

# USING THE CONCEPTUAL SITE MODEL (CSM) TO MAKE AN INFORMED RISK MANAGEMENT DECISION

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# TOPICS

- CSM Overview
- Initial CSM
- CSM and the Risk Matrices
- Case Study



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# CSM OVERVIEW

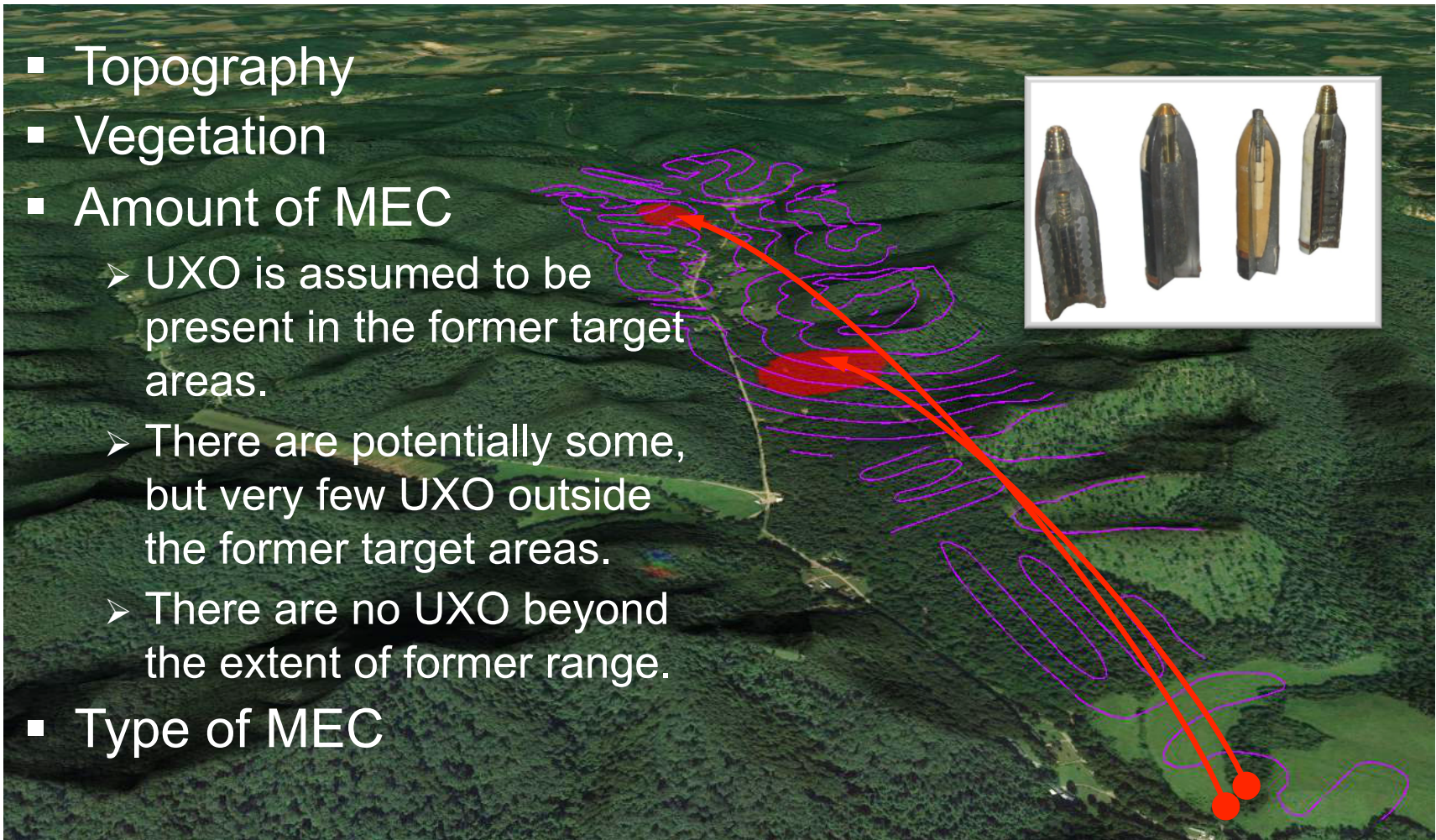


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# INITIAL CONCEPTUAL SITE MODEL

- Topography
- Vegetation
- Amount of MEC
  - UXO is assumed to be present in the former target areas.
  - There are potentially some, but very few UXO outside the former target areas.
  - There are no UXO beyond the extent of former range.
- Type of MEC



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## CONCEPTUAL SITE MODEL SHOULD DEFINE:

- Type of MEC hazards
- Physical features of the MRS and surrounding area
  - Topography
  - Vegetation
  - Geology
- Concentrated Munitions Use Areas (CMUA)
- Amount of MEC
- Access conditions and frequency of use (receptors)
- Land use activities and depths (exposure pathways)
- Vertical distribution profile



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# OTHER DATA NEEDS

## Alternative Development and Analysis

- Detection limit for specific munitions and instruments
- Institutional Analysis

## Cost Drivers

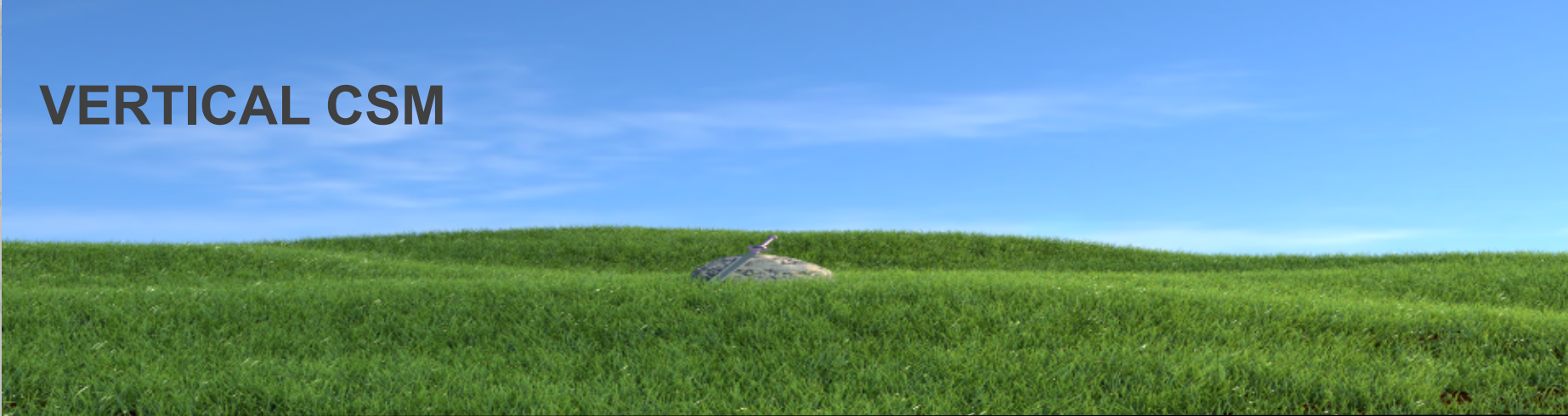
- CMUA area and anomaly density
- Non CMUA area and anomaly density
- Transect length/area
- Grid area
- Production rates



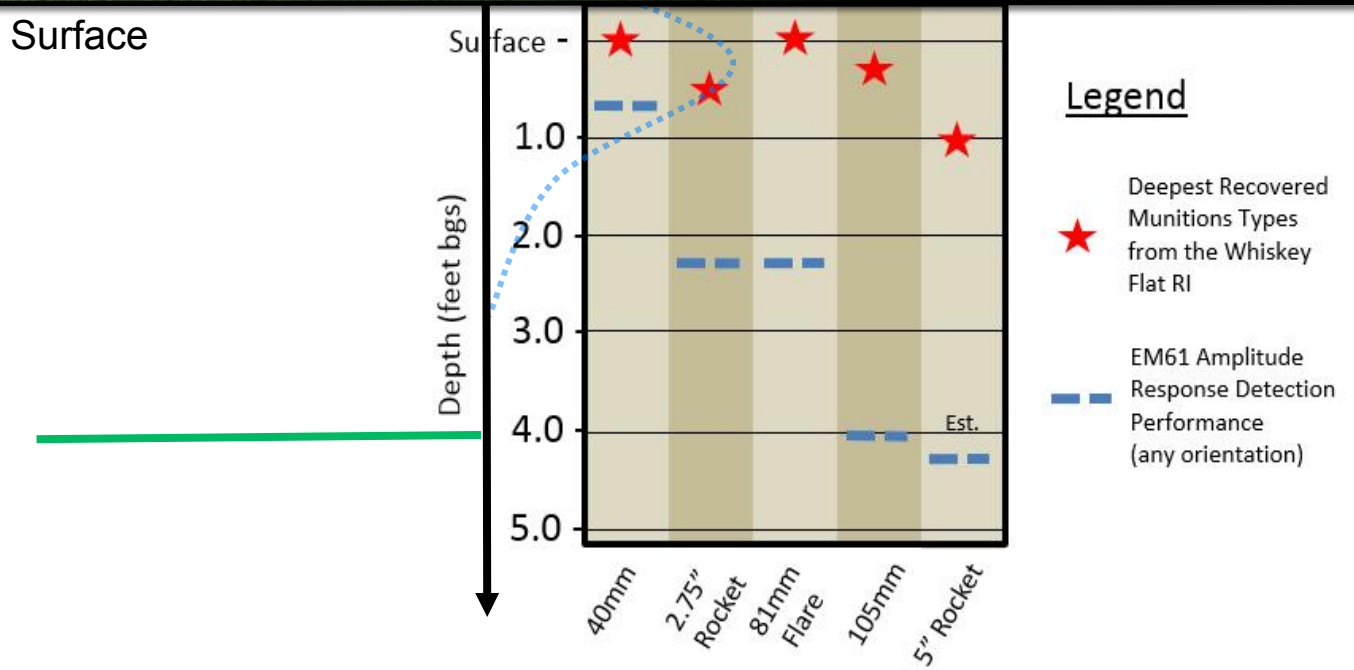
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# VERTICAL CSM



Land Use Depth =  
Action Limit



## Legend

- ★ Deepest Recovered Munitions Types from the Whiskey Flat RI
- EM61 Amplitude Response Detection Performance (any orientation)



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# CSM AND THE RISK MATRICES





# TYPES OF MEC HAZARDS

## Sensitivity: Susceptibility to Detonation

- **High**
  - e.g., classified as sensitive
- **Moderate**
  - e.g., high explosive (HE) or pyrotechnics
- **Low**
  - e.g., propellant or bulk secondary explosives
- **Not Sensitive**



## Severity Associated with Specific Munitions Items

- **Catastrophic/Critical:**
  - May result in 1 or more deaths, permanent total or partial disability, or hospitalization
- **Modest:**
  - May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization
- **Minor:**
  - May result in 1 or more injuries requiring first aid or medical treatment
- **Improbable:**
  - No injury is anticipated



# ACCESS CONDITIONS (FREQUENCY OF USE)

- Regular
  - e.g., daily use, open access
- Often
  - e.g., less regular or periodic use, some access
- Intermittent
  - e.g., some irregular use, access limited
- Rare
  - e.g., very limited use, access prevented



# LIKELIHOOD TO IMPART ENERGY ONTO AN ITEM

- High
  - e.g., areas planned for development, or seasonal tilled
- Modest
  - e.g. undeveloped, wildlife refuge, parks
- Inconsequential
  - e.g., not anticipated, prevented, mitigated

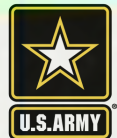


# AMOUNT OF MEC

- Need to estimate the amount and extent of MEC in order to make a decision.
- Amount of MEC will vary across the MRS.
- The Remedial Investigation and Data Quality Objectives should result in categorical representations for “amount of MEC” across the MRS (i.e., nature and extent).



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# EXAMPLE REPRESENTATION FOR AMOUNT OF MEC

CMUA – heavy contamination
CMUA – moderate contamination
Non CMUA – probably some UXO
Non CMUA – maybe some UXO
Non CMUA – could be some UXO
Clean



# FORT CUSTER BOMBING TARGET



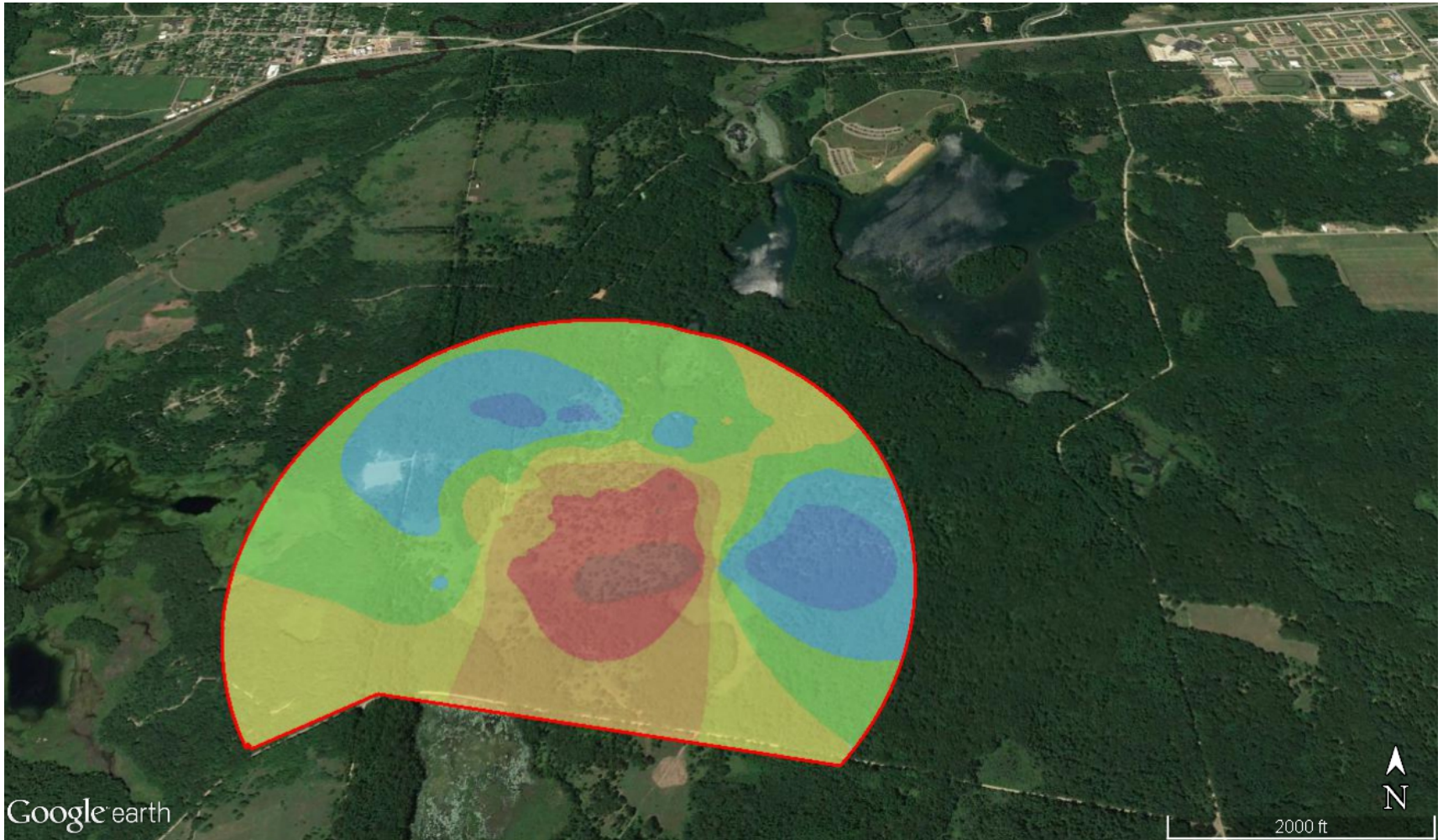
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# FORT CUSTER BOMBING TARGET



# FORT CUSTER BOMBING TARGET





# CSM CASE STUDY

## Camp Sherman Artillery Range



# CAMP SHERMAN ARTILLERY RANGE



5000 ft



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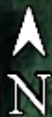


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# CAMP SHERMAN ARTILLERY RANGE

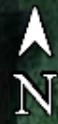
## Land Use Descriptions

- Residences and developed areas
- 100' around residences and developed areas
- Trails
- Forest



# CAMP SHERMAN ARTILLERY RANGE

Description	Frequency of Use	Likelihood to Impart Energy
Residences and developed areas	<i>Regular</i>	<i>High</i>
100' around residences and developed areas	<i>Often</i>	<i>High</i>
Trails	<i>Regular</i>	<i>Modest</i>
Forest	<i>Intermittent</i>	<i>Modest</i>



5000 ft



# CAMP SHERMAN ARTILLERY RANGE

Amount of MEC



5000 ft



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# CAMP SHERMAN ARTILLERY RANGE

Amount of MEC  
x Access Conditions (frequency of use)



5000 ft



# CAMP SHERMAN ARTILLERY RANGE

Amount of MEC  
x Access Conditions (frequency of use)  
**Likelihood of Encounter**



5000 ft



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# TYPES OF MEC HAZARDS

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# LAND USE SCENARIOS

Description	Frequency of Use	Likelihood to Impart Energy
<b>Residences and developed areas</b>	<i>Regular</i>	<i>High</i>
<b>100' around residences and developed areas</b>	<i>Often</i>	<i>High</i>
<b>Trails</b>	<i>Regular</i>	<i>Modest</i>
<b>Forest</b>	<i>Intermittent</i>	<i>Modest</i>



# CSM SITE CONDITIONS

Description	Frequency of Use	Likelihood to Impart Energy	CMUA (4)	Buffer (2)
Residences and developed areas	<i>Regular</i>	<i>High</i>	<b>A-1</b>	<b>B-1</b>
100' around residences and developed areas	<i>Often</i>	<i>High</i>	<b>A-1</b>	<b>B-1</b>
Trails	<i>Regular</i>	<i>Modest</i>	<b>A-2</b>	<b>B-2</b>
Forest	<i>Intermittent</i>	<i>Moderate</i>	<b>B-2</b>	<b>D-2</b>



# ACCEPTABLE AND UNACCEPTABLE SITE CONDITIONS

<i>Acceptable and Unacceptable Site Conditions</i>		Result from Matrix 2			
		A	B	C	D
Result from Matrix 3	1	<b>Unacceptable</b>	<b>Unacceptable</b>	Unacceptable	Acceptable
	2	<b>Unacceptable</b>	<b>Unacceptable</b>	Acceptable	<b>Acceptable</b>
	3	Unacceptable	Acceptable	Acceptable	Acceptable



## CONCEPTUAL SITE MODEL CONCLUSIONS:

- Type of MEC hazards
- Physical features of the MRS and surrounding area
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# Questions?



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