

# MORGAN ORDNANCE SUPPLY DEPOT FORMERLY USED DEFENSE SITE (FUDS), MRS-01 SAYREVILLE, NJ REMEDIAL INVESTIGATION (RI)

Systematic Project Planning  
Meeting 1

1 March 2023

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US Army Corps  
of Engineers®



Morgan Marina



1918 Explosion Crater





# GOALS



## Part 1

Introductions

Overview of CERCLA Process and Project

## Part 2

Review Preliminary CSM (UFP-QAPP Worksheet # 10)

Review Data Quality Objectives Steps 1 through 4  
(UFP-QAPP Worksheet #11)

Evaluate data collection options and develop Measurement  
Performance Criteria

## Part 3

Define Stakeholder Involvement

Review Project Schedule & Action Items





# **MORGAN ORDNANCE SUPPLY DEPOT FUDS MRS-01 RI/FS STAKEHOLDER AND SPP MEETING #1**

## **Part One** **Introduction and Meeting Goals**





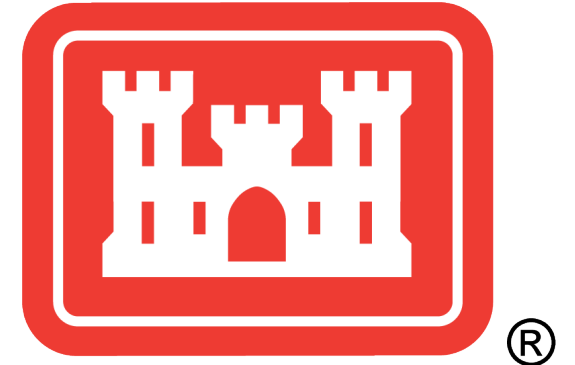
# INTRODUCTIONS

## Executing Agencies

- U.S. Army Corps of Engineers (USACE) New England (CENAE)
  - Gina Kaso, Project Manager
  - Jennifer Apell, Chemist
  - Amy Rosenstein, Human Health Risk Assessor
  - Brent Smith, Geologist
  - Marcos Paiva, Archaeologist
  - Michael Narcisi, Ecological Risk Assessor
  - Beth Gosselin, Public Affairs Officer
- USACE Baltimore (CENAB)
  - Katie Marrette, Contracting Officer
  - Todd Beckwith, Contracting Officer's Representative & Technical Manager
  - David King, Quality Assurance (QA) Geophysicist
  - Greg Abrams, QA Geophysicist
  - Marty Holmes, Ordnance and Explosive Safety Specialist (OESS)
- USACE New York (CENAN)
  - Michael Heck, Real Estate

## Contract Support

- Weston Solutions, Inc.
  - John Gerhard, Program Manager
  - Bryan Hnetinka, Project Manager
  - Caitlyn Martin, Assistant Project Manager & Project Engineer
  - Garrick Marcoux, Senior Project Geophysicist
  - Larry Werts, Health & Safety Manager





# INTRODUCTIONS



## Regulatory Agencies

- New Jersey Department of Environmental Protection (NJDEP)
  - Ralph Rodrigues, Munitions Lead
  - Scott Vondy, Munitions Constituents (MC) Lead
  - Keith Rivera, UXO Pro Inc. (consultant to NJDEP)
  - Joseph Corleto, Fish & Wildlife Lead

## Stakeholders

- Cheesequake State Park
  - Jonathan Luk
- Township of Old Bridge
  - Mayor Owen Henry
  - Nicole Shapiro
- City of South Amboy
  - Mayor Fred Henry
- Borough of Sayreville
  - Mayor Victoria Kilpatrick





# CERCLA PROCESS SUMMARY



## PROCESS

## OVERALL GOAL

Current Contract Scope

Identify Release(s)

Site Inspection

Remedial Investigation

Feasibility Study

Proposed Plan

Decision Document

Remedial Design

Remedial Action

Document the presence/absence of contaminants and whether further investigation is needed.

Define the nature and extent of contamination and complete a risk assessment.

Screen remedial technologies and develop/evaluate remedial alternatives.

Document and propose the selected remedy for public comment.

Document and authorize the selected remedy.





# TERMS & ACRONYMS



AGC – Advanced Geophysical Classification

bgs – below ground surface

CENAB – USACE, Baltimore District

CENAE – USACE, New England District

CENAN – USACE, New York District

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

CSM - Conceptual Site Model

DGM – Digital Geophysical Mapping

DMM – Discarded Military Munitions

DPT – Direct Push Technology

DoD – Department of Defense

DQO – Data Quality Objectives

EE/CA – Engineering Evaluation / Cost Analysis

FS – Feasibility Study

FUDS – Formerly Used Defense Site

HE – High Explosive

HUA / LUA – High Use Area / Low Use Area

ISM – Incremental Sampling Methodology

MC – Munitions Constituents

MEC – Munitions and Explosives of Concern





# TERMS & ACRONYMS



MMRP – Military Munitions Response Program

MPC – Measurement Performance Criteria

MPV – Man Portable Vector

MRS – Munitions Response Site

NEU – No Evidence of Use

NJDEP – New Jersey Department of Environmental Protections

OESS – Ordnance and Explosive Safety Specialist

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

RI – Remedial Investigation

ROE – Rights-of-Entry

SLAM – Simultaneous Localization and Mapping

SPP – Systematic Project Planning

SSS – Side Scan Sonar

TCRA – Time Critical Removal Action

TOI – Target of Interest

UFP–QAPP – Uniform Federal Policy Quality Assurance Project Plan

USACE – U.S. Army Corps of Engineers

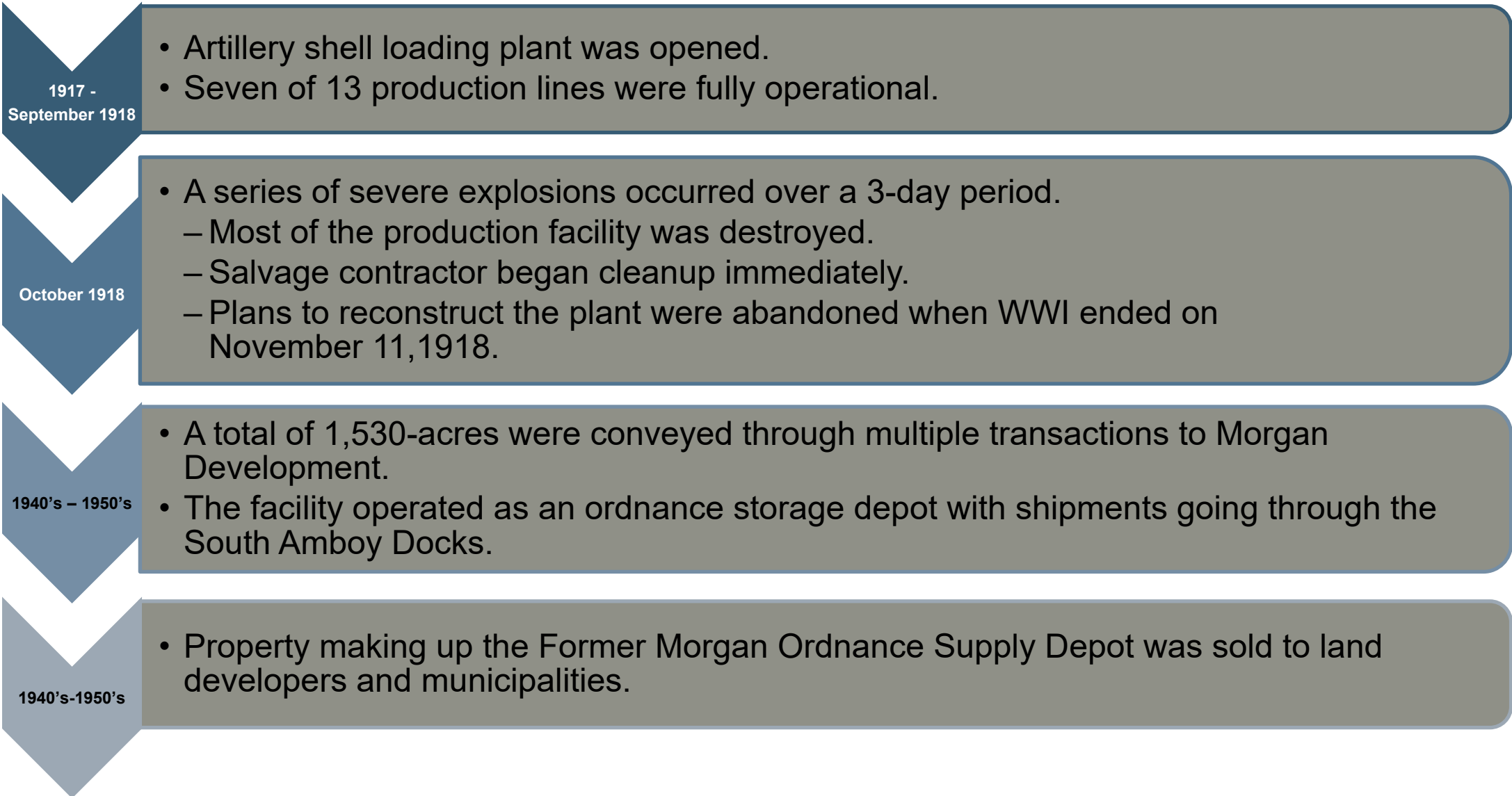
USEPA – U.S. Environmental Protection Agency

UXO – Unexploded Ordnance





# SITE HISTORY





# MORGAN ORDNANCE SUPPLY DEPOT LAYOUT



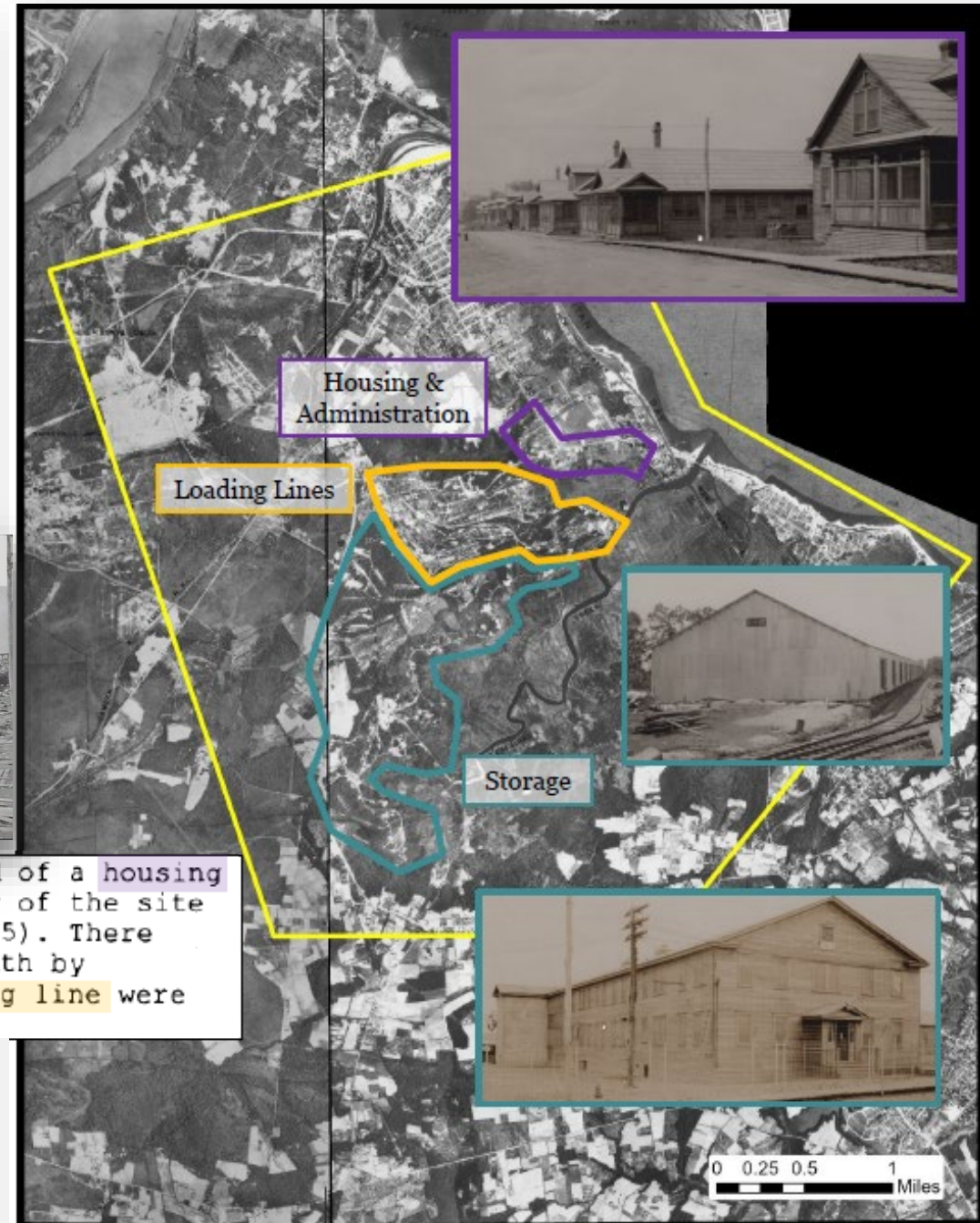
June 04, 1918



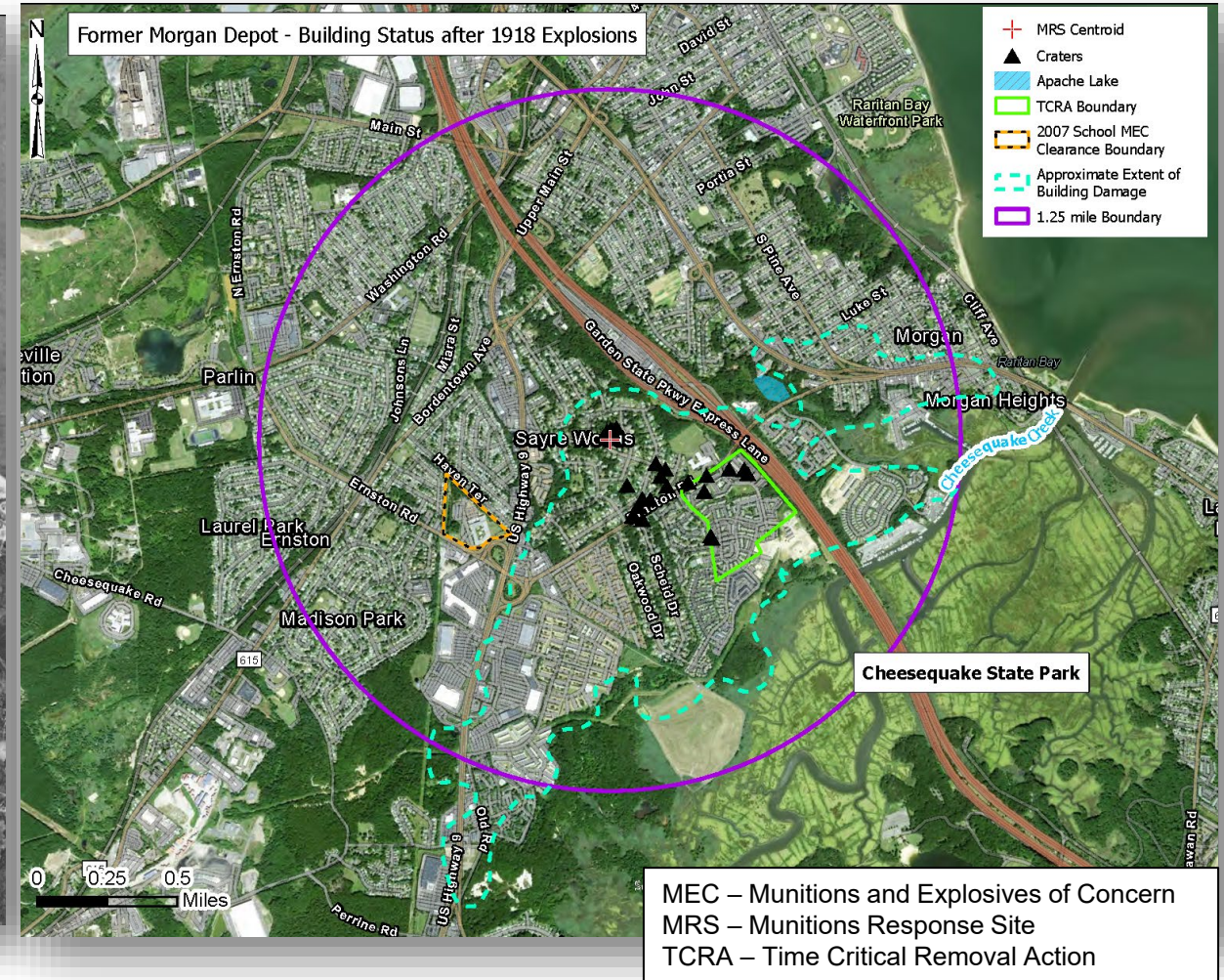
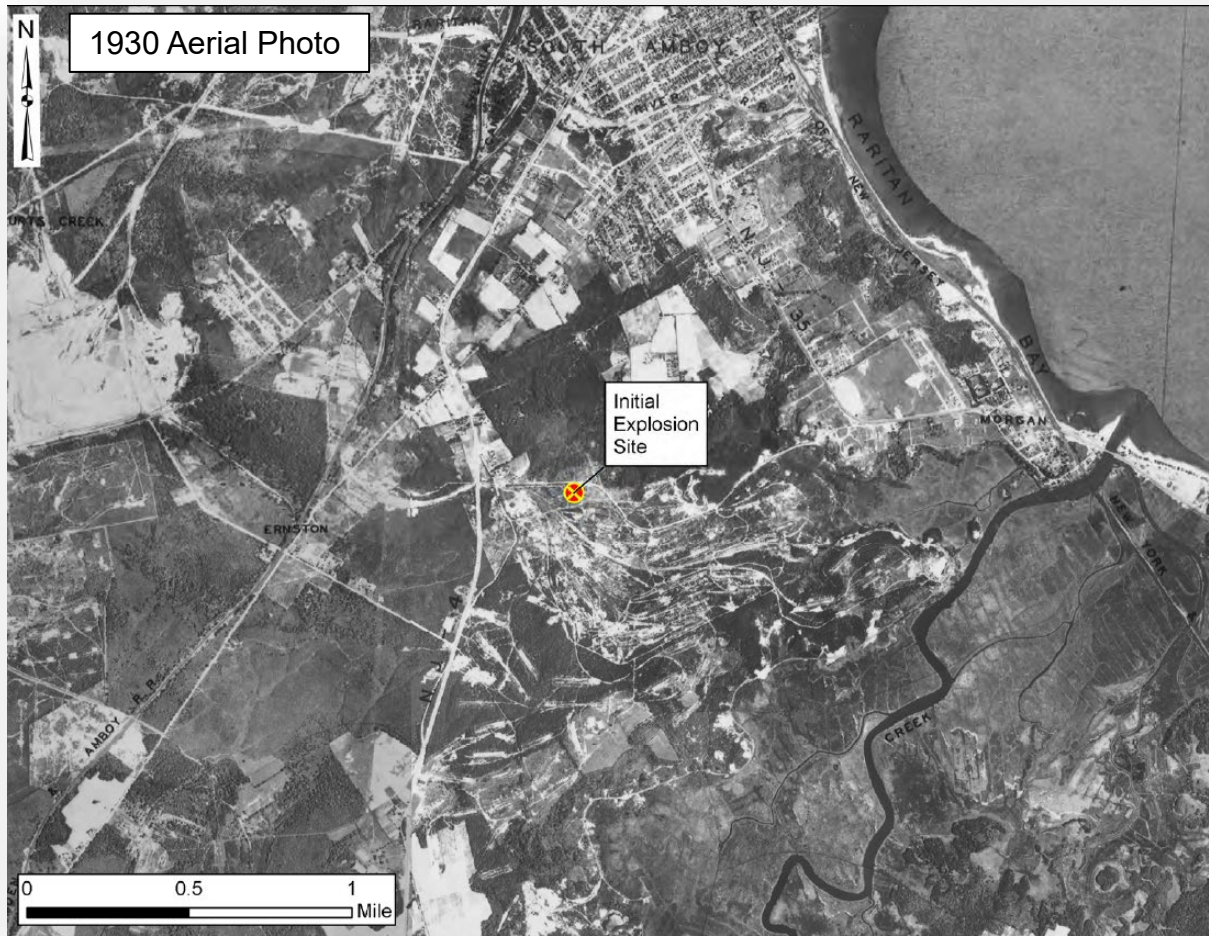
Cars near new coal trestle with empty shells.  
October 11, 1918

Before & After Explosions

(5) The layout of the plant consisted of a housing and administrative area in the northeast corner of the site facing what was then Morgan Road (now highway 35). There were 41 main storage buildings built in the south by Cheesequake Creek. The projection of 13 loading line were to be built in the northwest section

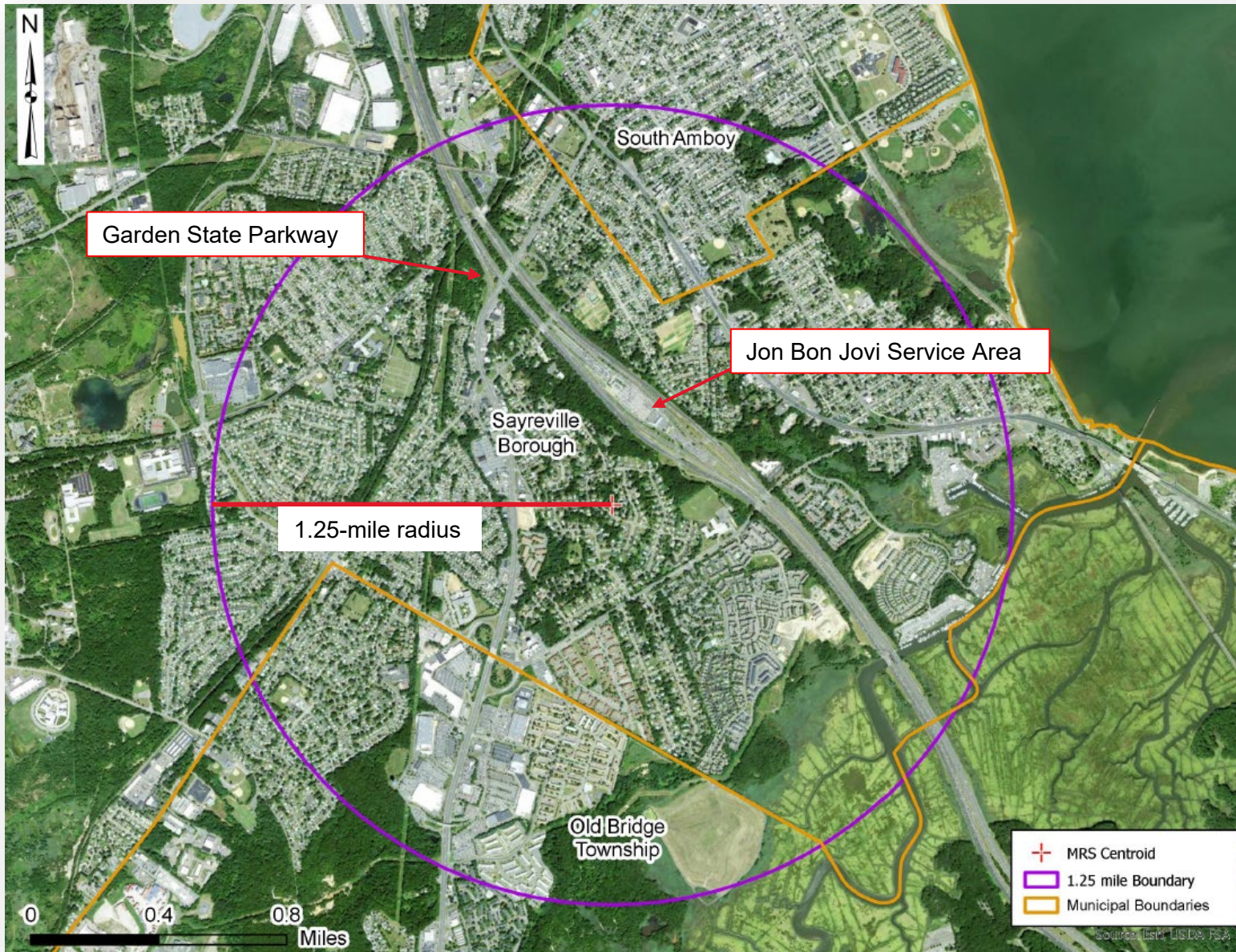


# POST EXPLOSION DEVELOPMENT





# SITE LOCATION & DESCRIPTION



One Munitions Response Site (MRS) has been identified for the Morgan Ordnance Supply Depot, which is called MRS-01.

The MRS boundary was determined by drawing a circle with a 1.25-mile radius from the location of the initial 1918 explosion. The 1.25-mile distance is based on the furthest ordnance item identified from the center of the explosion.

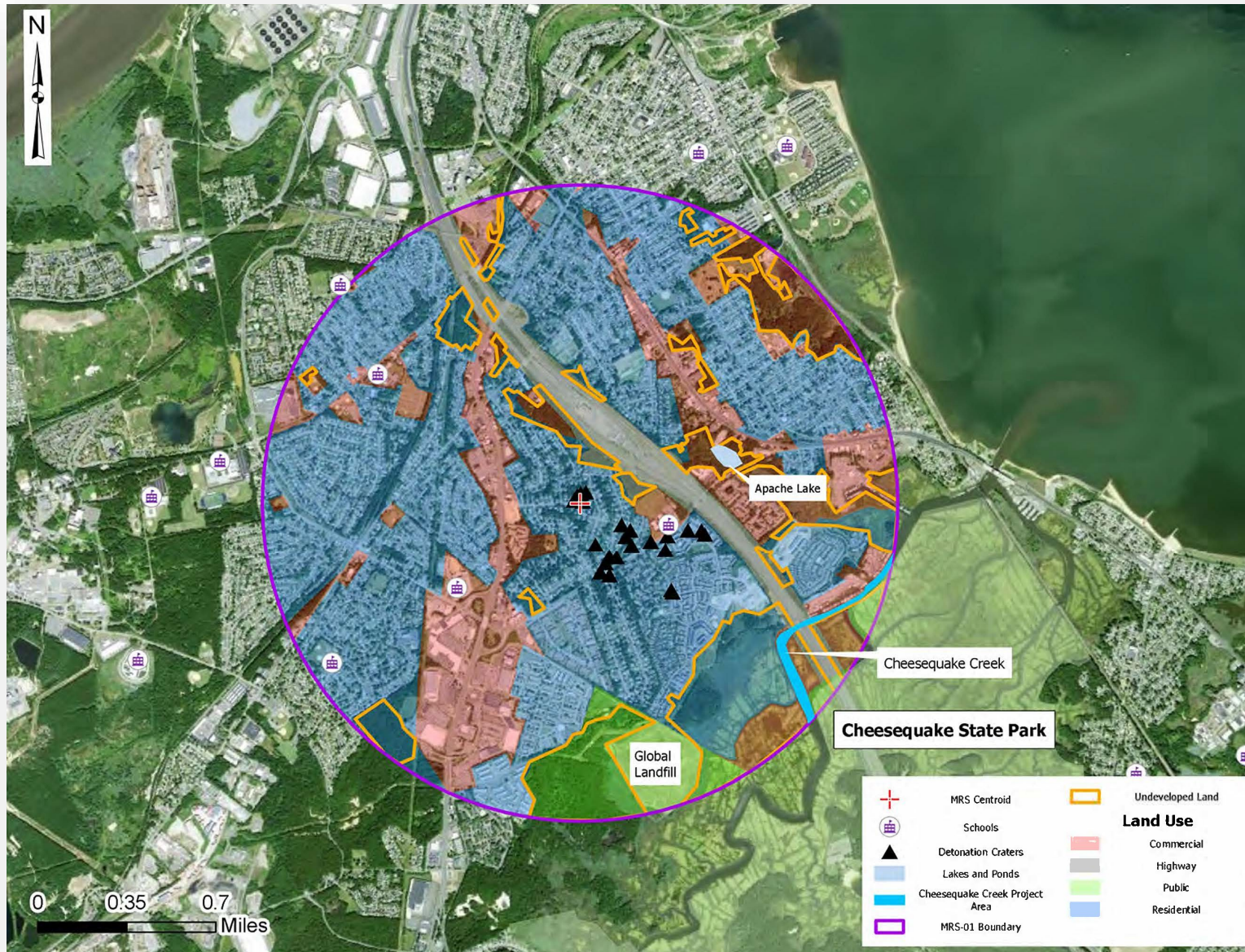
A total of 3,156-acres located in Sayreville, South Amboy, and Old Bridge communities.





# SITE LOCATION & DESCRIPTION

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- Current land uses:
  - Residential housing
  - Commercial business
  - Garden State Parkway & NJ Route-35 transect MRS-01
  - Cheesquake State Park





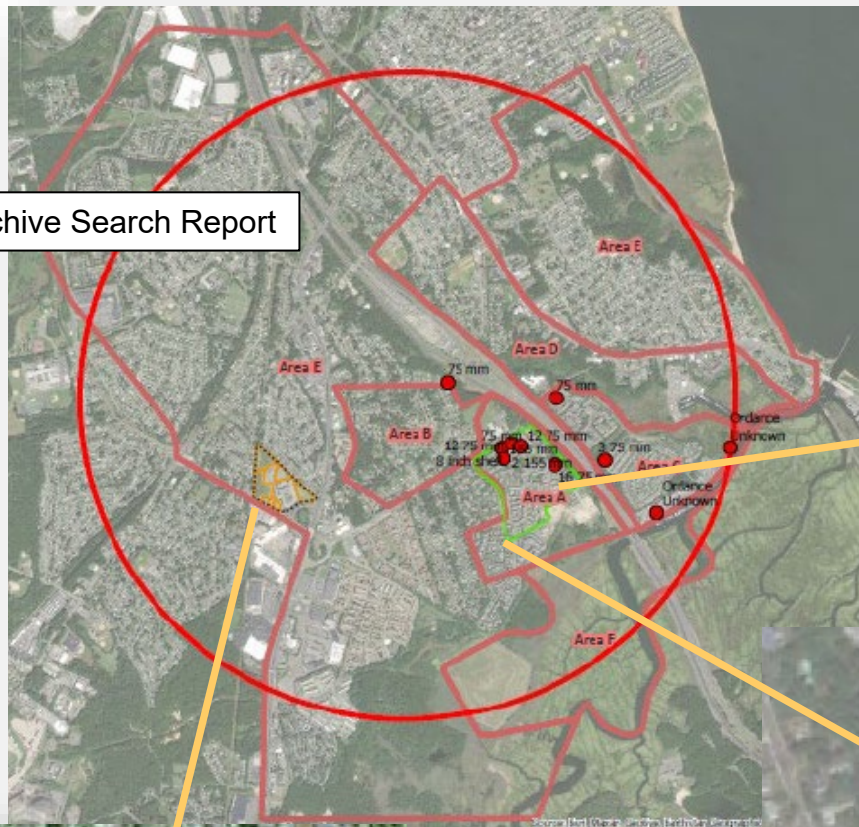
# PREVIOUS ACTIVITIES



Year	Type	Findings
1993	Preliminary Assessment	<ul style="list-style-type: none"><li>• 75mm, 155mm, and 8-inch projectiles were identified</li><li>• Project identified and forwarded to USACE for further evaluation</li></ul>
1994	Archives Search Report	<ul style="list-style-type: none"><li>• Site was segmented into six areas:<ul style="list-style-type: none"><li>– Areas A, B, C, and D – presence of MEC confirmed</li><li>– Areas E and F – presence of MEC unconfirmed, but the potential exists</li></ul></li><li>• A total of 15 MEC items were confirmed during the ASR</li></ul>
1994	TCRA	<ul style="list-style-type: none"><li>• 75 Acre TCRA – Analog Removal Survey to 2 ft bgs<ul style="list-style-type: none"><li>– 15-acre Eisenhower School property – 19 MEC items removed</li><li>– 60 acres south of Ernston Road and Eisenhower School, between Nathan Blvd. and the Garden State Parkway – 2,625 MEC items removed</li></ul></li></ul>
1994 - 1997	EE/CA Removal Action	<ul style="list-style-type: none"><li>• Pre-development removal action conducted at the 60-acre TCRA area to a depth of 4 ft bgs</li><li>• 2,379 MEC items and 30,022 pounds of ordnance and explosives scrap were removed</li></ul>
1995	Construction Support	<ul style="list-style-type: none"><li>• Construction of a sewer line in an 18-acre housing development within the 60-acre former TCRA parcel – 41 MEC items were removed</li></ul>
1994 - 2000	Site-Wide EE/CA Action Memorandum	<ul style="list-style-type: none"><li>• Geophysical surveys were performed on 57 sample plots</li><li>• Partial intrusive investigations conducted, including investigation of over 100 ordnance fragments and removal of one adapter booster</li></ul>
2007	Construction Support	<ul style="list-style-type: none"><li>• One MEC item was identified during construction of a playground on the grounds of Samsell Upper Elementary School prompting the MEC construction support.</li><li>• No additional MEC items were identified</li></ul>



1994 Archive Search Report



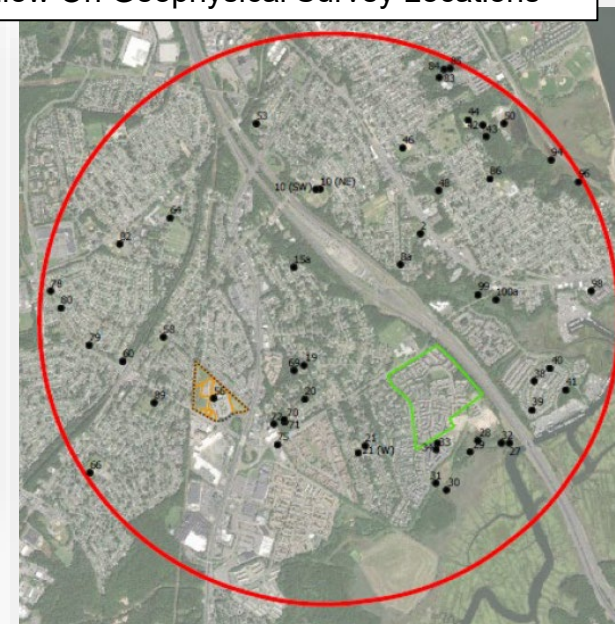
1994 TCRA Boundary  
1995 Construction Support  
occurred at 18-acre housing  
development within this area.



1994-2000  
Site-Wide EE/CA  
(Lower Left) First Geophysical Survey Effort 1994  
(Lower Right) Follow On Geophysical Survey Locations



2007 School Construction  
Support/MEC Clearance Boundary





# **MORGAN ORDNANCE SUPPLY DEPOT FUDS MRS-01 RI/FS STAKEHOLDER AND SPP MEETING #1**

## **Part Two** **RI Approach at MRS-01**





# COMMUNITY INVOLVEMENT PLAN & INSTITUTIONAL ANALYSIS

## Community Involvement Plan

Guides communications with landowners, including the following:

- Informs of project status & upcoming activities
- Answers questions
- Address concerns
- Provide day-to-day communications with participating property owners

## Institutional Analysis

Identifies controls and mechanism that may already be in place or may be applicable for future implementation to protect the community from potential residual risk, including the following:

- Proprietary control
- Local government controls
- Engineering controls (fence, signage, caps)
- Educational controls

All public coordination and meetings will be supported by the CENAE Public Affairs Officer.

The Institutional Analysis is being performed as part of the Historical Data Review which will guide QAPP development and potential field work locations.





# UFP-QAPP WORKSHEET 10

## MEC CONCEPTUAL SITE MODEL



Site Details	Known or Suspected Contamination Source(s)	Potential or Suspected Location and Distribution	Source or Exposure Medium	Current and Future Receptors & Land Use	Potentially Complete Exposure Pathways
<p>Morgan Ordnance Supply Depot FUDS, Sayreville, NJ MRS-01 3,156 acres</p> <p>Former DoD activities include the loading, assembly, and packing of munitions. A series of explosions in 1918 resulted in the scattering of munitions.</p>	<ul style="list-style-type: none"><li>• 75mm projectiles</li><li>• 155mm projectiles</li><li>• 3-inch Stokes mortars</li><li>• 4.7-inch projectiles</li><li>• 6-inch projectiles</li><li>• 8-inch projectiles</li><li>• 9.2-inch projectiles</li><li>• 240mm trench mortar</li></ul>	<p>Presence of MEC in subsurface soils confirmed at MRS-01. Site is heavily developed making it highly unlikely that MEC is present on the ground surface.</p>	<p>Surface and subsurface soils and sediment</p>	<ul style="list-style-type: none"><li>• Residents</li><li>• Industrial/commercial workers</li><li>• Recreational visitors/trespassers</li><li>• Construction workers</li><li>• Biota</li></ul> <p>Heavily developed, with industrial, commercial, and residential land uses. Recreational land use within Cheesequake State Park. Land use not expected to substantially change in the future.</p>	<p>Human receptors' exposure pathway potentially complete in surface and subsurface soils.</p> <p>Biota not considered for MEC exposure pathways.</p>





# UFP-QAPP WORKSHEET 10

## POTENTIAL MC CONCEPTUAL SITE MODEL



Site Details	Known or Suspected Contamination Source(s)	Potential or Suspected Location and Distribution	Source or Exposure Medium	Current and Future Receptors & Land Use	Potentially Complete Exposure Pathways
<p>Morgan Ordnance Supply Depot FUDS, Sayreville, NJ MRS-01 3,156 acres</p> <p>Former DoD activities include the loading, assembly, and packing of munitions. A series of explosions in 1918 resulted in the scattering of munitions.</p>	<p>Metals (e.g, lead, antimony, mercury)</p> <p>Explosives (TNT and its breakdown products, ammonium nitrate, and nitrostarch)</p>	<p>Within MRS-01 where survey results and investigations identify areas where MEC existed or currently exists and/or a potential MEC release could have occurred.</p>	<p>Surface and subsurface soils, sediment, and groundwater</p>	<ul style="list-style-type: none"><li>• Residents</li><li>• Industrial/commercial workers</li><li>• Recreational visitors/trespassers</li><li>• Construction workers</li><li>• Biota</li></ul> <p>Heavily developed, with industrial, commercial, and residential land uses. Recreational land use within Cheesequake State Park. Land use not expected to substantially change in the future.</p>	<p>Human and environmental receptors' exposure pathways potentially complete in surface and subsurface soils, groundwater, and sediment.</p>





# UFP-QAPP WORKSHEET 11

## DQO STEP 1 – STATE THE PROBLEM



The 1918 series of accidental explosions at the Former Morgan Ordnance Supply Depot has impacted the land that makes up MRS-01. The presence of MEC has been confirmed by previous investigations, removal actions, and construction support efforts conducted between 1918 and 2007.

Although the presence of MEC has been confirmed, the full extent of MEC that may remain throughout MRS-01 has not been defined.

No environmental media sampling has been conducted to determine if any potential MC release continues to impact MRS-01.

There is a potential explosive safety risk for human receptors if they encounter MEC hazards within MRS-01. The extent of potential MC contamination with MRS-01 is undefined.





# UFP-QAPP WORKSHEET 11

## DQO STEP 2 – IDENTIFY THE GOALS OF THE PROJECT



The primary goal of the RI is to determine if MEC and/or MC presents a potential hazard to human health or ecological receptors at the Former Morgan Ordnance Supply Depot MRS-01.

### **Principal Study Questions (MEC)**

Can a historical data review better define or confirm the impacts of the 1918 explosions?

Were Apache Lake or Cheesequake Creek used as disposal areas during subsequent cleanup efforts?

What is the nature (sensitivity, severity, and likelihood) of the potential residual explosive hazards within the HUA?

What current and potential future threats may be posed to human health by MEC remaining at the MRS-01?

### **Principal Study Questions (MC)**

Has a release of MC to soil occurred?

If a release of MC to soil is confirmed, has MC contamination impacted groundwater, sediment, and/or surface water?

What are the nature and extent of and potential exposures to MC at MRS-01?





# UFP-QAPP WORKSHEET 11

## DQO STEP 3 – IDENTIFY INFORMATION INPUTS



### MEC

### MC

Current and future land use, receptors, and exposure scenarios.

#### **Geophysical Surveys & Intrusive Investigation**

Identify areas where MEC has been removed or contained due to prior construction events.

Define horizontal and vertical extent.

Define geophysical target detection thresholds.

Derive geophysical anomaly densities and munitions distributions.

Identify the nature of the explosive hazards (e.g., UXO vs. DMM, caliber & type, HE vs. practice)

#### **MC Sampling & Analysis**

Identify the pre-1918 ground surface and sample media potentially impacted by historical DoD activities.

Target sampling within HUAs and MEC locations identified during intrusive investigations.

Identify the types of media impacted, if any, beyond soil (i.e., sediment, surface water, ground water).



# UFP-QAPP WORKSHEET 11

## DQO STEP 4 – DEFINE THE BOUNDARIES OF THE PROJECT



### Spatial Boundaries

Investigation Lateral Boundary - 3,156 acres MRS-01 excluding the following:

- 1918 soil removal areas
- Areas of substantial fill
- Inaccessible surface/subsurface (buildings, roads, sidewalks, utilities, landfills)
- Sensitive habitats, endangered species and vegetation, and cultural resources
- Right-Of-Entry (ROE) refusal

Vertical Boundary – Depth of detection of the geophysical equipment. Evaluated during the field effort.

### Temporal Boundaries

Coordination with local authorities regarding the following:

- Noise producing activities (e.g., DPT drilling)
- Evacuations (if needed) for intrusive investigations





# RIGHTS-OF-ENTRY

ROE efforts will focus on production areas and locations impacted by the 1918 explosions where fieldwork is anticipated.

- Weston will communicate with landowners via mail, phone, or in-person with support from CENAE Public Affairs Officer and CENAN Real Estate.
- Maintain documentation including execution and expiration dates of obtained ROE.
- No property owner identification will be disseminated in any documents.

## Example ROE

Property Address:

Owners:

### DEPARTMENT OF THE ARMY RIGHT-OF-ENTRY

This Right-of-Entry sets the arrangements by which the United States Government (the "Government") will conduct certain operations relating to the investigation and cleanup of the American University Experiment Station/Camp Leach (Spring Valley) site on the lot of the property owner(s) whose signature(s) appear(s) below (the "Owner"). The Owner, by this instrument, in consideration of the potential assistance and advantages to be derived by the Owner, does hereby grant to the Government a right-of-entry upon the following terms and conditions:

1. The Owner hereby grants to the Government the right to enter the lot located at the address identified herein at any time during daylight hours of the investigation and cleanup for the purpose of performing environmental investigation and response; including the right to store, move and remove equipment and supplies; erect and remove temporary structures on the land; investigate and collect samples; excavate and remove ordnance and explosives (OE), hazardous substances and contaminated soils and replace with uncontaminated soil; and perform any other such work which may be necessary and incident to the Government's use for the investigation and response on said lands.
2. The owner may revoke this right-of-entry at any time by notice delivered to the Government at its Spring Valley Resident Office, 5201 Little Falls Road, NW., Washington, DC (behind Sibley Memorial Hospital), or by telefax No. (410) 962-4922. This right-of-entry shall expire without further action by the owner upon completion of the work covered by this right-of-entry or twelve (12) months from the date of this right-of-entry, whichever occurs first.
3. The Government will use its best efforts to give the Owner at least three (3) working days prior notice before beginning the remedial work, such notice to be delivered by email or by telephone. If this is not possible, except in the case of an emergency, at least 24-hour verbal notice shall be given.
4. Without prejudice to any other rights the Owner may have, the Government is responsible, in accordance with applicable law, for the acts and omissions of its employees and agents which cause injuries to persons or damages to property, including any claims arising from such injuries or damages, caused by or arising from the remedial actions, except to the extent such injuries or losses are caused by the Owner's negligence. The Government represents that funds have generally been available for such purposes and that the Corps will seek on an annual basis from Congress such funds as may be required for these purposes. The provisions of this paragraph are subject to the provisions of paragraph 7 of this right-of-entry.
5. The Government may use private contractors to assist in or conduct the inspections, tests, and other response actions. The Government will ensure that independent contractors participating in the investigation and possible response actions on the Owner's property are required to have and maintain levels of insurance coverage that are appropriate for the activities to be conducted on the property, which, at a minimum, shall be primary comprehensive general liability (CGI) coverage of \$1 million per occurrence and \$2 million in the aggregate. The Government will provide the Restoration Advisory Board information regarding the insurance coverage of contractors and, when requested, a copy





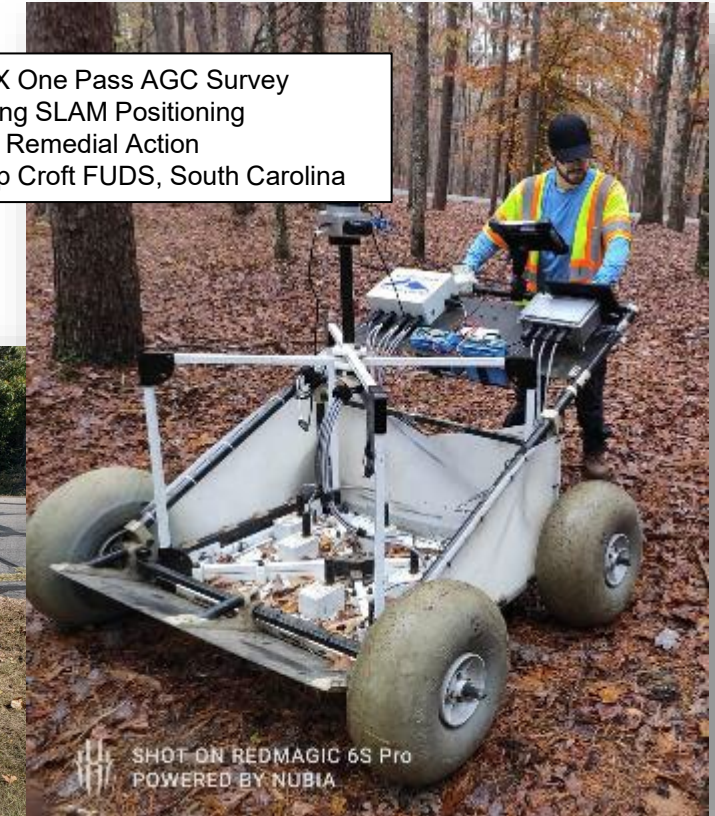
# DATA COLLECTION OPTIONS & MEASUREMENT PERFORMANCE CRITERIA



## Terrestrial AGC Mapping & Analysis (Depth of Detection)

- Residential Properties – MPV and Metal Mapper 2x2
- Cheesequake State Park – MPV and Apex One Pass

APEX One Pass AGC Survey  
utilizing SLAM Positioning  
MEC Remedial Action  
Camp Croft FUDS, South Carolina



Above – MPV Dynamic DGM Survey  
Right – MPV Cued AGC Survey  
utilizing Robotic Total Station Positioning  
MEC Remedial Action  
Spring Valley FUDS, Washington, D.C.



Metal Mapper 2x2 Cued AGC Survey  
utilizing Real-Time Kinematic Positioning  
MEC Remedial Action  
Camp Maxey FUDS, Paris, Texas





# DATA COLLECTION OPTIONS & MEASUREMENT PERFORMANCE CRITERIA



## Intrusive Investigations of Anomalies (4 ft bgs)

- -Residential & Commercial Properties
- -Cheesequake State Park



Geophysical data is evaluated and locations are selected for intrusive investigations.

Care is taken to limit ground disturbance during investigation and to ensure the property is restored to its original condition after the investigation is complete.



# DATA COLLECTION OPTIONS & MEASUREMENT PERFORMANCE CRITERIA

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## Bathymetric & SSS Surveys

### Underwater DGM Mapping & Analysis (Depth of Detection)

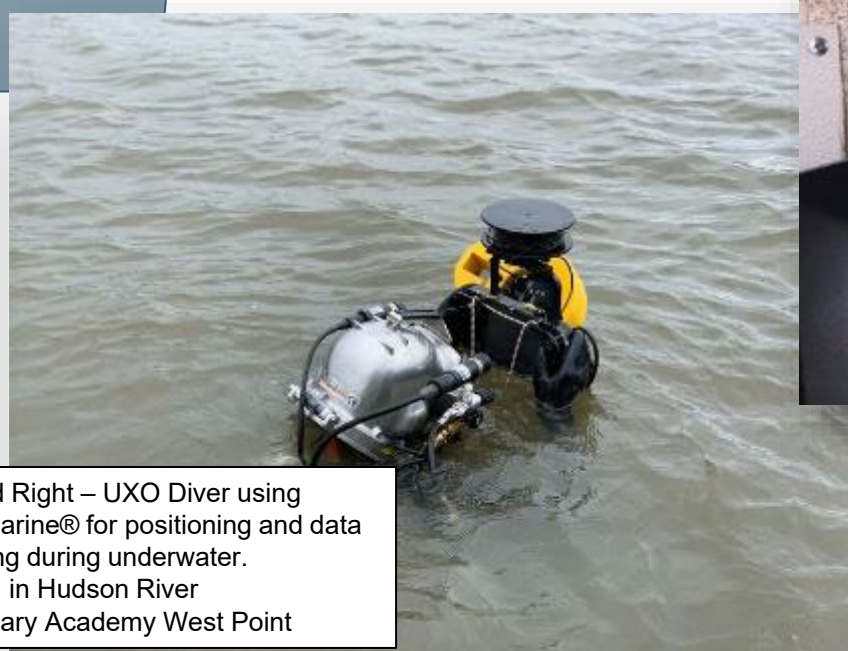
- Cheesequake Creek
- Apache Lake

### Intrusive Investigations of Selected Anomalies

- Apache Lake Dive Operations
- Cheesequake Creek Dive Operations



Left and Right – UXO Diver using SharkMarine® for positioning and data recording during underwater. MEC RI in Hudson River US Military Academy West Point



Output from SharkMarine®  
MEC RI  
US Military Academy West Point





# DATA COLLECTION OPTIONS & MEASUREMENT PERFORMANCE CRITERIA



## MC Phased Approach

### Phase I

HUA - ISM surface soil (0-1 ft bgs).

### Phase II

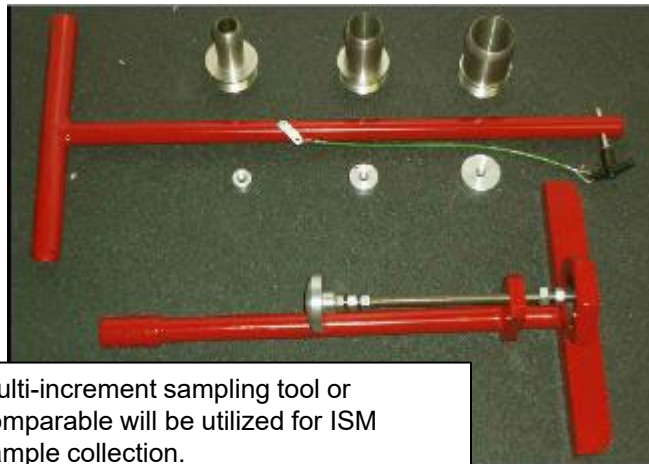
MEC locations and detections from Phase I – DPT subsurface soil (1-10 ft bgs).

### Phase III

Locations with evidence of impact – discrete surface water (depths > 10 cm) and ISM surface sediment (0-6 in bgs).

### Phase IV

Monitoring wells installed based on results of Phases I and II or to delineate the extent of an identified contaminant plume.



Multi-increment sampling tool or comparable will be utilized for ISM sample collection.



Above – Discrete subsurface soil sampling by hand auger. Soil Remedial Action. Spring Valley FUDS, Washington, D.C.

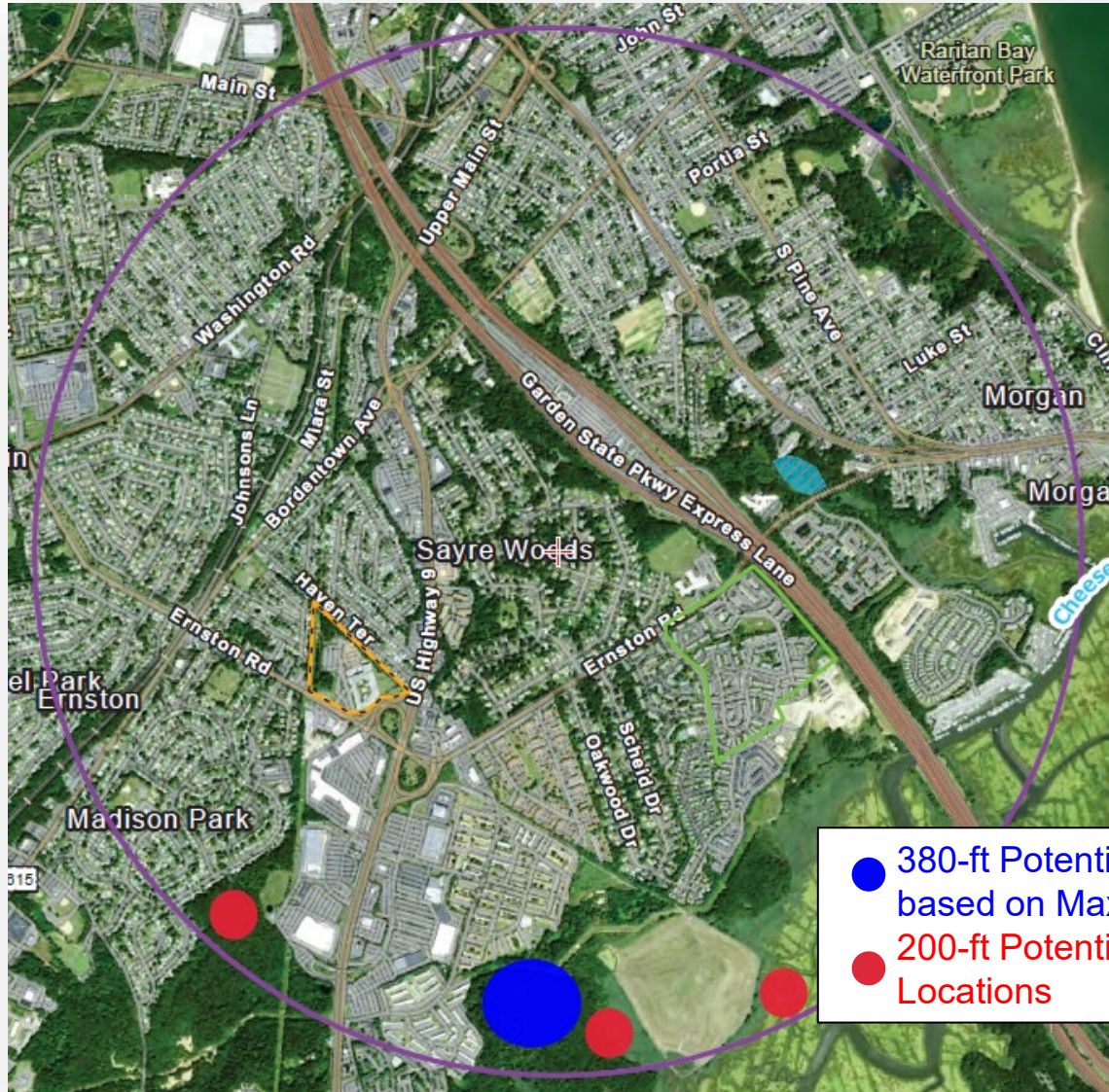


Right – Geoprobe DPT rig  
Left – DPT soil core  
Soil Remedial Action  
Spring Valley FUDS,  
Washington, D.C.





# PROPOSED ON-SITE MEC STORAGE MAGAZINE & DEMO LOCATIONS



- 380-ft Potential Magazine Locations based on Max Separation Distance
- 200-ft Potential On Site Detonation Locations



Example On-site MEC storage magazine  
MEC Remedial Action  
Camp Croft FUDS, South Carolina



Magazine Separation Distance  
Inhabited buildings: 380 ft  
Roads with less than 300 vehicles per day: 150 ft  
Roads with more than 300 vehicles per day: 278 ft  
Separation between magazines: 32 ft

Demolition Exclusion Zone 200-ft





# **MORGAN ORDNANCE SUPPLY DEPOT FUDS MRS-01 RI/FS STAKEHOLDER AND SPP MEETING #1**

## **Part Three Stakeholder Involvement & Next Steps**





# STAKEHOLDER INVOLVEMENT

## Regulatory Agency - NJDEP

- Review project documents (30 business days).
- Oversight of fieldwork to ensure regulatory compliance.
- Thoughts on access considerations and scope of the fieldwork.

## Cheesequake State Park

- Keep informed of project progress.
- Respond to recreational user inquiries.
- Coordinate park accessibility and any closures, as necessary.
- Participate in stakeholder surveys and interviews.
- Evaluate whether project staging and operations are allowed within the Park to include the following:
  - Equipment staging
  - MEC storage magazine & demolition activity
  - Geophysical surveys & intrusive investigations
  - Dive operations in Cheesequake Creek
- Provide thoughts on access considerations and scope of the fieldwork.





# STAKEHOLDER INVOLVEMENT



## Local Leaders & Representatives

- Keep informed of project progress.
- Respond to public comment in support of ROE process.
- Participate in stakeholder surveys and interviews.
- Engage local drinking water authority.
- Provide thoughts on access considerations and scope of the fieldwork.

## Local Community

- Participate in stakeholder surveys and interviews.
- Property owners within areas that may contain MEC and MC may be asked to approve ROE for RI field work.





# SCHEDULE & ACTION ITEMS



## Action Item Review

### Upcoming Documents

Draft Historical Data Review – April 2023

Draft Institutional Analysis – April 2023

Draft UFP-QAPP – July 2023

Draft Community Relations Plan – August 2023

### Upcoming Meetings

SPP Meeting #2 Anticipated July 2023

