DERP Forum

Strengthening Relationships with our Regulatory Partners

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Data Usability Assessment for Munitions Response

Brian Jordan
Army Corps of Engineers

Jeff Swanson
Colorado Department of Public Health and Environment

MRD Description of Session

"MR: Data Usability:
Discussion about using data at MRSs. Talk specifically about collecting and reviewing data, and making the best decision based on the data collected."

Decision Making on Munitions Sites

- Decisions rely on a weight-of-evidence approach
  - especially for designating non-impacted areas
- Conceptual Site Model (CSM) documents information to support decision making
  - Strength of CSM
  - Investigation data
    - Field observations
    - Statistical sampling
    - Dig results
- Data must be of known and sufficient quality
  - Data Quality Objectives (DQO) process
  - Data usability assessment (DUA)

Weight of Evidence Decision Making

- Unlike traditional chemical cleanups, MRS do not have a clearly defined endpoint based on acceptable risk
- A weight of evidence approach is a familiar concept found in scientific and regulatory literature
- It is a method for decision-making that involves consideration of multiple sources of information and lines of evidence
  - CSM documents sources of information
- Avoids relying solely on any one piece of information.
- Will allow us to make informed defensible decisions on MRS

What is the Data Usability Assessment?

- Qualitative and quantitative evaluation of project data
  - Data **type, quality,** and **quantity** sufficient to support the **MPCs** and **DQOs** specific to the investigation
  - Data of known and sufficient quality to support environmental decision making
- Retrospective review of the systematic planning process to ensure that:
  - Underlying assumptions are supported
  - Sources of uncertainty are managed appropriately
  - Data are representative of the population of interest
  - Results can be used as intended with an acceptable level of confidence

When is the DUA Conducted?

- On-going and continuous, as data set is collected…
  - DUA is integrated into the definable features of work (DFW) where decision-making occurs
  - DUA is performed on each data set before it is used for decision making
  - For phased investigations, the DUA will occur over each phase

Some QAPP DUA Terms

- **Data Usability Assessment -** an evaluation of the data set making up a delivery unit, to determine whether the data support their intended uses
  - DUA is an evaluation of conformance to the MPCs presented in Worksheet #12
  - DUA procedures are documented in Worksheet #37
- **Measurement Performance Criteria (MPCs)** - qualitative and quantitative specifications for **accuracy, sensitivity, representativeness, completeness,** and **comparability** that collected data must meet to satisfy the DQOs described in Steps 1 through 5 of the DQO process (Worksheet #11)
  - MPCs are documented in Worksheet #12
- **Data verification** is a completeness check to confirm that all required activities were conducted, all specified records are present, and the contents of the records are complete
- **Data validation** is a detailed evaluation of data for conformance to stated requirements, e.g., those contained in the contract, SOPs and Worksheet #22 (MQOs)
  - Data verification, validation and usability inputs are documented in Worksheet #34
  - Data verification and validation procedures are documented in Worksheet #35

A little more about MPCs

QAPP MPC (MR QAPP Table 12.1)	Accuracy	Sensitivity	Representative-ness	Completeness	Comparability
Site Prep.: 1. Accessibility					
Sampling Design: 2. Planned Survey Coverage					
Data Acq.: 5. Transect Positioning Requirement					
Data Acq.: 12. QA Seeding (analog)					
14. Anamoly Resolution: DGM					

Example

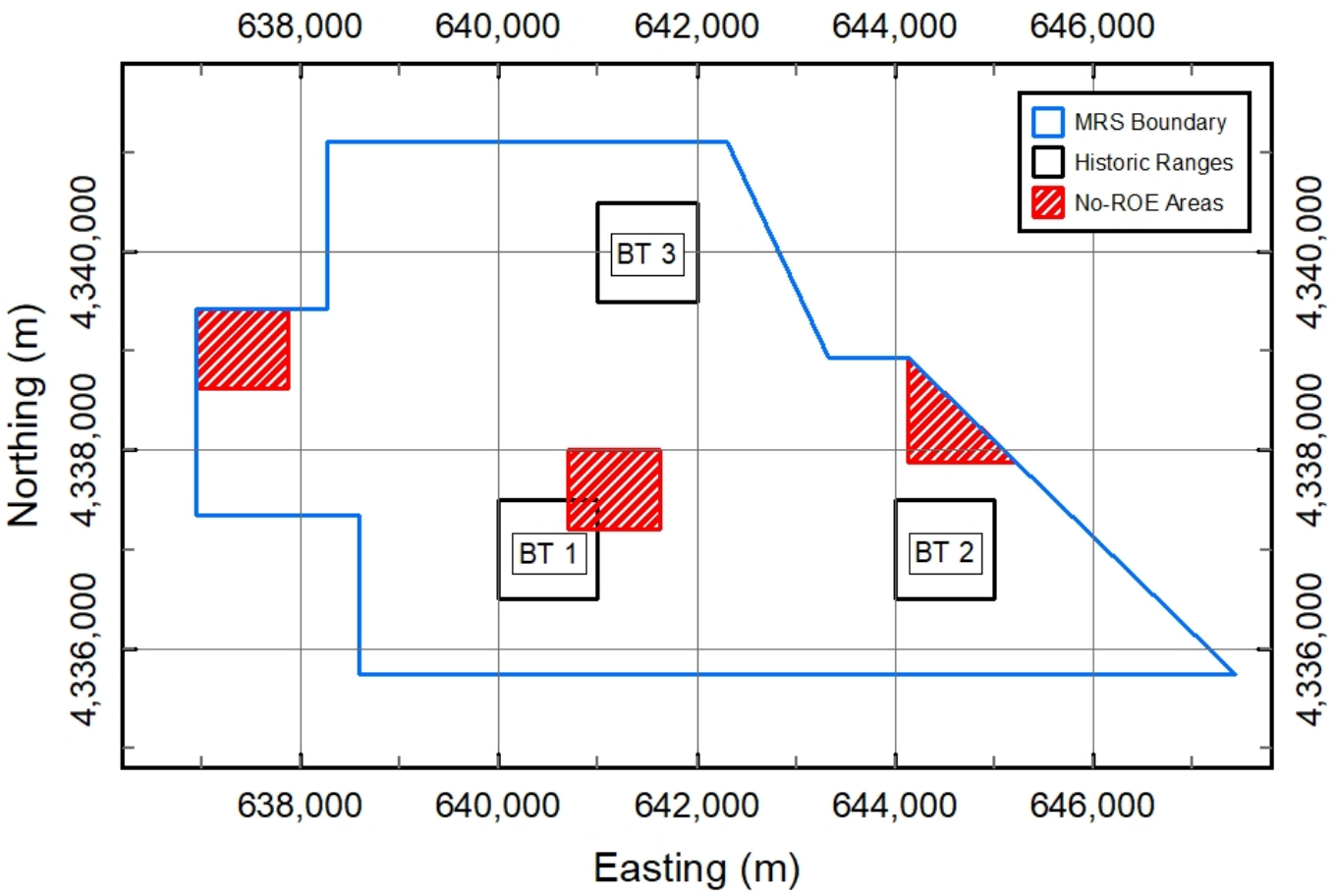
Weight-of-Evidence Decision Making

- **MRS A Preliminary Characterization**
  - Suspected Bomb Target #3

Glossary

- High-Density (HD) Area
  - anomaly density ≥ critical density
- High-Use Area (HUA)
  - HD areas are presumed to result from munitions use unless demonstrated otherwise
- Low-Density (LD) Area
  - anomaly density < critical density
- Low-Use Area (LUA)
  - LD area where potential presence of munitions cannot be ruled out
  - Examples include buffer zones and maneuver areas
- Non-Impacted Area (NIA)
  - LD areas when CSM contains adequate evidence that no munitions were used
  - HD areas when determined to be not related to munitions use

MRS A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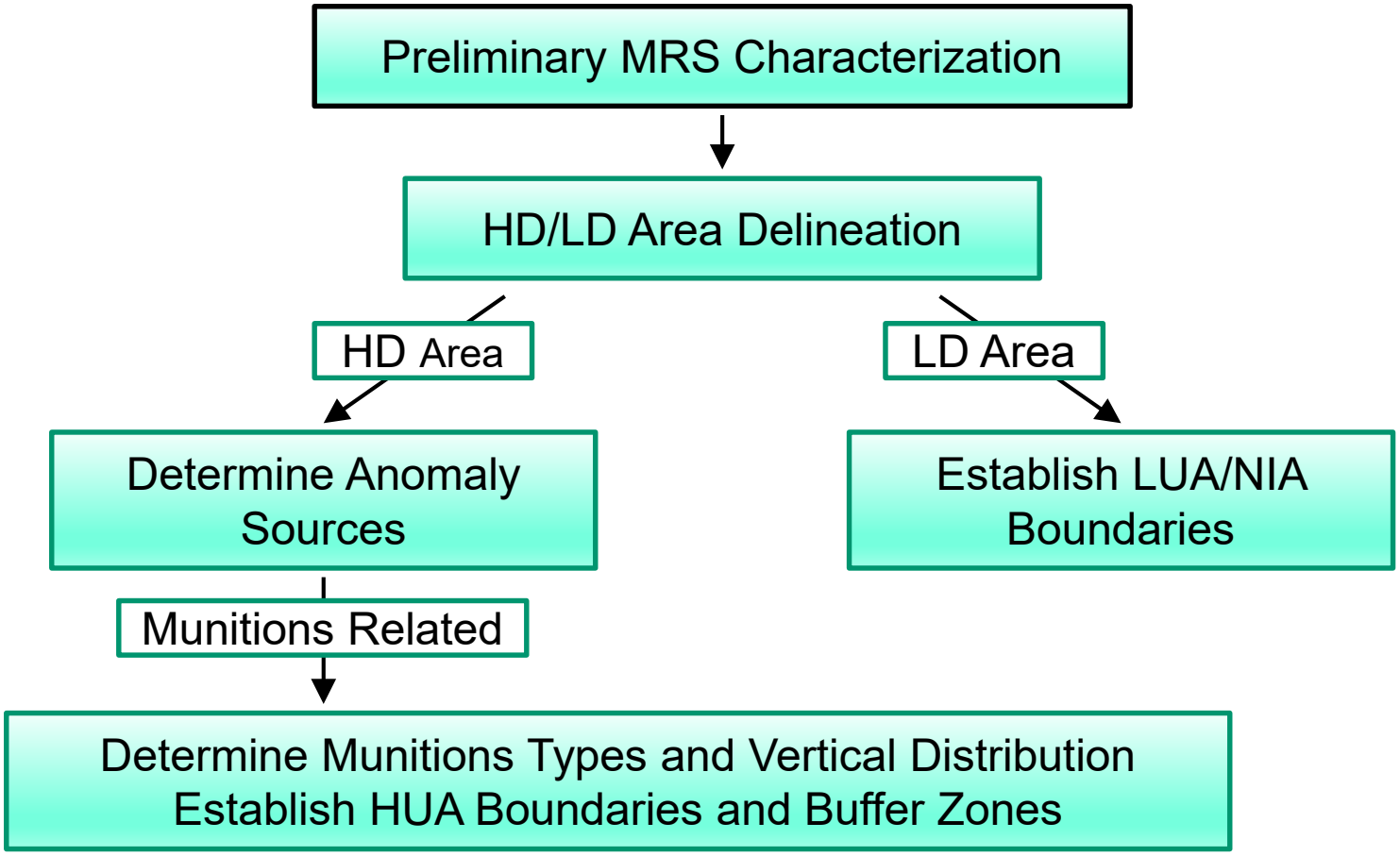
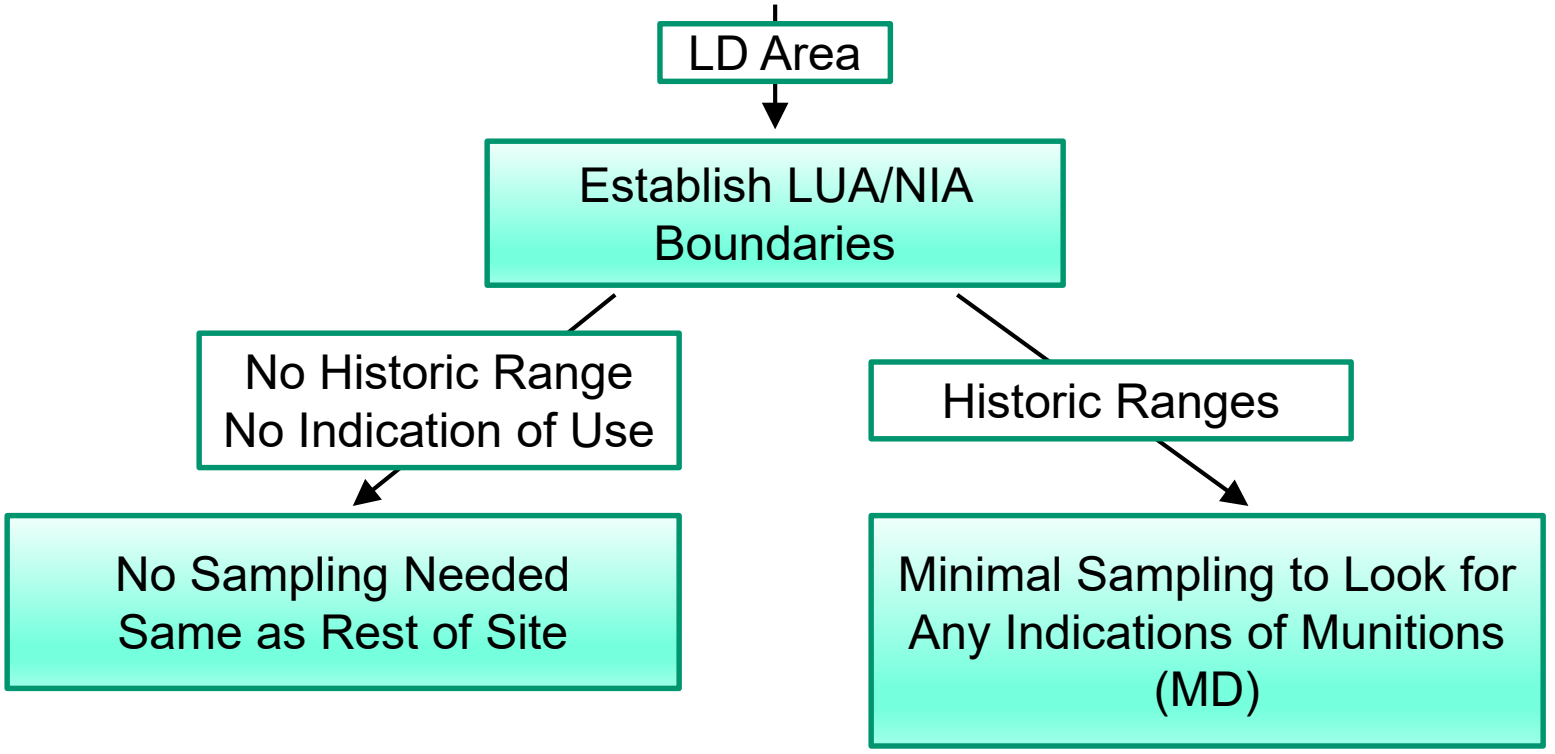
Northing (m)
Easting (m)
MRS Boundary
Historic Ranges
No-ROE Areas
BT 3
BT 1
BT 2

Characterization Approach



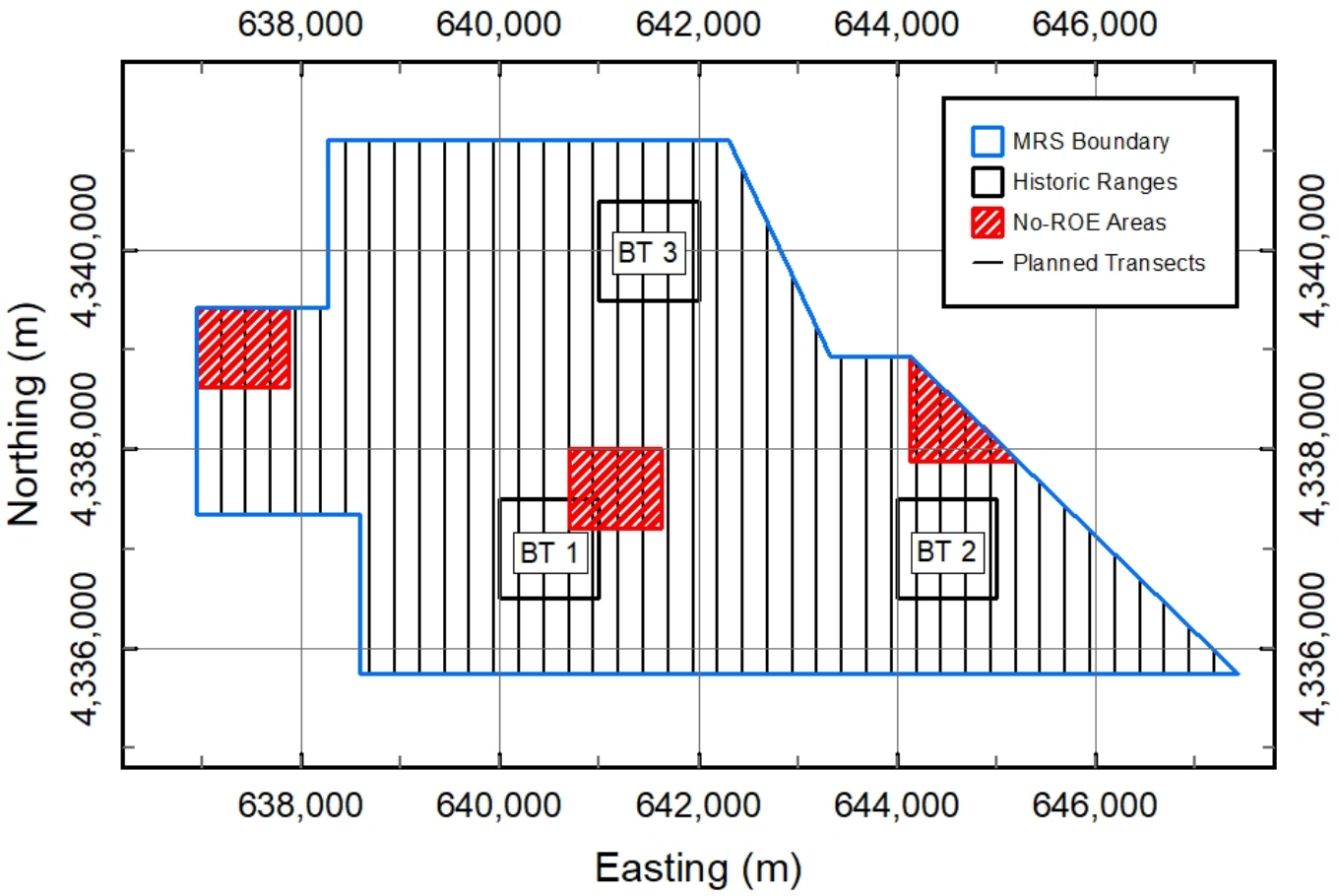
Characterization Approach



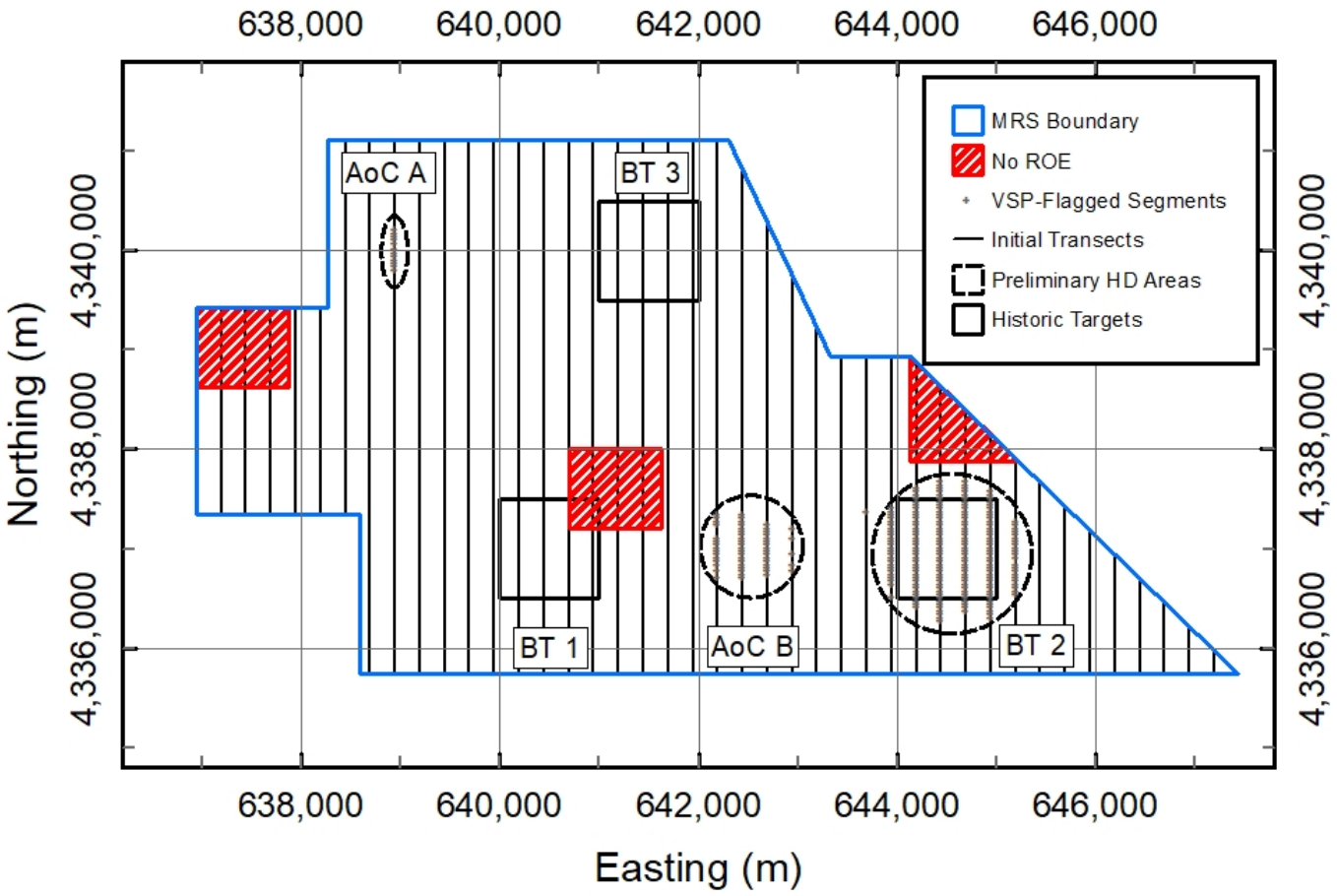
Can't Sample Your Way to No UXO/DMM

Weight of Evidence Approach

Initial Transect Design – MRS A



Initial Transect Results – MRS A



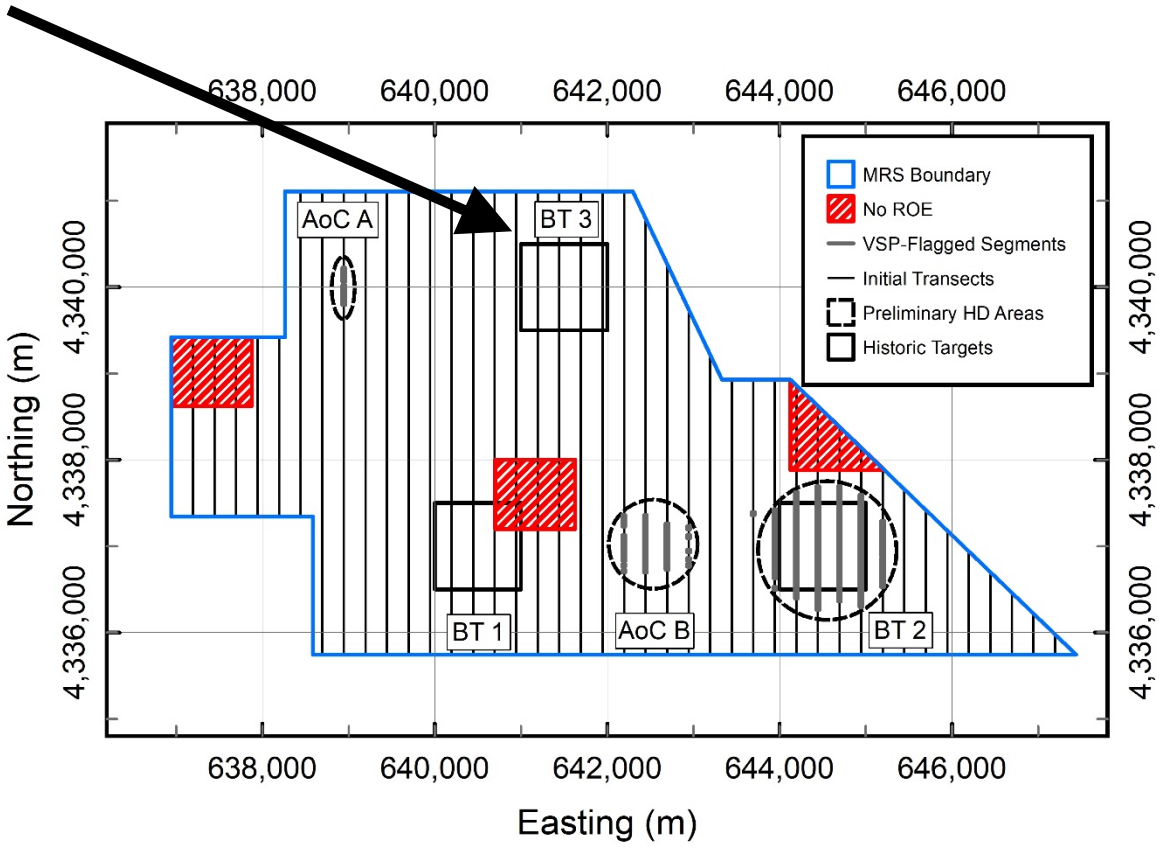
Weight-of-Evidence Decision Making

<u>Bomb Target 3</u>
CSM:

- Planned bomb target

RI Results:

- VSP analysis shows no HD area
- Field team observed no evidence of use
- No surface indication of MD or RRD



DUA Process

Review of the four-step data usability assessment process

DUA Process

Step 1	**Review the project's objectives and sampling design** • Review the data quality objectives • Review the sampling design as implemented for consistency with stated objectives
Step 2	**Review data outputs and evaluate conformance to MPCs** • Review the data verification/validation reports • Evaluate conformance to MPCs (WS #12) • Evaluate data completeness
Step 3	**Document data usability and draw conclusions** • Assess performance of sampling design • Identify any limitations on data use • Update CSM, apply decision rules, document conclusions
Step 4	**Document lessons learned and make recommendations** • Summarize conclusions • Make recommendations for next phase of investigation • Document Lessons Learned

Step 1 – Review Project's Objectives and Sample Design

- Review the data quality objectives
  - *Are underlying assumptions valid?*
- Review the sampling design as implemented for consistency with stated objectives
  - *Were VSP input parameters representative of actual site conditions?*
  - *Were sources of uncertainty accounted for and appropriately managed?*
- Summarize any deviations from the planned sample design and describe their impacts on the data quality objectives

Step 2 - Review data outputs and evaluate conformance to MPCs

- Review the data verification/validation reports and supporting data
  - Daily/weekly QC reports
  - Assessment reports
  - Corrective action reports
    - *Were any RCA/CA effective?*
    - *Evaluate the implications of unacceptable QC results.*
- Evaluate conformance to MPCs (WS #12)
- Evaluate data completeness
    - *Were all data inputs satisfied?*
    - *Identify data gaps.*

Step 3 - Document data usability and draw conclusions

- Assess the performance of the sampling design and identify any limitations on data use
  - *Considering the implications of any deviations and data gaps, can the data be used as intended?*
  - *Are the data sufficient to answer the study questions?*
- Update the conceptual site model, apply decision rules, and document conclusions

Step 4 – Document Lessons Learned and Make Recommendations

- Summarize conclusions
- Summarize lessons learned
  - Make recommendations for changes to DQOs
  - Make recommendations for the sampling design for the next phase of investigation or future investigations
- Prepare the data usability summary report

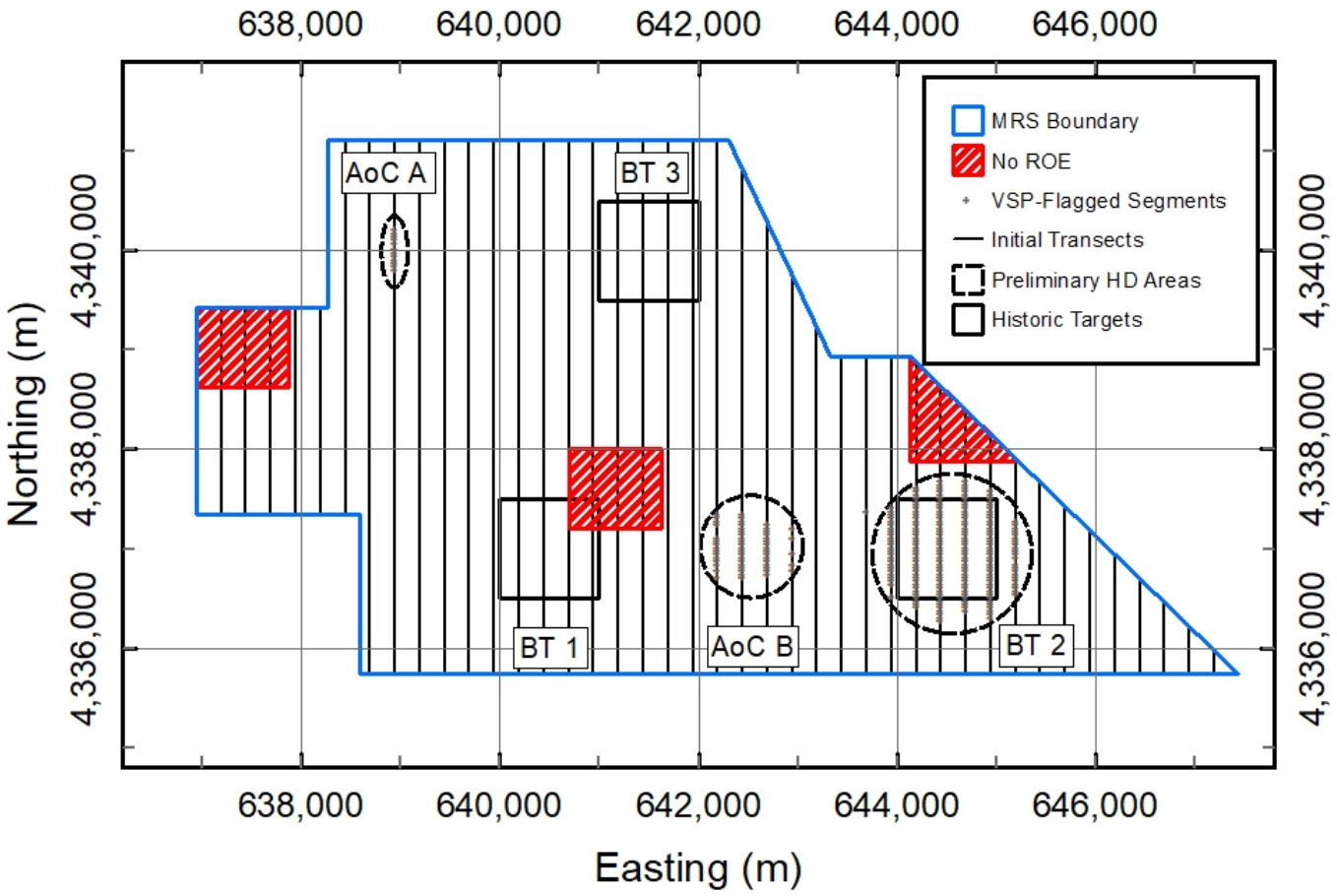
Example

Data Usability Assessment

MRS A

AOC A Detailed Characterization

Initial Transect Results – MRS A



Step 1 - Review the project's objectives and sampling design

- Review DQOs
  - Primary objectives are to:
    - delineate HD areas from LD areas, and
    - determine which areas require further characterization
- *Are underlying assumptions valid?*
  - Preliminary findings are consistent with confirming one bomb target and locating a second HD area that suggests a second bomb target

Step 1 - Review the project's objectives and sampling design

- *Were VSP input parameters representative of actual site conditions?*
  - The planned transect spacing was based on the VSP-recommended target size for air-dropped bombs of < 100 lbs
- *Were sources of uncertainty appropriately managed?*
  - Primary uncertainties are in VSP planning assumptions
    - background density, target size, and contrast
  - VSP reanalysis using actual site characteristics indicate 100% probability of traversing and detecting air-dropped bomb targets

The assumptions are valid based on everything known about MRS A

Step 2 - Review data and evaluate conformance to MPCs

Non-conforming MQO	Root cause	Corrective action implemented?
In-line measurement spacing exceeded 0.25m in 5% of transects in MRS A	Unsafe terrain	N/A – Measurement spacing was ≤1m for 100% of transects.
Transect spacing. No data collected in three no-ROE areas	No ROE	N/A – Data gaps are mapped in CSM. Impacts will be addressed during detailed characterization and final DUA.

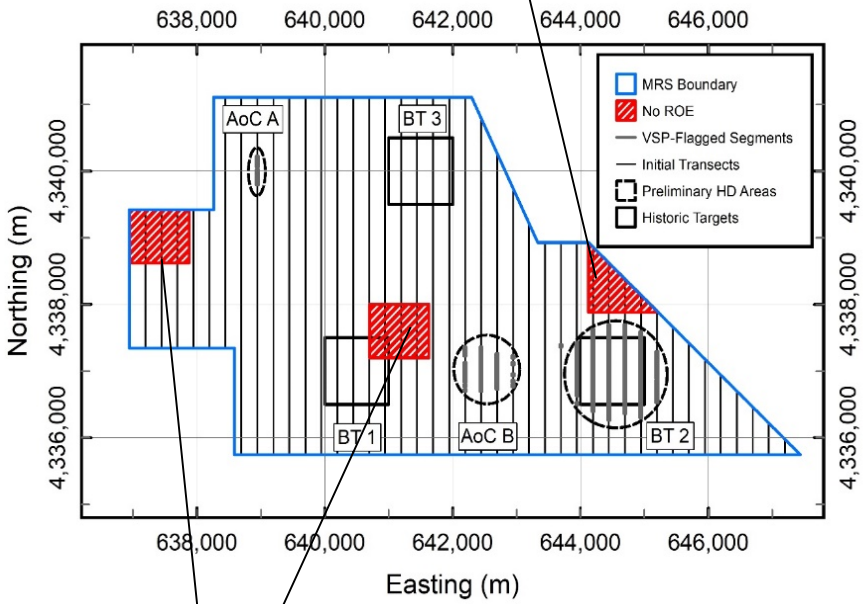
- *Summarize all non-conformances and RCA/CA*
  - No CAs were required
  - There were no unacceptable QC results
- *Evaluate conformance to MPCs*
  - MPCs have been satisfied

Step 2 - Review data and evaluate conformance to MPCs

Evaluate data completeness

- *Were all data inputs satisfied?*
- *Identify Data Gaps*
  - Data are complete in all accessible area
  - No survey data in no-ROE areas

- Confirmed HD area at expected location



- CSM contains nothing to suggest munitions use in this part of the MRS, but no data are available to rule it out

- All surrounding area is LD
- Low likelihood that an additional HD area would be entirely confined to the no-ROE area

The data are suitable to identify bomb targets in MRS A

Step 3 - Document data usability and draw conclusions

- *Considering the implications of any deviations and data gaps, can the data be used as intended?*
- *Are the data sufficient to answer the study questions?*
  - The sampling design for the preliminary characterization performed as expected
  - With the exception of the no-ROE areas, the data are suitable for delineating HD and LD areas in MRS A
  - The data are suitable for use in planning the HD and LD area characterization within MRS A
- *Update CSM to reflect*
  - the actual background anomaly density
  - approximate preliminary boundaries of AOC A, AOC B, BT2

Step 4 – Document lessons learned and make recommendations

- *Summarize conclusions*
- *Make recommendations for next phase of investigation*
  - Update DQOs for AOC A
    - Original DQO of HD Area Characterization is to collect sufficient data to determine extent, depth profile, types of munitions present
    - During the preliminary characterization, a small HD area was found that appears to be associated with an abandoned mine – no munitions expected
    - Additional data will be collected to confirm that elevated anomaly density at AOC A is related to the presence of an abandoned mine and not related to munitions use
- Summarize lessons learned

Summary – DUA Take Home

- Revisit planning assumptions versus actual site conditions to verify validity of design
- Document new information about the site, update CSM, and reconsider objectives and assumptions
- LUA/NIA designations will rely heavily on weight of evidence
  - Sampling alone will not provide the answer
- Assure HUA characterization information meets both RI and FS needs

Questions?