

ARMY RANGE MANAGEMENT TOOLKIT for GIS

Statement of Work

1.0 **Background.** Geographic Information Systems (GIS) helps to provide a context to more efficiently manage the Army's training lands. This project will provide the Army's range complex managers a GIS toolkit that helps manage safety hazards and other potential disturbances to local residents associated with live fire training activities.

1.1 **Purpose.** Two critical management issues associated with live fire training events are the projectiles from the weapon systems and their associated noise. First, projectiles moving downrange are a hazard to personnel within their associated Surface Danger Zone (SDZ). The dimensions and geometry of each SDZ is defined in Army Regulation (AR) 385-63 (Range Safety), and based on the weapon system, munitions, firing location, target location, and the medium that the round may ricochet of as it moves downrange. Second, firing weapon systems causes noise, which can be an annoyance to both on-post and off-post residents. The Army Center for Health Promotion and Preventive Medicine (CHPPM) has modeled noise contours associated with firing events, and these levels are based on the weapon system, munitions, firing location, target location, and atmospheric conditions. This project will provide an easy-to-use software tool that will allow range management offices to place SDZs and noise contours in the context of other map layers to gain better situational awareness of their range complex.

1.2 **Applicable Regulations and Documents.**

1.2.1 Army Regulation (AR) 385-63 (Range Safety)

1.2.2 Department of Army Pamphlet (DAPAM) 385-63 (Range Safety)

1.2.3 SDSFIE Definitions

1.2.4 AR 210-21 (Army Range and Training Land Program)

1.2.5 AR 350-4 (Army Integrated Training Area Management Program)

1.2.6 AR 200-1 (Environmental Protection and Enhancement)

2.0 **Objectives.** This project will provide the Army's range land managers a tool to help them safely manage risks associated with live fire training events.

2.1 The Range Management GIS ToolKit will allow range personnel to easily create SDZs in a manner that fits standard operating procedures on their installation.

2.2 The Range Management GIS ToolKit will allow range personnel to easily create noise contours in a manner that fits standard operating procedures on their installations.

- 2.3 The Range Management GIS ToolKit will produce SDZs that reflect the Army's most current safety information.
 - 2.4 The Range Management GIS ToolKit will aid range personnel in quickly, accurately preparing range waiver packages.
 - 2.5 The deployment of the Range Management GIS ToolKit will be well coordinated to guarantee that personnel have access to the latest, most complete and accurate version.
 - 2.6 The Range Management GIS ToolKit will automate processes wherever possible to ensure easy operation.
- 3.0 **Scope.** This project will be limited to (1) Upgrading the existing Government-owned Surface Danger Zone GIS application and converting the Government-owned noise application a GIS application, (2) Integrating the SDZ tool and the noise application into the Range Management GIS ToolKit, (3) Providing training to ITAM personnel on the operation of the ToolKit and GIS Standards.

The existing Government owned Surface Danger Zone GIS tool is an Environmental Science Research Institute (ESRI) extension that plugs into existing COTS software, ArcGIS. Purpose of this project is the modify existing extension with additional wizard functionality to improve Graphical User Interface and to incorporate a noise module.

4.0 **Tasks.**

- 4.1 **Project Management.** The Contractor shall provide materials to ensure that the Government is aware of progress on this project. All references to days in the following sections are Government business days, unless otherwise noted.
 - 4.1.1 **Initial Coordination Meeting.** The Contractor shall attend an initial coordination meeting at the US Army Training Support Center (ATSC) to review the requirements within this Scope of Work (SOW), resolve any questions on timelines or deliverables, and define specific requirements for the draft Management Plan, and monthly reporting procedures. The meeting shall be completed within ten (10) days of award.
 - 4.1.2 **Project Management Plan.** The Contractor shall provide a draft Project Management Plan (PMP), which details their plan to implement the successful completion of the tasks described in this Statement of Work, to the Government within ten (10) days after the Initial Coordination Meeting. This PMP will include timelines, resumes for key personnel, number of labor hours by task, estimated time required for meetings with government personnel, and travel costs. The Government will provide written comments electronically to the Contractor within ten (10) days of receipt of the draft PMP. The Contractor shall incorporate the Government's

comments into the final PMP within ten (10) days of receipt of the Government's comments.

- 4.1.3 **Monthly Status Reports.** The Contractor shall provide a Monthly Status Report (MSR) on the 15th calendar day of each month during the duration of the project. The Contractor shall include in each MSR: information about labor and other direct costs, progress related to each task, and significant issues concerning the project.
- 4.1.4 **Urgent Action Reports.** The Contractor shall notify the Government Points of Contact (POC) of any urgent issues that require Government input prior to submittal of an MSR. The Contractor shall provide these reports by telephone or email, and shall include a summary of these issues and their outcome in the MSR.
- 4.1.5 **Working Group Meetings.** The Contractor shall attend up to six (6) Working Group meetings as directed by the Government. A Working Group will consist of any combination of installation, MACOM, and HQDA subject matter experts.
- 4.2 **Current SDZ Tool Application Support.** The Contractor shall support the current SDZ Tool by recording all issues presented by users. The Contractor shall report these issues in table format in the MSR. The Contractor shall adapt the current SDZ tool to resolve these issues as directed by the Government.
- 4.3 **Range Management ToolKit Database Update.** The Contractor shall update and provide data entry of the database to support Range Management ToolKit functionality.
 - 4.3.1 **Noise Tool Database.** The Contractor shall adapt the database, which drives the Army Construction Engineering Research Laboratory (CERL)-developed noise tool, to meet the requirements of the new Noise Tool for GIS. The output of this task will be an integrated weapon system and munitions database that will be utilized by both the Noise Tool and the SDZ tool portions of the Range Management ToolKit for GIS.
 - 4.3.2 **DODIC, M-number, and description update.** The Contractor shall facilitate meetings with members of the Working Group to determine necessary changes to the database to match Department of Defense Identification Code (DODIC) to the M-number listed in AR 385-63 and the descriptions from both sources. The output of this task is a database, which supports all the functions of the Range Management ToolKit described in this document.
- 4.4 **SDZ Tool Upgrade Development.** The Contractor shall upgrade the Government-owned SDZ Tool for GIS for easier use, more automation, and more robust functionality. The Contractor shall propose a logical timeline to

complete each of the sub-tasks under Paragraph 4.4 in the Project Management Plan (Paragraph 4.1.2).

- 4.4.1 **New Weapon Systems.** The Contractor shall update the SDZ Tool database for new Weapon Systems as published by the Army/USMC Safety Office and incorporate the updates within the SDZ Tool.
- 4.4.2 **SDZ Tool Output Upgrades.** The Contractor shall upgrade the View SDZ Data functionality of the SDZ Tool to include a signature block for Installation Range Managers to certify hardcopy output of SDZ generated.
- 4.4.3 **SDZ Tool Functional Upgrades.** The Contractor shall upgrade the functionality of the SDZ Tool.
 - 4.4.3.1 **Multiple Munitions Entry Format.** The Contractor shall develop upgrades to the current SDZ tool graphical user interface (GUI) that will allow the user to select weapon systems and munitions by either DODIC or M-Number. The output of this task will be improved input flexibility for the end-user.
 - 4.4.3.2 **Indirect-Fire Database Integration.** The Contractor shall develop an automated process, which will allow the user to choose between selecting artillery- and mortar-specific information in a pick list or enter the same information from hard copy Tabular Firing Tables (TFTs) available at most range control offices. The output of this task will be improved input flexibility for the end-user.
 - 4.4.3.3 **Firing Point and Target Location Upgrade.** The Contractor shall upgrade the flexibility of the user to input firing point and target locations to include firing boxes, firing limits, and the combination of firing points and azimuths. A firing box is defined as a polygon consisting of four (4) points which bound the area from which soldiers fire their weapons. A firing limit is defined as a line segment that starts at either the left- or right-most firing point and passes through the corresponding left- or right-most target. The output of this task will be an interface, which allows users to easily enter firing event location data to include mouse, keyboard, and a pre-existing database, and the ability for the application to utilize this data to produce SDZs.
 - 4.4.3.4 **Crossing Fire Upgrade.** The Contractor shall develop the capability to create SDZs utilizing a firing box as the firing location and ensuring that the SDZ created is appropriate for soldiers firing from any point within the firing box at any target on the target line.
 - 4.4.3.5 **SDZ Manager Module.** The Contractor shall develop a module within the Range Management ToolKit that aids the user in managing SDZ files, modifying SDZs, and combining SDZs.
 - 4.4.3.5.1 **SDZ File Manager.** The Contractor shall develop a module within the Range Management ToolKit, which aids the user in managing files associated with SDZs.

- 4.4.3.5.2 **SDZ Setup Module.** The Contractor shall develop a setup module for the SDZ Tool that will allow the user to set preferences for how the application will prompt the user for information.
- 4.4.3.5.3 **SDZ Modification Module.** The Contractor shall develop a modification module for the SDZ Tool that will allow the user to perform common tasks associated with SDZs, including, but not limited to rotating SDZs, truncating an SDZ based on an elevation contour, or rotating a firing limit. The Contractor shall develop this functionality as determined by the Working Group.
- 4.4.3.5.4 **Conflict determination.** The Contractor shall develop a module that will aid the user in determining conflicts associated with live fire events, such as navigable waters, associated tributaries and adjacent wetlands, endangered species habitat, and installation boundary. The Contractor shall develop this module to be flexible and aid in determining alternative range configuration.
- 4.4.3.5.5 **Line of Sight Determination.** The Contractor shall develop a module that allows the user, who has one or both of Spatial Analyst or 3D Analyst ArcGIS Extensions, to determine line of sight and viewsheds for an SDZ given. This will require that the user also have a digital elevation model data available.
- 4.4.3.5.6 **Waiver Package Preparation.** The Contractor shall develop a module that aids the user in developing a range waiver, in accordance with Army Regulations. The purpose of this portion of the application is to demonstrate what changes were made to the standard SDZ, why the changes were made (e.g. natural backstop), and what impacts the change has on the SDZ. This will include the ability to combine, line of sight analysis output, before and after editing maps of SDZs (Standard and Modified). This module will incorporate other components described in this Statement of Work. The output of this task will be the capability for users to create waiver package reports.
- 4.5 **Existing Noise Tool Adaptation.** The Contractor shall adapt the existing Army Noise tool, which includes BNOISE2 and SARNUM, into a GIS application. CERL developed this tool, and it will be referred to as the “CERL tool” below. The Contractor shall propose a logical timeline to complete each of the sub-tasks under Paragraph 4.5 in the Project Management Plan (Paragraph 4.1.2).
- 4.5.1 **Interface Integration.** The Contractor shall integrate the CERL tool into a Noise Tool for GIS. The output of this task will be a GUI, which allows the end-user to choose all the factors that affect the geometry and location of noise contours in the same manner as the SDZ Tool. The GUI will process the data input by the end-user into a format readable by a portion

of the government-furnished CERL Tool, which will be used to create peak noise contours for a single firing event.

- 4.5.2 **Post-CERL Tool processing.** The Contractor shall develop an automated method to convert the output, which will be provided by the portion of the government-furnished CERL Tool, into peak noise contours. The output of this task will be the portion of the Noise Tool that converts the output of the CERL Tool into peak noise contour information stored in an ESRI shapefile or a feature class as a line.
- 4.6 **Application Integration.** The Contractor shall adapt the existing SDZ Tool to allow the end-user to quickly learn and easily use all of the functions of the upgraded SDZ Tool and the Noise Tool described in this Statement of Work. The output of this task shall be an extension to the ESRI ArcGIS Desktop application and will work on versions 8.1 through 8.3.
- 4.7 **Distribution and Application Support.** The Contractor shall support the use of application through documentation, testing, training, and a deployment strategy.
 - 4.7.1 **Documentation.** The Contractor shall prepare documentation necessary for the Army Safety Office to validate the tool. Contractor shall meet with the Safety Office to review requirements and shall include all actions, issues etc in the MSR. The Contractor shall provide documentation for the operation of the Range Management ToolKit GIS. The output of this task will be a User's Manual and Online Help within the application.
 - 4.7.2 **Testing.** The Contractor shall provide the means necessary to distribute the RMTK to an independent testing facility, approved by the government, in order to verify the accuracy and completeness of the application. At point of turnover the Contractor shall provide an abbreviated System Development Life Cycle (SDLC) documentation. Specific documents are listed in Paragraph 6 in the Deliverables. Information Technology (IT) Oversight shall be provided by the Army Environmental Center.
 - 4.7.2.1 **System Development Life Cycle Plan.** The Contractor shall coordinate with the Government in providing an abbreviated SDLC. Purpose of SDLC is to allow the Government to test product delivered. SDLC shall include the following: Development Phase, Integration and Test Phase, Implementation Phase, Operations and Maintenance Phase.
 - 4.7.2.1.1 **Development Phase.** The Contractor shall provide detailed specifications of hardware and software used during development.
 - 4.7.2.1.2 **Integration and Test Phase.** The Contractor shall provide a matrix of tasks completed and tools required to complete task. The user tests the application to ensure that the functional requirements are satisfied by the developed extension.

4.7.2.1.3 **Implementation Phase.** RMTK shall be installed and made operational in a production environment. The phase is initiated after the extension has been tested and accepted by the user.

4.7.2.1.4 **Operations and Maintenance Phase.** The extension is monitored for continued performance in accordance with user requirements, and needed extension modifications are incorporated. The operational system is periodically assessed through Technical In-Process Reviews to determine how the system can be made more efficient and effective. Technical In-Progress Reviews shall be held quarterly.

4.7.3 **Training.** The Contractor shall provide a one-week training course, which will consist of the ESRI-certified class "Introduction to ArcGIS I", Spatial Database Standards for Facilities, Infrastructure, and Environment (SDSFIE), and the features of the Range Management ToolKit for GIS. The Contractor shall attend the Integrated Training Area Management (ITAM) Annual Workshop.

4.7.4 **Accreditation and Certification.** The Contractor shall provide assistance and guidance in establishing proper DITSCAP accreditation and certification, where required.

4.7.5 **Deployment Strategy.** The Contractor shall recommend a strategy to optimize currency of the application and cost to the Government. The output of this task will be a report, which presents several courses of action to maintain, deploy, and develop the application. Actual deployment and usage process must be approved by the Army Safety Office.

5.0 **Selection Criteria.** The Contractor awarded shall possess each of the following.

5.1 The Contractor shall demonstrate extensive experience and competence in developing software in Environmental Systems Research Institute, Inc. (ESRI) GIS software, especially ArcView 8.X.

5.2 The Contractor shall demonstrate experience developing GIS applications for SDZs under the direction of an Army office.

5.3 The Contractor shall demonstrate knowledge of all documents cited in Section 1.3 of the Statement of Work, especially AR 385-63 and DAPAM 385-63.

5.4 The Contractor shall demonstrate at least one staff member working on the project who has successfully completed of Level II of the Army Training and Doctrine Command's (TRADOC) Range Safety Course.

6.0 Deliverables.

Task/Deliverable	Paragraph	Schedule (Days after Award)
Initial Coordination Meeting	4.1.1	10 Days
Draft Project Management Plan	4.1.2	20 Days
Final Management Plan	4.1.2	40 Days
Monthly Status Reports	4.1.3	15 th Calendar day of each month.
Urgent Action Reports	4.1.4	As required.
Working Group Meetings	4.1.5	Up to six meetings at ATSC, as directed by the government.
Current SDZ Tool Application Support	4.2	Monthly update on level of effort.
Noise Tool Database	4.3.1	60 Days
DODIC, M-number, and description update	4.3.2	60 Days
SDZ Tool Upgrade Development	4.4	360 Days
Existing Noise Tool Adaptation	4.5	360 Days
Application Integration	4.6	360 Days
Distribution and Application Support	4.7	360 Days
Test and Evaluation Plan/ Interface Control Document	4.7.2.1.1	360 Days
Extension Test Analysis Report	4.7.2.1.2	360 Days
Extension Design Document/ Software Development Document	4.7.2.1.3	360 Days
Technical In-Progress Reviews	4.7.2.1.4	Quarterly
Training	4.7.2	21 July – 25 July 2003 and 18-23 August 2003.
Source Code	4.8	360 Days

7.0 Government Furnished Equipment and Information. All data required, used, or otherwise handled remains the property of the installation or agency that provided it. The Contractor may not use datasets or other materials relating to this contract for publication without the expressed written consent of USAEC and the owning installation or agency. The Contractor shall

contact the owning installation or agency to discuss data manipulations and authorship prior to conducting data analysis with the intent of publication. The Contractor shall make available to USAEC and to the owning installation or agency draft copies of any publications, based on work conducted or data collected under this contract, for their review and comment. In order to accomplish the tasks defined in this scope of work, the Government will provide the following information and equipment:

- 7.1 All materials and information associated with the existing SDZ Tool for GIS.
- 7.2 CERL Noise tool, consisting of a) Noise grid calculation Fortran dynamic linked library (bcalc.dll), b) sound propagation tables used by bcalc.dll, c) BNOISE weapons noise/weapons parameters database (bnoise.mdb, Microsoft Access database format), d) installation activity database (activity.mdb), and e) BNOISE GUI (Graphical User Interface) software, written in Borland Delphi language.

8.0 Points of Contact. The Points of Contact for work under this delivery order are as follows:

GSA Contracts POC

Ms. Eileen Flanigan
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ATSC POC

Billy Karnes, ATSC
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AEC Information Management

Barbara Schmidt, AEC-IERD
Ph 410-436-6340

9.0 **Security.** This project has no security issues.

10.0 **Place of Performance.** Work shall be performed at the Contractor's workplace.

11.0 **Period of Performance.** The Period of Performance shall be twelve (12) months from the date of award.