



Risk-Based Explosives Safety Siting and Munitions Risk Assessment System

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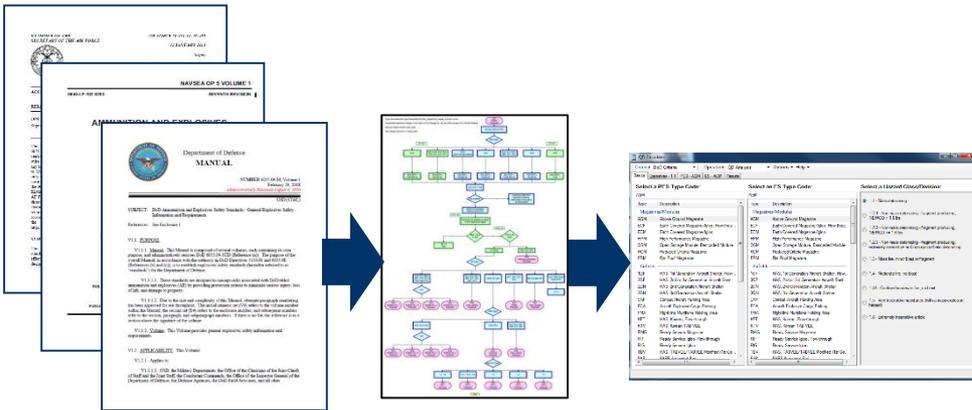
NAVFAC EXWC, Port Hueneme, CA

July 31, 2018

- **Background on ESS**
- **Overview and Status**
- **Validation and Verification**
- **RBESS Demonstration**
- **MRAS Demonstration**
- **Summary**

Background- What is ESS?

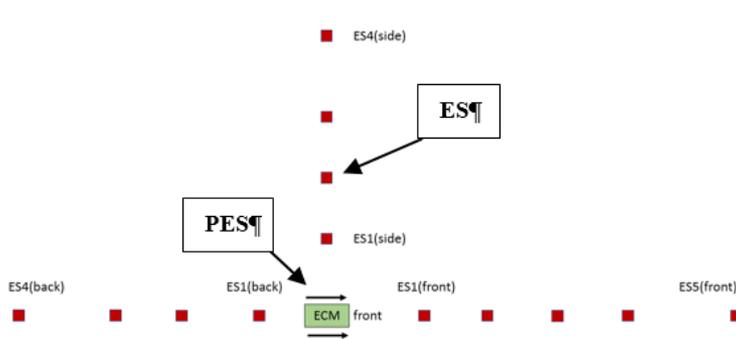
- DoD sponsored software developed for use by all DoD services.
- Software developed and maintained by NAVFAC EXWC on behalf of the DDESB
- Used for:
 - Automated calculation and display of explosives safety quantity distance (ESQD) arcs
 - Automated and standardized Site Plan Package development
 - Automated and standardized Potential Explosion Site (PES) data



ESS Tools: ESQD Analysis, DQ Analysis, QD Calculator, Site Maps/Reports, RBESS, MRAS

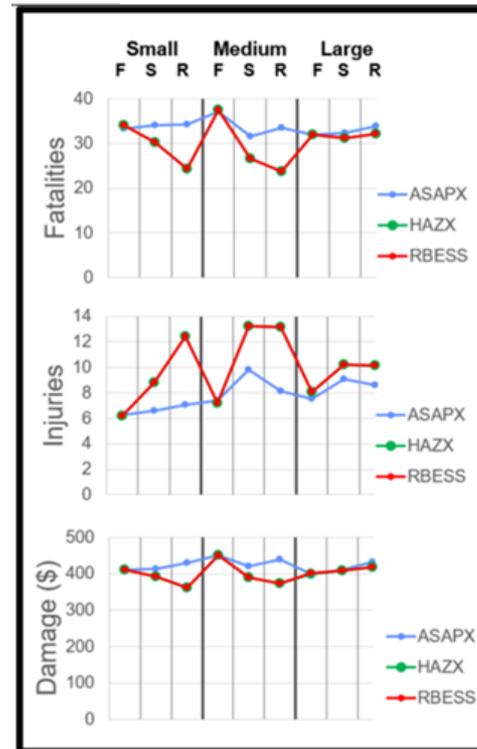
- **Hazard-consequence analysis tools have been added to ESS for risk acceptance of violations at Military Service Component level**
- **RBESS:**
 - Tier 1- ASAP-X algorithms based on hazard zones and consequences described in DoD6055.09M released in 6.1.4
 - Tier 2a- HAZX with Technical Paper 14 Rev 5 algorithms released in 6.1.4
- **Munition Risk Assessment System (MRAS):**
 - ASAP-X algorithms
 - MRAS process has been implemented
 - Released in 6.1.4
- **Status:**
 - RBESS Tier 1 and 2a and MRAS into ESS near completion
 - Additional effort is for final issue resolution and general ESS testing
 - Validation and Verification effort is complete
- **Future RBESS work:**
 - Refinement of implementation to enhance usability
 - Tier 2b- DDESB Approved Risk Based Explosives Safety SAFER TBD*

Phase I Verification Results

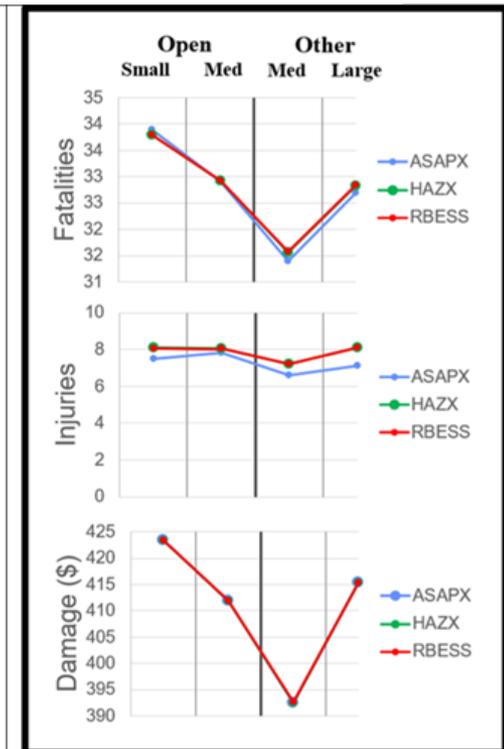


PES Type	Charge	ID	PES Orientation	IMD-B	ILD-B	IMD-U	ILD-U	PTR	IBD	> IBD
				ES 1	ES 2	ES 3	ES 4	ES 5	ES 6	ES 7
ECM	Small (1000 lb)	S1	Front	50	75	100	150	600	1000	1400
		S2	Side	40	65	95	140	500	1050	1300
		S3	Rear	30	70	105	115	400	850	1255
	Medium (70,000 lb)	S4	Front	200	300	400	500	800	1400	1600
		S5	Side	230	350	450	650	700	1300	1500
		S6	Rear	150	325	425	480	700	1000	1255
	Large (500,000 lb)	S7	Front	450	700	800	1300	2000	3800	4500
		S8	Side	400	600	750	1400	1600	3000	5000
		S9	Rear	475	500	870	1250	1500	2500	4000
Open	Small (500 lb)	S10	Front	40	60	80	120	400	900	1300
	Medium (30,000 lb)	S11	Front	150	250	300	500	650	1000	1400
Undefined	Medium (20,000 lb)	S12	Front	100	225	275	450	700	1200	1255
	Large (100,000 lb)	S13	Front	250	400	500	700	1000	1500	2000

- Nearly full agreement between HAZX and RBESS
 - Common Library implement properly
- Disagreement between ASAP-X and RBESS/HAZX for ECMs
 - Hazard zone calculated with QDE in RBESS/HAZX
 - Hazard zone calculated with simplified QD engine in ASAP-X
- Disagreement between ASAP-X and RBESS/HAZX for Injuries
 - Interpolation scheme for ASAP-X is not consistent for all hazard zone due to different rounding rules



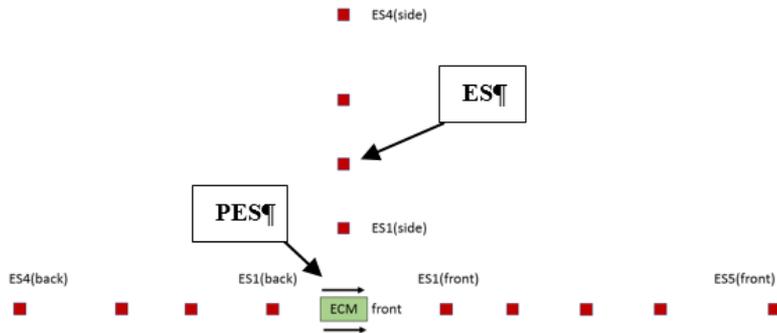
A. ECM-type PES Scenarios



B. Open- and Other-type PES Scenarios

Phase II Verification Results

- Similar analysis performed for Tier 2a
- Complete agreement between RBESS and HAZX
- RBESS calculated a higher expected value loss than HAZX by a factor of 10 for all roads, but issue was corrected
- RBESS functioned as expected

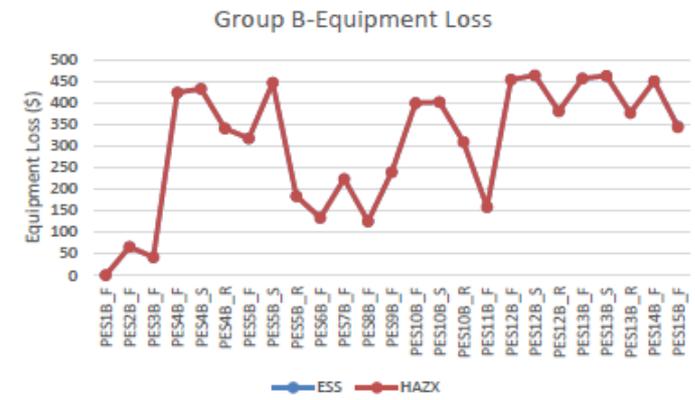
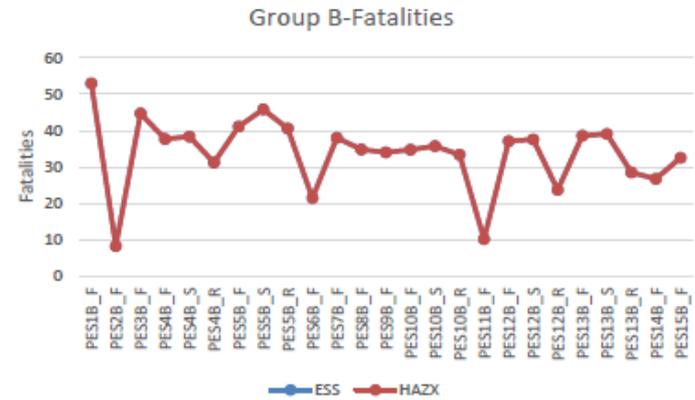


PES/NEW Parameters						
PES Category	PES Type	Soil Type	Activity Type	NEW	Hazard Division	Weapon Type
Aboveground Structure (AGS)	Small	Concrete	Destruction	5 (< 1000 lb)	1.1	AIM-7 Missile
	Med	Loose Soil	Maint/Assembly	M (> 1000 lb)	1.2.1	Bul/LI Case
	Large	None (Shops)	Operations	1 (< 100,000 lb)	1.2.2	M107
Earth Covered Magazine (ECM)	Small Steel Arch	Rock/Hard Clay	Storage		1.2.3	MK-82
	Small RC Arch		Testing		1.3	MK-83
	Med Steel Arch		Transportation		1.4	MK-84
Hardened AC Structure (HAS)	Med RC Arch				1.5	Unknown
	Large Steel Arch				1.6	MK1 (1.2.3)
	Large RC Arch					
Hollow Clay Tile ISO Container	HAC					
	Hollow Clay Tile ISO Container					
Open Operating Building (Concrete)	Open					
	Small					
Steel PEMB	Small					
	Medium					
Ship	Small					
	Large					

KEY	
Yellow	Considered in Phase 1
Light Green	Recommended to be included
Dark Green	Not likely to be included

ES Parameters					
ES Category	ES Building Type	ES Roof Type	Exposure Type	Glass	% Glass
Mod Build/Trailer	Mod Build/Trailer	14" Reinforced Concrete	None	Annular	Low (5-10%)
	Open	Open	4" Reinforced Concrete	IBD	Med (11-25%)
Vehicle	Vehicle	5/8" Gypsum Board	PTRD	Dual Pane	High (25-40%)
	Small (Office/Comm)	3/8" Plywood + 2x10 joists	ILD		
Reinforced Concrete	Medium (Office/Comm)	Light Steel Panel (22 gauge)	IMD		
	Large Tilt Up (Office)	Lightweight Con and Steel Deck	On Base Rd		
Reinforced Masonry	Small (Office/Comm)	Medium Steel Panel (18 gauge)	Asset Presry		
	Medium (Office/Comm)	Steel (Automobile)			
Steel PEMB	Small (Office/Storage)	Unknown			
	Medium (Office/Comm)	Wood Panelized (1/2" Plyd)			
Stud Wall (Wood Frame)	Large (Office/Storage/Hanger)				
	Small Wood Frame (Residence)				
	Med Wood Frame (Residence)				
Unreinforced Masonry	Medium Steel Stud				
	Small (Office)				
Medium (Office)	Medium (Office)				
	Large (Office)				

KEY	
Yellow	Considered in Phase 1
Light Green	Recommended to be included
Dark Green	Not likely to be included



RBESS Project



The screenshot displays the RBESS software interface. The main window shows a map with several labeled areas: **ES's**, **ECMs**, **ES's**, **Tanks**, **Parking Lot**, **Dock**, **Airfield**, **EOL**, and **AGM 1041**. A context menu is open over the 'ES's' label, listing various analysis options. A yellow box labeled 'Click' points to the 'Tier 1: Run New Analysis' option. The menu items include: Spatial Analysis, Analyze Installation, Analyze Facilities Selected from List, Analyze Facilities Selected from Map, Edit and Analyze Single Facility, Analyze and Site for DQ, Delete Analysis, Reset Analysis, Risk-based Analysis (highlighted), Arc Analysis Results, Analysis Errors, Analysis Reports, Violations, Mitigation, DQ Results, Advanced Analysis, Local Eval Zones, Air Force Commander's Risk Assessment Report, and Weapons Safety Report. The 'Risk-based Analysis' sub-menu is also visible, containing: Tier 1: Run New Analysis, Tier 1: Review Analysis Results, Tier 2A: Run New Analysis, Tier 2A: Review Analysis Results, and MRAS Analysis. The bottom status bar shows '559973.06, 4183387.18', 'Progress Indicator', 'Data Check', and 'Current Storage Scenario: Default'. The Windows taskbar at the bottom shows the time as 8:45 AM on 1/23/2018.

RBESS Tier 1 Input



PES Input Requirements:

- Replacement Cost
- Occupants

Tier1: Risk-Based Analysis Scenario Setup

Scenario PES Non-Transient ES

PES Detail

PES Type: ECM (Small) # People: 15
 PES ESS Name: 1045 | Igloo Str Inst | ECM Replacement Cost: 6200000
 PES ESS Description: HIGH EXPLOSIVE MAGAZINE High Density Storage: Charge Density > 0.028 pcf
 Headwall Type: Undefined Headwall

PES Volume (changes require OD to be run)
 Use Calculated Floor Area from ESS Map Use Internal Length and Width from Facility Enter Length and Width
 Height (ft): 12.5 Area (sqft): 19

Explosive Detail

IBD Distance	Hazard Zone Distance	HCD	IBD (ft)	ESS Database NEW	Scenario NEW
1.1	1825			95000	95000
1.2.1	1393			75000	75000
1.2.2	575			75000	75000
1.2.3	274			75000	75000
1.3	485			350000	350000
1.4	100			500000	500000

Baseline HCD: 1.1 Changes to Baseline HCD require OD to be re-run.
 Auto Select

< Back Next >

- Instructions:
1. Fill out the information for PES Detail: # People and Replacement Cost are required.
 2. Select one of the options to determine PES volume and enter the Height.
 3. In Explosive Detail, update NEW where necessary (only cells in yellow can be updated).
 4. Click on the 'Save Information' button.
 5. Then, click on the 'Run QD' button, this will calculate the Hazard Zone Distances and load ES sites in the Non-Transient ES tab.

- After Run OD:
1. Click on Hazard Zone Distances to review distances.
 2. Click on 'Next' to review ES in Non-Transient ES tab.

Tier1: Risk-Based Analysis Scenario Setup

Scenario PES Non-Transient ES

PES Detail

PES Type: ECM (Small) # People: 15
 PES ESS Name: 1045 | Igloo Str Inst | ECM Replacement Cost: 6200000
 PES ESS Description: HIGH EXPLOSIVE MAGAZINE High Density Storage: Charge Density > 0.028 pcf
 Headwall Type: Undefined Headwall

PES Volume (changes require OD to be run)
 Use Calculated Floor Area from ESS Map Use Internal Length and Width from Facility Enter Length and Width
 Height (ft): 12.5 Area (sqft): 19

Explosive Detail

IBD Distance	Hazard Zone Distance	1 (K6)	2 (K8)	3 (K11)	4 (K18)	5 (K24/PTRD)	6 (K40/IBD)
Front	274	458	502	821	1095	1825	
Left	274	319	319.1	730	1095	1825	
Right	274	319	319.1	730	1095	1825	
Rear	274	274.1	274.2	548	1095	1825	

Baseline HCD: 1.1 Changes to Baseline HCD require OD to be re-run.
 Auto Select

< Back Next >

Save Information > Run QD > Run Scenario

- Instructions:
1. Fill out the information for PES Detail: # People and Replacement Cost are required.
 2. Select one of the options to determine PES volume and enter the Height.
 3. In Explosive Detail, update NEW where necessary (only cells in yellow can be updated).
 4. Click on the 'Save Information' button.
 5. Then, click on the 'Run QD' button, this will calculate the Hazard Zone Distances and load ES sites in the Non-Transient ES tab.

- After Run OD:
1. Click on Hazard Zone Distances to review distances.
 2. Click on 'Next' to review ES in Non-Transient ES tab.

RBESS Tier 1 Input

ES Input Requirements:

- Replacement Cost
- Occupants

Tier1: Risk-Based Analysis Scenario Setup

Include in Scenario: RBESS Eval Zone: 1.2 Additional Options: All facilities within evaluation zone [Update] [?]

Scenarios [Close]

Scenario PES Non-Transient ES

Select ES for RBESS Analysis (27 of 49 total ES's are listed below from current ESS Spatial Analysis Zone):

	<input checked="" type="checkbox"/>	Facility #	Desc	Max # of People	Height (ft)	Total Cost	On Base	Exposure Type
01	<input checked="" type="checkbox"/>	1038	HIGH EXPLOSIVE MAGAZINE	23	15	135...	<input checked="" type="checkbox"/>	IMD(B)
02	<input checked="" type="checkbox"/>	1038	GENERAL STORAGE SHED	23	15	135...	<input checked="" type="checkbox"/>	IBD
03	<input checked="" type="checkbox"/>	1039	GENERAL STORAGE SHED	23	15	135...	<input checked="" type="checkbox"/>	IBD
04	<input checked="" type="checkbox"/>	1040	GENERAL STORAGE SHED	23	15	135...	<input checked="" type="checkbox"/>	IBD
05	<input checked="" type="checkbox"/>	1041	HIGH EXPLOSIVE MAGAZINE	0	15	0	<input checked="" type="checkbox"/>	IMD(B)
06	<input checked="" type="checkbox"/>	1042	HIGH EXPLOSIVE MAGAZINE	0	15	0	<input checked="" type="checkbox"/>	IMD(B)
07	<input checked="" type="checkbox"/>	1043	DEMOLISHED WATER TANK	0	15	0	<input checked="" type="checkbox"/>	IBD
08	<input checked="" type="checkbox"/>	1044	DEMOLISHED WATER TANK	0	15	0	<input checked="" type="checkbox"/>	IBD
09	<input checked="" type="checkbox"/>	1046	HIGH EXPLOSIVE MAGAZINE	15	15	620...	<input checked="" type="checkbox"/>	IMD(B)
10	<input checked="" type="checkbox"/>	1047	HIGH EXPLOSIVE MAGAZINE	15	15	620...	<input checked="" type="checkbox"/>	IMD(B)
11	<input checked="" type="checkbox"/>	1048	12x17 Box ECM	15	15	620...	<input checked="" type="checkbox"/>	IMD(B)
12	<input checked="" type="checkbox"/>	1049	12x17 Box ECM	15	15	620...	<input checked="" type="checkbox"/>	IMD(B)
13	<input checked="" type="checkbox"/>	1050	INERT STOREHOUSE	19	15	450...	<input checked="" type="checkbox"/>	IBD
14	<input checked="" type="checkbox"/>	1051	HIGH EXPLOSIVE MAGAZINE	19	15	450...	<input checked="" type="checkbox"/>	IBD
15	<input checked="" type="checkbox"/>	1052	ADMINISTRATIVE OFFICE (De...	19	15	450...	<input checked="" type="checkbox"/>	IBD
16	<input checked="" type="checkbox"/>	1053	Guard Shack	19	15	450...	<input checked="" type="checkbox"/>	IBD
17	<input checked="" type="checkbox"/>	1054	GATE / SENTRY HOUSE	0	15	0	<input checked="" type="checkbox"/>	IBD
18	<input checked="" type="checkbox"/>	1059	ADMINISTRATIVE OFFICE	0	15	0	<input checked="" type="checkbox"/>	IBD

Instructions:

1. Review Non-Transient ES to be included in scenario.
2. Update information where necessary (only cells in yellow can be edited)
3. Click on 'Save Information'
4. Click on 'Run Scenario'

Optional:

Use the 'Next' and 'Back' buttons to review information on the Non-Transient ES and PES tabs.

Set ratio for RBESS Eval Zone (default is 1.2).

In Additional Option, select option for ES (Exposed Sites).

If either of the options listed above are updated, click the 'Save Information' button, then the 'Run Scenario'

< Back Next >

Save Information > Run QD > Run Scenario

RBESS Tier 2a PES Input

PES Input

Requirements:

- Facility Information
 - Height
 - Structure Type
- Replacement Cost
- Occupants
- PES Activity

Tier 2A: Risk-Based Analysis Scenario Setup

Scenario PES Explosives

PES Details

PES Description: HIGH EXPLOSIVE MAGAZINE Reduce Fragment Size due to Load Density:

PES Category: Earth-covered magazine (ECM)

PES Type: Small RC Arch ECM

Soil Type: Concrete

Headwall Type: Undefined Headwall

ISO Containers: Not Applicable

PES Volume (changes require QD to be run)

Use Calculated Floor Area from ESS Map Use Internal Length and Width from Facility Enter Length and Width

Height (ft): 12.5 Area (sqft): 204

Event Probability

Activity Category: Storage

Activities: Any operating stocks in an area subject to hostile action such as rockets, missiles, air attacks, or terrorists.

Mahap Likelihood: Likely

Description: Several or numerous occurrences

Instructions

1. Review and update the information.
2. Click on the 'Save Information' button.
3. Then, click on the 'Next' button.

Tier 2A: Risk-Based Analysis Scenario Setup

Scenario PES Explosives Non-Transient ES Transient ES Barricades

Explosive Settings:

HC/D	IBD (ft)	ESS Database NEW (lb)	Scenario NEW (lb)	Weapons Type	Weapons Description
1.1	2770	100	200000	Unknown	Robust or thick-skinned bomb (MK-82)
1.2.1	1232	25000	25000	M1 (105 mm) projectile	Robust or thick-skinned 105 mm projectile
1.2.2	783	500000	500000	MK2 (40 mm) projectile	Robust or thick-skinned 40 mm projectile
1.2.3	569	500000	500000	MK32 bomb (1 round detonates)	Robust or thick-skinned bomb
1.3	232	45000	45000	Bulk propellant	Bulk propellant
1.4	100	500000	500000	None	Not applicable

Instructions:

1. Review Explosive setting and update where necessary (only cells in yellow can be edited)
- Select a different Baseline HC/D by unchecking 'Auto Select' and select desired HC/D from dropdown (optional)
2. Click the 'Save Information'
3. Click the 'Run QD'
4. After QD has finished, click on 'Next' to continue

Baseline HC/D: 1.1 Changes to Baseline HC/D require QD to be re-run.
 Auto Select

RBESS Tier 2a ES Input



ES Input Requirements:

- Facility Information
 - Height
 - Structure Type
 - Roof Type
 - Window
- Replacement Cost
 - Building
 - Windows
- Occupants
- Traffic Information
- Barricade Polygons

Tier 2A: Risk-Based Analysis Scenario Setup

Include in Scenario: RBESS Eval Zone: 1.2 Additional Options: All facilities within evaluation zone Update

Scenario PES Explosives Non-Transient ES Transient ES Barricades

Select ES for RBESS Analysis (31 of 47 total ES's are listed below from current ESS Spatial Analysis Zone):

Scenario	Exp Grp	Facility #	Desc	Height (ft)	Glass %	Total Cost	Window Cost %	On Base	Exposure Type	Structure Category
01	<input checked="" type="checkbox"/>	Exp Grp	1036	HIGH EXPLOSIV...	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
02	<input checked="" type="checkbox"/>	Exp Grp	1039	GENERAL STO...	15	10	0	2.5	<input checked="" type="checkbox"/> IBD	Steel PEMB
03	<input checked="" type="checkbox"/>	Exp Grp	1040	GENERAL STO...	15	10	0	2.5	<input checked="" type="checkbox"/> IBD	Steel PEMB
04	<input checked="" type="checkbox"/>	Exp Grp	1041	HIGH EXPLOSIV...	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
05	<input checked="" type="checkbox"/>	Exp Grp	1042	HIGH EXPLOSIV...	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
06	<input checked="" type="checkbox"/>	Exp Grp	1046	HIGH EXPLOSIV...	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
07	<input checked="" type="checkbox"/>	Exp Grp	1047	HIGH EXPLOSIV...	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
08	<input checked="" type="checkbox"/>	Exp Grp	1048	Igloo Str Inst	15	10	0	2.5	<input checked="" type="checkbox"/> IMD(B)	Steel PEMB
09	<input checked="" type="checkbox"/>	Exp Grp	1049	Igloo S Tier 2A: Risk-Based Analysis Scenario Setup						
10	<input checked="" type="checkbox"/>	Exp Grp	1051	HIGH						
11	<input checked="" type="checkbox"/>	Exp Grp	1052	ADMIT						
12	<input checked="" type="checkbox"/>	Exp Grp	1053	Guard						
13	<input checked="" type="checkbox"/>	Exp Grp	1054	GATE						
14	<input checked="" type="checkbox"/>	Exp Grp	1055	ADMIT						

Instructions:

1. Review Non-Transient ES to be included in scenario.
optional - Set ratio for RBESS Eval Zone (default is set to 1.2)
optional - Additional Options, filter ES option
2. Update ES information where necessary (only cells in yellow can be edited)

Explosive Settings:

HC/D	IBD (ft)	ESS Database NEW (lb)	Scenario NEW (lb)	Weapons Type	Weapons Description
1.1	2770	100	200000	Unknown	Robust or thick-skinned bomb (MK-82)
1.2.1	1232	25000	25000	M1 (105 mm) projectile	Robust or thick-skinned 105 mm projectile
1.2.2	783	500000	500000	MK2 (40 mm) projectile	Robust or thick-skinned 40 mm projectile
1.2.3	565	500000	500000	MK82 bomb (1 round detonates)	Robust or thick-skinned bomb
1.3	232	45000	45000	Bulk propellant	Bulk propellant
1.4	100	500000	500000	N/A	Not applicable

Instructions:

- 1 Review Explosive setting and update where necessary (only cells in yellow can be edited)
2. Click the 'Save Information'
3. Click the 'Run QD'
4. After QD has finished, click on 'Next' to continue

Tier 2A: Risk-Based Analysis Scenario Setup

Include in Scenario: RBESS Eval Zone: 1.2 Additional Options: All facilities within evaluation zone Update

Scenario PES Explosives Non-Transient ES Transient ES Barricades

2 rows found.

Height (ft)	Layer
10	barricade_area
10	barricade_area

Save Information Run QD Run Scenario

Summary



- **RBESS Tier 1 and Tier 2a modes have been implemented in ESS.**
- **Output for both Tier 1 and Tier 2a RBESS include color-coded maps that display information on replacement cost, fatalities, and injuries.**
- **Output also displays consequence information for individual ES's as well as summary information for all the ES's affected by the PES.**
- **Both tiers of RBESS automatically populate the Department of Army (DA) Form 7632 which is known as the Deviation Approval and Risk Acceptance Document (DARAD).**
- **RBESS has been validated through comparisons with ASAP-X and HAZX for Tier 1 and 2a and has been shown to generate the expected results.**
- **RBESS is being released in ESS v6.1.4 and will be available to ESS users in the near future.**

Questions

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Overview
Munitions Risk Assessment System (MRAS)
in
Explosive Safety Siting Software (ESS 6.1.4)

July 31, 2018

David Bianchi & Ruby Domingo

MRAS (Munitions Risk Assessment System):

Calculates and outputs risk assessment reports including consequence reports, injury reports, zone map report and base fact reports.

Explosives Safety Siting (ESS) Software



- **DoD sponsored software developed for use by all DoD services.**
- **Software developed and maintained by NAVFAC EXWC on behalf of the DDESB**
- **What does ESS do?**
 - Automates the calculation and display of explosives safety quantity distance (ESQD) arcs.
 - Automated and standardized Site Plan Package development.
 - Automated and standardized Potential Explosion Site (PES) data.

MRAS STEPS IN ESS

1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

MRAS STEPS IN ESS



1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

Prepare ESS Database:

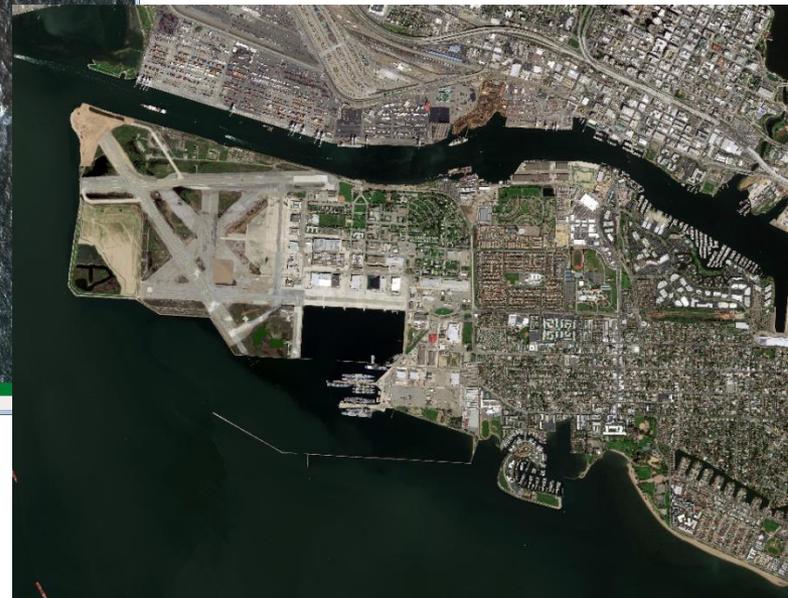
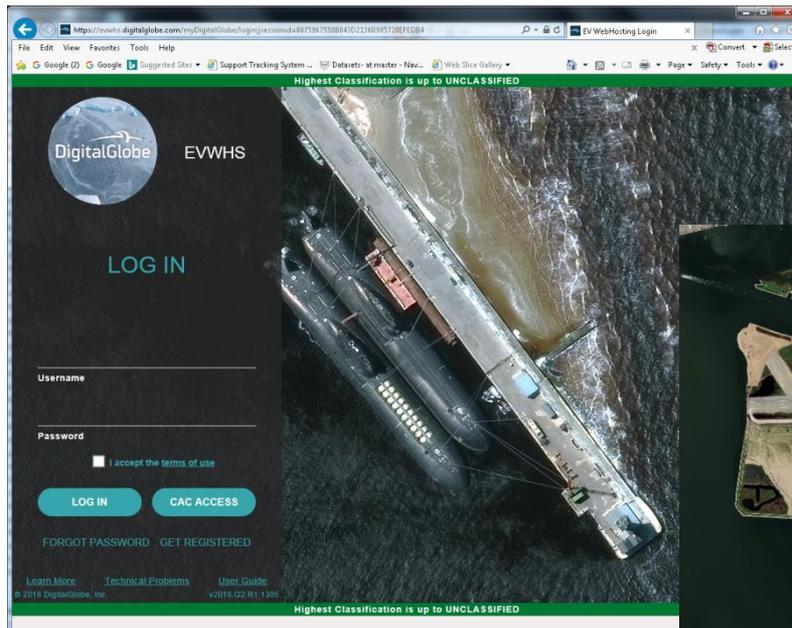
1. Create a New ESS Project with the Database Wizard
2. Add Map Layers and Imagery
3. Draw PES
4. Run QD Analysis
5. Display Arcs
6. Draw Land Use Areas
7. Prep MRAS Assessment
8. Create ESS Archive file for transfer to field computers

Prepare ESS Database – Imagery



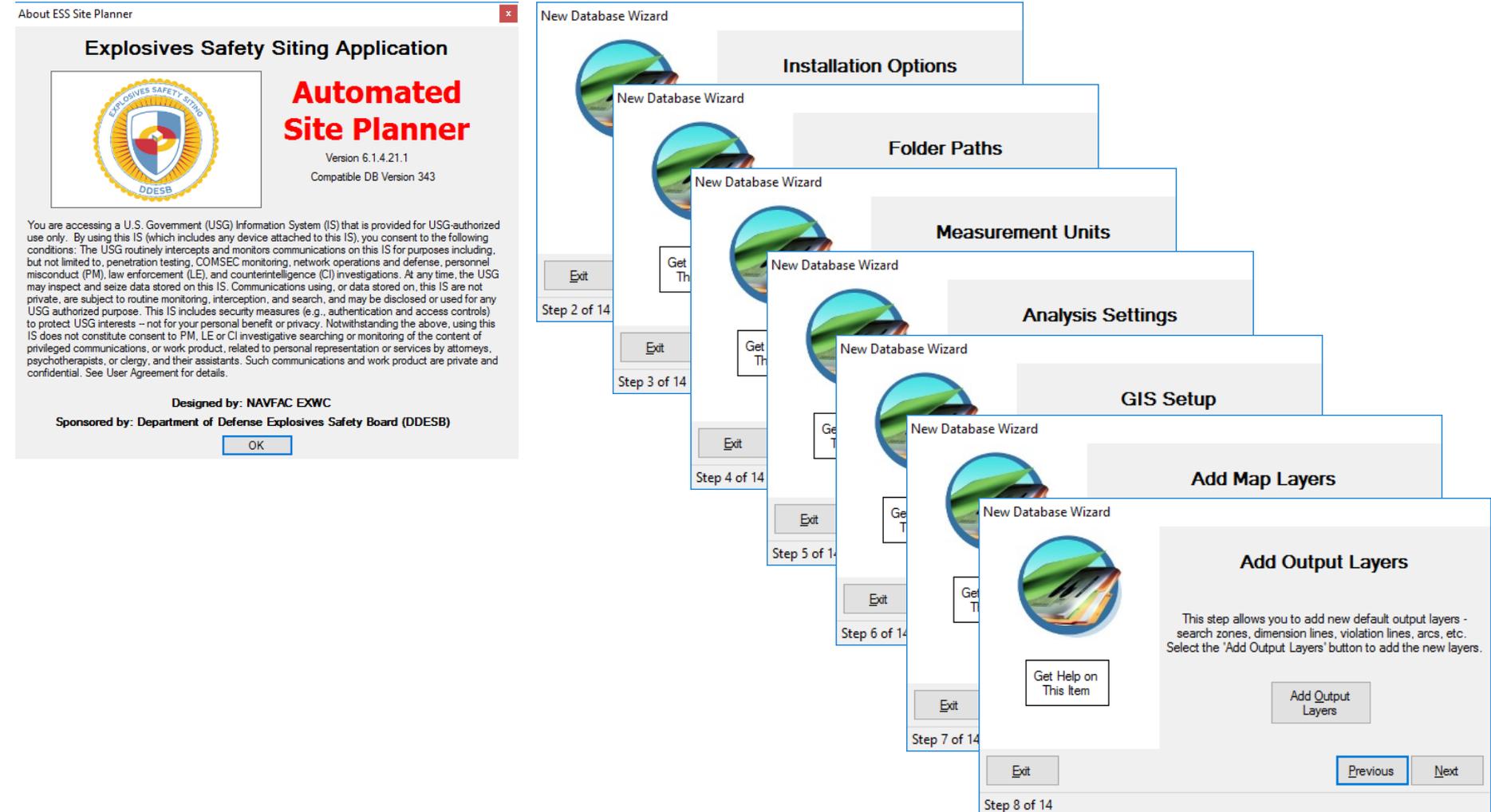
Obtain imagery from DigitalGlobe or other source.

- <https://evwhs.digitalglobe.com/myDigitalGlobe>
- Recommend saving in UTM coordinate system in SID or TIF format.



Prepare ESS Database – Create ESS Project

Start the ESS software and create a new ESS project using the New Database wizard.



The image displays the 'Explosives Safety Siting Application' splash screen on the left and a sequence of 'New Database Wizard' dialog boxes on the right, illustrating the steps to create a new ESS project.

Explosives Safety Siting Application
Automated Site Planner
Version 6.1.4.21.1
Compatible DB Version 343

New Database Wizard (Steps 2-8 of 14):

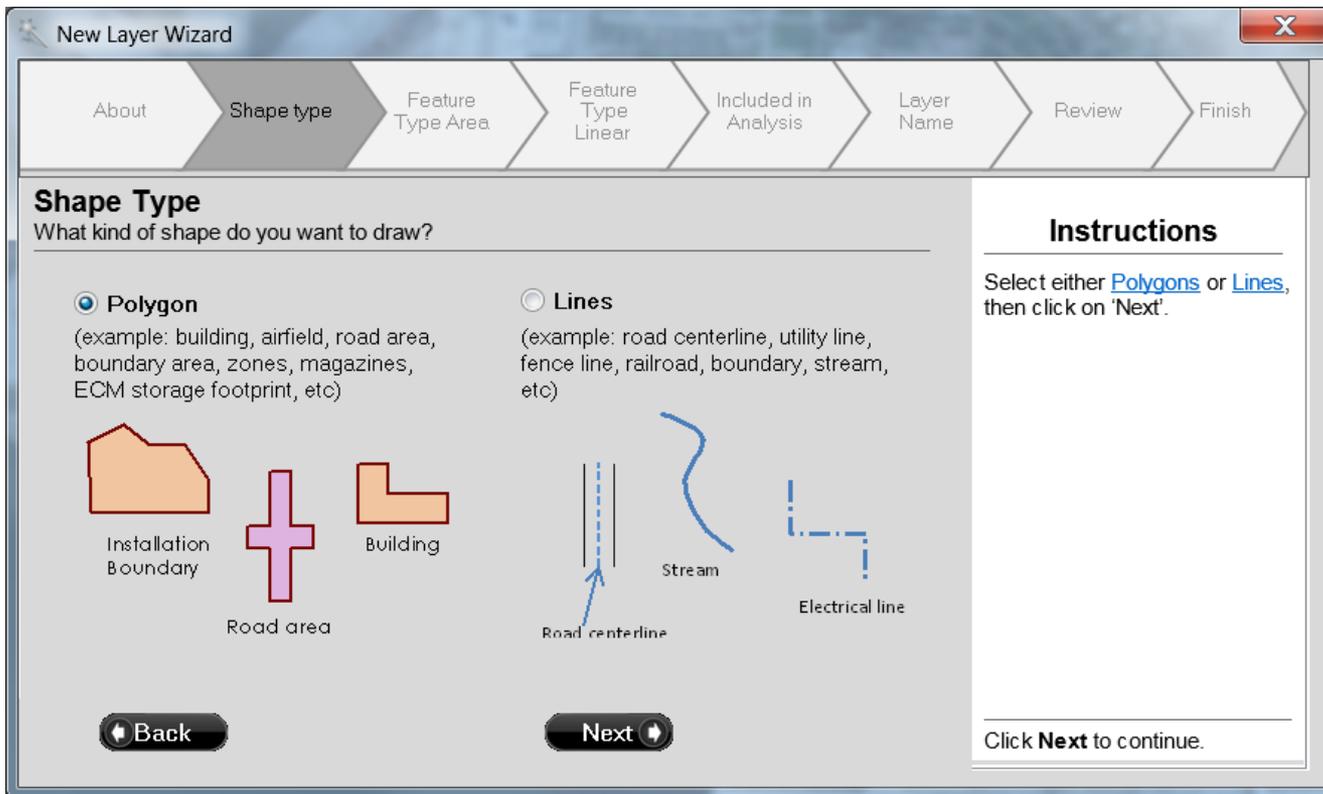
- Step 2 of 14: Installation Options
- Step 3 of 14: Folder Paths
- Step 4 of 14: Measurement Units
- Step 5 of 14: Analysis Settings
- Step 6 of 14: GIS Setup
- Step 7 of 14: Add Map Layers
- Step 8 of 14: Add Output Layers

The 'Add Output Layers' step includes the following text: "This step allows you to add new default output layers - search zones, dimension lines, violation lines, arcs, etc. Select the 'Add Output Layers' button to add the new layers." Buttons for 'Add Output Layers', 'Previous', and 'Next' are visible.

Prepare ESS Database - Create GIS layers with ESS Wizards



Use the New Layer Wizard to create GIS layers:



1. PES Sites
2. Group Areas
3. Group Sites
4. Single ES
5. NFA ES
6. Other features such as Roads, Parking, Piers, Airfields, etc.

Prepare ESS Database - Draw PES Site



Enter information about the PES:

1. **Polygon Tab:** Simple Polygon on the PES_Sites layer using Mouse Clicks to draw.
2. **Features Tab:** Enter Facility Number and Description
3. **Attributes Tab:** Enter the type of facility (Type Code) ELP, AGM, ECM, EOL, etc. and other properties.
4. **Explosives Tab:** Enter the Hazard Class and NEW
5. Use the **Editor** tools to size and position the polygon.



Template: Simple Polygon Add

Polygon Features Attributes Missions Explosives

Add to Layer:
PES_Sites **1**

Mouse Clicks
 Shape Template

Browse

Angle: 0 Degrees

Template: Simple Polygon Add

Polygon Features Attributes Missions Explosives

Facility Number: **2**
7007

Facility ID:
7007

Description:
Explosives Loading Pier

Template: Simple Rectangle Add

Rectangle Features Attributes Missions Explosives

Type Code:
ELP **3**

Construction Type:

Weapons Configuration:

Percent HC/D 1.1:
%

Fragments Contained:

Open Location:

Maritime Prepositioned Ship:

Port Facility Exception:

Template: Simple Rectangle Add

Rectangle Features Attributes Missions Explosives

Add HC/D Remove HC/D **4**

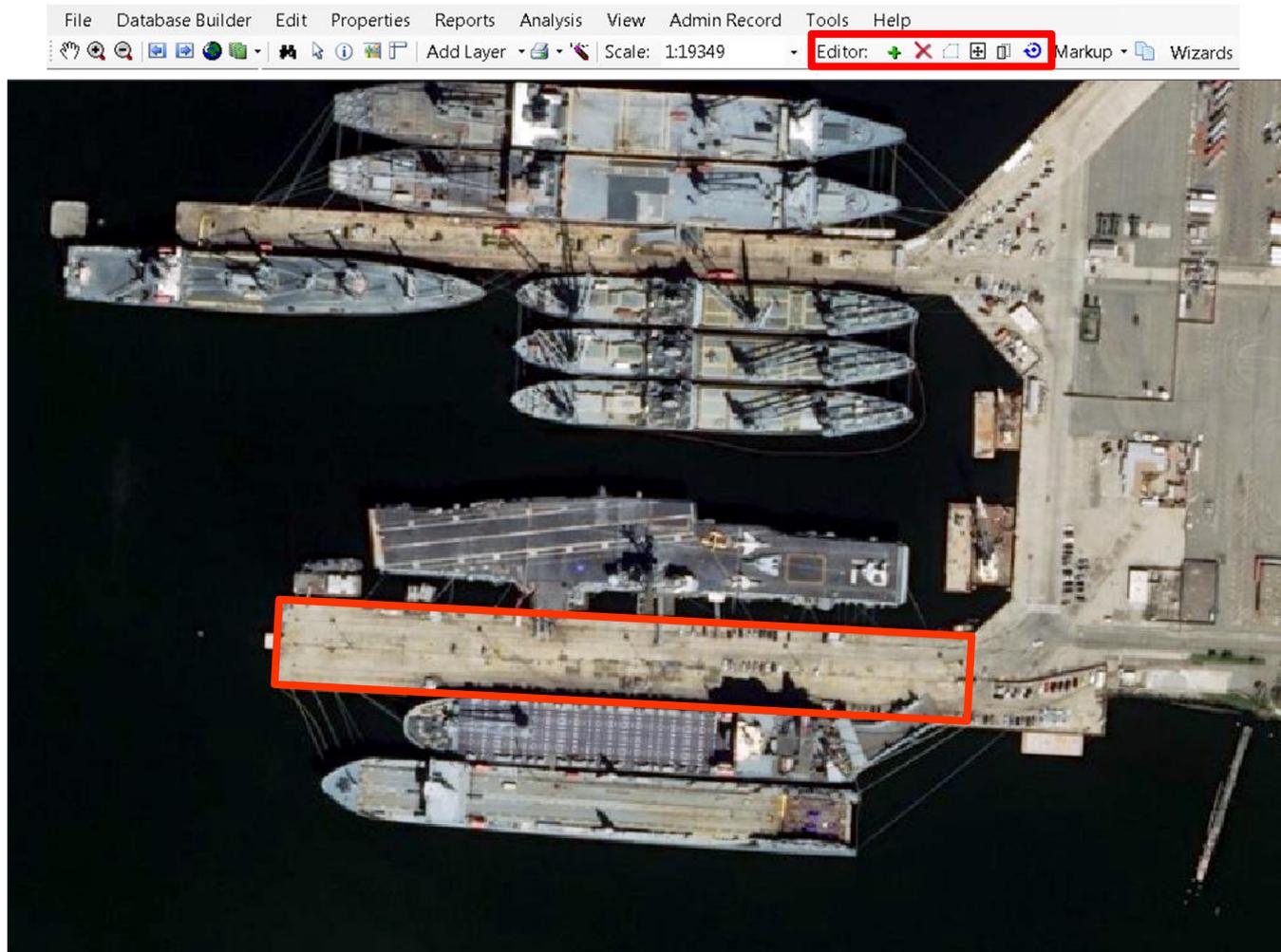
	HC/D	Quantity
	1.1	1000000
	1.2.1	500000
	1.2.2	350000
	1.2.3	350000

HFD xx:
feet

Fragmenting Item:

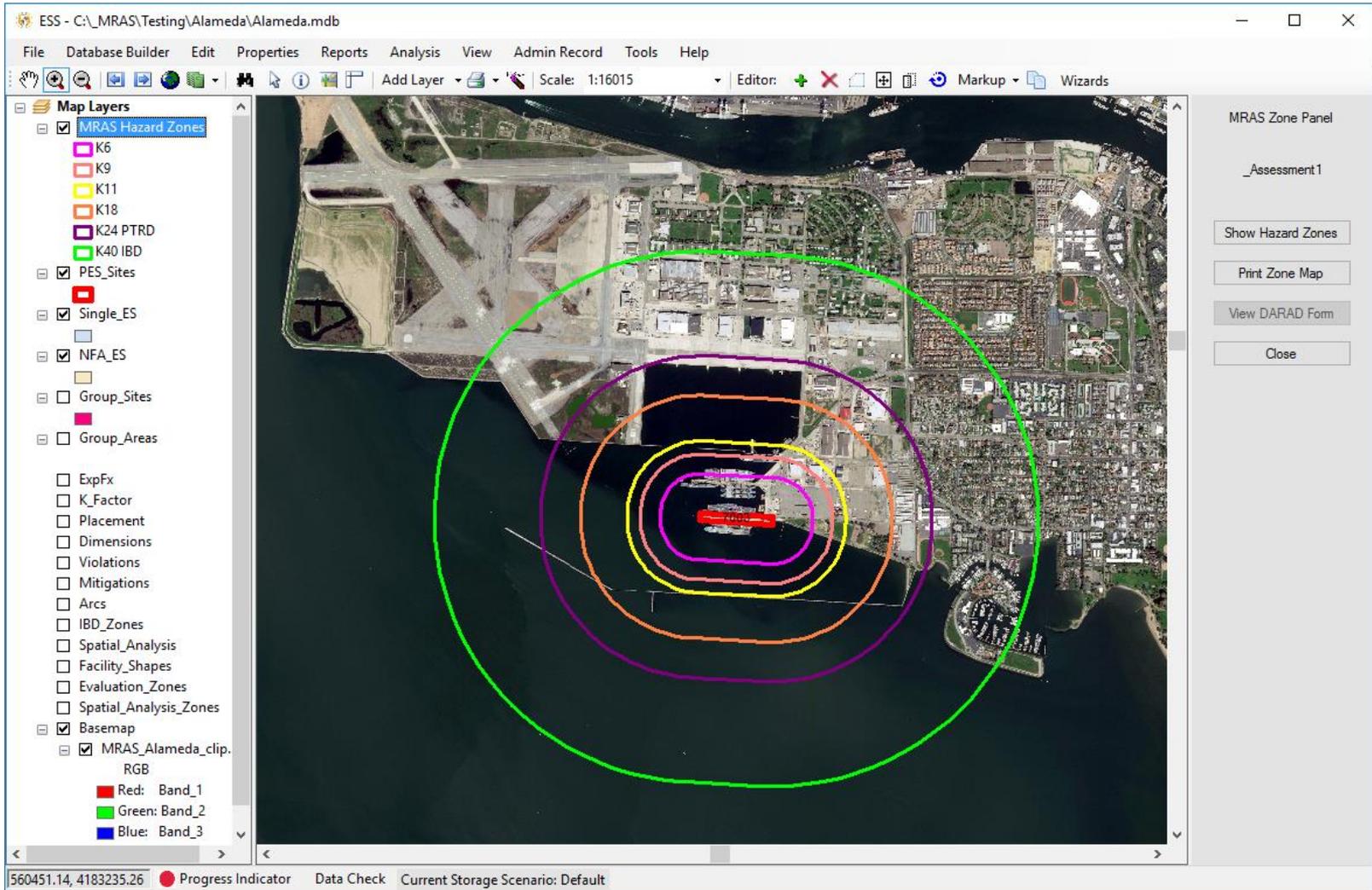
Prepare ESS Database - Draw PES Site

Draw the PES Site using the Editor Toolbar.



Prepare ESS Database - ESS Analysis

Run the ESS Analysis and display MRAS Hazard Zones



The screenshot displays the ESS software interface with the following components:

- Map Layers Panel (Left):**
 - MRAS Hazard Zones
 - K6
 - K9
 - K11
 - K18
 - K24 PTRD
 - K40 IBD
 - PES_Sites
 - Single_ES
 - NFA_ES
 - Group_Sites
 - Group_Areas
 - ExpFx
 - K_Factor
 - Placement
 - Dimensions
 - Violations
 - Mitigations
 - Arcs
 - IBD_Zones
 - Spatial_Analysis
 - Facility_Shapes
 - Evaluation_Zones
 - Spatial_Analysis_Zones
 - Basemap
 - MRAS_Alameda_clip.
 - RGB
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3

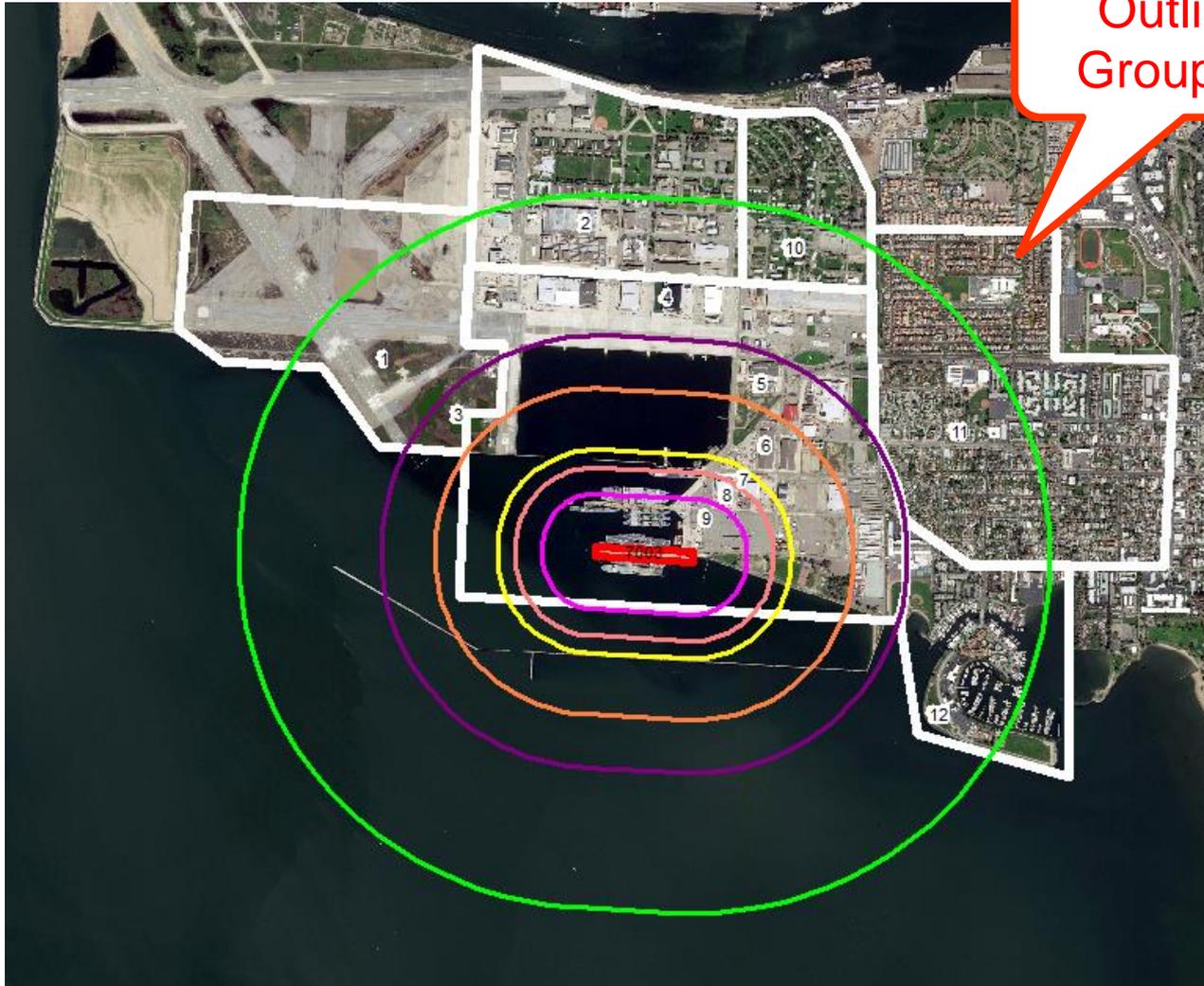
- Map View (Center):** An aerial photograph of an urban area with several concentric hazard zones overlaid. The zones are colored from innermost to outermost: red, purple, yellow, orange, and green. A red rectangular object is visible in the center of the innermost zone.
- MRAS Zone Panel (Right):**
- MRAS Zone Panel
- _Assessment1
- Show Hazard Zones
- Print Zone Map
- View DARAD Form
- Close
- Footer (Bottom):**
- 560451.14, 4183235.26
- Progress Indicator
- Data Check
- Current Storage Scenario: Default

Prepare ESS Database - Draw GIS Features



Draw ES Group Areas:

- Agricultural
- Commercial
- Industrial
- Institutional
- Residential



Outline ES Group Areas

Prepare ESS Database - MRAS Assessment



Create New Assessment

Munitions Risk Assessment Data Collection Tool - 1045

New Edit Delete Merge Team Data Calculate Reports ▾

Assessment Risk Assessment Construction Costs PES Single ES Group ES NFA ES GPS Device Team

AssessmentName	Location	AssessmentType	Created	Calculated
_Assessment1	Hawaii, H34F	Munitions Risk Assessment	7/25/2016	<input checked="" type="checkbox"/>
1045	alameda	Munitions Risk Assessment	11/22/2017	<input checked="" type="checkbox"/>

Risk Assessment - Types associated with assessment

Munitions Risk Assessment Data Collection Tool - 1045

New Edit Delete Merge Team Data Calculate Reports ▾

Assessment Risk Assessment Construction Costs PES Single ES Group ES NFA ES GPS Device Team

Selected	Sequence	Description
<input checked="" type="checkbox"/>	1	Planning
<input checked="" type="checkbox"/>	2	Reception, staging, onward movement & integration (RSOI)
<input type="checkbox"/>	3	Storage
<input checked="" type="checkbox"/>	4	Transportation
<input checked="" type="checkbox"/>	5	Distribution/Collection
<input checked="" type="checkbox"/>	6	Maintenance and Handling
<input type="checkbox"/>	7	Retrograde and Removal
<input type="checkbox"/>	8	Disposal and Demilitarization

Prepare ESS Database - MRAS Assessment



Construction Costs

Munitions Risk Assessment Data Collection Tool - 1045

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES Single ES Group ES NFA ES GPS Device Team

Description	Property Cost Per Square Feet
Agricultural	230
Commercial	540
Industrial	880
Institutional	750
Residential	600

Construction Cost Reference:

Prepare ESS Database - MRAS Assessment



PES Information

Munitions Risk Assessment Data Collection Tool - AGM site

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES Single ES Group ES NFA ES GPS Device Team

PES Name	Description	DescFunc	PES Type	Is ECM	Is Other
100400_4	magazine	AHA	Other	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Edit PES

Assessment Name: Assessment1

PES Name: 7003_2

General Hazard Division Coordinates Photo

Description: Explosives Loading Pier

Remarks: 7003

Location:

Planning Factors:

Team: Air Force Explosive Processing Site #5 Device: Device1

PES Type: Other Headwall Type:

Is ECM Large Is ECM Undefined

PES Desc Func: AHA Desc Func Other:

Survey Date: 07/27/2018 14:06:42 PES Adjusted

ESRI ID: MRA Type:

Created: 7/27/2018 2:06:42 PM Last Modified: 7/27/2018 2:06:42 PM

Save Cancel

Edit PES

Assessment Name: Assessment1

PES Name: 7003_2

General Hazard Division Coordinates Photo

Display Number	NEW Assessed
1.1	2000000
1.2.1	0
1.2.1 MCE	0
1.2.2	0
1.2.3	0
1.2.3 MCE	0
1.2.3 HFD (∞)	0
1.3	0

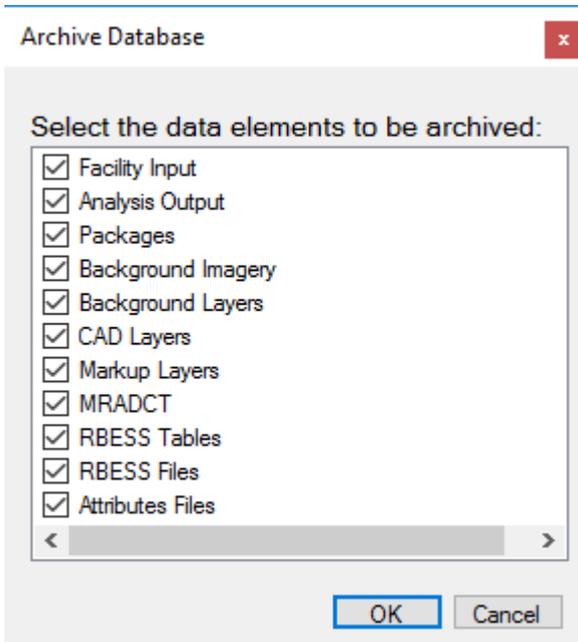
NEW Assessed Unit: lb

Save Cancel

Prepare ESS Database – Transfer to Field Computers



Create an ESS Archive file to distribute to field computers



MRAS STEPS IN ESS



1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

Field Assessment:

1. Restore Archive
2. Survey
 1. Single ES
 2. Group ES
 3. NFA ES
 4. Collect GPS points

Field Assessment - Draw Exposed Sites

Draw GIS Features

1. ES Group Sites
2. Single ES
3. NFA ES

ES Group
ES Site



Field Assessment - GPS



ESS - C:\ESS\NBVC_MRAS\nbvc_20180717.mdb

File Database Builder Edit Properties Reports Analysis View Admin Record Tools Help

Map Layers

- GPS_Polygo
- GPS Poly
- GPS_Point [
- ExpFx
- K_Factor
- Placement
- Dimensions
- Violations
- Mitigations
- Arcs
- IBD_Zones
- Spatial_Analysis
- Facility_Shapes
- Evaluation_Zones
- Spatial_Analysis_Zones
- Grp_Area
- Explosive_Site
- Single_ES
- Land_Use [bk]
- PtHueneme6.tif
- RGB
- Red: Band_1
- Green: Band_2
- Blue: Band_3

GPS location

Grp 7 commercial Grp 12 Grp 8 Grp 13

MRAS Zone Panel

AGM site

Show Hazard Zones

Print Zone Map

View DARAD Form

Close

Munitions Risk Assessment Data Collection Tool - AGM site

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES Single ES Group ES NFA ES GPS Device Team

COM Port and Coordinates

COM Port	Latitude	Longitude
COM1	N34.258	W119.237

Update

Save Location

ES Name: Bldg 4500

Area: 2100

People: 50

Property Type: Commercial

Estimated Value: 450000

Type Code: IHB

Is ES on Base? Yes

ES Type: Single ES Group ES NFA

Notes/Comments: Building

Record Location

```
S POS *20
SGPWPL.3415.485.N.11914.241.W.PRES POS *20
SGPAPB.V.V...N.V.V..T...T..T.A*33
SGPBWC.215247.07.....T..M..N..A*55
SGPGGA.215247.07.3415.485.N.11914.241.W.1.03.46.50.M.-36.4.M.,*79
SGPGSV.3.3.12.18.11.100.,27.08.209.,03.08.295.,25.02.089.*75
SGPRMC.215247.07.A.3415.485.N.11914.241.W.0.000.,291116.12.5.E.A*32
SGPWPL.3415.485.N.11914.241.W.PRE
```

Field Assessment - Creating an Exposed Site



Create an Exposed Site:

1. **Exposed Sites** > **New**
2. **General Tab** > Fill in Team, Device, Survey Date, Exposed Type (Single ES, Group ES, NFA ES)
3. **Single/Group/NFA tab** > Fill in required number of people, cost, etc.
4. **Coordinate tab** > Copy coordinates from current GPS location or draw on map.
5. **Photo tab** > Add photo

Munitions Risk Assessment Data Collection Tool - Assessment 2

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES **EXPOSED SITES** GPS Device Team

Seq	ES Name	Unique Name	Property Type	Inside IBD	On Base	Personnel	Infrastructure Cost	Fatalities	Building Damage Loss
	1038_53			<input type="checkbox"/>	<input type="checkbox"/>	0		0	
	1039_54			<input type="checkbox"/>	<input type="checkbox"/>	0		0	
	1040_55			<input type="checkbox"/>	<input type="checkbox"/>	0		0	

Field Assessment - Creating an ES (Exposed Site)



Create an Exposed Site:

1. **Exposed Sites** > New
2. **General Tab** > Fill in Team, Device, Survey Date, Exposed Type (Single ES, Group ES, NFA ES)
3. **Single/Group/NFA tab** > Fill in required number of people, cost, etc.
4. **Coordinate tab** > Copy coordinates from current GPS location or draw on map.
5. **Photo tab** > Add photo

a. Enter name of ES Group or Facility Number

b. Select the ES Type: Single ES, Group ES, NFA ES

c. Enter Survey info: Team, Device, and Survey Date

Field Assessment - Creating an ES (Exposed Site)



Create an Exposed Site:

1. **Exposed Sites** > New
2. **General Tab** > Fill in Team, Device, Survey Date, Exposed Type (Single ES, Group ES, NFA ES)
3. **Single/Group/NFA tab** > Fill in required number of people, cost, etc.
4. **Coordinate tab** > Copy coordinates from current GPS location or draw on map.
5. **Photo tab** > Add photo

A screenshot of the 'Edit ES' form in a software application. The form is titled 'Edit ES' and has a light blue header. It contains several input fields and tabs. The 'Assessment Name' field is filled with 'assessment 2'. The 'ES Name' field is filled with '1038_53'. There are five tabs: 'General', 'Single ES', 'Group ES', 'NFA', and 'Coordinates'. The 'General' tab is selected. The form includes fields for 'Known Area' (121.169796539466), 'Square Foot' (dropdown), 'Auto Area' (checkbox), 'Stories' (2), 'Max Personnel' (3), 'ES Property Type' (Industrial), 'Property Type (Other)' (empty), 'Estimated Value' (848188576), 'Auto Value' (checkbox), and 'Is ES On Base?' (checked). At the bottom right, there are 'Save' and 'Cancel' buttons.

Field Assessment - Creating an ES (Exposed Site)



Create an Exposed Site:

1. **Exposed Sites** > New
2. **General Tab** > Fill in Team, Device, Survey Date, Exposed Type (Single ES, Group ES, NFA ES)
3. **Single/Group/NFA tab** > Fill in required number of people, cost, etc.
4. **Coordinate tab** > Copy coordinates from current GPS location or draw on map.
5. **Photo tab** > Add photo

GPS Waypoint	Seq	Latitude				Longitude				Date Collected	Operator	Device
		Dir	Deg	Min	Sec	Dir	Deg	Min	Sec			
	1	N	37	47	34.917934020	W	122	19	10.804623121	03/31/2017 16:22		Device1
	1	N	37	47	35.157935391	W	122	19	10.782248077	03/31/2017 16:22		Device1
	1	N	37	47	35.196023127	W	122	19	11.430998911	03/31/2017 16:22		Device1
	1	N	37	47	34.938547835	W	122	19	11.444178359	03/31/2017 16:22		Device1

Add Coordinate:
retrieves current GPS
location.

Field Assessment - Creating an ES (Exposed Site)



Create an Exposed Site:

1. **Exposed Sites** > New
2. **General Tab** > Fill in Team, Device, Survey Date, Exposed Type (Single ES, Group ES, NFA ES)
3. **Single/Group/NFA tab** > Fill in required number of people, cost, etc.
4. **Coordinate tab** > Copy coordinates from current GPS location or draw on map.
5. **Photo tab** > Add photo

A screenshot of the 'Edit ES' software interface. The window title is 'Edit ES'. It has several input fields: 'Assessment Name' with the value 'assessment 2', and '* ES Name' with the value '1038_53'. Below these are tabs for 'General', 'Single ES', 'Group ES', 'NFA', 'Coordinates', and 'Photo', with 'Photo' currently selected. The main area shows an aerial photograph of a large ship docked at a pier. Below the photo are fields for 'Device Name', 'Date Taken' (03/31/2017 16:28:59), 'Photo Number', and a checked 'Is Primary' box. A 'Delete Photo' button is to the right. At the bottom, a 'Selected Photo' field shows the path 'C:\Users\Public\Pictures\Sample Pictures\Lighthouse.jpg' with a browse button. At the very bottom are 'Save' and 'Cancel' buttons.

MRAS STEPS IN ESS

1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

Merge Team Data:

1. Save the field data to the master database
2. Merge Team Data
 - Analysis > Risk-based Analysis > MRAS Analysis > Merge Team Data



MRAS STEPS IN ESS



1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

Review Data & Updates:

1. Review and Update team data
2. Review GPS Points and add to MRAS ES
3. Edit and Update (reposition Group ES, type codes, add facilities, etc.)

Review Data & Updates – ESS Editor Tools

EDIT SHAPE, RESIZE, MOVE, ROTATE, DELETE



Editor: Markup ▾

MOVE TOOL



Review & Move location of Exposed Sites

Review & Edit Exposed Sites data

Munitions Risk Assessment Data Collection Tool - Assessment 2

New Edit Delete Merge Team Data Calculate Reports ▾

Assessment	Risk Assessment	Construction Costs	PES	EXPOSED SITES	GPS	Device	Team			
Seq	ES Name	Unique Name	Property Type	Inside IBD	On Base	Personnel	Infrastructure Cost	Fatalities	Building Damage Loss	
1038	53			<input type="checkbox"/>	<input type="checkbox"/>		0		0	
1039	54			<input type="checkbox"/>	<input type="checkbox"/>		0		0	
1040	55			<input type="checkbox"/>	<input type="checkbox"/>		0		0	

MRAS STEPS IN ESS

1. PREPARE ESS DATABASE

2. FIELD ASSESSMENT

3. MERGE TEAM DATA

4. REVIEW DATA & UPDATES

5. MRAS ASSESSMENT

MRAS Assessment:

1. Reset & Rerun QD Analysis
2. MRAS > Calculate
3. MRAS Reports
4. MRAS Zone Panel

MRAS Assessment - Calculate

- ESS: Analysis (Spatial & ESQD)
- MRAS: Calculate

Click on Calculate

Munitions Risk Assessment Data Collection Tool - A M site

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES EXPOSED SITES GPS Device Team

Assessment_ID	Seq	ES Name	Unique Name	Property Type	Inside IBD	On Base	Personnel	Infrastructure Cost	Fatalities	Building Damage Loss
1df970f8-e191-...		Grp 1_2		Other	<input type="checkbox"/>	<input type="checkbox"/>	30	\$100,000		
1df970f8-e191-...		Grp 10_11		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000		
1df970f8-e191-...		Grp 11_12		Industrial	<input type="checkbox"/>	<input type="checkbox"/>	1,000	\$500,000		
1df970f8-e191-...		Grp 12_13		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000		
1df970f8-e191-...		Grp 13_14		Industrial	<input type="checkbox"/>	<input type="checkbox"/>	1,000	\$500,000		
1df970f8-e191-...		Grp 14_15		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000		

MRAS Assessment - Results



MRAS: Group ES tab > Results populated

Group ES results populated

Munitions Risk Assessment Data Collection Tool - AGM site

New Edit Delete Merge Team Data Calculate Reports

Assessment Risk Assessment Construction Costs PES EXPOSED SITES GPS Device Team

Assessment_ID	Seq	ES Name	Unique Name	Property Type	Inside IBD	On Base	Personnel	Infrastructure Cost	Fetalities	Building Damage Loss
1df970f8-e191-...		Grp 1_2		Other	<input type="checkbox"/>	<input type="checkbox"/>	30	\$100,000	0	\$9,238
1df970f8-e191-...		Grp 10_11		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000	3	\$28,292
1df970f8-e191-...		Grp 11_12		Industrial	<input type="checkbox"/>	<input type="checkbox"/>	1,000	\$500,000	18	\$88,250
1df970f8-e191-...		Grp 12_13		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000	32	\$129,045
1df970f8-e191-...		Grp 13_14		Industrial	<input type="checkbox"/>	<input type="checkbox"/>	1,000	\$500,000	163	\$219,091
1df970f8-e191-...		Grp 14_15		Commercial	<input type="checkbox"/>	<input type="checkbox"/>	200	\$300,000	31	\$126,755

MRAS Assessment - Reports Menu



Munitions Risk Assessment Data Collection Tool - AGM site

New Edit Delete Merge Team Data Calculate Reports ▾

Assessment Risk Assessment Construction Costs PES

Assessment_ID	Seq	ES Name	Personnel	Infrastructure Cost	Fatalities	Building Damage Loss
1df970f8-e191-...	Grp 1_2		30	\$100,000	0	\$9,238
1df970f8-e191-...	Grp 10_11		200	\$300,000	3	\$28,292
1df970f8-e191-...	Grp 11_12		1,000	\$500,000	18	\$88,250
1df970f8-e191-...	Grp 12_13		200	\$300,000	32	\$129,045
1df970f8-e191-...	Grp 13_14		1,000	\$500,000	163	\$219,091
1df970f8-e191-...	Grp 14_15		200	\$300,000	31	\$126,755
1df970f8-e191-...	Grp 15_16	Industrial	1,000	\$500,000	154	\$211,668
1df970f8-e191-...	Grp 16_17	Industrial	1,000	\$500,000	905	\$500,000
1df970f8-e191-...	Grp 17_18	Industrial	1,000	\$500,000	139	\$199,163
1df970f8-e191-...	Grp 18_19	Residential	200	\$1,000,000	32	\$434,135
1df970f8-e191-...	Grp 19_20	Residential	200	\$1,000,000	4	\$183,573
1df970f8-e191-...	Grp 2_3	Other	30	\$100,000	0	\$8,846
1df970f8-e191-...	Grp 20_21	Industrial	1,000	\$500,000	12	\$40,528
1df970f8-e191-...	Grp 21_22	Industrial	1,000	\$500,000	19	\$90,362
1df970f8-e191-...	Grp 22_23	Residential	200	\$1,000,000	2	\$64,165
1df970f8-e191-...	Grp 23_24	Industrial	1,000	\$500,000	12	\$39,112
1df970f8-e191-...	Grp 24_25	Residential	200	\$1,000,000	3	\$89,668
1df970f8-e191-...	Grp 3_4	Commercial	200	\$300,000	3	\$31,798

Show Zone Panel

Fact Sheet

Zone

Potential Consequences

Plan Fact

Injury Report

AHA FACT SHEET: 100400_1

Hazard Division (HD)	Net Explosives Weight (NEW)	Inhabited Building Distance (IBD)	Exposures						Potential Consequences			
	Assessed	Assessed	No. of Personnel within IBD		No. of Facilities within IBD		Infrastructure Cost (USD)		Fatalities		Infrastructure Damage Loss (USD)	
			On Base	Off Base	On Base	Off Base	On Base	Off Base	On Base	Off Base	On Base	Off Base
1.1	500,000	3,969										
1.2.1			1,500	12,120	3	24	\$116,234,541	\$11,200,000	588	1,601	\$66,495,147	\$2,802,164
1.2.1 MCE												
1.2.2												
1.2.3												
1.2.3 MCE			Total No. of Personnel	Total No. of Facilities	Total Infrastructure Cost		Total Fatalities		Total Infrastructure Damage Loss			
1.2.3 HFD (xx)			13,620	27	\$127,434,541		2,189		\$69,297,311			
1.3												

Military Munitions Operations (planning, training exercises, or operation): planning

Location (city, country, port, railhead, NATO operating, training area, etc.): Port Hueneme, CA	Types of Exposed Site Facilities and Assets:	PES GPS Coordinates (Latitude, Longitude): N34° 9' 53.403" W119° 12' 27.633" N34° 9' 53.395" W119° 12' 25.848" N34° 9' 50.625" W119° 12' 25.866" N34° 9' 50.633" W119° 12' 27.651"	Munitions Risk Assessment Type: <input checked="" type="checkbox"/> Planning <input type="checkbox"/> Reception, staging, onward movement & integration (RSOI) <input type="checkbox"/> Storage <input type="checkbox"/> Transportation <input type="checkbox"/> Distribution/Collection <input type="checkbox"/> Maintenance and Handling <input type="checkbox"/> Retrograde and Removal <input type="checkbox"/> Disposal and Demilitarization
		PES Dimension and Footprint	
		Length (ft):	0
		Width (ft):	0
		Area (sq ft):	0

Site Description:

General Comments:

AHA FACT SHEET: 100400_1 MITIGATING CONTROL MEASURES

Instructions: These control measures are provided for your use. Modify as needed for this specific site; use the blank space to add any site-specific measures.

- | | |
|---|--|
| <ul style="list-style-type: none"> <input type="checkbox"/> Require the host nation to provide firefighting support. <input type="checkbox"/> Generate a fire map that identifies the HD of all military munitions located at the site and provide it for first responders. <input type="checkbox"/> Make available appropriate types and sufficient quantities of fire extinguishers throughout the military munitions storage and operating sites. <input type="checkbox"/> Provide medical support by the training unit during all military munitions operations. <input type="checkbox"/> Provide access to and maintain standard operating procedures and technical manuals for receipt, segregation, storage, and issue (RSS&) during all military munitions operations. <input type="checkbox"/> Provide the appropriate level of security required for the security risk codes of military munitions located at storage and operating sites. <input type="checkbox"/> Arrange for explosive ordnance disposal support until all military munitions have been expended or retrograded. <input type="checkbox"/> Require qualified/certified personnel and/or unit safety officers are present during all military munitions operations. <input type="checkbox"/> Control and maintain vegetation at a maximum height of 18 inches. Maintain a fire break of 50 feet around storage and operating sites. <input type="checkbox"/> Establish applicable emergency withdrawal distances based on the highest HD of military munitions being stored and brief all personnel working within storage and operating sites. <input type="checkbox"/> Establish notification procedures for impending electrical storms within 15 miles of storage and operating sites. Evacuate personnel to a minimum public traffic route distance based on the highest HD of military munitions located at the storage or operating site. <input type="checkbox"/> Require all vehicles and equipment offered for transporting military munitions are inspected by personnel who are AMMO-51 certified. On a case-by-case basis, the senior qualified inspector onsite will make a determination to use any vehicle or equipment that does not meet US safety standards identified on DD Form 626, "Motor Vehicle Inspection (Transporting Hazardous Materials)." <input type="checkbox"/> Open military munitions-laden International Organization for Standardization (ISO) containers as needed for ventilation as long as adequate security is provided. <input type="checkbox"/> Enforce hazards of electromagnetic radiation to ordnance restrictions to include radios, cell phones, and electronic devices. | <ul style="list-style-type: none"> <input type="checkbox"/> Ground military munitions-laden ISO containers. Bond military munitions-laden ISO containers to any other metal objects within 6 feet of the containers. <input type="checkbox"/> Load test material handling equipment, ordnance handling equipment, and weight handling equipment in accordance with U.S. standards. Evaluate equipment that does not meet the U.S. standards by onsite qualified personnel and make a determination on a case-by-case basis before use. <input type="checkbox"/> Place ISO containers with HD 1.1 military munitions at the most distant location from exposed sites. <input type="checkbox"/> Place ISO containers with HD 1.4 military munitions between containers storing HD 1.1 military munitions. <input type="checkbox"/> Properly package military munitions in storage; there should be no exposed explosives. <input type="checkbox"/> Provide white phosphorus firefighting kits to all storage sites containing white phosphorus. <input type="checkbox"/> Maintain <u>intra</u>line separation distance from munitions storage containers when conducting RSS& operations. <input type="checkbox"/> Maintain compatibility within the ISO containers. <input type="checkbox"/> Maintain electrically sensitive items in proper packaging. <input type="checkbox"/> Do not store inert material with live military munitions. <input type="checkbox"/> Do not use or issue live and blank military munitions from the same building or range at the same time. Do not store live and blank military munitions in the same building or range at the same time. <input type="checkbox"/> Require that only qualified/certified personnel store/handle military munitions in the ASP/FASP. <input type="checkbox"/> Require that only qualified/certified personnel handle military munitions with the exception of host nation contracted crane operators and associated personnel who are responsible for on/offloading and staging military munitions-laden ISO containers within the ASP/FASP. <input type="checkbox"/> Set up road access control points along all roads leading to the ASP/FASP, transfer point, and live fire training areas to restrict access to essential personnel only. <input type="checkbox"/> Clear all local residents from the ASP/FASP, transfer point, and live fire training areas during the exercise. <input type="checkbox"/> Establish force bed-down area to keep non-military munitions-related functions outside of the explosives safety quantity distance arc. |
|---|--|

Additional Measures:

Table J-4. Total Exposed Site Output Data: NBVC

Exposed Site (ES)	On-Base?	Distance from PES (Feet)	Affected Personnel at ES	Fatalities*	Injuries	Building Cost (USD)	Building Damage Loss (USD)
Zone 2 (K9)							
1100_28	Yes	604.101	500	473.021	26.979	\$38,744,847.000	\$38,744,847.000
Grp 16_17	No	702.896	1,000	904.665	95.335	\$500,000.000	\$500,000.000
ON-BASE – ZONE 2			500	473 / 94.6%	27 / 5.4%	\$38,744,847	\$38,744,847 / 100.0%
OFF-BASE – ZONE 2			1,000	905 / 90.5%	95 / 9.5%	\$500,000	\$500,000 / 100.0%
SUBTOTAL – ZONE 2			1,500	1,378 / 91.8%	122 / 8.2%	\$39,244,847	\$39,244,847 / 100.0%
Zone 5 (K24/PTRD)							
Facility 64_26	Yes	1,927.379	500	52.846	105.692	\$38,744,847.000	\$13,282,489.981
Facility 65_27	Yes	1,830.704	500	62.024	124.048	\$38,744,847.000	\$14,467,810.504
Grp 8_9	No	2,222.061	1,000	49.904	99.808	\$500,000.000	\$124,919.845
Grp 12_13	No	1,649.842	200	31.618	63.236	\$300,000.000	\$129,044.942
Grp 13_14	No	1,624.930	1,000	162.909	325.818	\$500,000.000	\$219,090.886
Grp 14_15	No	1,674.038	200	30.702	61.404	\$300,000.000	\$126,754.776
Grp 15_16	No	1,672.118	1,000	154.002	308.003	\$500,000.000	\$211,668.009
Grp 17_18	No	1,750.854	1,000	138.996	277.991	\$500,000.000	\$199,162.920
Grp 18_19	No	1,637.307	200	32.096	64.192	\$1,000,000.000	\$434,135.413
ON-BASE – ZONE 5			1,000	115 / 11.5%	230 / 23.0%	\$77,489,694	\$27,750,300 / 35.8%
OFF-BASE – ZONE 5			4,600	600 / 13.0%	1,200 / 26.1%	\$3,600,000	\$1,444,777 / 40.1%
SUBTOTAL – ZONE 5			5,600	715 / 12.8%	1,430 / 25.5%	\$81,089,694	\$29,195,077 / 36.0%
Zone 6 (K40/IBD)							
Grp 9_10	No	2,538.468	200	3.801	7.601	\$300,000.000	\$55,514.687
Grp 21_22	No	2,583.886	1,000	18.715	37.430	\$500,000.000	\$90,361.798
Grp 20_21	No	3,639.592	1,000	12.070	24.141	\$500,000.000	\$40,527.561
Grp 2_3	No	3,560.494	30	0.377	0.754	\$100,000.000	\$8,845.662
Grp 19_20	No	2,553.863	200	3.781	7.562	\$1,000,000.000	\$183,572.808
Grp 11_12	No	2,629.791	1,000	18.433	36.867	\$500,000.000	\$88,249.798
Grp 22_23	No	3,817.029	200	2.189	4.378	\$1,000,000.000	\$64,164.915

Table J-4. Total Exposed Site Output Data: NBVC Continued

Exposed Site (ES)	On-Base?	Distance from PES (Feet)	Affected Personnel at ES	Fatalities*	Injuries	Building Cost (USD)	Building Damage Loss (USD)
Grp 1_2	No	3,518.499	30	0.385	0.770	\$100,000.000	\$9,237.768
Grp 23_24	No	3,669.484	1,000	11.882	23.763	\$500,000.000	\$39,112.435
Grp 7_8	No	2,399.266	200	3.976	7.952	\$300,000.000	\$59,458.606
Grp 6_7	No	2,757.984	30	0.529	1.057	\$100,000.000	\$16,425.223
Grp 5_6	No	3,711.822	1,000	11.608	23.215	\$500,000.000	\$37,056.394
Grp 4_5	No	2,899.242	30	0.502	1.004	\$100,000.000	\$15,100.540
Grp 3_4	No	3,374.477	200	2.747	5.493	\$300,000.000	\$31,798.341
Grp 24_25	No	3,547.251	200	2.529	5.058	\$1,000,000.000	\$89,667.704
Grp 10_11	No	3,499.065	200	2.591	5.182	\$300,000.000	\$28,292.498
ON-BASE – ZONE 6			0	0 / 0.0%	0 / 0.0%	\$0	\$0 / 0.0%
OFF-BASE – ZONE 6			6,520	96 / 1.5%	192 / 2.9%	\$7,100,000	\$857,387 / 12.1%
SUBTOTAL – ZONE 6			6,520	96 / 1.5%	192 / 2.9%	\$7,100,000	\$857,387 / 12.1%
ON-BASE – ALL ZONES			1,500	588 / 39.2%	257 / 17.1%	\$116,234,541	\$66,495,147 / 57.2%
OFF-BASE – ALL ZONES			12,120	1,601 / 13.2%	1,488 / 12.3%	\$11,200,000	\$2,802,164 / 25.0%
GRAND TOTAL – ALL ZONES			13,620	2,189 / 16.1%	1,745 / 12.8%	\$127,434,541	\$69,297,311 / 54.4%
*Fatality subtotals are rounded up to the nearest whole number. Individual exposed site fatalities are not rounded							

MRAS: Reports > Potential Consequences

Table ES-1. Potential Consequences of an Unplanned Explosives Event for NBVC

Potential Explosion Site	Exposure Location	Number of Exposed Sites	Exposures		Potential Consequences		
			Number of Personnel Within IBD	Infrastructure Cost (USD)	Fatalities*	Injuries*	Infrastructure Damage Loss (USD)*
100400_1	On-Base	3	1,500	\$116,234,541	588	257	\$66,495,147
	Off-Base	24	12,120	\$11,200,000	1,601	1,488	\$2,802,164
	Total	27	13,620	\$127,434,541	2,189	1,745	\$69,297,311
	On-Base						
	Off-Base						
	Total						
	On-Base						
	Off-Base						
	Total						
	On-Base						
	Off-Base						
	Total						
	On-Base						
	Off-Base						
	Total						
	On-Base						
	Off-Base						
	Total						

*The potential fatalities and infrastructure damage loss (which excludes the contents of the infrastructure) were determined using the C&RI Assessment Tool that analyzes an exposed site's estimated population and property (i.e., assets, facilities, and infrastructure within the IBD ESQD arc) based on the type of material, construction, functional use, size, and cost per square foot. This tool provides the estimated number of fatalities and property replacement value based on potential damages resulting from the exposed site's physical distance to the PES.

Source: Enter additional notes here

MRAS: Reports > Plan Fact > Base Plan Fact

Table 1. NBVC Planning Factors NEW

Potential Explosion Site (PES)	Net Explosives Weight (NEW), Hazard Division (HD)	Inhabited Building Distance (IBD) Explosive Safety Quantity Distance (ESQD) Arcs*	
		m	ft
100400_1	1.1: 500,000 lb	1,210	3,969
*The IBD ESQD arc distances were obtained from Volume 3 of DoD 6055.09-M.			

MRAS: Reports > Plan Fact > Second Plan Fact

Table 3. NBVC Planning Factors, Potential Total Fatalities, and Potential Building Damage Loss by Site

Potential Explosion Site	NBVC Planning Factors ¹	Potential Total Fatalities ²	Potential Total Building Damage Loss (USD) ²
100400_1		2,189	\$69,297,311

¹The planning factor selected is based on historical or projected use for each port.
²The potential fatalities and building damage loss were determined using the C&RI Assessment Tool that analyzes an exposed site's area (i.e., infrastructure within the ESQD IBD arc), type of construction, and cost per square foot, and provides an estimated replacement value based on the amount of damage due to the physical distance from the PES. The total fatalities are based on the physical distance from the PES.

MRAS: Reports > Injury Report

OUTPUT DATA FOR

ZONE	DISTANCE	FATAL	BUILDING DAMAGE LOSS	% FATAL	% BLDG DAMAGE	Total # Personnel	INJURIES	
1	1 (K6)			0%	0%	0	0	All non-fatal are injuries
2	2 (K9)	1378	39,244,847	92%	100%	1,500	122	All non-fatal are injuries
3	3 (K11)			0%	0%	0	0	All non-fatal are injuries
4	4 (K18)			0%	0%	0	0	Sliding scale from "all non-fatal" to 2X fatalities
5	5 (K24/PTRD)	715	29,195,077	13%	36%	5,600	1,430	Twice the # of fatalities
6	6 (K40/IBD)	96	857,397	1%	12%	6,520	192	Twice the # of fatalities

Total Fatalities	2,189	Total # Personnel	13,620	1,744	Total Injuries
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Note: Copy cells E39:H44 from the original ASAP-X file and paste in cells C6:F11 above.

DEVIATION APPROVAL AND RISK ACCEPTANCE DOCUMENT (DARAD)					
For use of this form, see DA PAM 385-30; the proponent agency is DAS.					
SITE INFORMATION					
1a. Country: United States		1b. State: California		2. Service: N - Navy	3a. Installation Type: DEPOT
3b. Installation Name: Unknown Installation			3c. Type of Site: Unknown Site Type		
DEVIATION INFORMATION					
4. Deviation #:		5a. Effective Date: <small>(MM as to populate from block #8)</small>	5b. Expiration Date:	6. Deviation From:	
7. Type of Deviation:		8a. Number/Title and Paragraph of Requirement:			
8b. What we need to do that deviates from 8a: <small>(Synopsis of block 24)</small>					
8c. Operational, Strategic or Compelling Reason for Violation:					
9. Potential Consequences of Deviation from Approved Standards:		9a. # Fatalities: 2,188.9	9b. # Injuries: 1,744.73	9c. Equip/Fac Loss \$: \$ 69,297,311.01	10. Date Deviation Initiated: 20180717
11. Residual Severity:		12. Residual Probability:	13. Residual Level of Risk:	14a. Safety Professional/Analyst (POC Info):	
14b. Analyst Signature:		14c. Submitter (POC Info): <small>(If different from 14a.)</small>		14d. Submitter Signature:	
14 e. REVIEWED BY:					
DATE	CONCUR <small>(YES/NO)</small>	ORGANIZATION	PRINTED NAME/TITLE	Attachment	SIGNATURE
	▼			Attachment? <input type="checkbox"/>	
	▼			Attachment? <input type="checkbox"/>	
	▼			Attachment? <input type="checkbox"/>	
	▼			Attachment? <input type="checkbox"/>	
	▼			Attachment? <input type="checkbox"/>	
	▼			Attachment? <input type="checkbox"/>	
DEVIATION APPROVAL/RISK ACCEPTANCE					
I have reviewed the risk assessment and understand the hazard and potential consequences. I am approving this deviation and accepting the additional potential consequences and residual risk based on current operational necessity.					
15. Army HQ:		15b. Unit/Comm:	16a. DATE:	16b. Expiration Date:	17. RANK/TITLE:
17a. PRINTED NAME:			17b. SIGNATURE:		
17c. Comment:					Attachment? <input type="checkbox"/>

RISK ASSESSMENT WORKSHEET

Deviation #:	Effective Date:	Expiration Date:	
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RISK ANALYSIS INFORMATION

18. Current Situation: "Provide a description of the situation that necessitates this deviation."	Attachment? <input type="checkbox"/>
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18

19. Hazard Category:	20. Specific Hazard:
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21. Duration of Deviation (Choose one of the following)	21a. 1 month or less: (select the duration (in days))	0	21b. 1 month to 1 year: (select the duration (in months))	0	21c. 1 year to 5 years: (select the duration (in years))	0	21d. Permanent or greater than 5 years: (enter number of years or PERMANENT)
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22. Deviation Approval Authority: (or Equivalent)	
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23. Mission Impact of Not Accepting Risk:	Attachment? <input type="checkbox"/>
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24. What we need to do that violates 8a: (Provide a detailed description of the action that deviates from the standards.)	Attachment? <input type="checkbox"/>
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25. Control Measures: "Measures taken, or will take, to reduce hazards of risk being accepted."	Attachment? <input type="checkbox"/>
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26. Permanent Corrective Actions (with Milestones): Include estimated cost, military construction project number, etc.	Attachment? <input type="checkbox"/>
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27. Alternatives Considered: "Things considered doing but didn't, and why."	Attachment? <input type="checkbox"/>
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Alternative 1:	
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Alternative 2:	
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Alternative 3:	
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28. Attach any supporting documents (i.e. Photos, MOU, ASAP-X, ESS, etc.)	Attachment? <input type="checkbox"/>
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AMMUNITION AND EXPLOSIVES WORKSHEET														
Deviation #:				Effective Date:					Expiration Date:					
INFORMATION ON THE POTENTIAL EXPLOSION SITE (PES)														
29a. PES Name/#: 100400_1			29b. PES Function:					30. PES # People: 0						
31. PES Equip/Fac (Value) \$: \$0.00			32. Required Blast Distance: 0					33. Required Fragment Distance: 0						
34a. Hazard Division: 1.1: NEW: 500,000			34b. Hazard Division: 1.2.1: NEW:					34c. Hazard Division: 1.2.2: NEW:						
34d. Hazard Division: 1.2.3: NEW:			34e. Hazard Division: 1.3: NEW:					34f. Hazard Division: 1.4: NEW/MEQ:						
35a. QD arcs exceed the installation boundary? YES <input type="checkbox"/> NO <input type="checkbox"/>			Are other Services affected? YES <input type="checkbox"/> NO <input type="checkbox"/>			Was coordination made? YES <input type="checkbox"/> NO <input type="checkbox"/>			Provide other coordination documentation, as necessary.					
Why coordination was/was not made:											Coordination paperwork attached? <input type="checkbox"/>			
35b. Is this deviation associated with a hybrid or risk-base safety submission? <input type="checkbox"/>							35c. If YES, provide site plan #:							
INFORMATION ON THE EXPOSED SITES (ES)														
36. EXPOSED SITES							At Required Distance			At Requested Distances			(Attachment?) <input type="checkbox"/>	
FACILITY	DISTANCE: Feet		# PEOPLE	EQUIP/FAC (VALUE) \$	EXPOSURE TYPE	ON/OFF INSTALLATION	FATALITIES	INJURIES	EQUIP/FAC (LOSS) \$	FATALITIES	INJURIES	EQUIP/FAC (LOSS) \$	VIOLATION?	
	REQUIRED /	ACTUAL												
Grp 19_20	0	2,553.9	200	1,000,000.00						3.78	7.56	183,572.81	NO <input type="checkbox"/>	
Grp 6_7	0	2,758	30	100,000.00						0.53	1.06	16,425.22	NO <input type="checkbox"/>	
Facility 65_27	0	1,830.7	500	38,744,847.00						62.02	124.05	14,467,810.50	NO <input type="checkbox"/>	
Grp 10_11	0	3,499.1	200	300,000.00						2.59	5.18	28,292.50	NO <input type="checkbox"/>	
Grp 17_18	0	1,750.9	1,000	500,000.00						139	277.99	199,162.92	NO <input type="checkbox"/>	
Grp 12_13	0	1,649.8	200	300,000.00						31.62	63.24	129,044.94	NO <input type="checkbox"/>	
Grp 21_22	0	2,583.9	1,000	500,000.00						18.72	37.43	90,361.80	NO <input type="checkbox"/>	
Facility 64_26	0	1,927.4	500	38,744,847.00						52.85	105.69	13,282,489.98	NO <input type="checkbox"/>	
Grp 13_14	0	1,624.9	1,000	500,000.00						162.91	325.82	219,090.89	NO <input type="checkbox"/>	
1100_28	0	604.1	500	38,744,847.00						473.02	26.98	38,744,847.00	NO <input type="checkbox"/>	
Grp 23_24	0	3,669.5	1,000	500,000.00						11.88	23.76	39,112.44	NO <input type="checkbox"/>	
Grp 5_6	0	3,711.8	1,000	500,000.00						11.61	23.22	37,056.39	NO <input type="checkbox"/>	
Grp 15_16	0	1,672.1	1,000	500,000.00						154	308	211,668.01	NO <input type="checkbox"/>	
EXPECTED POTENTIAL CONSEQUENCES														
37. Potential Explosion Site:		a. Fatalities: 0			b. Injuries:			c. Equip/Fac \$: \$ 0.00						
38. Potential Losses for Exposed Sites (ES) Meeting Criteria:		a. Fatalities:			b. Injuries:			c. Equip/Fac \$:						
39. Potential Loss Being Accepted for Deviating from Approved Standards:		a. Fatalities: 2,188.9			b. Injuries: 1,744.73			c. Equip/Fac \$: \$ 69,297,311.01						
40. Total Potential Loss (#/\$):		a. Fatalities: 2188.9			b. Injuries: 1,744.73			c. Equip/Fac \$: \$ 69,297,311.01						

Questions

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