



Using GIS to Help Support and Sustain U.S. Army Ranges - A Global Approach

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**Army Sustainable Range Program (SRP) Geospatial Support Center
Army Garrison Fort A.P. Hill, Virginia, USA**



Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE JUN 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE Using GIS to Help Support and Sustain U.S. Army Ranges -A Global Approach				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Army SRP Geospatial Support Center, Army Garrison Fort AP Hill, VA, 22427				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 14-17 June 2010 in Denver, CO.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 24	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Agenda / Objectives



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- Provide a brief overview of the Sustainable Range Program (SRP)
- Provide an overview of the SRP Geospatial Support Center
- Highlight the agencies, installations, and offices that are directly supported by the SRP Geospatial Support Center
- Highlight procedures, products, and tools created in support of the SRP
- Highlight several projects executed at the SRP Geospatial Support Center
- So, how can Parsons support your geospatial mission?

Sustainable Range Program (SRP)



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- DoDD 3200.15 signed in August 2003
 - Established policy for the sustainment of all DoD ranges
- AR 350-19 established in September 2005
 - Defines the SRP and the responsibility within the SRP
- The Army's overall approach for improving the way in which it designs, manages, and uses its ranges to ensure long-term sustainability
- Maximizes the capability, availability, and accessibility of ranges and training lands to support doctrinal training and testing requirements, mobilization, and deployments under normal and surge conditions

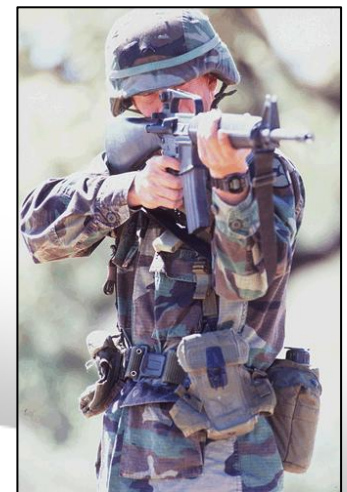


Sustainable Range Program (SRP)



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- The SRP includes two core programs, under the direction of Headquarters Department of the Army (HQDA) G-3 Training Simulations Division (DAMO-TRS)
- **Range and Training Land Program (RTLTP)**
 - Range Operations
 - Range Safety
 - Range Modernization
- **Integrated Training Area Management (ITAM) Program**
 - Land Rehabilitation and Maintenance (LRAM)
 - Range and Training Land Assessment (RTLTA)
 - Sustainable Range Awareness (SRA)
 - Training Requirements Integration (TRI)

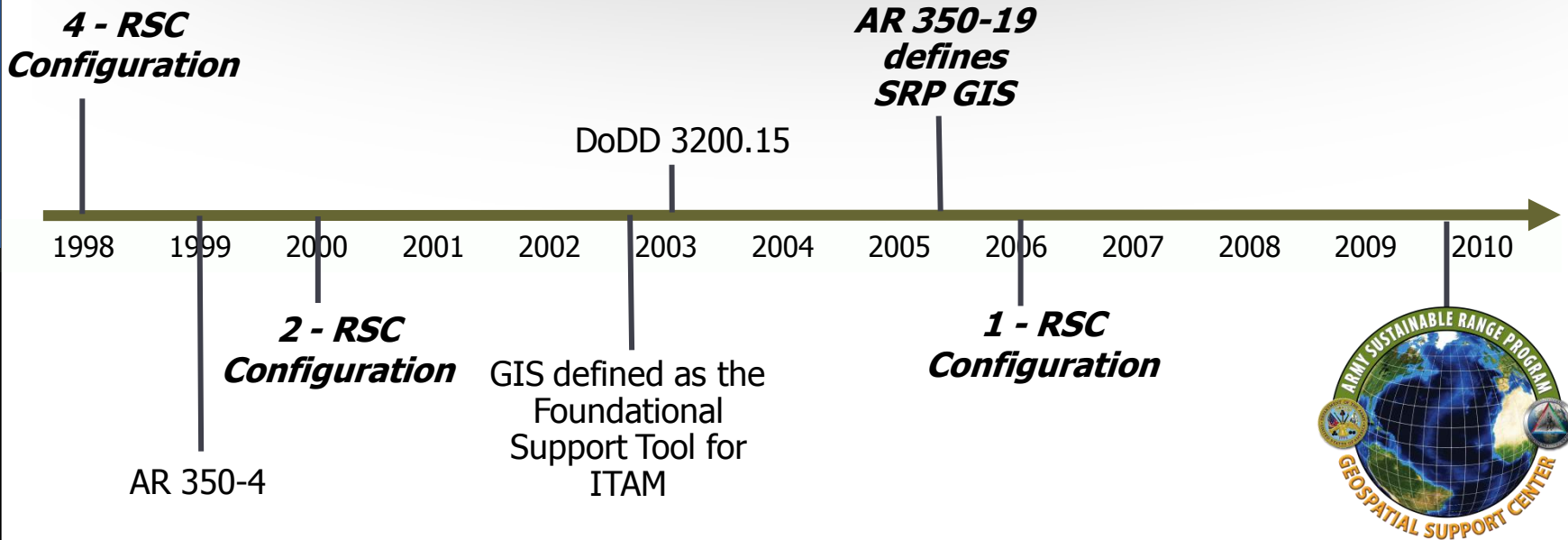


SRP Geospatial Support Center



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- As a tenant on Fort AP Hill, have been serving the Army since 1998
- Previously called the SRP GIS Regional Support Center



So why the name change?

- Increased focus on all HQ (G3/5/7) Range and Training Area analysis
- Haven't been regional since 2006 (Just didn't want to lose the RSC name)
- Dictate GIS guidance and standards for all Army Ranges and TAs

SRP Geospatial Support Center



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Mission Oriented Operation

- Designed to execute achievable goals and tasks
- Provide central service and support to the SRP

Structured Operation

- Standard Operating Procedures.
- Documented tool and application protocols

Flexible Implementation

- Sustainable Range Program is dynamic
- Army ranges and training are dynamic

Basic Goals

- Increasing the utility and cost effectiveness of GIS
- Increasing data compatibility
- Eliminating redundant GIS efforts
- Creating standardized products (Maps, data, etc.)



Geospatial Support Center Teams



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Who we support



- Support over 225 Installations / Training Areas / LTAs / Sites
- Installations are divided into Tiers (Tiers 1 – 3)
 - Size of Installation, Installation Mission, Active Duty Units, etc.
- Tiers dictate the level of GIS support we provide

GIS Support Structure



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- Sites with a GIS Operator or that are regionally supported
 - Larger SRP Installations (Tier I and II)
 - Operated locally and supported by Geospatial Support Center ~ **175 Sites**
- Sites without a GIS Operator
 - Smaller SRP Installations (Tier III)
 - Centrally supported by Geospatial Support Center ~ **56 Sites**
- ★ Support includes:
 - SRP GIS Training Program
 - Military Installation Map (MIM) Development
 - Standards for Hardware, Software, Geospatial Data
 - Support in the procurement of Vector Data and Visualization Data/Imagery
 - RFMSS Graphic Fire Desk Data Support
 - GIS Technical Support (Centralized Expertise)
 - Testing and Evaluation of GIS software/applications
 - Data Development / Acquisition / Standardization
 - Site Visits (Training and GPS)
 - Data Repository for HQDA Analysis (Dedicated Offsite Back-ups)
 - Augment Existing Support

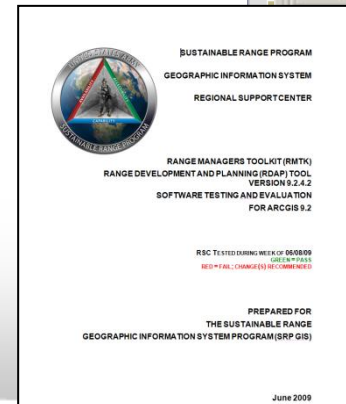
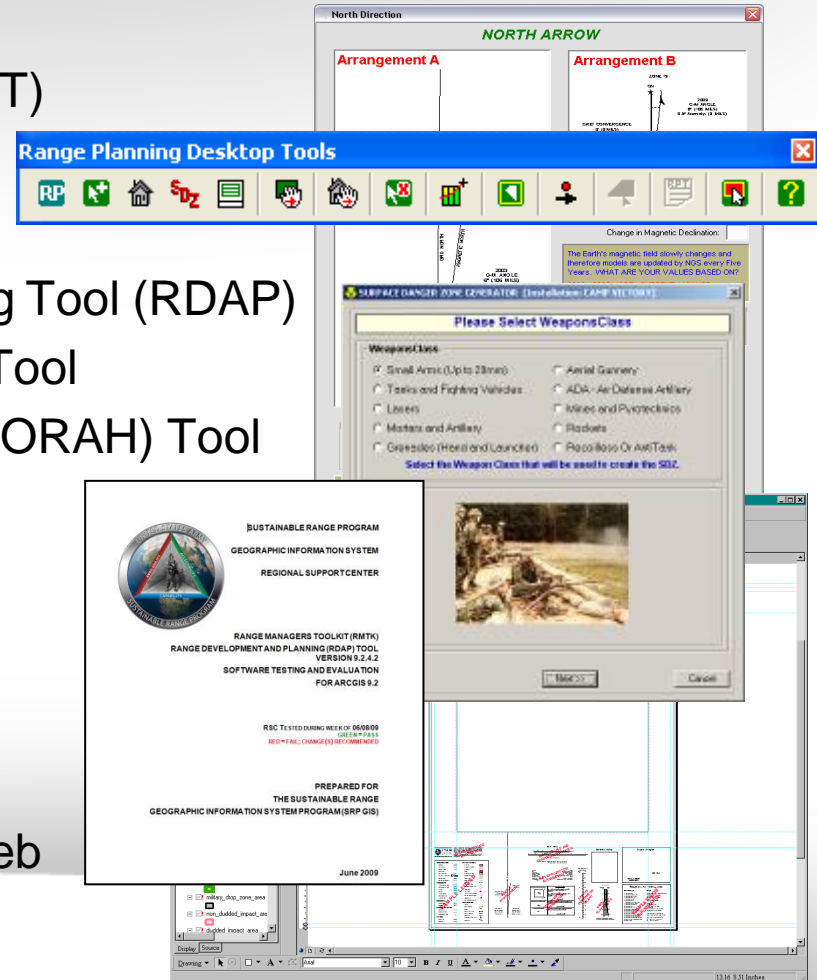
SRP Tools and Application Support



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- Execute and document Software Qualification Test (SQT) for all tools
- Provide all technical support to Army range community

- Military Installation Map Toolkit (MIMT)
- Range Managers Toolkit (RMTK)
 - Surface Danger Zone (SDZ) Tool
 - Range Development and Planning Tool (RDAP)
 - Explosive Training Range (ETR) Tool
 - On Range Ammunition Handling (ORAH) Tool
 - Noise Tool (*Planning Tool*)
- SRP Metadata Editor Tool (SMET)
 - In Development
- SRP GIS Tracker



All tools are downloadable on SRPWeb

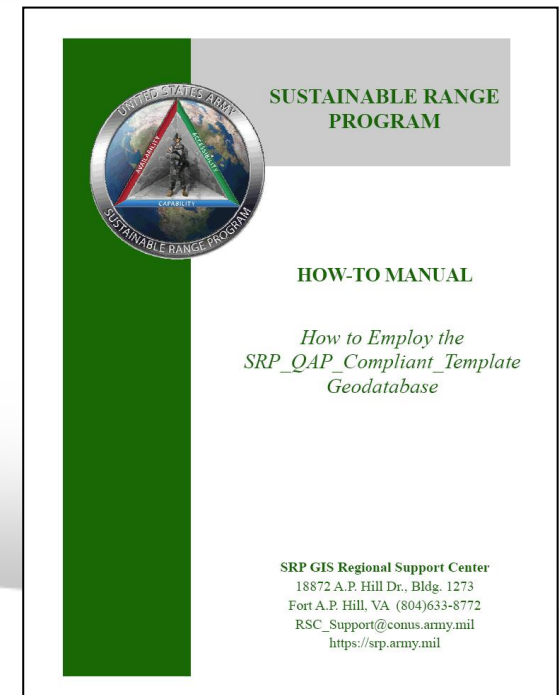
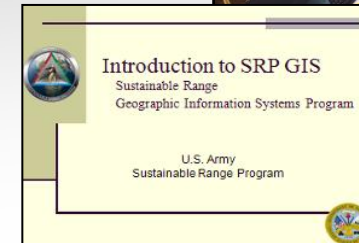
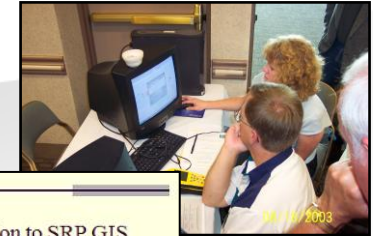
<https://srp.army.mil>

GIS Training Support



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- Online SRP GIS Professional Training Course
 - Overview of SRP GIS Program
 - Protocols and Procedures
 - Tips to best support the installation
- SRP GIS Technical Articles
 - Topology Tricks and Tips
 - Quality Assurance Plans for GIS Data
 - Military Installation Map
 - GeoPDF
- SRP GIS Procedural “How-to’s”
 - How to make a data dictionary
 - How to use the SRP QAP geodatabase
- GIS for Range Staff Course
 - Range Safety Tools and basic GIS training
- Workshops and Conferences

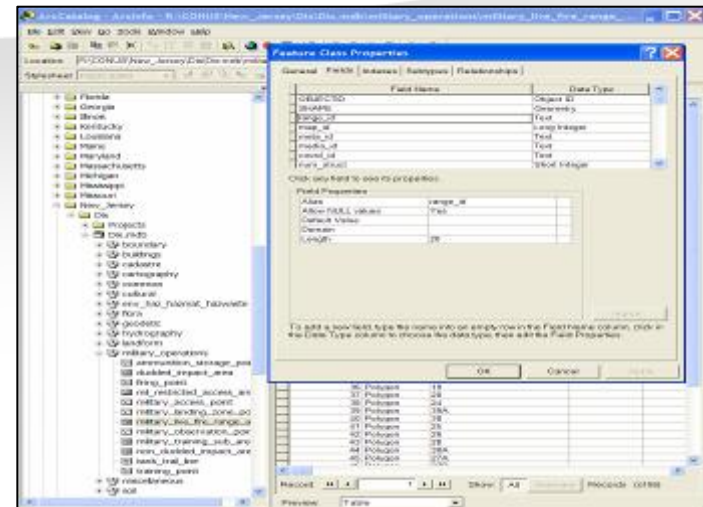


Data Development Team Projects



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- Following all geospatial standards and SRP protocols, create and maintain geospatial data for 56 installations in support of land management and mission planning
- Created and maintain over 600 military operation feature classes for the 56 installations
- Visit 25 – 30 Installations per year for GPS data collection
- Since this data is used for safety, driving range development decisions, stewardship; all data is GPSed to include every firing point, target, etc.
- Very important as data drives everything we do and support.



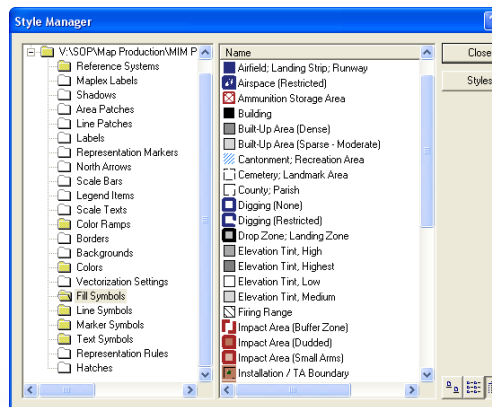
Map Development Team Projects



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Military Installation Maps (MIM)

- Created a MIM template (.mxt) based on layout of previously produced NGA MIMs and supporting documentation.
- Created standard MIM symbology which contains symbols, labels, and tints based on existing DoD and NGA standards.
- Created MIM Production Guidance Documentation



MIM Production Guidance Documentation

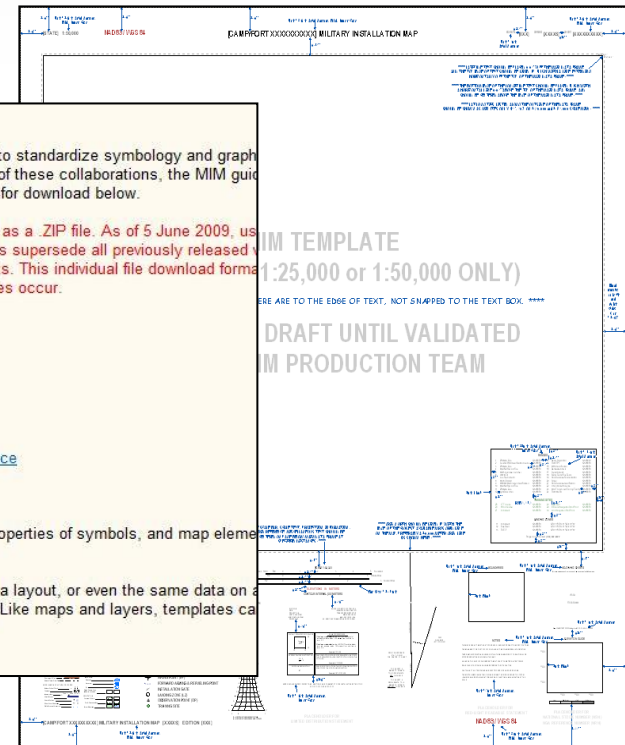
The SRP GIS Program has worked closely with Army G-2 and NGA to standardize symbology and graph they train across Army training and testing installations. As a result of these collaborations, the MIM guidance and the MIM Production Guidance Documentation (MPGD), are available for download below.

NOTE: Previously, the MPGD was available for download collectively as a .ZIP file. As of 5 June 2009, this symbology, templates) are now available for download, and these files supersede all previously released files below to ensure compliancy with current MIM production requirements. This individual file download format will ensure that persons can be notified when updates to individual files occur.

- [Memorandum - Production of Military Installation Maps \(MIMs\)](#)
- [Production Specifications for Military Installation Maps \(MIMs\)](#)
- [Appendix A - Required Data Layers for the MIM](#)
- [Appendix B - Additional SRP Proponent Data Layer Requirements](#)
- [Appendix C - Non-Proponent Data Layer Requirements](#)
- [Appendix D - MIM Spacing & Font Requirements](#)
- [Appendix E - MIM Layout Examples](#)
- [Appendix F - FAQ Regarding MIM Development and Quality Assurance](#)
- [Appendix G - MIM Finishing Review Checklist](#)
- [Appendix H - MIM Approval Signature Document](#)

MIM Style (An organized collection of predefined colors, symbols, properties of symbols, and map elements used in mapping products.)

MIM Template (Map templates make it easy to reuse or standardize a layout, or even the same data on a map. you don't have to manually reproduce the common parts of the map. Like maps and layers, templates can be used to standardize the maps that we produce.)



Map Development Team Projects



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Military Installation Maps (MIM)

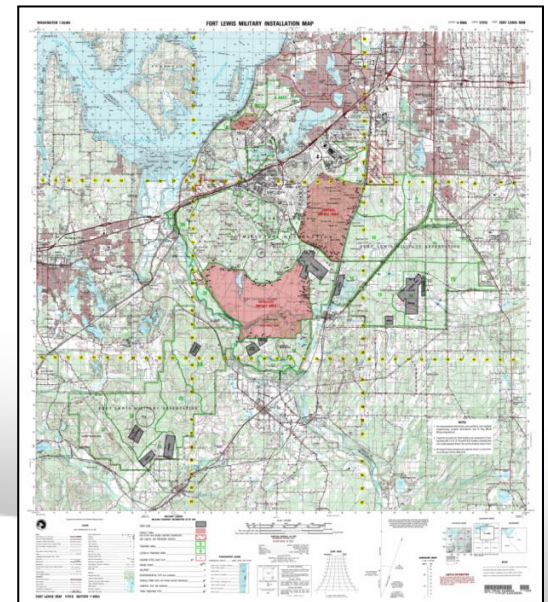
- G-2, SRP, and NGA signed Memorandum of Agreement (MOA) on 9 Feb 09 to formalize support for MIM production



- 32 MIM sheets have been finalized and validated by SRP since 2007
- 29 of these have been printed by NGA, and are currently in stock at DLA, with 2 more ready for printing



- Export finalized MIMs to GeoPDF format, and they are posted to SRPWeb as well as the Army Geospatial Center (AGC) website, and are available for download



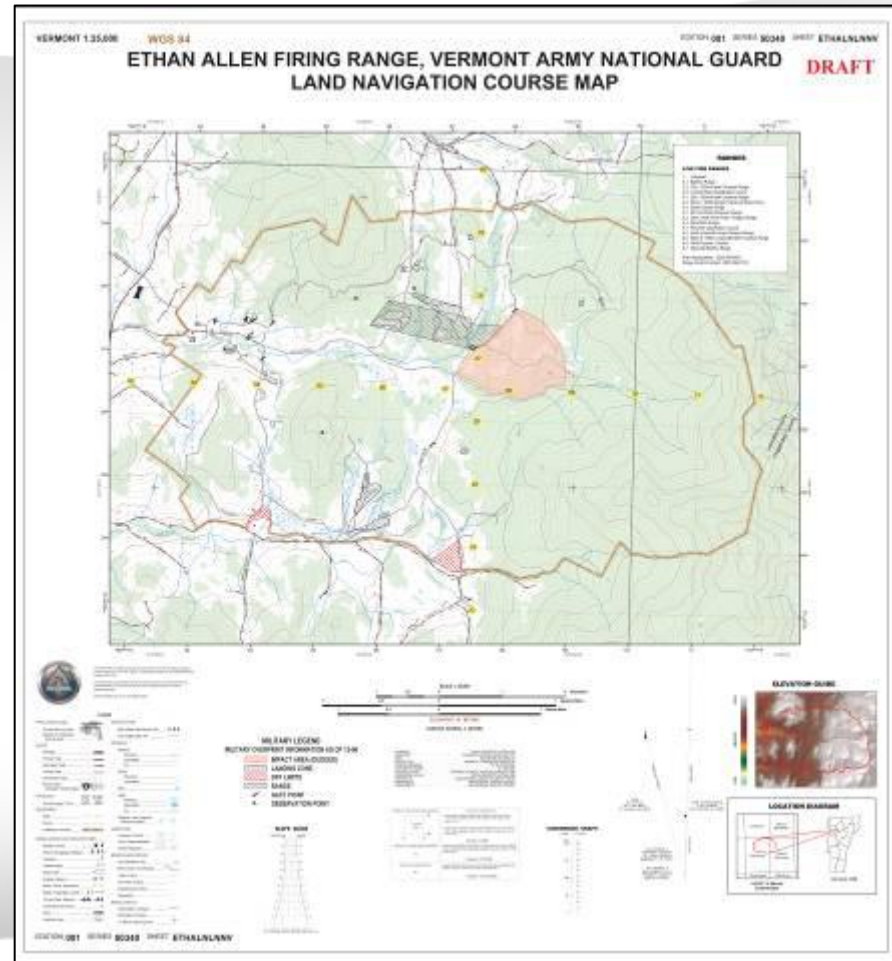
Map Development Team Projects



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Custom Map Production

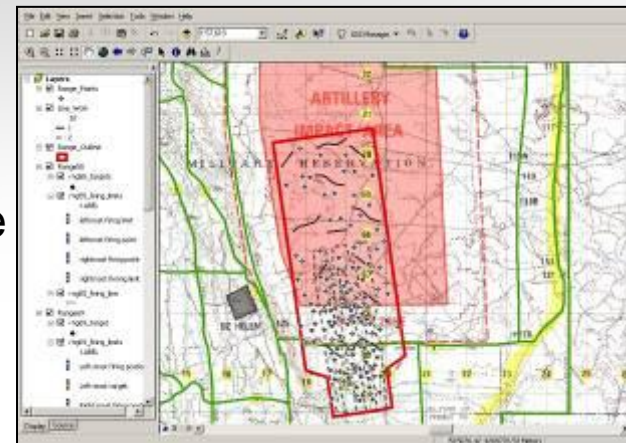
- Training Scenarios
- Land Navigation
- Range Planning
- Range Analysis
- Situational Maps
- Emergency Response
- MOUT Site Maps
- Impacts to Training
- Range Safety
- DoD Proximity Maps
- Land Management
- Land Disturbance



Range Support Team Projects

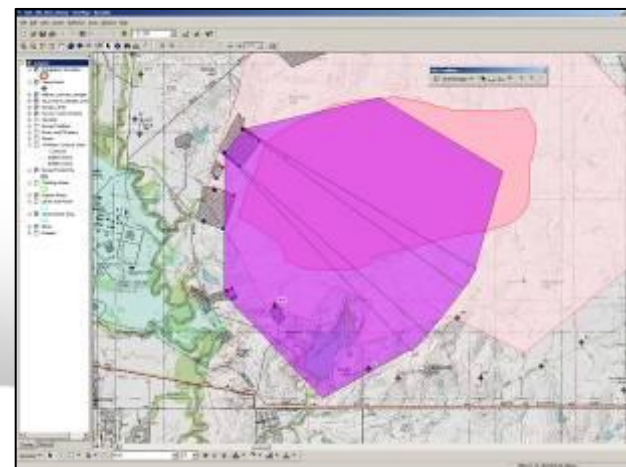
Range Complex Master Plan (RCMP) Support

- Provide GIS Support by (GPSing) current range data to support installation plan
- Collect natural resource, environmental, and public works data to help identify fit and placement of new range project
- Use the RDAP and SDZ tool to identify range location taking into account all factors:
 - Environmental conflicts
 - Infrastructure (Fiber optics, electrical,...)
 - Topography



Charrette Support

- Range project has been approved and team goes down range to fine tune the analysis using the same techniques used during the RCMP
- Provide GIS Support to the TCM-Live Range modernization (Charrette)



Quality Control Team Projects



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Map Production Quality Control

- SRP MIM Production Team performs QA to ensure consistency with symbology, spacing, and layout requirements (report card)
- Created MIM finishing review checklist for users creating their own MIM
- Once validated by SRP, the MIM is sent to NGA for inspection.
- Checked for these items:
 - ✓ Absolute horizontal error
 - ✓ Relative horizontal (feature to feature) accuracy
 - ✓ Circular Map Accuracy Standard (CMAS)
 - ✓ Absolute vertical error
 - ✓ Relative vertical error

MIM SHEET INFORMATION			
Sheet Name	XXXXXXXXXX		
Series Number	X7XS or X8XS		
Edition Number	003		
Reviewer	SRP GIS Regional Support Center		
Date	XX / XX / 20XX		
DATA QUALITY			
ITEM	REQUIREMENT	STATUS	COMMENT
Source Materials / Quality Assessment	Source materials documented / obtained for all data layers being included on map. All data layers complete (all features included) when compared to stated source materials. All data layers pass QA/QC assessment when compared to stated source materials. Geodetic tab run acquired for all map sheets.		
GEODEIC INFO & MARGINALIA			
ITEM	REQUIREMENT	STATUS	COMMENT
Sheet Identification	State name in upper left margin identifier. Scale of map is either 1:25,000 or 1:50,000. Installation / sheet name entered into title, upper right margin identifier, and lower left margin identifier. Edition entered in upper right margin identifier and lower left margin identifier.		
Projection	NGA series number entered in upper right margin identifier and lower left margin identifier. Measurement of projection dimensions agrees with geodetic tab run. Geographic coordinates labeled and spaced correctly on all four corners. All geographic T ticks shown, and 5' ticks labeled. Interior geographic intercepts (latitude/longitude ticks) at 5' shown. *One second* notes correct on all four sides (latitude notes read from east).		
Grid - Major	Data frame rotated prior to converting graphic to geodetic. Measurement of grid lines from projection corners agrees with geodetic tab run. Full Easting and Northing grid values on SW corner for first grid lines shown (not necessarily first full line). Each line of major grid labeled - small numbers included for each 10,000m grid number. 1,000 meter and 10,000 meter grid lines symbolized properly. (Display number of rows and columns represented (omit last row/col if applicable).		
Legend			
Military Legend			
Conversion Graph			
Scale Bars / Note(s)			
Geodetic Notes			

MIM FINISHING REVIEW CHECKLIST
(Sheet 1:00 scale 1:100)

Sheet #: _____ Series ID: _____ Edition #: _____
Reviewer: _____ Producer/Contractor: _____ Date: _____

SOURCE MATERIALS

- ___ Evaluation prints, QC tabs, file folders
- ___ Review edition and date numbers, release maps, 50K, 100K, JOD, City/DM
- ___ Determine to verify listing and appropriate native source maps/NTM contact (Geomatics POC)
- ___ DVPF, AWP, MBG, Geodetic Report Tab run

GEODEIC INFO & MARGINALIA

PROJECTION

- ___ Measurement of projection dimensions agrees with geodetic tab run
- ___ Geographic coordinates labeled and spaced correctly on all four corners
- ___ All geographic one-minute ticks are shown and 5' (1000) ticks labeled
- ___ Interior geographic intercepts at 5' (1000) or 10' (2000) are shown
- ___ *One second* notes correct on all four sides (latitude notes read from east)
- ___ *Note: check all of the above (One second* notes only if values are different than base map)

GRID - MAJORS

- ___ Measurement of grid lines from projection corners agrees with geodetic information
- ___ First grid line at each corner agree with tab run corner grid coordinates
- ___ Full Easting and Northing grid values on SW corner for first grid lines shown (not necessarily first full line)
- ___ Each line of major grid is labeled - include small numbers for each 10,000m grid number
- ___ Grid major corners are shown in proper color
- ___ 10,000 meter grid lines are wider (thicker) color
- ___ 1000 meter grid lines are thinner (lighter) color
- ___ Grid line values correct and shown in proper color
- ___ 1:1000m grid lines are 1/100th of applicable same color as major grid
- ___ Zone junction note shown (if applicable)
- ___ *Note: check all of the above (One second* notes only if values are different than base map)

GRID - OVERLAPPING (when applicable)

- ___ Check for overlapping grid intersections
- ___ Measurement of grid ticks (shown as line projections from projection corner) agree with geodetic information
- ___ First grid tick at each corner agrees with tab run corner grid coordinates
- ___ Full Easting and Northing grid values on SW corner for first grid ticks shown
- ___ All overlapping grid ticks are present and the same color as major grid lines
- ___ 10,000 meter grid ticks are wider (thicker)
- ___ 1000 meter grid ticks are thinner (lighter)
- ___ Grid tick values correct and shown in proper color
- ___ *Note: check all of the above

GRID REFERENCE BOX

- ___ Grid of reference line to verify with major grid
- ___ 100,000 meter square identification (bottom and 10,000m grid values) correct per TM 83M-1
- ___ SW corner designation correct per TM 83M-1
- ___ 100 meter reference line
- ___ 100,000 meter square identifiers shown inside inset (if different than base map)

DECLINATION DIAGRAM(S)

- ___ 2000 Epoch data
- ___ Diagram and notes are same color as major grid (one diagram)

Version 6 1 11/3/06

Unclassified - FOUO

REPORT OF FORT STEWART MILITARY INSTALLATION MAP EVALUATION (V7455 FTSTEWAMIM 004)

Military Installation Map was evaluated using georeferenced NTM stereo imagery to see for comparison (road intersections, stream intersections, etc.). The differences are derived from the map and the imagery were then used to compute the statistics. 4 points were selected for the evaluation (see Figure 1 below).

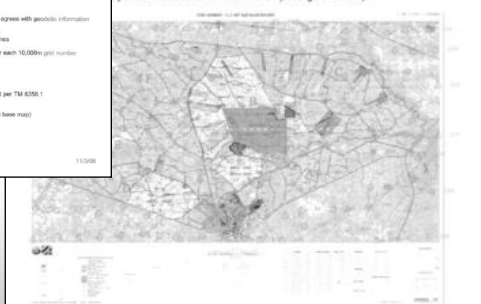


Figure 1. Point Distribution for the Fort Stewart Military Installation Map Evaluation

Seventy-five points were located inside, seventy-two points located outside, the military installation boundary. Three sets of accuracy statistics were computed: 1) all evaluation points; 2) the subset of points inside the military installation boundary; 3) the subset of points outside the military installation boundary. The horizontal error of the subset inside the installation boundary was about twenty meters better than the subset outside (see the Evaluation Results below).

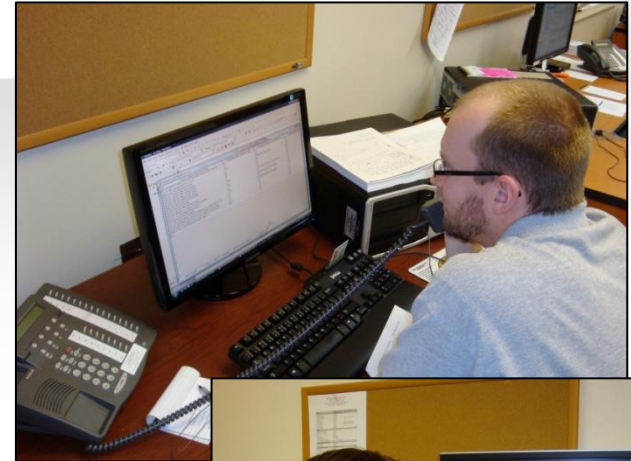
Following each set of statistics in the Evaluation Results section is a vector plot of that evaluation. The vector plot displays the magnitude and direction of the horizontal error for each point in the evaluation. The base of the vector represents the latitude and longitude of the point on the map and the vector points to the true position of the point derived from NTM stereo imagery.

Technical Support



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- Annually, the RSC averages over 600 GIS technical support calls
- Topics include:
 - RMTK (All tools)
 - MIM Development
 - QAP/Data Development
 - Data Acquisition
- The RSC created and maintained a technical support log tracker to manage and track all SRP GIS related questions
 - This allows for searching on answers to redundant questions



SRP GIS Website Statistics



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- SRPWeb (<https://srp.army.mil>)
- From 1 Oct 07 to present, there were 39,285 individual SRP GIS webpage hits with over 22,000 SRP GIS files downloaded from the SRPWeb library to include:
 - 7,523 Military Installation Maps
 - 5,653 guidance documents
 - 1081 “How-To” documents
 - 3,920 tools
 - 672 SRP GIS Technical Articles
 - 531 SRP GIS Courses

The screenshot displays the SRPWeb website interface. At the top, there are navigation links for 'robert.maple', 'Log Out', 'My Profile', 'SRP Tools', 'Applications', and 'Support'. Below this is a banner image of soldiers in a field. The main content area is titled 'Sustainable Range Program' and is divided into two columns. The left column contains an 'Overview' section with a paragraph describing the SRP as the Army's overall approach for improving range design, management, and sustainability. The right column contains a 'Headlines' section with several news items, including updates on the 2010 TSS Workshop, the Real Property Range Inventory spreadsheet, and TCM-L IPT updates. A 'Job Vacancy Announcements' section is also visible, featuring a small image of a map and links to 'Military Installation Maps (MIMs)', 'MIM Production Guidance', and 'Documentation'. At the bottom, there is an 'Available for download' section with a small image of a map and a link to 'Download a copy of the 25th Year ITAM anniversary logo'.

In Summary

- Provided a snapshot of the work executed at the SRP Geospatial Support Center
- The SRP Geospatial Support Center is:
 - ❖ Mission Oriented
 - ❖ Structured Operation
 - ❖ Striving for standard products and data
 - ❖ Dynamic and Flexible
 - ❖ GIS Center of Excellence
 - ❖ Time tested success (12+ years)



Points of Contact



PARSONS

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