multiple teams, each consisting of UXO technicians meeting the standards of DDESB Technical Paper (TP)-18 for their respective assigned positions, will intrusively investigate the reacquired anomalies. HGL's SUXOS, UXOQCS, and UXOSO will be on site at all times. Electronic dig sheets will be properly annotated and all columns completed. Anomalies will be excavated IAW the approved WP to positively identify each item. HGL will maintain a detailed record of the items including amounts of MEC, proper nomenclature and condition, location, depth, and disposition. The record will include classification of the item (i.e., discarded military munitions [DMM], UXO, or MC with enough explosives to present an explosive hazard) and the mark/model number of the item. Digital photographs will be taken for reporting purposes. Dig sheets and photographs will be linked to the project GIS. QC checks of the cleared designated anomaly locations will be accomplished by the UXOQCS. UXO-qualified technicians will backfill excavations and restore the ground surface to its original condition.

MEC Disposal: The on-site SUXOS and UXOSO will directly supervise MEC disposal operations. Traffic and engineering controls should not be required; however, if needed, they will be employed to mitigate the effects of an explosive detonation (fragmentation, blastoverpressure, noise) to protect human health, and property. Items that are acceptable to move will be consolidated for destruction with items that are unacceptable to move. Explosives will be stored IAW the approved ESP. If necessary, HGL will post a guard on-site when explosives are delivered and/or stored onsite to maintain public safety. HGL will closely coordinate all explosive disposal operations with local law enforcement and other emergency

management agencies as necessary. The UXO Technician III Team Leader will document each MEC item and note its final disposition.

Disposal/Disposition of MPPEH: HGL will furnish the necessary personnel and equipment to make final disposition of all recovered MPPEH. HGL will remove and consolidate all inert ordnance and metallic debris encountered and will follow the provisions of Chapter 14 of EM 1110-1-4009 and Errata Sheet No. 2 when making final disposition of MEC, MPPEH, and MD. The inspected materials will be packaged, weighed and sealed, and a completed DoD Form 1348-1A will be prepared for each container. These containers will be transferred to a scrap dealer with a written statement that all MD will be immediately processed through a smelter prior to release. All MPPEH will be inspected, weighed, and placed in lockable roll-off containers at the end of each workday. Material documented as safe (MDAS) and metallic debris will have already been inspected and segregated by the UXO teams. This debris (shaped MDAS, MDAS fragments and metallic debris) will be stored in three separate containers. The first container will be used for scrap metal. Items such as banding wire, hinges, nails, etc. will be placed in the scrap metal container. The second container will be used for MDAS fragments. MDAS that has been inspected and reinspected/ certified to not require further treatment prior to final disposition, such as indiscernible fragments will be placed in this container type. The third container will be used for shaped MDAS, which requires further treatment by demilitarization IAW DoD's Demilitarization Manual 4160.21M prior to final disposition. These lockable containers will be stored inside of a locked CONEX box on site until they are shipped off site for proper disposal.

4.5.4.2.1 MC Characterization (Environmental Sampling and Analysis)

A primary goal of the RI/FS is to identify the presence and delineate the nature and extent of MC concentrations present in various MRS environmental media (soil, sediment, and groundwater). Review of the existing data provided for this proposal indicates that there has been site-specific data previously collected at Conway BGR. However, additional sampling is required to augment existing analytical data, to generate a defensible RI/FS. Costs associated with supplemental MC sampling are relatively low compared to the potential risks associated with not developing an acceptable RI/FS; therefore, HGL proposes additional MC sampling at each MRS that will provide adequate support for the RI/FS and subsequent DDs. The following sections define HGL's technical approach (shown in Table 4.7) for environmental sampling and analysis.

Table 4.7
Sample Collection and Analysis Decision Rules

Identification of MC contamination	Compare analytical results to background concentrations and state/federal criteria to evaluate whether an exceedence exists in surface soils (Phase 1).
Delineation of MC contamination	(If required) when MC concentrations exceed established regulatory criteria or background, additional media will be sampled and additional samples will be collected to identify the extent of contamination (Phase 2 and Phase 3).

MC Sampling and Analytical Approach

HGL's proposed RI/FS approach incorporates site history, previous investigation analytical results, and HGL's extensive experience conducting phased RI/FS projects. During HGL's completion of the RI/FS, activities will be conducted to identify the presence or absence of soil, sediment and/or groundwater contamination, to delineate the nature and extent of existing MC contamination, and to evaluate migration pathways and/or pathways for the potential discharge of chemical constituents into the surface water or groundwater. Field sampling activities will be conducted in coordination with MEC field activities in three phases with six separate stages:

Phase 1

- Stage 1 – geophysical surveys to evaluate site conditions and identify the presence and extent of surface and subsurface MEC/MD;
- Stage 2 – MEC characterization, identification, and disposal; and
- Stage 3 – ISM surface soil sampling (explosives) and discrete soil sampling (metals) activities to define the nature and extent of soil contamination compared to site-specific background metal concentrations.

Phase 2

- Stage 4 – dependent upon Phase 1 soil sampling results, additional discrete or ISM surface and/or subsurface soil sampling at locations (estimated 10 per MRS) where a release of MC is verified; and
- Stage 5 – additional sediment sampling (estimated 20 per MRS) from surface water bodies adjacent to potential source areas to characterize the impact on the local drainage, if necessary.

Phase 3

- Stage 6 – dependent upon Phase 1 and Phase 2 results, groundwater sample collection from existing wells to characterize the nature and extent of groundwater contamination, if necessary.

HGL has designed this phased approach for sampling that will adequately characterize the nature and extent of contaminants, provide the necessary data for a risk-based evaluation, and serve as a basis for future response decisions. The following section specifies HGL's approach for the completion of the Conway BGR RI environmental sampling and analysis.

Phase 1 Soil Sampling (Incremental and Discrete)

HGL proposes to collect a total of 40 surface soil samples using a combination of ISM sampling (explosives) and discrete samples (metals). Ten ISM samples will be collected from each MRS. The VSP Multi-Increment Sample Module was used to calculate the number of

surface soil samples required to achieve 95% confidence that the site is impacted above action levels. Sampling will be conducted throughout each MRS based on confirmation of historical information, DGM analysis, and intrusive investigative results IAW the approved RI WP.

HGL proposes the collection of 10 samples from identified background locations for the generation, use, and reporting of a site-specific background dataset. Background samples will be collected from areas similar to, but outside of the MRS boundaries, per EPA guidance. Background soil samples will be collected as discrete samples and will be analyzed for select metals using Method 6020A/7471B. Background samples will not be analyzed for explosives.

MRS-specific areas will be designated as sampling units (SU) based on their status as suspected source areas (the confirmed presence of MEC or MD). ISM sampling for explosives will be conducted in the SUs using the methodology outlined in Appendix A of EPA Method 8330B and IGD 09-02 (USACE, 2009b). Judgmentally located (biased) discrete sampling will be conducted at each MRS for selected metals, dependent upon the confirmed presence of MEC or MD. Analytical parameters will be based on munitions used on site and are anticipated to be explosives and the metals previously detected (lead, zinc, cadmium, and mercury).

Each primary sample collected for Method 8330B (explosives analysis) will consist of at least 30 subsamples collected from a gridded area including equal surface areas covering each respective SU. The VSP Multi-Increment Sample Module was used to determine that each SU will be 100 feet x 100 feet. Each subsample increment will be advanced from 0 to 6 inches using a specialized 8330B coring device. A total of approximately 1.5 kilograms of soil sample will be collected in each bag, homogenized, and sampled. Based on HGL's experience with SCDHEC and past project experience, HGL is not proposing the collection of pre- or post blow- in-place (BIP) samples.

Phase 2 Soil Sampling

Based on the decisions made by the PDT during the TPP process and the Phase 1 analytical results, additional soil samples may be required; therefore HGL is proposing the collection of up to 20 discrete or ISM soil samples associated with delineation of the results obtained during Phase 1. These sample locations will be selected based on Phase 1 results and existing site conditions (MEC, MPPEH, MD or anomalies), and each sample analysis may include explosives (8330B) and select metals (6020A/7471B).

An HGL environmental scientist and a UXO-qualified technician (to provide escort) will collect soil samples for chemical analysis. In addition, HGL will collect QC (e.g., field duplicates, equipment rinsate, and trip blanks), and QA samples.

Both discrete and background soil samples will be collected for chemical analysis using decontaminated stainless-steel spoons. Soil will be transferred to a stainless-steel bowl for homogenization before being transferred to the sample jars. Samples will be assigned a unique sampling identification number based on the location, media, and sample depth. Samples will

be packed in coolers immediately upon collection and tracked using a chain of custody. The samples will be forwarded directly to the analytical laboratory in waterproof coolers on wet ice; both sample jars and ice will be packed in separate bags in a manner to minimize cross-contamination and cooler leakage during shipment. Coolers will be sealed and marked with custody seals to prevent tampering.

All hand augers, spoons, trowels, sample coring devices, and other reusable sampling equipment used to collect surface and subsurface soil samples will be decontaminated between each sampling location by using a multi-step decontamination process.

HGL's approach defined above focuses on soil sampling for the following reasons: (1) historical data associated with Conway BGR suggests that source areas of MC contamination are limited to areas with MEC contamination present; (2) the likelihood of MRS specific MC sediment and groundwater impact is minimal given the low solubility of most of the suspected constituents; and 3) in HGL's experience, it is an extreme rarity to find munitions related reportable explosives or metal concentrations above threshold criteria in groundwater samples at formerly used defense sites (FUDS) locations.

Phase 2 Sediment Sampling

With TPP team concurrence, during Phase 2 of the field investigation activities 20 sediment sample locations will be selected within each MRS, if applicable. HGL will coordinated with the TPP team to evaluate the Phase 1 results to determine that potential source areas exist within surface soil that may impact adjacent surface water bodies. If necessary, sediment samples will be collected to evaluate the potential impact of MC and selected metals on local surface water bodies.

Sediment samples will be collected from surface water locations (ponds, creeks, rivers) identified during the completion of the RI field activities to characterize potential migration of MC. Sediment samples will be collected using either a stainless steel hand auger or a stainless steel trowel, based on site conditions. Sediment samples for explosives and metals analysis will be placed in a stainless steel bowl and homogenized before placing them into the laboratory-specified sample containers.

Laboratory Qualifications

The Denver facility of TestAmerica will provide primary analytical services for this project. Accutest will provide independent QA laboratory analysis of split samples. TestAmerica and Accutest are certified under DoD ELAP and the South Carolina Environmental Laboratory Certification Program. Analysis includes the development of a project-specific automated data review format and Superfund electronic data deliverables 2a or higher. The laboratories will supply sample containers with added preservatives as appropriate. Field QA/QC samples will be used to assess the representativeness of the sampling activities to ensure sample integrity and that samples sent to the laboratory are representative of site conditions. Field QC samples collected will include field duplicates, matrix spike/matrix spike duplicate samples and

equipment rinsate blanks. The field QA sample will consists of a field split sample; field QA/QC samples will be collected as follows:

- Field QC Duplicates – 1:10 (10%, minimum 1 per MRS);
- Field QA Splits – 1:10 (10%, minimum 1 per MRS);
- matrix spike/matrix spike duplicate – 1:20 (5%, minimum 1 pair per MRS);
- Equipment Rinsate Blanks – 1 per day per matrix (for reusable sampling devices); and
- Temperature Blanks – 1 per cooler

Field duplicate (QC) samples will be collected simultaneously from the same media source under Identical conditions, homogenized, and split into separate containers. All samples will be homogenized prior to division of split samples to ensure that all subsamples have the same properties. Field duplicates sent to the laboratories will be labeled so that analysts performing laboratory analyses cannot distinguish duplicate samples.

To provide a measure of the representativeness of the sampling procedure and precision between primary and secondary laboratories, QA field duplicate splits will be collected from the same respective locations as the parent samples under identical conditions and sent to a separate laboratory (Accutest) by HGL for independent analysis. The QA split sample containers will be filled immediately after the field duplicate samples and labeled identically to the parent sample with the addition of "QA" to the name. HGL will ensure that analytical results are forwarded directly to the USACE. The costs associated with QA sampling have been incorporated into HGL's cost proposal.

MS/MSDs will be collected to assess interferences in analytical results caused by the sampled matrix. The samples for MS/MSD will be shared with the parent sample containers. The sample volume for aqueous samples will be sufficient to ensure that enough sample is collected for all MS/MSD analyses. Samples of deionized water used to rinse sampling equipment will be collected on a daily basis to assess potential cross-contamination from the non-disposable sampling equipment, the sample container, and/or preservatives.

HGL will perform definitive data validation services on all analytical data collected at the project site. HGL will produce Quality Control Summary Reports documenting the data validation.

All sample locations will be surveyed for horizontal control by using a PPK GPS unit IAW EM 1110-1-4009 and WERS-DID-007.01. All data submitted will be in the Universal Transverse Mercator coordinate system.

Data from the RI sampling event will be used to perform the human health and ecological risk analysis. The full datasets and risk results will be presented during the third TPP meeting. This information, combined with previous data, geophysical results, and intrusive findings will be used to determine that all data gaps have been addressed.

Chemical analytical results will be compared to established background criteria to determine if site concentrations significantly exceed those background criteria. Numerous statistical methods may be appropriate for processing the data collected at the site. The method selected depends on such things as number of samples, distribution of the data, and percent of samples with values reported as less than method detection limit or reporting limit. If chemical analytical results are detected above background criteria, then those results will be compared to appropriate risk-based screening criteria.

4.6 FINAL REPORTS

Following field activities HGL will prepare an RI report in draft, draft final, and final versions. Major components of the RI report will include site characterization, MRS characterization for MEC and MC contamination (if any), including data evaluation, human health and ecological risk assessments, based on current and future land use, and recommendations including no further action and assessment of required interim measures. HGL will incorporate all relevant previously collected data into the RI report. If warranted, HGL will recommend MRS boundary revisions within the RI report. Other reports will follow the preparation and review of the RI report, and subsequent documents include the Feasibility Study, Proposed Plan, and Decision Document.

4.7 COMMUNITY RELATIONS PLAN SUPPORT

4.7.1 Community Relations Activities

Throughout the performance of RI field activities, various community relations support efforts will be ongoing. HGL will provide community relations support throughout the project life to accomplish project requirements and objectives. HGL will draft a Community Relations Plan to keep community leaders, local government officials, and affected citizens informed about the project. HGL will support USAESCH and USACE in the maintenance of the project repository/Administrative Record. The project repository will be updated by HGL on a monthly basis, and made available to the public.

Public Meetings

Three public meetings will be held near the site in Conway, South Carolina. One of the public meetings will be held to discuss the PP with interested stakeholders. Community relations support tasks include development and delivery of presentations, graphics, handouts, and posters. HGL will provide printing services associated with the meeting materials and will submit all presentation materials to USACE for approval no later than 14 days prior to the meetings with final meeting materials available no later than the day of the meeting. HGL will also coordinate the logistical support for these meetings.

Evacuations

As negotiated with landowners during planning stages, HGL will provide for evacuations and temporary relocation of personnel when residences are located within a defined safety

exclusion zone. HGL will work closely with affected individuals and businesses whose property may be impacted by intrusive investigations to ensure that everyone is kept informed of the field work schedule. HGL will make telephone calls or attempt face-to-face meetings with affected residents and establish a look-ahead schedule to identify plans and locations for on-going and future work, when evacuations may be needed. HGL will coordinate logistics for individuals requiring temporary lodging (a hospitality area or individual hotel rooms), when necessary.

FIGURES

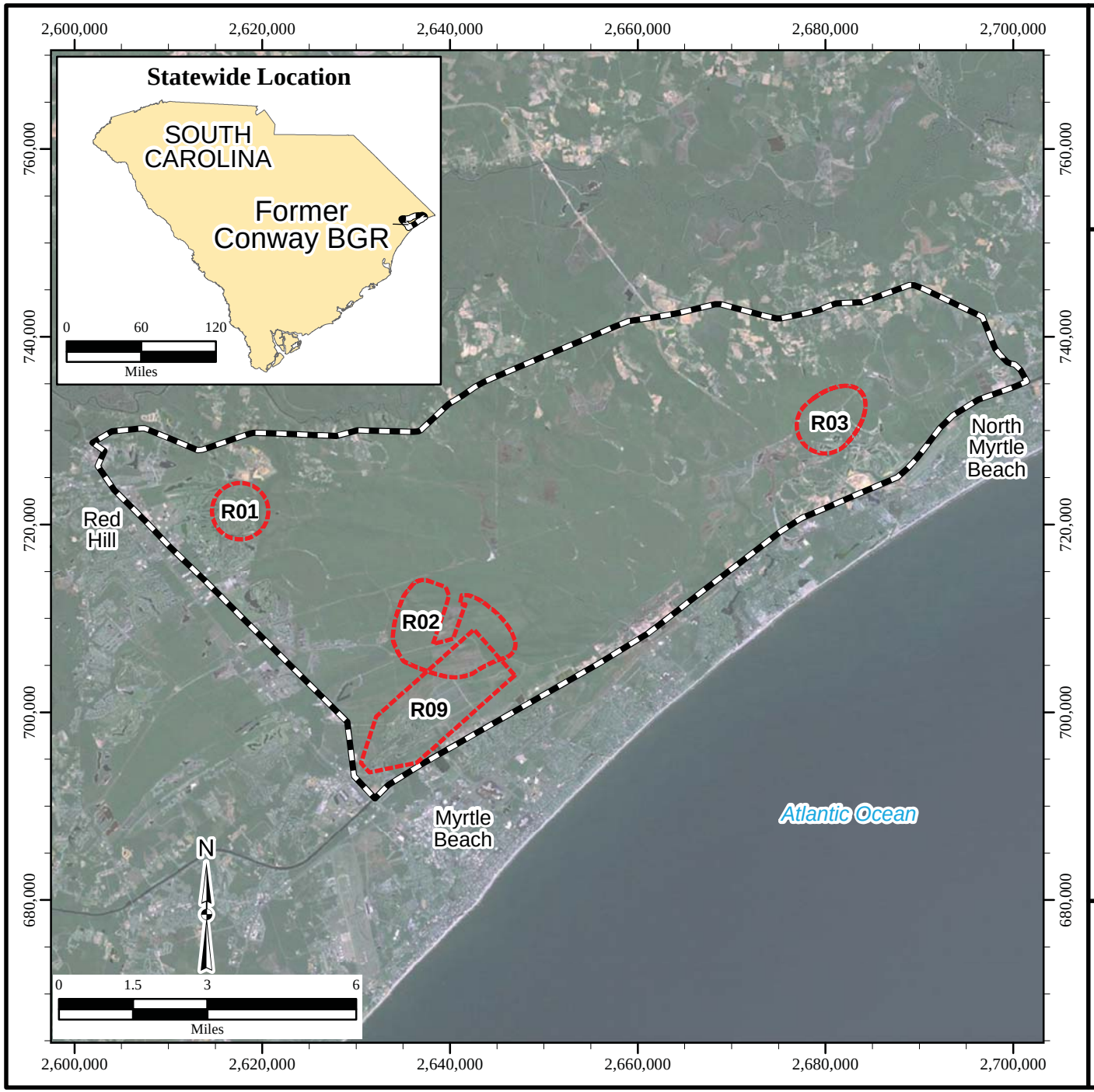

Figure 1

Site Locations

Legend

Munitions Response Site

Former Conway Bombing and Gunnery Range

Notes:
Coordinates in South Carolina Stateplane, NAD83, feet.

BGR=Bombing and Gunnery Range

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Source: HGL, USGS, USACE
ArcGIS Online World Imagery

HGL HydroGeoLogic, Inc

HGL—Former Conway Bombing and Gunnery Range, SC

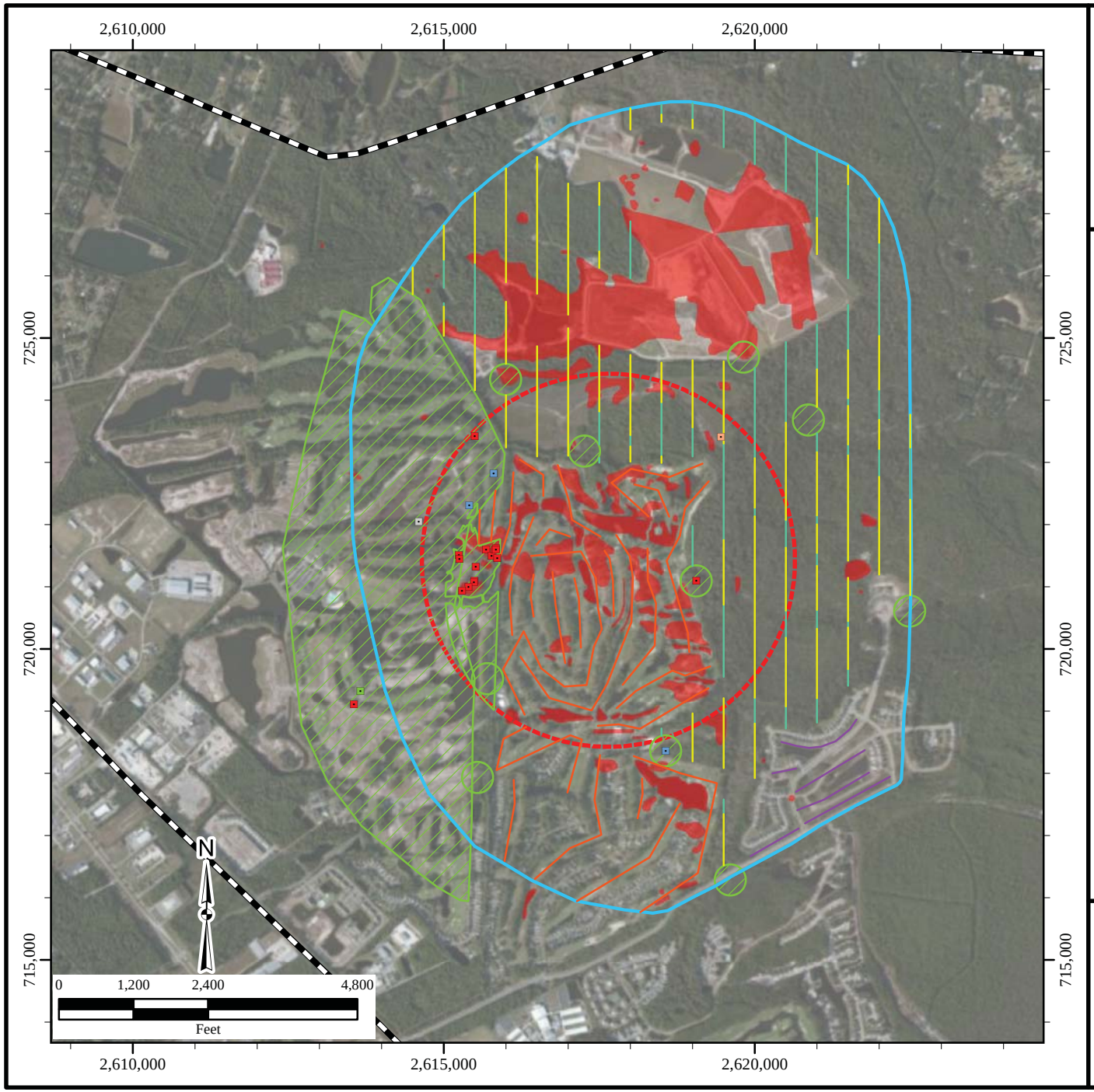

Figure 2

MRS-R01, Range II RI Site-Specific Technical Approach

Legend

MEC/MD:

- 100lb Bomb
- 2.25" Rocket
- 20lb Bomb
- Small Arms
- Other

- Proposed Overland Transect
- Proposed Wetland Transect
- Proposed Golf Course Transect
- Proposed Residential Transect
- Previously Characterized Area
- Investigation Area
- Historical Use Area
- Munitions Response Site R01
- Former Conway Bombing and Gunnery Range

Note:
Coordinates in South Carolina Stateplane, NAD83, feet.

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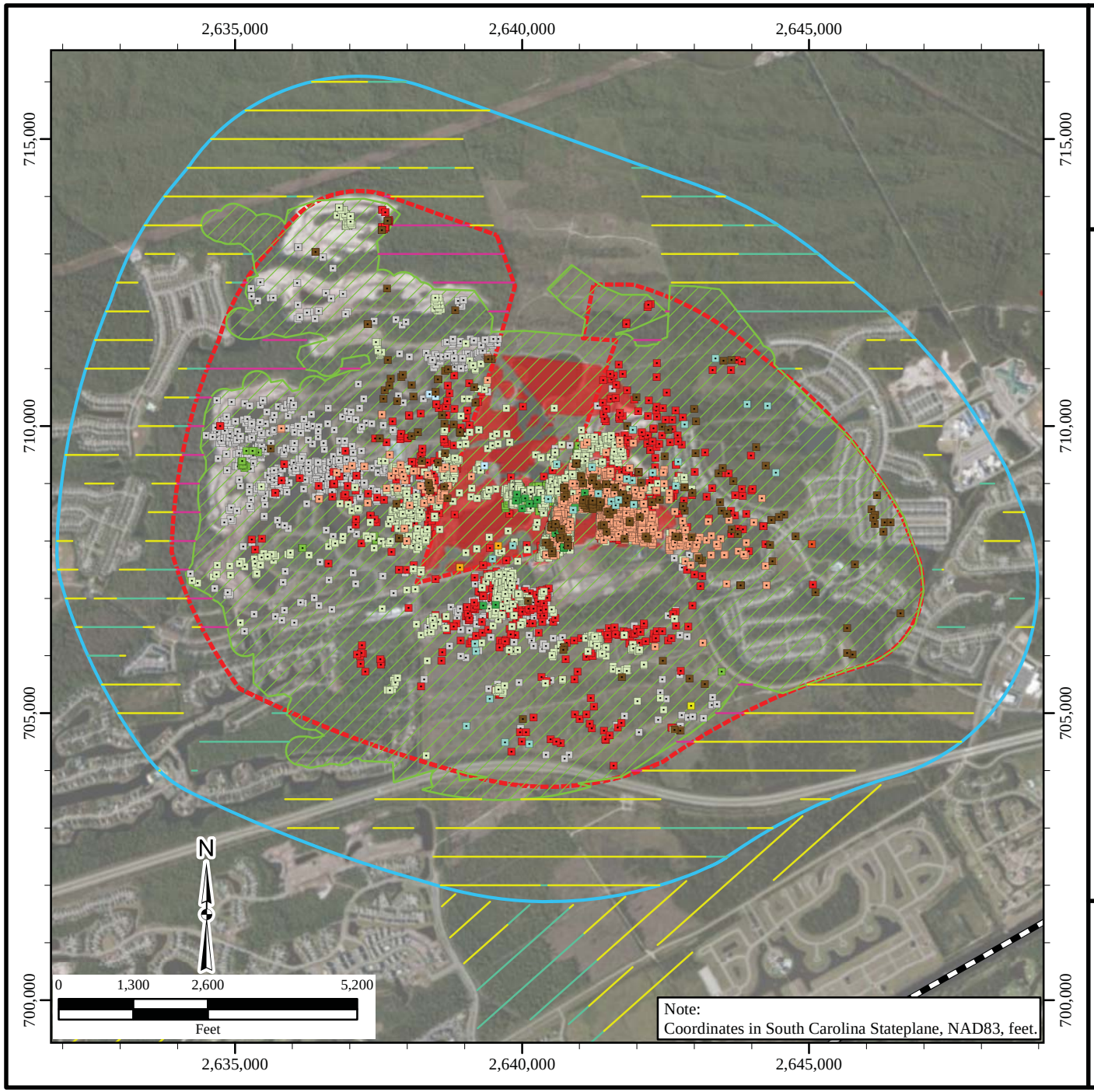
Source: HGL, USGS, USACE
ArcGIS Online World Imagery

HGL HydroGeoLogic, Inc

HGL—Former Conway Bombing and Gunnery Range, SC

Figure 3

MRS-R02, Range III
RI Site-Specific
Technical Approach



Legend

MEC/MD:

- 1.1" Projectile
- 100lb Bomb
- 2.25" Rocket
- 2.36" Rocket
- 2.75" Rocket
- 3" Rocket
- 20lb Bomb
- 250lb Bomb
- 37mm Projectile
- 4lb Bomb
- 5" Rocket
- 6lb Bomb
- Other
- Proposed Overland Transect
- Proposed Wetland Transect
- Proposed Mag and Dig Transect
- Previously Characterized Area
- Investigation Area
- Historical Use Area
- Munitions Response Site R02
- Former Conway Bombing and Gunnery Range

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Source: HGL, USGS, USACE
ArcGIS Online World Imagery

HydroGeoLogic, Inc

HGL—Former Conway Bombing and Gunnery Range, SC

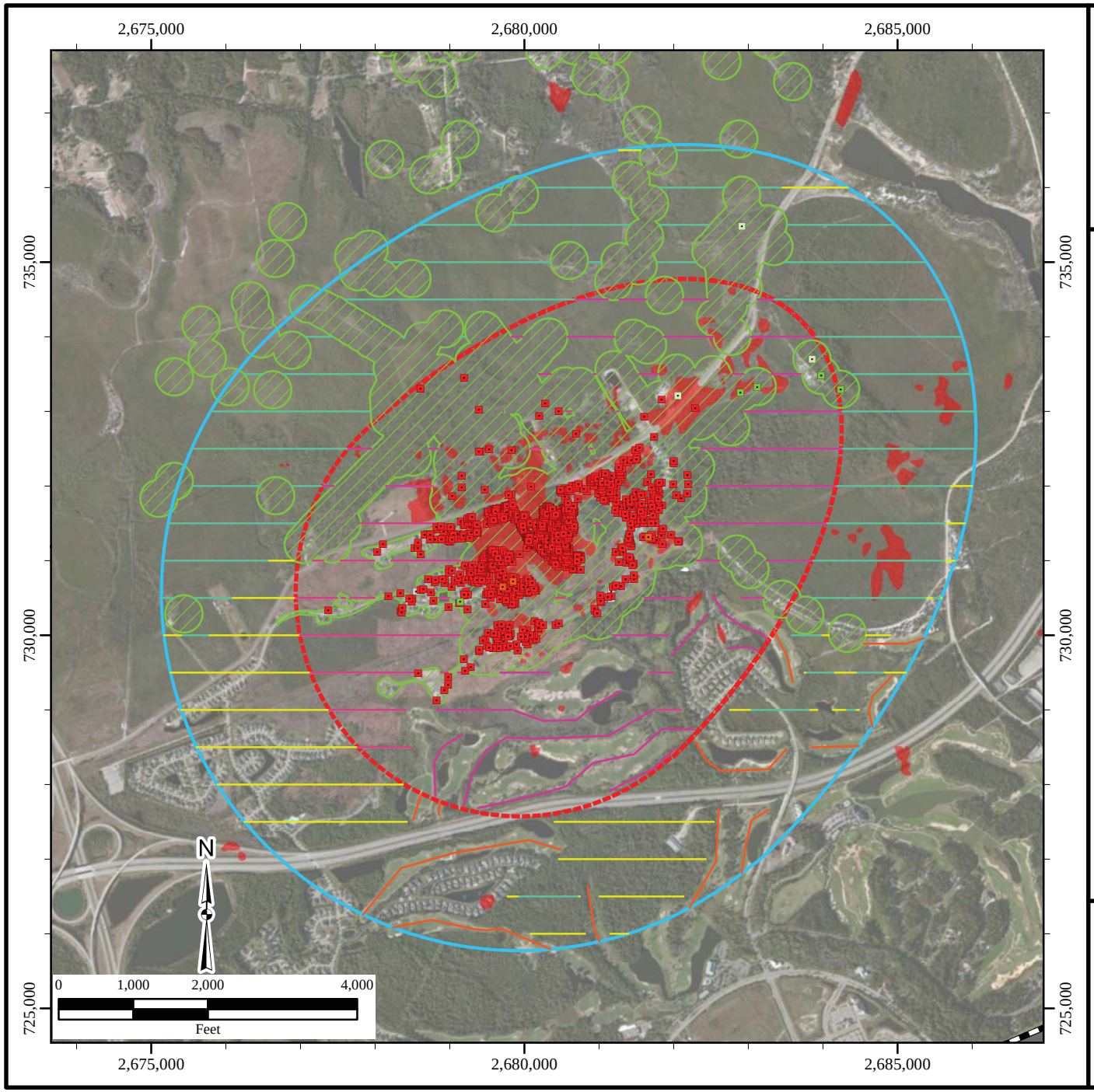

Figure 4

MRS-R03, Range IV
RI Site-Specific
Technical Approach

Legend

MEC/MD:

- 100lb Bomb
- 2.75" Rocket
- 20lb Bomb
- 4lb Bomb
- Other
- Proposed Overland Transect
- Proposed Wetland Transect
- Proposed Golf Course Transect
- Proposed Mag and Dig Transect
- Previously Characterized Area
- Investigation Area
- Historical Use Area
- Munitions Response Site R03
- Former Conway Bombing and Gunnery Range

Note:
Coordinates in South Carolina Stateplane, NAD83, feet.

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Source: HGL, USGS, USACE
ArcGIS Online World Imagery

HydroGeoLogic, Inc

HGL—Former Conway Bombing and Gunnery Range, SC

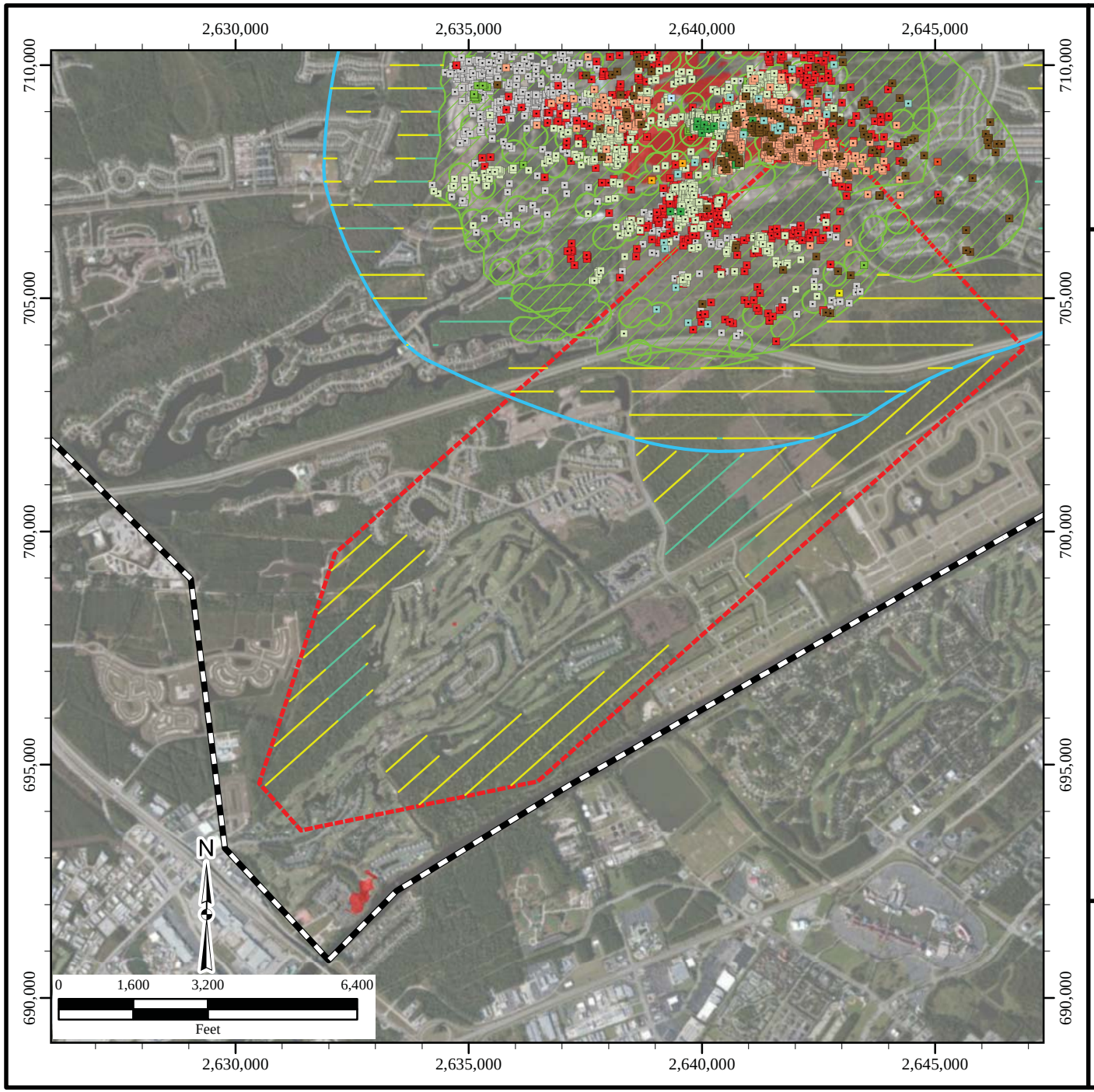

Figure 5
MRS-R09
Machine Gun/Rifle Range
RI Site-Specific
Technical Approach

Legend

MEC/MD:

- 1.1" Projectile
- 100lb Bomb
- 2.25" Rocket
- 2.36" Rocket
- 2.75" Rocket
- 3" Rocket
- 20lb Bomb
- 250lb Bomb
- 37mm Projectile
- 4lb Bomb
- 5" Rocket
- 6lb Bomb
- Other

Proposed Overland Transect

Proposed Wetland Transect

Previously Characterized Area

Investigation Area

Historical Use Area

Munitions Response Site R09

Former Conway Bombing and Gunnery Range

Note:
Coordinates in South Carolina Stateplane, NAD83, feet.

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Source: HGL, USGS, USACE
ArcGIS Online World Imagery

HydroGeoLogic, Inc

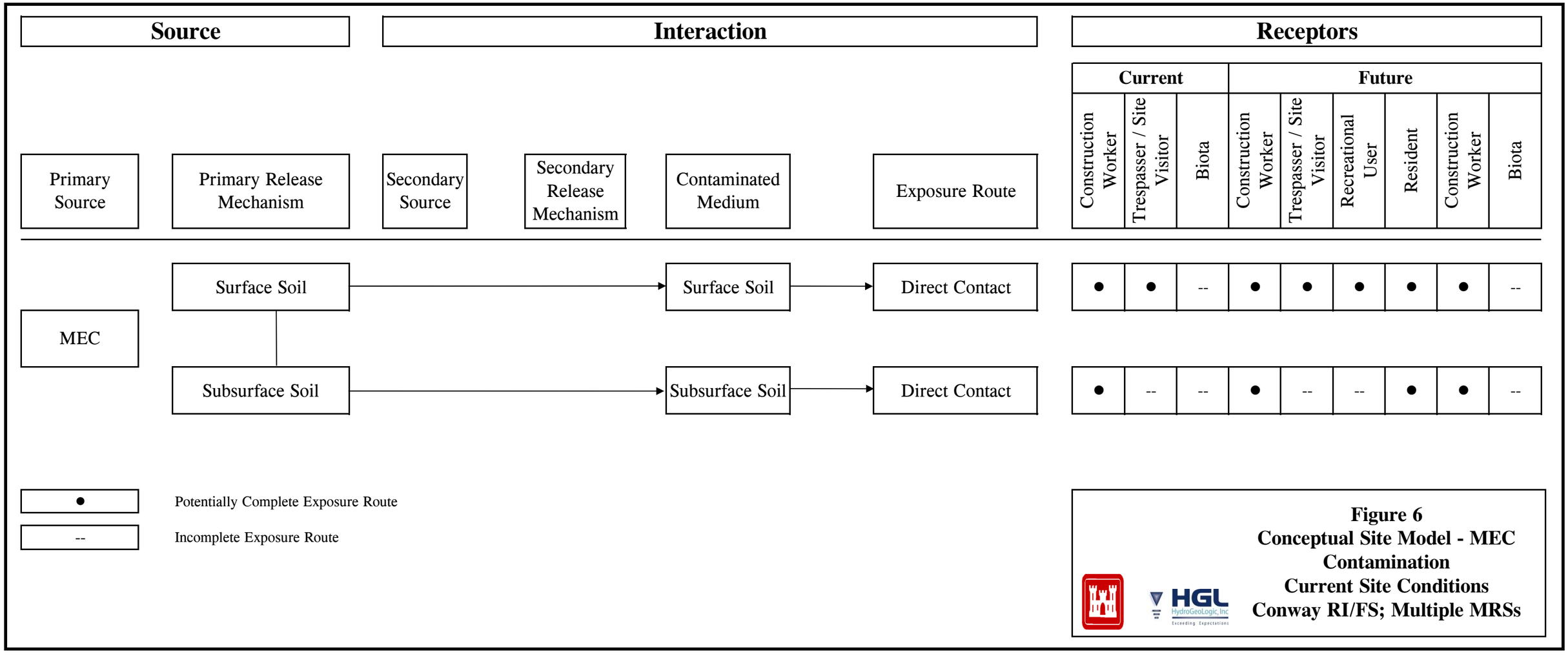


Figure 6
Conceptual Site Model - MEC Contamination
Current Site Conditions
Conway RI/FS; Multiple MRSs

Source	Interaction				Receptors								
					Current			Future					
Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Contaminated Medium	Exposure Route	Construction Worker	Trespasser / Site Visitor	Biota	Construction Worker	Trespasser / Site Visitor	Recreational User	Resident	Construction Worker	Biota
MC (from MEC presence)	Erosion and Stormwater Runoff			Surface Soil	Incidental Ingestion	●	●	●	●	●	●	●	●	●
					Dermal Contact	●	●	--	●	●	●	●	●	--
		Surface Soil	Bioaccumulation	Vegetation/Prey	Ingestion	--	--	●	--	--	--	--	--	●
		Surface Soil	Dust Emissions	Ambient Air	Inhalation	●	●	--	●	●	●	●	●	--
		Subsurface Soil		Subsurface Soil	Incidental Ingestion	--	--	--	--	--	--	--	●	--
					Dermal Contact	--	--	--	--	--	--	--	●	--
	Leaching			Groundwater	Ingestion	--	--	--	--	--	--	●	--	--
					Dermal Contact	--	--	--	--	--	--	●	--	--
					Inhalation while Showering	--	--	--	--	--	--	●	--	--

● Potentially Complete Exposure Route

-- Incomplete Exposure Route

Note: The composition of future surface soil (surface soil data or pooled surface/subsurface soil data) will be determined after evaluation of the soil data.

Figure 7
Conceptual Site Model - MC Contamination
Current Site Conditions
Conway RI/FS; Multiple MRSs

TPP WORKSHEETS

TPP Team	EM 200-1-2, Paragraph 1.1.1	
Decision Makers		
Customer	US Army Corps of Engineers, Support Center Huntsville (USAESCH) USACE Charleston District	
Project Manager	USAESCH PM Chris Cochrane and CESAC PM Shawn Boone	
Contract Manager	Chris Cochrane, USAESCH COR	
TPP Technical Manager	Kelly Longberg, USAESCH Technical Manager	
Regulators	South Carolina Department of Health and Environmental Control (SCDHEC) - Susan Byrd, Project Manager and U.S. Environmental Proction Agency Region 4	
Primary Stakeholders	USACE, USAESCH, SCDHEC, representatives of local county and municipal governments, and major landowners	
Data Types	**Data Users**	**Data Gatherer**
Compliance/Regulatory (CR)	Regulatory Perspective	HGL RI/FS Team
Demographics/Land Use	Risk, Responsibility, and Compliance Perspectives	HGL RI/FS Team
Site Conditions	Remedy Perspective	HGL RI/FS Team
Munitions and Explosives of Concern (MEC)	Risk and Remedy Perspectives	HGL RI/FS Team
Munitions Constituents (MC)	Risk and Remedy Perspectives	HGL RI/FS Team
Chemical Warefare Materiel (CWM and ABPs)	Risk and Remedy Perspectives	HGL RI/FS Team
Archaeology	Compliance and Remedy Perspectives	HGL RI/FS Team
Endangered Species	Risk and Compliance Perspectives	HGL RI/FS Team

CUSTOMER'S GOALS		EM 200-1-2, Paragraph 1.1.2	
Munitions Response Site (MRS)	**Contaminant Issues**	**Future Land Use**	**Site-specific Closeout Goal (if applicable)**
Four (4) Munitions Response Sites: Range II (R01), Range III (R02), Range IV (R03), and Machine Gun (MG)/Rifle Range (RR) (R09)	MEC and MC	Residential, Commercial, Recreational, Agricultural	Remedy protective of human health, safety, and the environment.

Site Closeout Statement
To manage the munitions and explosives of concern (MEC) and munitions constituents (MC) risk through a combination of characterization, administrative controls, remediation, and public education; thereby rendering the site as safe as reasonably possible to humans and the environment and conducive to the anticipated future land use.

Customer's Schedule Requirements
RI/FS process through Decision Document by April 2016.

Customer's Site Budget		
RI/FS: Fully Funded Through Decision Document.		
IDENTIFY SITE APPROACH		
EXISTING SITE INFORMATION & DATA EM 200-1-2, Paragraph 1.1.3 and 1.2.1		
TPP Information and Data	**Located at Repository**	**Preliminary Conceptual Site Model**
Archive Search Report (ASR)	Horry County Memorial Library in Conway, SC	No
ASR Supplement (2004)	Horry County Memorial Library in Conway, SC	No
EE/CA 2004	Horry County Memorial Library in Conway, SC	No
TC Removal Action - Blalock and Riley Properties	Horry County Memorial Library in Conway, SC	No
Time Critical Removal Action - Lakeview Subdivision	Horry County Memorial Library in Conway, SC	No
Interim Removal Actions (2008, 2009, 2010)	Horry County Memorial Library in Conway, SC	No
POTENTIAL POINTS OF COMPLIANCE EM 200-1-2, Paragraph 1.2.1.3		
Determination of nature and extent of explosive safety hazards, MC, and CWM, as applicable.		
If MC is detected, comparison against background concentrations and Soil Screening Levels (SSLs) will be conducted to evaluate whether an exceedance exists in surface soils (Phase 1). If required, when MC contaminations exceed established regulatory criteria or background data, additional media will be sampled and additional samples will be collected to identify the extent of contamination (Phase 2 and Phase 3).		
MEDIA OF POTENTIAL CONCERN EM 200-1-2, Paragraph 1.2.1.4		
Qualitative review of MEC presence in surface and subsurface soils.		
Quantitative screening of MC constituents for soil, and if necessary, sediment contamination. Background sampling of surface soils for metals.		
SITE OBJECTIVES EM 200-1-2, Paragraph 1.2.2		
Phased approach for geophysical evaluation and media sampling focused on areas of greatest concern (historical use and existing site conditions).		
MEC and MC sampling to adequately characterize site conditions		
Evaluation of MEC and MC data to determine if acceptable for completion of RI/FS		
Eliminate from further consideration those releases that pose no significant threat to public health or the environment.		
Completion of RI/FS		
Develop MRSPP scores for each MRS		
REGULATOR AND STAKEHOLDER PERSPECTIVES EM 200-1-2, Paragraph 1.2.3		
Regulators	**Community Interests**	**Others**
Regulators principal concern is the protection of human health and the environment. Also ensuring that sampling results are defensible by requiring the use of approved analytical laboratories and methods.	Landowners (including homeowners) primary concern is the presence of potential hazards (MEC and MC). Land is safe for intended/current land use.	Nearby towns concerned with potential for future land development.
PROBABLE REMEDIES EM 200-1-2, Paragraph 1.2.4		
Remedial Action following RI/FS characterization.		
Institutional controls following RI/FS characterization.		
EXECUTABLE STAGES TO SITE CLOSEOUT EM 200-1-2, Paragraph 1.2.5		
Remedial Investigation/Feasibility Study (RI/FS)		
Community Relations Plan (CRP)		
Proposed Plan		
Decision Document		
Follow work as stipulated in Decision Document		

IDENTIFY CURRENT PROJECT		
SITE CONSTRAINTS AND DEPENDENCIES EM 200-1-2, Paragraph 1.3.1		
Administrative Constraints and Dependencies		
Rights of Entry (ROE) will be executed by USACE, supported by HGL .		
Utility review and coordination.		
Coordination with landowners		
Cultural Resources		
Funding beyond the RI/FS		
Site Security		
Scheduling		
Technical Constraints and Dependencies		
Establishment of exclusion zone for munition of greatest fragmentation distance during excavation of MEC/UXO.		
Working depth of geophysical instruments.		
MEC avoidance		
Topography/Vegetation		
Heat stress consideration during summer activities		
Hunting seasons		
Legal and Regulatory Milestones and Requirements		
Consistent with CERCLA and NCP		
Public, stakeholder & regulatory involvement & review of key documents		
Screening levels as agreed upon by the Project Team. Background samples will be used to assess metals.		
CURRENT EXECUTABLE STAGE EM 200-1-2, Paragraph 1.3.3		
Technical Project Planning (TPP)		
Remedial Investigation/ Feasibility Study (RI/FS) Work Plan Development		
RI fieldwork		
RI/FS Reports		
Proposed Plans		
Decision Documents		
Basic (For Current Projects)	**Optimum** (For Future Projects)	**Excessive** (Objectives that do not lead to site closeout)
MEC investigation and MC sampling within MRSs	MEC and MC Removal Actions, if warranted.	

Acronyms

ASR - Archives Search Report
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CESAC - U.S. Army Corps of Engineers, Charleston District
EPA - U.S. Environmental Protection Agency
EE/CA - Engineering Evaluation/Cost Analysis
ESV - Ecological Screening Value
FUDS - Formerly Used Defense Sites
HGL - HydroGeoLogic
HRS - Hazard Ranking System
MC - munitions constituents
MEC - munitions and explosives of concern
MRS - Munitions Response Site
MRSPP - Munitions Response Site Prioritization Protocol
NCP - National Contingency Plan

Acronyms (cont'd)
NDAI - No Department of Defense Action Indicated
PIP - Public Involvement Plan
PRG - Preliminary Remediation Goal
RAB - Restoration Advisory Board
RI/FS - Remedial Investigation and Feasibility Study
ROE - Rights of Entry
SCDHEC - South Carolina Department of Health and Environmental Control
SSL - Soil Screening Level
TBD - To be determined
TPP - Technical Project Planning
UXO - Unexploded Ordnance

PROJECT OBJECTIVES WORKSHEET

SITE: **MRSs - R01, R02, R03, and R09**
PROJECT: **Former Conway Bombing and Gunnery Range, SC**

Site Objective					Data Needs	Data Collection Methods	Data Users	Project Objective Classification [d]
Number	Executable Stage [b]		Description	Source [c]				
	Current	Future						
1	Yes		Assess MEC data, determine risk reduction alternatives.	ASR, EE/CA, RAs	Additional MEC investigation	Digital Geophysical Mapping, Mag-and-dig, intrusive investigation	Risk and Remedy Perspectives	Basic
2	Yes		Assess MC data to evaluate risk to human health or the environment	ASR, EE/CA, RAs	Additional MC sampling	Soil, sediment, and, if necessary, groundwater/surface water sample collection	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2
b Refer to EM 200-1-2, Paragraph 1.2.5
c For example, Meeting with Customer/stakeholder/Regulator, State Regulation____,
d Classification of project objectives can only occur after the current project has been identified.
Refer to EM 200-1-2, Paragraph 1.3.3.

ASR - Archive Search Report
IAW - In accordance with
MEC - Munitions and Explosives of Concern
LU - Land Use
MC - Munitions Constituents
SAP - Sampling and Analysis Plan

MEC Data Quality Objective Worksheet

Site: MRSs - R01, R02, R03, and R09

Project: Former Conway Bombing and Gunnery Range RI/FS

DQO Statement Number: 1 of 2

DQO Element Number [(1)]	DQO Element Description [(1)]	Site-Specific DQO Statement
Intended Data Use(s):		
1	Project Objective(s) Satisfied	Evaluate presence/absence of MEC and determine if further response actions are required to support current and future residential, commercial, agricultural, and recreational land use.
Intended Need Requirements:		
2	Data User Perspective(s)	Risk, Remedy
3	Contaminant or Characteristic of Interest	MEC, Munitions Debris distribution/density
4	Media of Interest (Surface and Subsurface Soil)	N/A
5	Required Locations or Areas	MRSs - R01, R02, R03, R09 - Investigation of each MRS as described in paragraphs 5.3.1.1.1 to 5.3.1.1.4 of the Advance Summary.
6	Number of Samples Required	N/A
7	Reference Concentration of Interest or Other Performance Criteria	DGM and intrusive investigations will be conducted to meet the performance critieria required by the PWS (90% confidence that MEC contaminated areas are bounded to an accuracy of 250 feet, etc.) DQOs will be expanded in the TPP Memorandum and Work Plan to include Decision Rules, etc.
Appropriate Sampling and Analysis Methods:		
8	Sampling Method	Digital Geophysical Mapping (DGM), Mag-and-Dig Intrusive Investigation.
9	Analytical Method	N/A

[(1)] Refer to EM 200-1-2, Para. 4.2.1

MC Data Quality Objective Worksheet

Site: R01, R02, R03, and R09

Project: Former Conway Bombing and Gunnery Range RI/FS

DQO Statement Number: 2 of 2

DQO Element Number [(1)]	DQO Element Description [(1)]	Site-Specific DQO Statement
Intended Data Use(s):		
1	Project Objective(s) Satisfied	Evaluate presence/absence of MC
Intended Need Requirements:		
2	Data User Perspective(s)	Risk, Remedy
3	Contaminant or Characteristic of Interest	See Table 1 (Human Health and Ecological Screening Values for Soil)
4	Media of Interest	Soil, and other media (if applicable)
5	Required Locations or Areas	Incremental sampling (IS) will be conducted throughout the R01, R02, R03, and R09 MRSs, based on confirmation of historical information, DGM analysis, and intrusive investigative results IAW the approved WP. These areas will be designated as sampling units (SUs). IS will also be conducted at identified background locations for the site-specific background dataset. Background IS samples will be collected from areas similar to, but outside of the MRS boundaries, per EPA guidance. Based on decisions made by the PDT during the TPP process and IS analytical results, discrete soil sampling may be required at locations identified during the completion of field activities. Discrete sample locations will be selected based on incremental sampling results and existing site conditions. Based on the soil sampling results, other media may also be sampled.
6	Number of Samples Required	During Phase 1: Ten IS surface soil samples will be collected from the following MRSs: R01, R02, R03, and R09. Ten IS surface soil samples will also be collected from areas similar to, but outside of the MRS boundaries.
7	Reference Concentration of Interest or Other Performance Criteria	If MC is detected, comparison against background levels and screening levels will be conducted to determine if further MC evaluation is warranted. Screening levels, listed in Table 1, will be agreed upon by the Project Team. Characterization of MC presence will be performed in compliance with the performance objectives set out in the PWS for the project.
Appropriate Sampling and Analysis Methods:		
8	Sampling Method	Samples in accordance with SAP.
9	Analytical Method	IS will be analyzed for explosives (8330B) and select metals (6010C). Background IS will be analyzed for select metals (6020A). Analysis of discrete samples will include explosives (8330A), select metals (6010C).

[(1)] Refer to EM 200-1-2, Para. 4.2.1

TABLE 1 - Human Health and Ecological Screening Values for Soil

Analyte	Abbreviation	CAS #	Human Health Screening Values[1]				Ecological Screening Values			
			EPA Regional Screening Levels for Residential Soil (mg/kg) (THQ=1)	EPA Regional Screening Levels for Residential Soil (mg/kg) (THQ=0.1)	EPA Regional Screening Levels for Industrial Soil (mg/kg) (THQ=1)	EPA Regional Screening Levels for Industrial Soil (mg/kg) (THQ=0.1)	Ecological Soil Screening Values (mg/kg)	Eco Soil SV Source	Ecological Sediment Screening Values (mg/kg)	Eco Sediment SV Source
Trinitrobenzene, 1,3,5-	1,3,5-TNB	99-35-4	2200	220	27000	2700	0.376	B	1300	C
Dinitrobenzene, 1,3-	1,3-DNB	99-65-0	6.1	0.61	62	6.2	0.655	B	0.00861	B
Trinitrotoluene, 2,4,6-	2,4,6-TNT	118-96-7	36	3.6	420	42	6.4	C	420	C
Dinitrotoluene, 2,4-	2,4-DNT	121-14-2	1.6	1.6	5.5	5.5	1.28	B	0.0144	B
Dinitrotoluene, 2,6-	2,6-DNT	606-20-2	0.33	0.33	1.2	1.2	0.0328	B	0.0398	B
Dinitrotoluene, 2-Amino-4,6-	2-Am-DNT	35572-78-2	150	15	2000	200	10	C	34	C
Nitrotoluene, 2-	2-NT (o)	88-72-2	2.9	2.9	13	13	9.9	C	28	C
Nitrotoluene, 3-	3-NT (m)	99-08-1	6.1	0.61	62	6.2	12	C	24	C
Dinitrotoluene, 4-Amino-2,6-	4-Am-DNT	19406-51-0	150	15	1900	190	3.6	C	9.5	C
Nitrotoluene, 4-	4-NT (p)	99-99-0	30	24	110	110	22	C	52	C
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	3800	380	49000	4900	27	C	27000	C
Nitrobenzene	NB	98-95-3	4.8	4.8	24	24	1.31	B	0.145	B
Nitroglycerin	NG	55-63-0	6.1	0.61	62	6.2	71	C	1700	C
Pentaerythritol Tetranitrate	PETN	78-11-5	120	12	1200	120	100	C	1400	C
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	5.6	5.6	24	24	7.5	C	45	C
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	120	1200	120	250	0.99	C	100	C
Barium	Ba	7440-39-3	15000	1500	190000	19000	330	A	150	C
Cadmium	Cd	7440-43-9	70	7	800	80	0.36	A	0.99	B
Lead	Pb	7439-92-1	400[2]	400[2]	800[2]	800[2]	11	A	35.8	B
Mercury	Hg	7487-94-7	23	2.3	310	31	0.1	B	0.174	B
Zinc	Zn	7440-66-6	23000	2300	310000	31000	46	A	121	B

[1] = USEPA Regional Screening Levels, November 2013.

[2] = Lead value based on blood lead modeling

Eco Screening Value Sources:

A - USEPA Eco SSLs

B - USEPA Region V Ecological Screening Levels

C - No Effect Ecological Screening Level, Los Alamos National Laboratory , ECORISK Database Release 3.1, 2012

MRSPP Data Quality Objective Worksheet

Site: R01, R02, R03, and R09
Project: Former Conway Bombing and Gunnery Range RI/FS
DQO Statement Number: 3 of 4

Module	Table #	Table Description	Known Data	Current Data Gap	Data Source
Explosive Hazard Evaluation (EHE)	1	Munitions Type		X	Historical Records/Findings
	2	Source of Hazard	X		Historical Maps
	3	Location of Munitions		X	Historical or Field Findings
	4	Ease of Access	X		Field Findings
	5	Status of Property	X		Historical Records
	6	Population Density		X	U.S. Census Bureau
	7	Population Near Hazard		X	Field Findings
	8	Types of Activities/Structures		X	Regional Zoning
	9	Ecological and/or Cultural Resources		X	State Historic Preservation Office
	10	Determining the EHE		X	Scores from Tables 1 through 9
Chemical Warfare Material (CWM) Hazard Evaluation (CHE)	11	CWM Configuration	X		Historical Records/Findings
	12	Sources of CWM	X		Historical Records/Findings
	13	Location of CWM		X	Historical or Field Findings
	14	Ease of Access	X		Field Findings
	15	Status of Property	X		Historical Records
	16	Population Density		X	U.S. Census Bureau
	17	Population Near Hazard		X	Field Findings
	18	Types of Activities/Structures		X	Regional Zoning
	19	Ecological and/or Cultural Resources		X	State Historic Preservation Office
	20	Determining the CHE		X	Scores from Tables 11 through 19
Health Hazard Evaluation (HHE)	21	Groundwater Data	X		Not Applicable
	22	Surface Water - Human Endpoint	X		Not Applicable
	23	Sediment - Human Endpoint	X		Not Applicable
	24	Surface Water - Ecological Endpoint	X		Not Applicable
	25	Sediment - Ecological Endpoint	X		Not Applicable
	26	Surface Soil		X	Surface Soil Sampling Results
	27	Supplemental Contaminant Hazard Factor		X	All MC Sampling Results
	28	Determining the HHE		X	Scores from Tables 21 through 27
	29	MRS Priority		X	Scores from Tables 10, 20, and 28
	A	MRS Background Information	X		DoD Databases

5.0 TPP MEETING SLIDE PRESENTATION

FORMER CONWAY BOMBING AND GUNNERY RANGE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HORRY COUNTY, SOUTH CAROLINA

Technical Project Planning Meeting - 1

21 November 2013

US Army Corps of Engineers
BUILDING STRONG®

Meeting Agenda

- Introductions
- TPP Objectives / Basic Definitions
  - ► Project Description & Objectives
- Technical Approach Concurrence
  - ► Site Background / Project Overview
  - ► Technical Approach for each MRS
- Schedule Update
- Closing Discussions
  - ► Action Items Review

Team Member Introductions

- USAESCH, Project Manager and COR, Chris Cochrane; Technical Manager, Kelly Longberg; Geophysicist, Debra Edwards
- USACE Savannah District, Julie Hiscox
- USACE Charleston District, Shawn Boone
- SCDHEC Project Manager, Susan Byrd
- Horry County officials
- Various private Landowners
- HGL Project Manager, Kimberly Vaughn
- HGL MMRP Operations Manager, Neil Feist

US Army Engineering and Support Center, Huntsville

HGL HydroGeoLogic, Inc Exceeding Expectations

D H E C PROMOTE PROTECT PROSPER

See Advance Summary Section 2.0 Point of Contacts

Key Definitions

- MEC – Munitions and Explosives of Concern - military munitions that may pose unique explosives safety risks. Includes unexploded ordnance (UXO), discarded military munitions (DMM), and explosive concentrations of munitions constituents (MC).
- MD – Munitions Debris - Scrap metal from munitions (with no explosive safety risk)

Key Definitions

- MC – Munitions Constituents - materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials and emission, degradation, or breakdown elements of munitions.

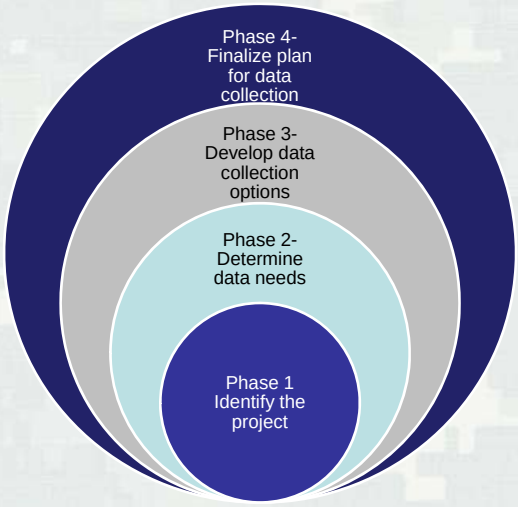
TPP Meeting Objectives

- Discuss regulator expectations
- Solicit Stakeholder Input
  - ►Identify key issues
  - ►incorporate concerns into process
  - ►Understand Local Community
- Develop Site Closeout Statement
- Concurrence to technical approach

TPP Process Overview

1. Describe site current conditions
2. Determine data needs
3. Present and discuss data collection options to fill data needs
4. Finalize data collection program for incorporation into work plans

Four Phases of TPP



Site Closeout Statement

To reduce the potential MEC and MC risk and ensure hunters, workers, residents, and farmers are aware of the risk of MEC.

After completion of the Decision Document requirements the potential risk to human health and the environment from MEC or MC will be reduced to the extent practical.

Remedial Investigation (RI) Purpose

- Determine the nature and extent of MEC and MC across each site
  - ►Collect and analyze data
- Determine potential risks to human health and/or the environment
  - ►Conduct risk assessment to quantify MC risk and a MEC hazard assessment
- Data Quality Objectives are developed to meet these goals

Feasibility Study (FS) Purpose

- The FS phase involves the development, screening, and detailed evaluation of alternative munitions response options
- Alternatives designed to protect human health, safety, and the environment.

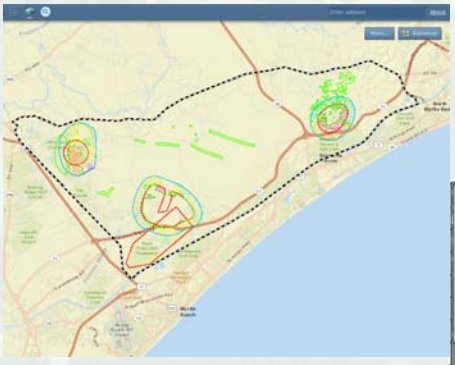
Conway Bombing and Gunnery Range RI/FS

PROJECT OVERVIEW

Munitions Response Sites Included in RI/FS

- Munitions Response Site (MRS) - A discrete location that is known to require a munitions response.
- Four included in this project scope of work:
  - ►MRS-R01, MRS-R02, MRS-R03, and MRS-R09

See Figure 1, Page 7 of Advance Summary and webmap



Webmap Option to view figures "live" during TPP meeting

Advance Summary Figure 1

Site Background

- Land used for timber harvest and farming prior to 1940.
- Myrtle Beach AAF used the Conway bombing and gunnery range (Conway BGR) for training
- By 1948, the leases for the majority of the property had been terminated and land had been returned to private ownership.
- 55,854 acres
- nine MRSs within Conway BGR
- four are being addressed by this project

Previous Investigations

- All four MRSs:
  - ► 1991 Archives Search Report (ASR)
  - ► 1994 Preliminary Assessment
  - ► 2003 EE/CA, Parsons
  - ► 2004 ASR Supplement
  - ► July 2012 RI, EODT, Revision 1
- Specific MRSs:
  - ► Time Critical Removal Actions (MRS-R02)
  - ► Third-party funded removal actions (MRS-R01, MRS-R02, MRS-R03)

Archives Search Reports

- Includes a historical records search and site inspection
- Interviews with onsite personnel
- Identification of current land use
- Determines if the potential of explosives hazards exists
- Confirms contaminated or uncontaminated

EE/CA

- Evaluated the sites by the defined areas
- Recommended removal actions and further investigation based on risks identified
- Time critical removal action (TCRA) performed at one MRS
- Evaluated non-time-critical response action alternatives where risk was identified

EODT 2012 RI

- RI conclusions where rights of entry (ROE) were obtained
- Limitations on ROE affected data gathered
- Additional investigation required for characterization of the four MRSs included in this project

Data Quality Objectives

- Defined for MEC hazards *(page 45)*
- Potential MC contamination *(page 46)*
- Geophysical data collection DQOs will be included in TPP Memorandum
- Other data needs, as identified
- Will be refined and reviewed in the TPP memorandum and the future work plans for stakeholder concurrence

Preliminary Conceptual Site Model

- Based on review of current site conditions and available historical data
- Will refine based on data gathered
- MEC CSM *(Figure 6)* and MC CSM *(Figure 7)*
  - ►Additional review and comment in both TPP memorandum and work plans

Remedial Investigation (RI) General Approach

- MEC contamination expected:
  - ► digital geophysical mapping (DGM) along transects
  - ► DGM of grids
  - ► Intrusive investigation (digging) in grids
  - ► Intrusive investigation transects
  - ► Munitions constituents sampling
- Outside MEC contaminated areas
  - ► Intrusive investigation in grids

Section 5.4.3.1 of The Advance Summary

Data collection methods

DGM Transects*			Intrusive of DGM Transects (Analog Mode)	Intrusive Between DGM Transects (Analog Mode)	Intrusive Transects to delineate well defined targets	Intrusive DGM Grids	MC Sampling	Comments
Golf Course and Residential Transects (Towed Array)	Overland Transects (Person Portable)	Wetlands Transects (Towed Array)						
DGM Transects with analog intrusive investigation	DGM Transects in rural vegetated areas with analog intrusive investigation	DGM Transects in wetlands or surface water areas with amphibious vehicle towed array	Analog Intrusive investigation of 50% of Overland DGM Transects to define MEC used areas to within 250ft	Analog Intrusive investigation of 50% of Golf Course and Residential DGM Transects to be conducted in non fairway areas (i.e. in adjacent wooded / rough areas) to define MEC used areas to within 250ft	Analog Intrusive Transects near areas where targets are well defined (to delineate extent of MEC at R02 and R03)	Intrusive DGM Grid Locations based on DGM Transect densities	Biased locations based on evaluated data	DGM transect spacing of 500 feet (nonintrusive investigation) Analog transect spacing of 500 feet (intrusive) Grids=20% of transect acreage

Alternate Approaches

- HGL proposes to negotiate alternate approaches based on land use
  - ► Golf courses, residential areas
  - ► Overland wooded, open, or wetlands areas
    - Amphibious vehicle for wetlands areas
- Rights-of-entry a known challenge
- Requires interaction with landowners
  - ► Minimizes impacts to gather data
- Successfully negotiated on other RIs

Figure 1

Figure 2

MEC Contaminated Areas

- DGM transects
  - Brush clearance (mechanical or hand clearance)
  - Linear transects designed to detect target areas with a 90% confidence
  - Towed array or person portable
- DGM Grids

Intrusive Investigation

- Transects:
  - Along DGM transects

  Or
  - Separate intrusive transects to delineate MEC contamination areas
- Grids
  - intrusive after DGM data is collected

Non-MEC contaminated areas

- Buffer areas of the MRSs (outside of the expected MEC presence areas)
- Grid sampling approach to confirm that MEC is not present
- HGL proposes 100 grids (100-ft x 100-ft size) in these outlying areas
- DGM and Intrusive investigation

Page 19, Advance Summary, "Basis for MEC Investigation", subparagraph (iii)

MEC Hazard Assessment

- Explosives Safety Hazard
  - ►Will be assessed using MEC Hazard Assessment (MEC HA)
- evaluates potential MEC hazards
- interim guidance document issued by EPA in 2008
- Evaluated for each MRS and documented in final reports

Munitions Constituents (MC)

- Identify MC contamination (phase 1)
- Delineate MC contamination (phase 2)
- Incremental sampling method surface soil sampling
  - ► Explosives by 8330B
  - ► compare to site-specific background concentrations for metals
- Collect additional surface or subsurface soil at locations where an MC release is confirmed

MC contamination

- Verify MC contamination presence
  - ► comparison of MC concentrations to:
    - EPA ecological screening values or
    - EPA regional screening levels for residential and industrial soil
  - ► Identified COPCs will be evaluated further in the risk assessment
- Details in TPP Memorandum and future sampling plans

See Table 1, page 47 of Advance Summary

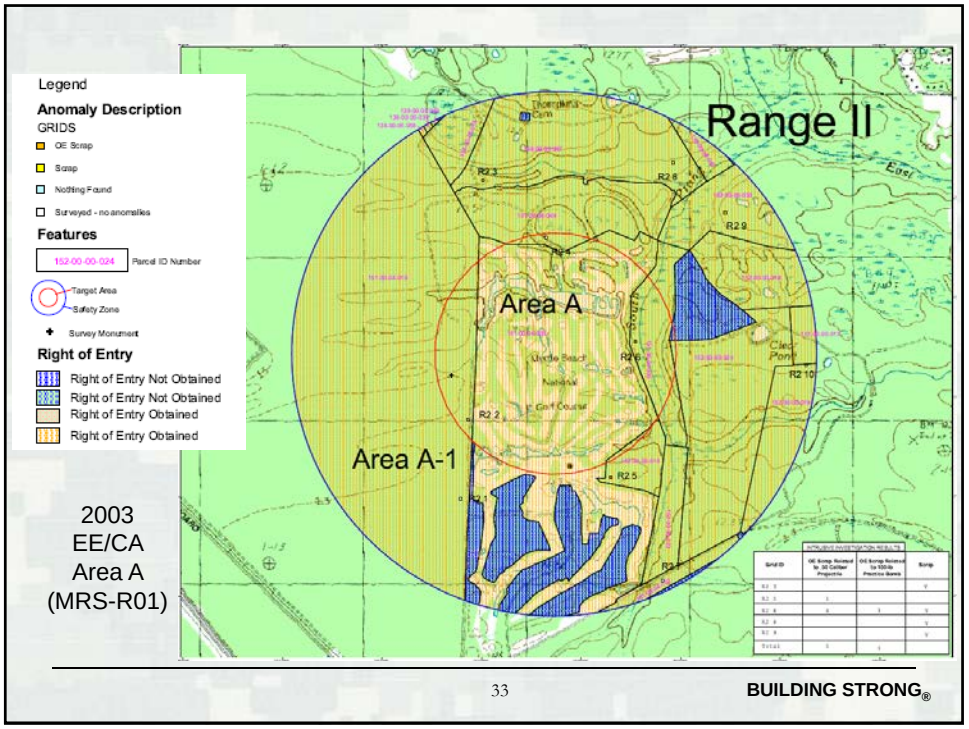
Conway Bombing and Gunnery Range RI/FS

TECHNICAL APPROACH FOR EACH MRS

MRS-R01, Range II

- Historical use:
  - Practice bombing, including high- and medium-altitude bombing, skip bombing, parafrag bombing, and rocket firing.
- Identified in EE/CA
- Investigated as “Area A and A-1”
- Not delineated in previous RI/FS 2012
- Historical aerial photo analysis to identify potential impact areas

See Table 1.1, page 9 of Advance Summary


Legend
Anomaly Description
GRIDS
OE Scrap
Scrap
Nothing Found
Surveyed - no anomalies
Features
152-00-00-024
Parcel ID Number
Target Area
Safety Zone
Survey Monument
Right of Entry
Right of Entry Not Obtained
Right of Entry Not Obtained
Right of Entry Obtained
Right of Entry Obtained
Range II
Area A
Area A-1
2003
EE/CA
Area A
(MRS-R01)
33
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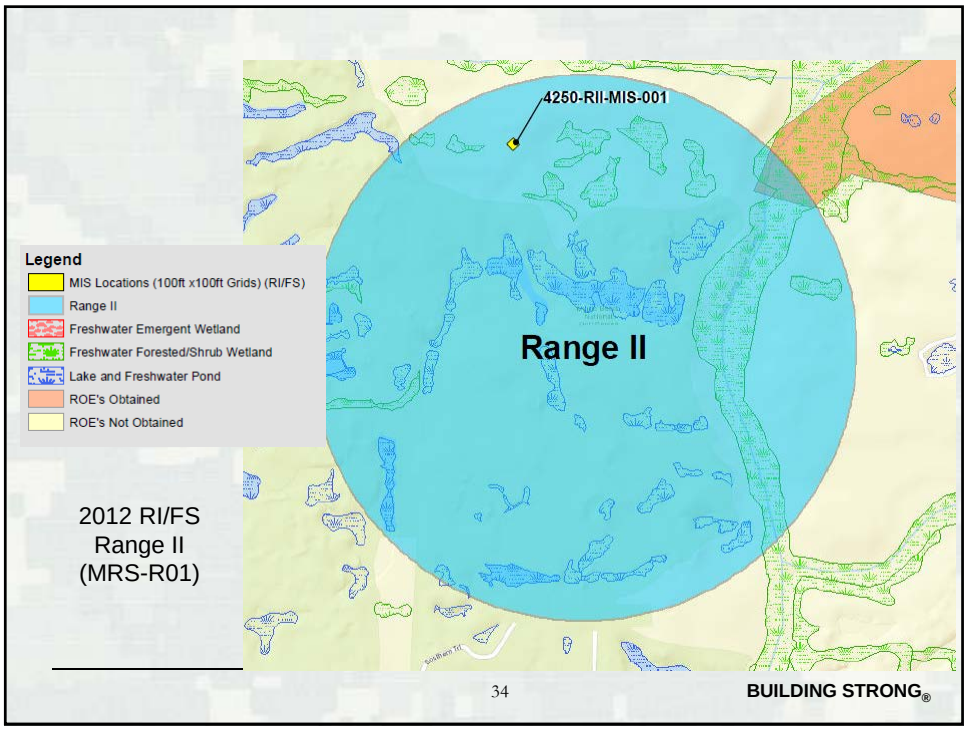
4250-RII-MIS-001
Legend
MIS Locations (100ft x100ft Grids) (RI/FS)
Range II
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Lake and Freshwater Pond
ROE's Obtained
ROE's Not Obtained
Range II
2012 RI/FS
Range II
(MRS-R01)
34
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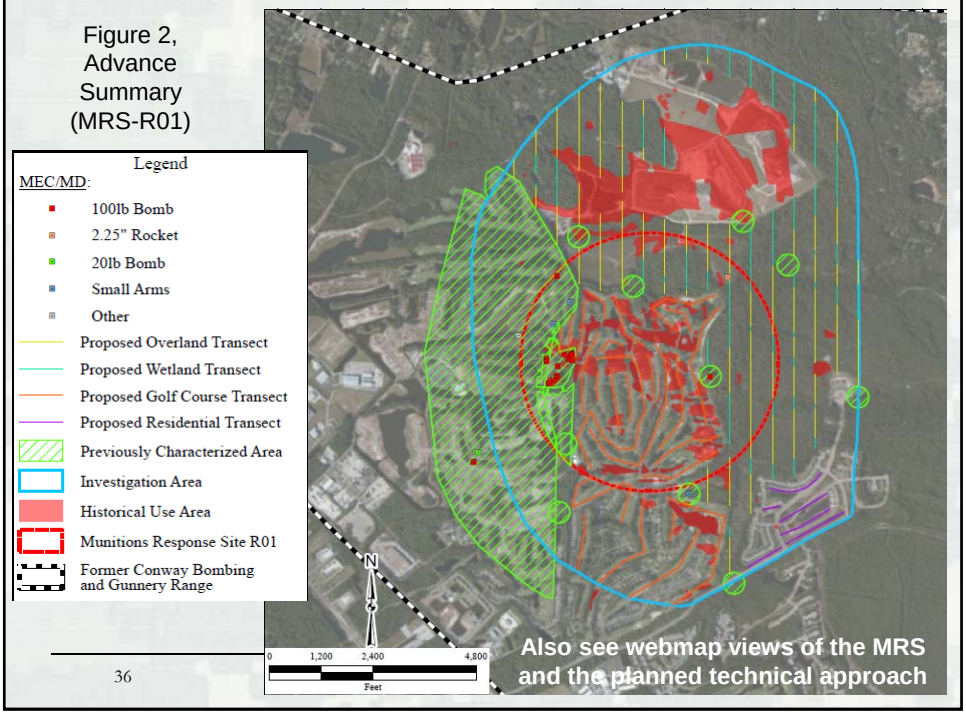
Delineate to north, northwest and east

- 1.29 miles of residential area transects
- 9.31 miles of golf course transects
- 9.31 miles of overland transects
- 4.87 miles of wetland/ponds transects
- Grids based on DGM transect densities will be proposed
- Intrusive investigation (grids & analog transects)
- Incremental soil sampling

Figure 2, Advance Summary (MRS-R01)

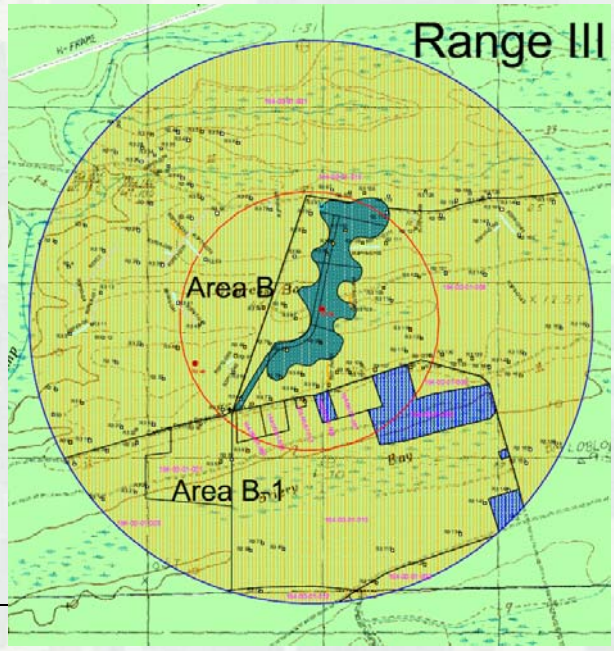


Also see webmap views of the MRS and the planned technical approach

MRS-R02, Range III

- Historical use
  - high- and medium-altitude bombing, skip bombing, and rocket firing including demolition bombing, dive bombing, strafing, rocket firing, and incendiary bombing
- MEC found previously: 100-pound practice bombs and 2.25-inch rockets
- Investigated as “Area B”
- TCRA on 45 acres (Parsons, 2002).
- Not delineated in previous RI/FS 2012
- Historical aerial photo analysis

See Table 1.2, page 10 of Advance Summary



Legend:

Anomaly Description

GRIDS

- OE Scrap
- Scrap
- Nothing Found
- Not Dug - underwater
- Surveyed - no anomalies
- UXO Item (Grid R3 94 - 3 Intact OE Items Were Also Recovered)

TRANSECT LINES

- OE Scrap
- Nothing Found
- Surveyed - no anomalies

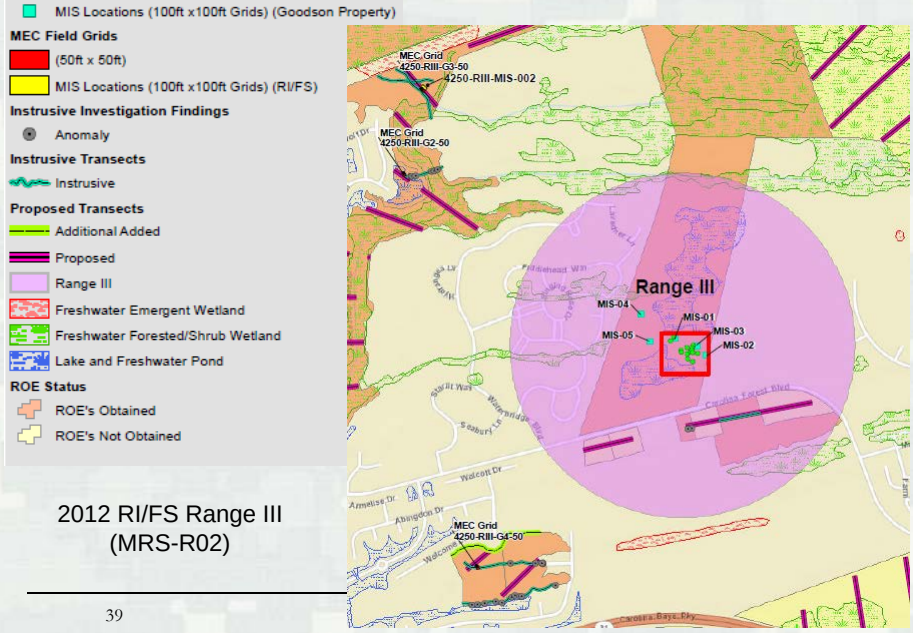
Features

- 164-00-01-008 Parcel ID Number
- Target Area
- Safety Zone

Right of Entry

- Right of Entry Not Obtained
- Right of Entry Obtained
- Proposed Lake and Access Road for Goodson Property

2003 EE/CA Area B (MRS-R02)

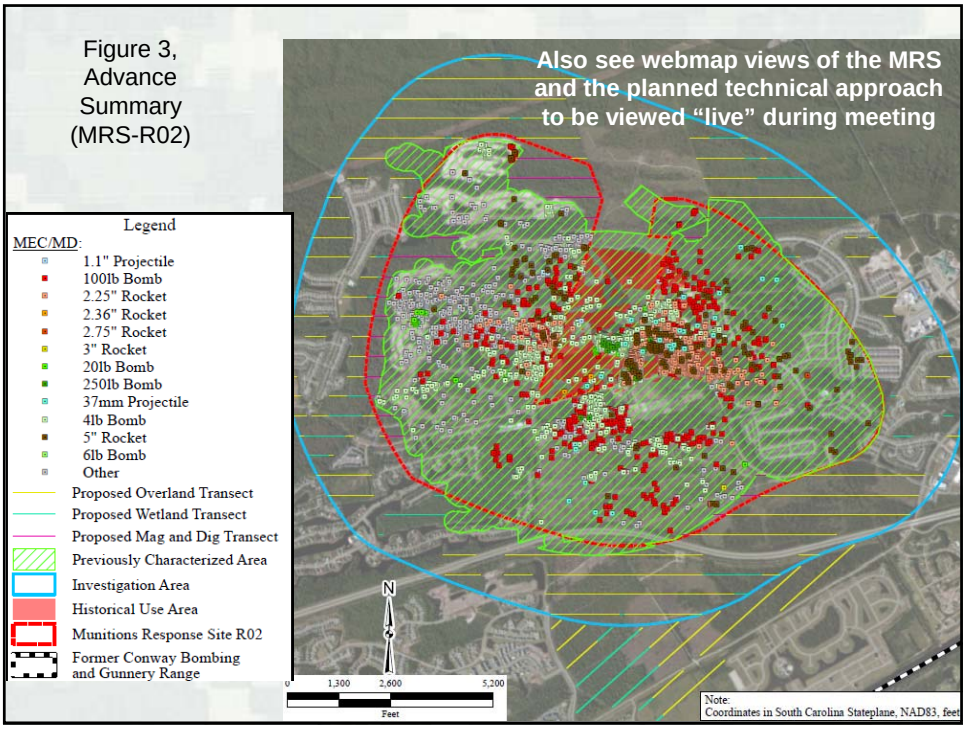


2012 RI/FS Range III (MRS-R02)

Additional delineation, MRS-R02

- 16.29 miles of overland transects
- 4.31 miles of wetland/ponds transects
- 2.47 miles of analog transects
- Grids based on DGM transect densities will be proposed
- Intrusive investigation (grids & analog transects)
- Incremental soil sampling

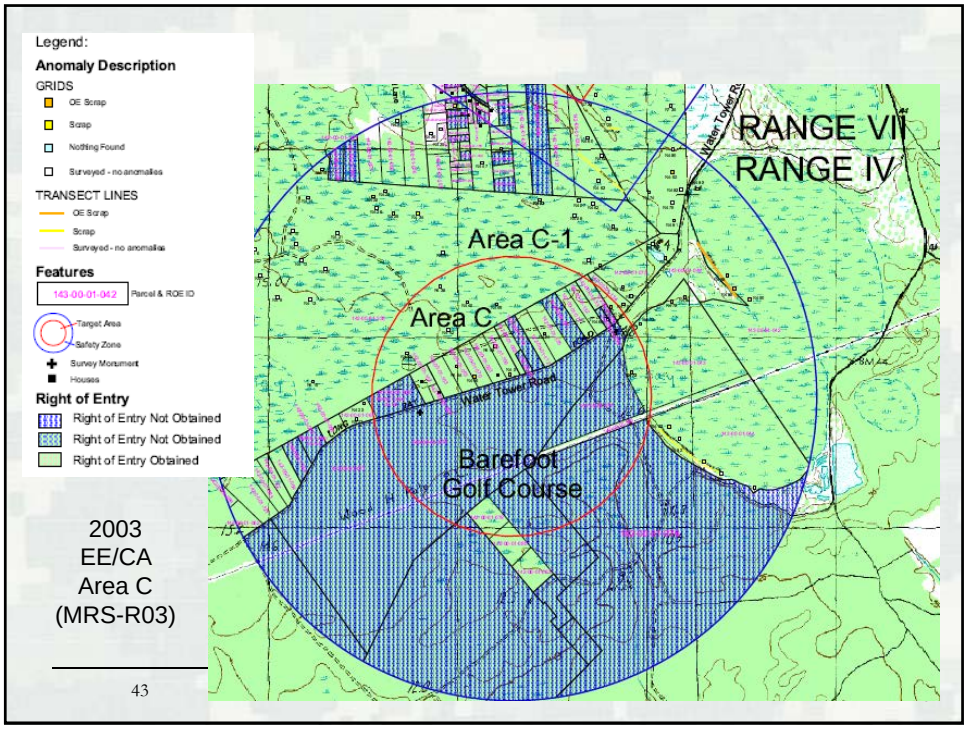
Figure 3, Advance Summary (MRS-R02)



MRS-R03, Range IV

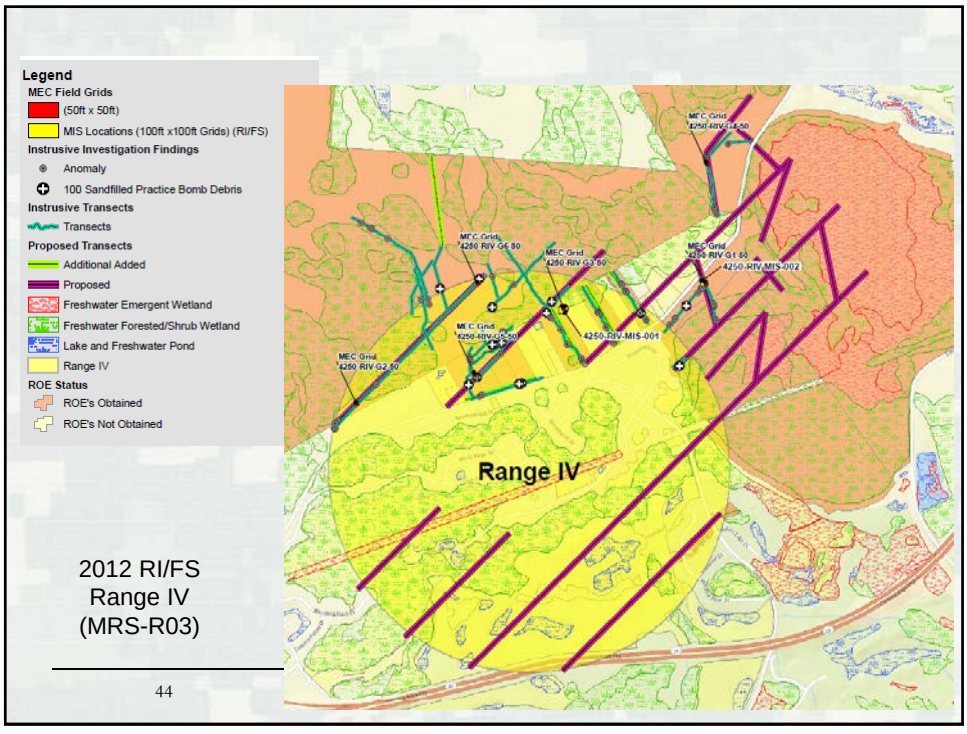
- Historical use:
  - ► practice bombing, including medium-altitude bombing
- identified in the EE/CA
- Investigated as "Area C"
  - ►MD: 4-lb incendiary bombs, 100-lb practice bomb, 20-lb fragmentation bomb
- Third-party removal actions occurred

See Table 1.3, page 11 of Advance Summary



2003
EE/CA
Area C
(MRS-R03)

43



2012 RI/FS
Range IV
(MRS-R03)

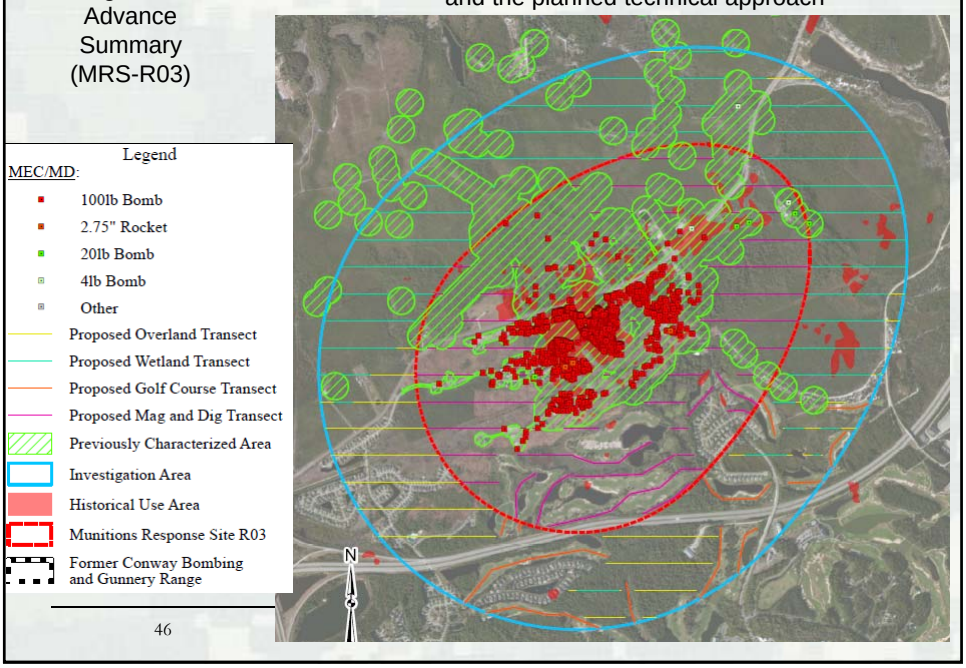
44

Delineate to northeast, southeast & southwest

- 2.54 miles golf course transects
- 4.45 mi overland transects
- 8.66 miles wetland/ponds transects
- 7.89 miles of analog transects
- Grids based on DGM transect densities will be proposed
- Intrusive investigation (grids & analog transects)
- Incremental soil sampling

Figure 4, Advance Summary (MRS-R03)

Also see webmap views of the MRS and the planned technical approach



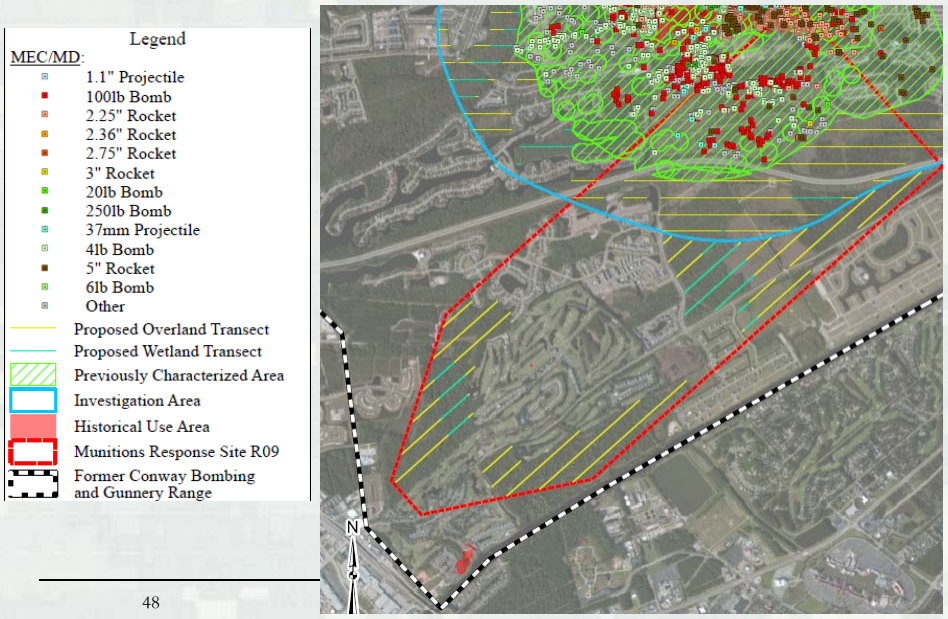
MRS-R09, Machine Gun/Rifle Range

- Historical use:
  - ►firing bomber turrets and machine guns in a ground-mounted mode, and the basic rifle marksmanship training
- EE/CA recommended NDAI
- RI indicated MEC confirmed on site

See Table 1.4 in Advance Summary

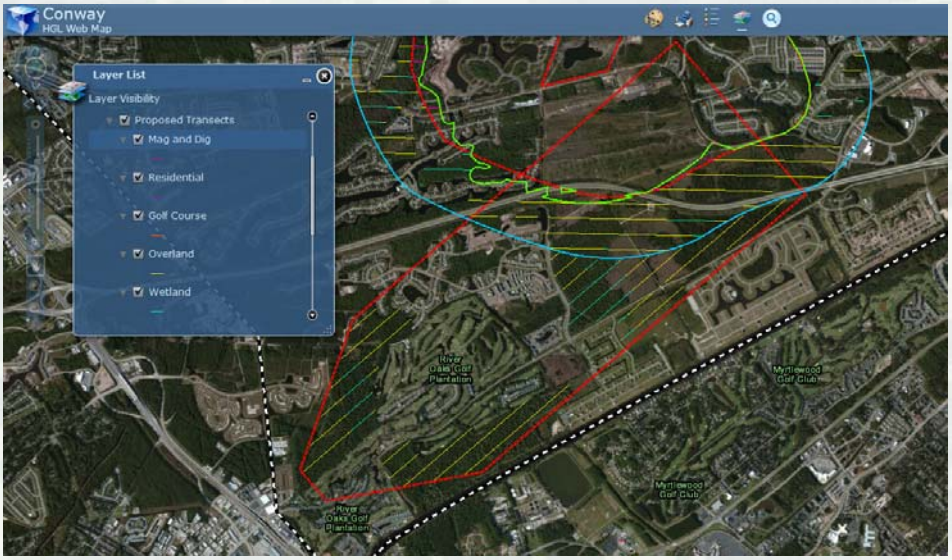
Figure 5, Advance Summary (MRS-R09)

Overlap with MRS-R02 not covered



Delineate suspected MEC contamination

- 7.49 mi overland transects
- 2.20 miles wetland/ponds transects
- Up to 50% of DGM transects mileage will be performed as analog transects, locations to be proposed in future
- Grids based on DGM transect densities will be proposed
- Intrusive investigation (grids & analog transects)
- Incremental soil sampling



Webmap views of the MRS and the planned technical approach

Right-of-Entry Support

- HGL to identify relevant parcels
- Draft lists of landowner contact information
- Current Horry County data has been incorporated in HGL's GIS
- Viewable on the webmap
  - ►Separate webmap for tracking ROE status

Community Relations Support

- Three (3) public meetings anticipated
  - ► One in support of the Proposed Plan
  - ► Others to support right-of-entry

- Community Relations Plan
  - ► Involve community leaders and citizens
- Administrative Record will be updated with final versions of documents
  - ► Horry County Memorial Library, Conway, SC

Key Reports / Documents

- Draft TPP Memorandum
- Draft Work Plan (Explosives Siting Plan)
- Community Relations Plans
- Field Activities
- RI Report / FS Report
- Proposed Plans
- Decision Documents

Moving Forward - Schedule

☑ TPP Meeting #1 (today)

❑ TPP Memorandum (December 2013)

❑ Work Plans (Draft January 2014)

► TPP Meeting #2 (March 2014)

❑ Field Work (summer/fall 2014)

❑ Draft RI Report (January 2015)

Site Closeout Statement

To reduce the potential MEC and MC risk and ensure hunters, workers, residents, and farmers are aware of the risk of MEC.

After completion of the Decision Document requirements the potential risk to human health and the environment from MEC or MC will be reduced to the extent practical.

TPP Meeting Closure Issues

- Concurrence –
  - Technical Approach, DQOs, preliminary CSM, sampling comparison criteria
  - Information to be provided in TPP Memorandum for formal comment
- Other Issues/Notes –
  - Area access limitations
  - Rights of entry (ROE)
  - Identify additional stakeholders, etc.

Closing

- Action item review
- Questions or concerns

5-inch ZUNI rocket warhead (practice)
Located in 2003 at The Farm at Carolina Forest

6.0 SCDHEC REVIEW OF ADVANCE SUMMARY

D H E C
PROMOTE PROTECT PROSPER
Catherine B. Templeton, Director
Promoting and protecting the health of the public and the environment

February 7, 2014

Julie Anne Hiscox
FUDS Senior Project Manager
US Army Corps of Engineers
Savannah District
100 W Oglethorpe Avenue
Savannah, Ga 31401-08809

Re: Technical Project Planning Meeting1
Advanced Summary
Former Conway Bombing and Gunnery Range
Remedial Investigation/Feasibility Study

Dear Mrs. Hiscox:

The Department has completed its review of the above referenced document and has no additional questions or comments at this time. If you need any additional information, feel free to contact me at (803)898-0308 or byrdsk@dhec.sc.gov.

Sincerely,

Susan K. Byrd

Susan Byrd, FUDS Project Manager
Division of Waste Management
Bureau of Land and Waste Management