**U.S. Army Engineering and Support Center, Huntsville**

**Military Munitions Response Program**

# PROPOSED PLAN FOR OPEN DETONATION GROUNDS MUNITIONS RESPONSE SITE

**Seneca Army Depot Activity (SEDA) in Romulus, New York** **September 2024**

## INTRODUCTION

### Purpose

This **Proposed Plan** is being presented by the United States Army Base Realignment and Closure (BRAC) Branch of the Deputy Chief of Staff G9 to facilitate public involvement in the remedy selection process for the former Open Detonation Grounds (OD Grounds) **Munitions Response Site (MRS)** located at the Seneca Army Depot Activity (SEDA) in Romulus, New York (**Figure 1**).

The total area of the OD Grounds MRS is approximately 403 acres (**Figure 2**). The OD Grounds MRS contains two areas, the "OD Hill" and the "Kickout Area" (**Figure 2**). The OD Hill is an area of elevated topography at the center of the OD Grounds MRS where open detonation operations occurred. The Kickout Area is the portion of the MRS surrounding the OD Hill in which blast fragments emanating from open detonation operations might be found and it extends out approximately 2,500 feet (ft) from the center of the OD Grounds MRS.

This Proposed Plan is part of the BRAC Branch community relations program, which is a component of the requirements of Section 117(a) of the **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 42 U.S.C. §9601 et. seq.)** and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan ([NCP], 40 C.F.R. Part 300).

This Proposed Plan follows the requirements from the United States (U.S.) Environmental Protection Agency (USEPA) guidance provided in *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (USEPA, 1999) and Army policy guidance.

**Dates to Remember:**

**PLEASE MARK YOUR CALENDAR!**

**PUBLIC COMMENT PERIOD:**

***September 30, 2024 – November 1, 2024***

USACE will accept written comments on this Proposed Plan during the public comment period.

*Written comments may be sent to:*

Mr. Chris Gallo
USACE, New York District

BRAC Environmental Coordinator (BEC)
2890 Woodbridge Ave.
USACE c/o USEPA Region 2
Edison, NJ 08818
Christopher.T.Gallo@usace.army.mil

*A public meeting will be held* ***October 9, 2024 from 1:00pm – 7:00pm*** *at the Seneca Army Depot Activity, Building 125, 5786 State Rt. 96, Romulus, New York 14541 to explain this Proposed Plan and the alternatives presented in the Feasibility Study Report. Verbal and written comments will be accepted at the meeting.*

**For more information and details of the public meeting schedule, please see the Administrative Record at: https://senecaarmydepotar.com**

This Proposed Plan contains terms (**in bold letters**) used for environmental remediation and the overall **Military Munitions Response Program (MMRP)**. The terms in bold are described in the Glossary found at the end of this document. The MMRP is a Department of Defense (DoD) program that addresses munitions-related concerns, including explosive safety, environmental, and health hazards from releases of **unexploded ordnance (UXO)**, **discarded military munitions (DMM)**, and **munitions constituents (MC)** found at locations other than operational ranges on active and BRAC Branch installations and **Formerly Used Defense Sites (FUDS)** properties. A list of acronyms and abbreviations used in this document is presented following the Glossary at the back of this document.


**Figure 1 Seneca Army Depot Location**

The purposes of this Proposed Plan are to:

- Provide background information.
- Describe initial remedial alternatives considered.
- Identify the **Preferred Alternative**(s) for remedial action (RA) and explain the reasons for the preference.
- Describe the other remedial options carried forward to detailed analysis.
- Solicit public review and comment on the alternatives described.
- Provide information on how the public can be involved in the remedy selection process.

The information and recommendations are based on the results of the **Remedial Investigation/Feasibility Study (RI/FS)** and the selection of remedy process (40 C.F.R. 300.430) conducted under the guidance of the Project Delivery Team (PDT) comprised of the Army (including the BRAC

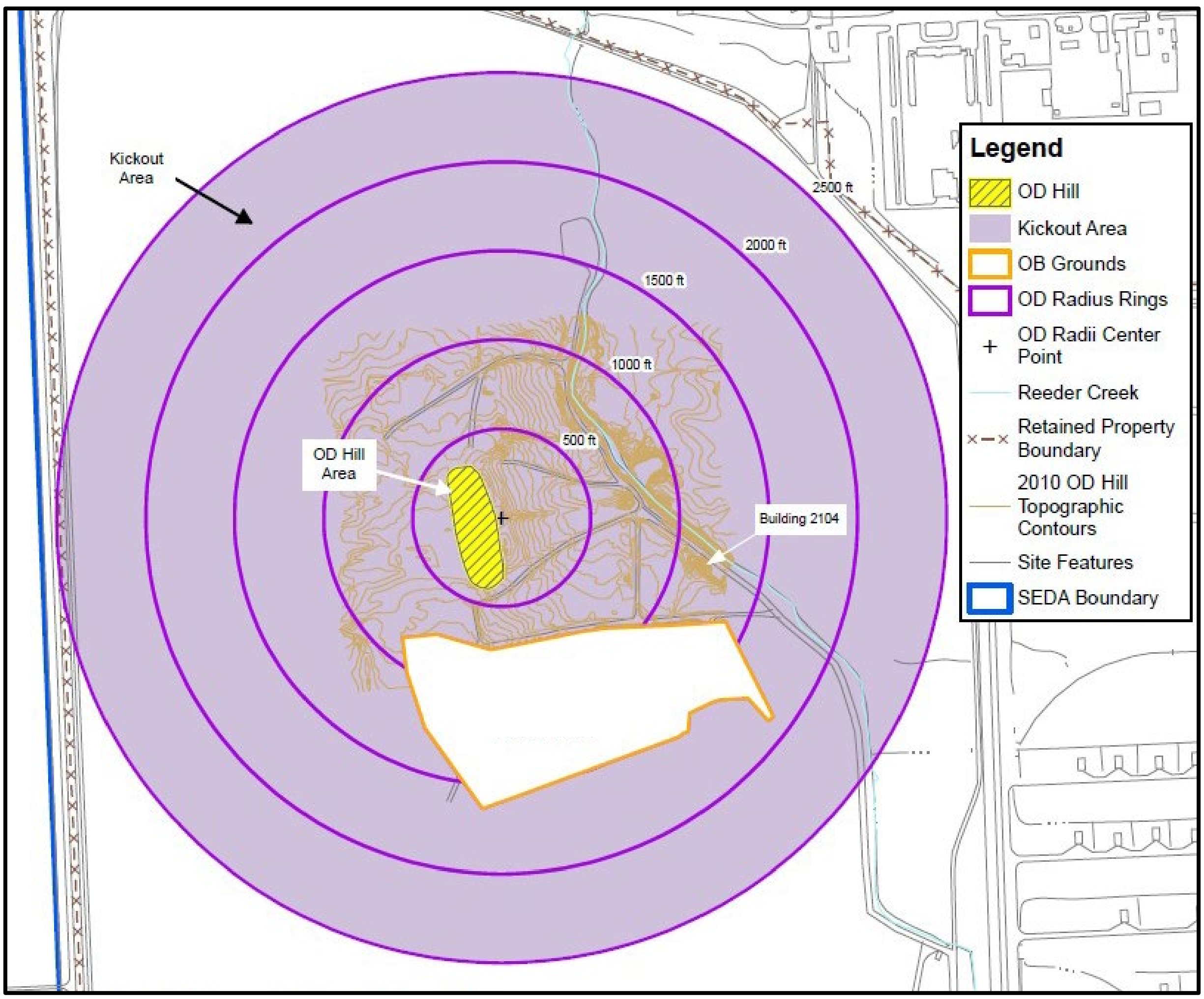



**Figure 2 OD Grounds MRS Layout**

Branch and the U.S. Army Corps of Engineers [USACE]) with review and comments provided by the USEPA, the New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of Health (NYSDOH). Approval of the FS and Proposed Plan by the USEPA is conditional until the public comment period concludes and any significant comments are evaluated. The FS report, along with other documents regarding the OD Grounds MRS, are part of the **Administrative Record** for the OD Grounds MRS which was developed in accordance with 40 C.F.R. 300.800. The administrative record is accessible at: https://senecaarmydepotar.com

### Public Involvement Process

Local community members and other interested parties are encouraged to review this Proposed Plan and submit comments. Public comments on all alternatives are considered before any remedial action is selected. The Army, the lead agency for activities at the OD Grounds MRS, USEPA, and NYSDEC may memorialize the selection of a final remedy for this operable unit after reviewing and considering all information submitted during the public comment period. The Army, USEPA, and NYSDEC may jointly modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented herein.

This document summarizes information that can be found in greater detail in the FS report and other documents contained in the Administrative Record file for the remedial decision for the OD Grounds (**Table 1**). The public is encouraged to review these documents to gain a more comprehensive understanding of the OD Grounds MRS and the activities conducted therein.

The final remedial decision for the OD Grounds MRS will be presented in a **Record of Decision (ROD)**. The BRAC Branch responses to public comments on this Proposed Plan will appear in the "Responsiveness Summary" section of the ROD. The flow chart shown in **Figure 3** summarizes the various steps in the development and approval process for the ROD.

### Lead and Support Agencies

The Army and USEPA will select a final remedy, with concurrence from NYSDEC and NYSDOH.

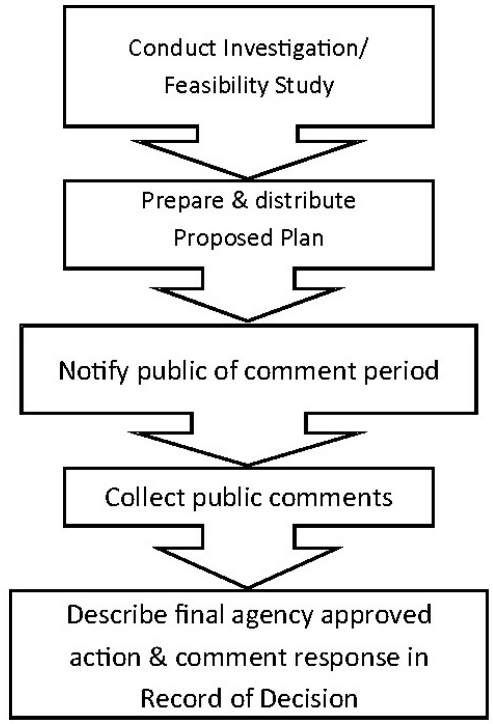



**Figure 3 Decision Process**

## PROJECT BACKGROUND

### MRS History and Causes of Contamination

From the 1940s until 1999, SEDA used the OD Grounds to destroy excess, obsolete, or unserviceable munitions. During open detonation operations, munitions were placed in a hole created in the OD Hill with additional demolition (explosive) material, covered with a minimum of 8 ft of soil, and detonated remotely. After demolition was completed, explosively displaced portions of the mound were reconstructed by bulldozing the soils back into the central earthen mound. SEDA use of the range stopped after the closure of the ammunition mission in 1999; however, after that time the Army was permitted to dispose of munitions via open burning (OB) and OD at the OD Grounds for those items recovered from investigations and removals at SEDA. Based on the history of OD activities, the OD Grounds MRS was investigated for contamination caused by past munitions demolition, incomplete "low-order" detonations, and "kickouts" (i.e., where munitions items are ejected away from the demolition point during detonation). A wide range of excess, obsolete, or unserviceable munitions types were disposed of there in this manner over the 50+ year history of the OD Grounds MRS.

The OB Grounds (**Figure 2**) was investigated separately from the OD Grounds. An RI (Parsons ES, 1994) was performed, a proposed plan was issued and a remedy was selected (Parsons ES, 1999), and a remedial action (EODT, 2001; Weston, 2005b) was implemented at the OB Grounds. Annual long-term monitoring (LTM) between 2007 and 2020 was undertaken to monitor the effectiveness of the remedial action completed at the OB Grounds with respect to preventing future groundwater quality deterioration and the erosion or breaching of the vegetated soil cover. Starting in 2021, ongoing LTM activities include annual inspections of Reeder Creek and the vegetated soil caps and groundwater monitoring during 5-year review years (Parsons, 2021). This Proposed Plan below focuses primarily on the OD Grounds MRS, but it does also include additional response activities addressing the area identified as the OB Grounds on **Figure 2**, as described below.

The OD Grounds MRS was investigated for residual **unexploded ordnance (UXO)/munitions and explosives of concern (MEC)**, as well as contamination resulting from the release of **munitions constituents** (**MC**) to the environment, specifically to soil within the MRS. MC are the chemicals that could cause contamination as a result of munitions use/disposal at the OD Grounds MRS. Groundwater sampling results from the Supplemental Site Characterization (SSC) in 2020 and 2021 at the OD Grounds MRS indicate that groundwater shows limited impacts from the MC contamination in soil.

This Proposed Plan describes the remedial alternatives that were evaluated as part of the Feasibility Study and identifies the Preferred Alternative for the contamination identified.

## Previous Investigations

Several investigations and MEC removals were completed at the OD Grounds MRS including several investigations that began before the OD Grounds mission ended in 1999. Several phases of investigations/removals were conducted at the OD Grounds MRS to remove UXO/MEC in areas with known hazards and to investigate the extent of UXO/MEC and/or MC contamination. A summary of the activities conducted during these phases are provided in **Table 1**.

# CHARACTERISTICS OF THE MRS

## Location

The SEDA previously occupied approximately 10,600 acres of land located in the Towns of Varick and Romulus in Seneca County, New York (**Figure 1**). The OD Grounds MRS is located in the northwestern corner of the former SEDA. **Figure 2** shows the layout of the MRS.

## Physical Characteristics

SEDA is located in an uplands area which forms a divide separating two of the New York Finger Lakes, with Cayuga Lake on the east and Seneca Lake on the west. The OD Grounds MRS is located in the northwestern corner of SEDA at an elevation of approximately 600 ft above mean sea level. Surface water flow from precipitation events at the OD Grounds MRS is controlled by local topography which slopes gently to the east-northeast, as there is little relief within the MRS other than the OD Hill. In general, surface water flows east making its way into a network of drainage swales throughout the MRS that eventually lead into Reeder Creek, a sustained surface water body with non-precipitation event flow that is approximately 4 inches deep and 3 ft wide near the OD Grounds MRS. Reeder Creek is approximately 800 ft northeast of the OD Hill and flows to the north-northwest (**Figure 2**). Additionally, there are isolated wetland areas with standing water (predominately south of the OD Hills) present within the OD Grounds MRS. A wetlands management plan will be part of the Remedial Action Work Plan.

Vegetation at the OD Grounds MRS consists primarily of grassy meadow with some wooded and heavily brushed areas. As a result of past demolition and earth-moving activities, fewer trees are located toward the center of the MRS.

## Land Use

Currently the OD Grounds MRS is within a portion of the former SEDA that has been retained under Army ownership. The Army retained parcel is planned to be turned over to the Seneca County Industrial Development Agency (SCIDA) after a remedy is implemented at the OD Grounds. The planned future uses of the broader property within the former SEDA includes institutional training, data storage / communication, conservation / recreation, farming / agriculture, and an office and warehousing area, whereas under this revised future use plan, the anticipated future use of the OD Grounds MRS is "conservation/recreation" , which refers to a use of the land where there is limited activity and reduced potential for subsurface soil contact (i.e., does not include playgrounds or ballparks, but may include seasonal hunting and hiking on nature trails). Anticipated future land use may include the Army retaining access for groundwater monitoring, solar power generation, hunting, planting (for habitat management), and access for maintenance (e.g., roads and mowing fire breaks). The SCIDA has subsequently sold the property surrounding the Army-retained parcel to a private party for use as a conservation area.

There are no known drinking water wells or industrial wells within the OD Grounds MRS.

**Table 1. Summary of Previous Investigations and Response Actions**

| Previous Investigation | Year | Summary |
|---|---|---|
| United States Army Environmental Hygiene Agency Studies (USAEHA, 1984; 1988) | 1979-1982 | Groundwater samples were analyzed for conventional pollutants and explosives and soil samples were analyzed for extraction procedure toxicity and explosives. |
| Expanded Site Inspection (ESI) (ES, 1995b) | 1993-1994 | Geophysics, test pitting, groundwater and surface water sampling conducted. |
| Archives Search Report (USACE, 1998) | 1998 | Site inspection, archives search and employee interviews to document previous military use and potential environmental contamination that could remain at the Seneca Army Depot. |
| Ordnance and Explosives Engineering Evaluation/Cost Analysis Report (Parsons ES, 2004) | 2000 | Characterized the nature and extent of MEC at the OD Ground using geophysical survey techniques and intrusive investigations. |
| Phase I Geophysical Investigation (Weston, 2005a) | 2003 | Geophysical surveys collected using EM61 MK2 towed-array system to identify 14,700 anomalies within open areas between the 1,000 ft. and 1,500 ft. radius of OD Hill. |
| Phase II OE Removal Activities (Weston, 2006) | 2003-2005 | Reacquired, removed, and disposed of approximately 8,500 MEC/UXO and **Munitions Debris (MD)** items located between the 1,500 ft. and 2,500 ft. radius from the OD Hill to a depth of 4 ft. |
| Additional Munitions Response Site Investigation (Parsons, 2010) | 2010 | Topographic and geophysical surveys of portions of the OD Grounds MRS and the collection and analysis of soil samples from test pits and surface locations. |
| Munitions Response Action (Parsons, 2016) | 2012-2014 | Reacquired, and investigated 14,688 anomalies; used analog methods to remove UXO/ **Discarded Military Munitions (DMM)**, and dispose of 15,885 munitions related items located between the 1,500 ft. and 2,500 ft. radius from the OD Hill to a depth of 4 ft. |
| MEC Clearance at OD Grounds (Shaw, 2012) | 2012 | Prior to early termination of contract, Digital Geophysical Mapping (DGM) survey of inner 1,000 ft completed. |
| Perchlorate Sampling (Parsons, 2019, 2020) | 2018-2019 | Perchlorate sampling in soil, groundwater, ditch soil, and surface water. |
| Feasibility Study (including Compilation Report) (Parsons, 2022b)[1] | 2022 | Compiled data from all previous investigations to compile a conceptual site model (CSM). A Human Health and a Baseline Ecological Risk Assessment was completed for MEC, MC and other analytes based on results of previous investigations. Feasibility study summarized the CSM and evaluated remedial alternatives to mitigate risk. |
| Addendum 1: Supplemental Site Characterization (SSC) (Parsons, 2022a)[1] | 2022 | Installed and sampled new deep and shallow wells to assess the potential presence of **Chemicals of Potential Concern (COPCs)** in shallow overburden and deeper bedrock groundwater and investigate groundwater flow direction and rate. Sampled and analyzed surface water and sediment/ditch soil samples in the vicinity of the OD Grounds MRS. |
| Errata Sheet | 2022 | An Errata to the FS provides a summary of, and presents a description of, all the elements of the Feasibility Study (FS) Report for the Open Detonation (OD) Grounds. |

1) The Seneca Administrative Record includes all of the documents listed in the table above.

## Nature and Extent of Contamination

### *Munitions and Explosives of Concern*

The nature and extent of MEC at the OD Grounds MRS are summarized in the FS report (Parsons, 2022b), which includes a compilation and evaluation of data from previous investigations and removals at the OD Grounds MRS. The evaluation includes previous Digital Geophysical Mapping (DGM) and analog geophysical surveys, as well as intrusive results to evaluate the nature and extent of MEC contamination. The data from the previous investigations were used to estimate the distribution of anomalies and MEC/**Material Potentially Presenting an Explosive Hazard (MPPEH)** over the MRS. For purposes of reporting, data at the OD Grounds MRS was divided into areas based on the distance from the center of the range (**Figure 2**).

**Table 2** summarizes the **anomaly** density and MEC/MPPEH densities for each area of the range based on the DGM data. Analog data was also collected during previous investigations; however, the density data was not in a format which could be quantitatively evaluated. **Tables 3** and **4** summarize the vertical distribution of **munitions debris (MD)**, MEC/MPPEH at the OD Grounds MRS. A large variety of munitions were found during previous investigations and removal actions completed at the OD Grounds MRS. A full list of identified munitions is available in the FS Report (Parsons, 2022b).

On **Figure 4**, the distribution and density of anomalies are mapped within the MRS. The density of anomalies decreases with distance from the OD Grounds center. Anomalies within the center to 1,000 ft radius ring were not intrusively investigated given the density of items detected. The anomalies in this area were not categorized.

**Table 2. Summary of Horizontal Distribution of MEC Contamination**

| Range Area | Estimated Anomalies per Acre | Estimated MEC/MPPEH per Acre |
|---|---|---|
| 0-1,000 ft | Saturated(1) | Saturated(1) |
| 1,000-1,250 ft | 773 | 79 |
| 1,250-1,500 ft | 484 | 43 |
| 1,500-1,750 ft | 281 | 40 |
| 1,750-2,000 ft | 182 | 12 |
| 2,000-2,250 ft | 138 | 4.3 |
| 2,250-2,500 ft | 125 | 2.7 |

1) During the data processing the high density of metal prevented anomaly selection at a normal background threshold. The method used required increasing the contouring range until individual anomalies could be selected, as such the anomaly density is likely biased to reflect fewer anomalies. The calculated estimated densities for this area were 102.8 anomalies per acre and 3.76 to 4.37 MEC/MPPEH per acre; however, the total per acre is likely much higher due to the saturation of metal, and methods used for anomaly selection.

**Table 3. Summary of Vertical Distribution of MEC Contamination**

| Depth (inches bgs) | Munitions Debris | | MPPEH | | Confirmed MEC | | Cumulative percent of MPPEH and MEC at or above measured depth |
|---|---|---|---|---|---|---|---|
| | Total | Percent | Total | Percent | Total | Percent | |
| 0 | 459 | 0.55% | 23 | 0.74% | 1 | 0.29% | 0.70% |
| 0.5 to 6 | 51,444 | 61.99% | 1,575 | 50.97% | 185 | 54.41% | 52.01% |
| 7 to 12 | 27,170 | 32.74% | 914 | 29.58% | 108 | 31.76% | 81.81% |
| 13 to 18 | 2,467 | 2.97% | 57 | 1.84% | 11 | 3.24% | 83.79% |
| 19 to 24 | 1,089 | 1.31% | 514 | 16.63% | 17 | 5.00% | 99.27% |
| 25-30 | 155 | 0.19% | 5 | 0.16% | 7 | 2.06% | 99.62% |
| 31 to 36 | 153 | 0.18% | 2 | 0.06% | 1 | 0.29% | 99.71% |
| 37 to 42 | 21 | 0.03% | 0 | 0.00% | 3 | 0.88% | 99.80% |
| 43 to 48 | 1 | 0.00% | 0 | 0.00% | 2 | 0.59% | 99.85% |
| 49 to 54 | 0 | 0.00% | 0 | 0.00% | 5 | 1.47% | 100.00% |
| 55 to 60 | 8 | 0.01% | 0 | 0.00% | 0 | 0.00% | 100.00% |
| **Total** | **82,981** | **100%** | **3,090** | **100%** | **340** | **100%** | |

**Table 4. Munitions Categories and Related Maximum Depths Found**

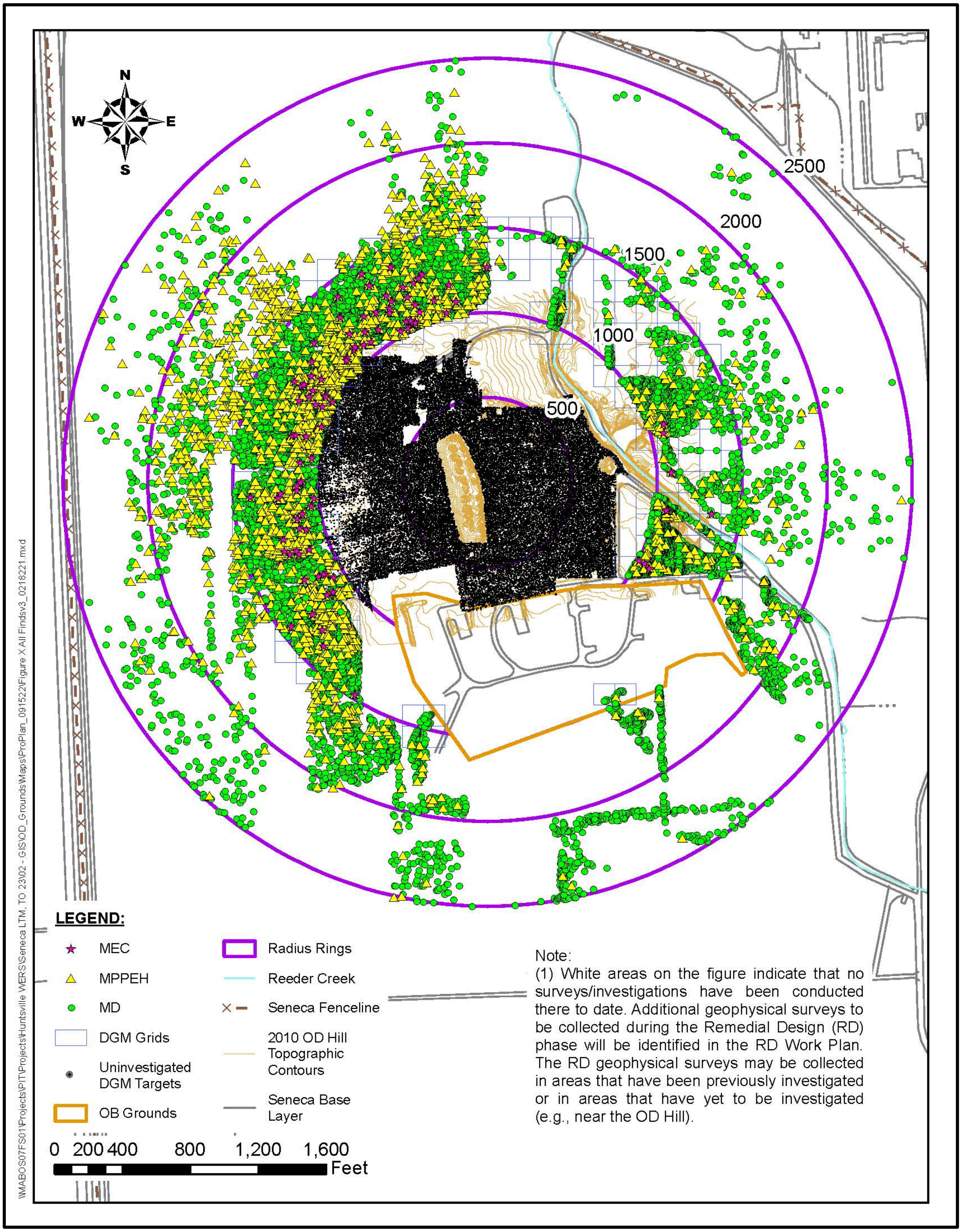
| Munitions Category(3) | Description | Maximum Depth of UXO/DMM (inches bgs)(2) | Maximum Depth of MPPEH (1) (inches bgs) (2) | Maximum Depth of MD (inches bgs) (2) |
|---|---|---|---|---|
| Bomb, B1 | Butterfly Bomblets | -- | 8 | 8 |
| Bomb, B2 | 20lb Fragmentation Bombs | -- | 2 | 3 |
| Fuze, F1 | Very Small – approx. 2″x3″ or smaller (e.g., small base fuzes, small Russian projectile fuzes, rocket base fuses, some land mine fuzes, etc.) | 12 | 26 | 8 |
| Fuze, F2 | Small – Between 2″x3″ and 4″x6″. (e.g., "T-bar" fuzes, artillery projectile fuzes, smaller rocket fuzes, etc.) | 12 | 26 | 12 |
| Fuze, F3 | Medium – 100 series bomb fuzes, larger rocket fuzes, etc. | 5 | 18 | 12 |
| Fuze, F4 | Large – M60 series base fuzes and similar very heavy, large fuzes. | 7 | 9 | -- |
| Grenade, G1 | Hand Grenades | 9 | 12 | 12 |
| Grenade, G2 | Rifle Grenades | 12 | 14 | 2 |
| Mine, M1 | M1 square mines and "bouncing betty" mines and flares. | 9 | 12 | 12 |
| Projectile, P1 | 20mm/25mm/1.1″ projectiles and similar | 10 | 36 | 24 |
| Projectile, P2 | 30mm projectile without cartridge case | 5 | 15 | -- |
| Projectile, P3 | 37mm/40mm projectiles without cartridge case. 20mm with cartridge case, 30mm with cartridge case, etc. | 12 | 18 | 12 |
| Projectile, P4 | 57mm projectiles, 2.36″ rocket warheads, 2.36″ rocket motors, etc. | 12 | 24 | 16 |
| Projectile, P5 | 75mm/76mm projectiles, 90mm AP projectiles | 10 | 25 | 21 |
| Projectile, P6 | 105mm projectiles, 3.5″ rockets, etc. | -- | 18 | 10 |
| Projectile, P7 | 155mm projectiles/6″ projectiles, 4.2″ mortars, 120mm projectiles, etc. | -- | 15 | 6 |

(1) "MPPEH" here refers to a combination of MEC and MD that cannot be further differentiated based on the source information available.

(2) The depths presented are based only on results from investigation of DGM anomalies during the Phase I Investigation (Weston, 2005a), the Phase II Investigation (Weston, 2006), and the Munitions Response/Phase III (Parsons, 2016). Some fill areas were observed at discrete locations at the OD Grounds MRS and these contained items down to 60 inches bgs.

(3) Munitions categories are defined in the Final FS (Parsons, 2022b), Appendix E, Section 4.1 Nature and Extent of MEC, Table 4.6.

**Figure 4 Extent of MEC Contamination**



### *Munitions Constituents and Other Analytes*

Munitions constituents (MC) are metals and explosives that make up ordnance items. Other analytes, also called hazardous and toxic waste (HTW), may also be present due to former use of the OD Grounds MRS. Analytical samples were collected to determine if there is evidence of contamination. Contamination is defined as a release of MC or other analytes to environmental media at concentrations greater than those allowed by State or federal regulations for unrestricted land use, potentially posing a risk to receptors within the MRS. Samples of soil, groundwater, surface water, and sediment were collected during two phases of investigation at the OD Grounds MRS (**Table 1**):

1) Sampling that pre-dates the Feasibility Study and whose data were included in the Human Health Risk Assessment (HHRA) and the Baseline Ecological Risk Assessment (BERA). These investigations include:
   - United States Army Environmental Hygiene Agency Study (USAEHA, 1984; 1988), during which groundwater and soil samples were collected from 1979 to 1982,
   - Expanded Site Inspection (ESI), (Parsons ES, 1995), during which test pit, groundwater, ditch soil and surface water samples were collected in 1993 and 1994,
   - Additional Munitions Response Site Investigation (Parsons, 2010) during which soil samples were collected in 2010, and
   - Perchlorate Sampling (Parsons, 2020), during which perchlorate samples were collected in soil, groundwater, ditch soil, and surface water during 2018 and 2019.
2) Supplemental sampling conducted in 2020/2021 as part of the Supplemental Site Characterization (SSC) (Parsons, 2022a). Data from the SSC was not evaluated in a risk assessment. Additional site characterization activities and additional groundwater quality data were required to be performed and collected, respectively, before the OD Grounds FS Report could be finalized. As part of this supplemental characterization, three rounds of groundwater samples (Round 1, July 2020; Round 2, September 2020; and Round 3, March 2021), two rounds of surface water and sediment/ditch soil (soil within ephemeral water bodies) samples (conducted during Rounds 1 and 3), and supplemental samples at two wells in December 2021 were collected. The purpose of the updated assessment was to provide new data collected using the latest methods to provide a better understanding of the current conditions of the groundwater, surface water and sediment.

**Chemical of Concern (COC)** – COCs are defined as the chemicals of potential concern (COPCs) that are present at sufficient concentrations to pose a risk to human health or the environment.

**Chemicals of Potential Concern (COPCs)** – COPCs are defined as any MC that are present at elevated concentrations with regard to local conditions and human health screening levels. COPCs are carried forward for evaluation in the human health risk assessment.

**Screening Level** - A screening level is a preliminary estimate of the potential risk posed by a contaminant or substance in a specific environmental media. It is used to determine whether further investigation or action is needed to protect human health and the environment.

#### *Soil*

All soil data were collected prior to the FS and were evaluated in the HHRA and BERA. Additional soil sampling was not conducted in the SSC. Within the OD Grounds MRS, 52 surface soil (0-2ft bgs) and 31 subsurface soil (2-15ft bgs) samples were collected within the 500-foot OD Hill radius. An additional 25 surface soil samples were collected at locations between 500 and 2,000 ft from the OD Hill to delineate the extent of MC and other analyte contamination in soil. Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), explosives, metals, perchlorate, herbicides, pesticides, and polychlorinated biphenyls (PCBs). Also, four ditch soil samples were collected from ephemeral drainage ditches located approximately 500 feet from the OD Hill. Three of the samples were collected from the drainage ditches located downgradient of the OD Hill and the fourth sample was collected from a low-lying area northwest of the OD Hill. The ditch samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides and nitrate/nitrite nitrogen. Ditch soil was evaluated as surface soil during the risk assessments because of the chemical similarity of the OD Grounds MRS ditch soil and surface soil to surface soil during the OB Grounds Remedial Investigation, as well as the same exposure scenario.

Sections 1.3.2.1, 1.3.2.3, Appendix B1 (Section 2.2.2 and Table 2.1) and Appendix E (Section 4.2.1) of the FS (Parsons, 2022b) detail the identification of **chemicals of potential concern (COPCs)** in surface soil. The HHRA identified **chemicals of concern (COCs)** that represent an unacceptable risk, including: Aroclor-1254 and cadmium (Surface Soil, OD Hill) and 2-methyl-4-chlorophenoxyacetic acid (MCPA), cobalt, and manganese (Surface Soil, Kickout Area). The BERA identified **chemicals of ecological concern (COECs)** that result in lowest observed adverse effect level (LOAEL)-based **hazard quotient (HQs)** higher than 1. For the OD Hill area, the COECs identified included copper for small mammal exposures; copper, lead, mercury, bis(2-ethylhexyl)phthalate and di-n-butylphthalate for bird exposures; and Endosulfan I for soil invertebrates. Within the Kickout Area surface soil, the COECs identified included copper, lead and bis(2-ethylhexyl)phthalate for birds; and Endosulfan I for soil invertebrates (**Table 5**).

Sections 1.2.3.2, Appendix B1 (Section 2.2.2, Table 2.2) and Appendix E (Section 4.2.1) of the FS (Parsons, 2022b) detail the identification of COPCs in subsurface soil. The HHRA identified Aroclor-1254 and cadmium as COCs for combined surface and subsurface soil within OD Hill (**Table 5**).

Note that throughout the history of sampling at the OD Grounds, applicable **screening level** standards for various contaminants have changed and evolved over time. Any discussions regarding comparisons to **screening levels** in the following sections are in reference to the standards used during the time of the investigation and these previous investigation reports may be referenced for the applicable standards of the time. These standards may be different than the **Preliminary Remediation Goals (PRGs)** established following the FS.

_Groundwater_

Prior to the FS, there were two main groundwater sampling events at the OD Grounds that were evaluated in the HHRA: the ESI in 1994 (VOCs, SVOCs, explosives, herbicides, pesticides, PCBs and metals), and a perchlorate sampling event in June 2018 and December 2019; one well at the OD Grounds (MW45-4, located west of the OD Hill), was sampled an additional three times between 1997 and 1999 as part of OB Grounds groundwater investigations. All groundwater samples were collected from the upper aquifer (till/weathered bedrock) across the interval where munitions contamination would occur.

Selection of groundwater COPCs in the HHRA is detailed in Section 1.3.3, Appendix B1 (Section 2.2.2, Table 2.4), and Appendix E (Section 4.2.2) of the FS (Parsons, 2022b); however, these data are predominantly from groundwater investigations conducted in the late 1990s and may not be representative of current conditions. The HHRA identified the COCs in groundwater as arsenic, cobalt, manganese and thallium for exposure to groundwater ingestion at well MW45-4 located approximately 300 feet west of the OD Hill (**Table 5**).

A re-evaluation of the OD Grounds groundwater quality was conducted in the 2020/2021 SSC (Parsons, 2022a). Three rounds of groundwater sampling were completed in 23 new monitoring wells in the upper water bearing zone (glacial till / weathered bedrock) and 6 new wells in the lower water bearing zone (shale bedrock). The groundwater was analyzed for VOCs, SVOCs, perchlorate, metals, explosives, phosphorus, and orthophosphate. Per USEPA request, analysis for chromium VI was added in Round 3 (March 2021). Analysis of herbicides, pesticides and PCBs were not conducted in the latest sampling effort because they were not previously identified as COPCs in the HHRA. These newer data obtained during the SSC are not included in the risk assessments but were compared to applicable **screening levels**.

During the SSC, VOCs, SVOCs, explosives, and perchlorate were not detected at concentrations greater than applicable **screening levels** in the upper aquifer groundwater at the OD Grounds. Two metals (iron and manganese) were consistently detected above their **screening levels** within the upper water bearing zone at the OD Grounds (Parsons, 2022a; Table 6, Figure 4A, 4B). During the SSC, the concentrations of metals detected in groundwater samples collected during three rounds of sampling indicate a significant reduction in key metals concentrations since the 1994 ESI, including a reduction in the concentrations of metals (arsenic, cobalt, manganese, and thallium) that contributed to the unacceptable human health risk (**Table 5**). The groundwater quality improvement is likely due to improved sampling methodology, installation of new well(s) and well construction, and natural processes over time.

The lower water bearing zone (shale bedrock) was investigated during the SSC at OD Grounds for the first time. SVOCs, explosives, chromium VI and perchlorate were not detected at concentrations greater than their **screening levels** in any of the sampling rounds. One VOC, benzene, exceeded its **screening level** once, but was subsequently not detected in a resampling event in December 2021. Analytes detected at concentrations greater than their **screening levels** in the lower water bearing zone are metals (antimony, chromium, iron) (Parsons, 2022a; Table 5, Figure 5). Chromium was not consistently detected at concentrations greater than its **screening level** within the OD Grounds MRS and had concentrations otherwise similar to background. Antimony was detected at a concentration greater than its **screening level** in one well and was detected at other deep wells; however, those estimated concentrations were equivalent to background concentrations (**Table 5**).

Given the overall lower concentrations of metals detected in the recent SSC sampling event versus the groundwater data evaluated in the HHRA from earlier investigations, groundwater is no longer considered a medium of concern at the OD Grounds MRS. The 2020/2021 groundwater concentrations in the shallow water bearing zone were less than the concentrations observed during the ESI sampling. Based on the updated evaluation of groundwater conducted in 2020/2021, there are no analytes of concern in groundwater.

*Surface Water*

Surface water data evaluated in the risk assessments include data collected from ditches in 1993 from within the OD Hill Area, samples collected from Reeder Creek in 1991 and 1992 from the Kickout Area, and samples collected from Reeder Creek in 1997 in support of the investigation conducted at SEAD-12, which is located upgradient of the OD Grounds. Samples collected in Reeder Creek upstream of the OD Grounds were evaluated separately from those collected within and downstream of the OD Grounds, as upstream samples are not expected to have been affected by activities at the OD Grounds. The upstream samples were used to determine the impact the OD Grounds may have had on contaminant concentrations in Reeder Creek. Additionally, as part of the 2020/2021 SSC (Parsons, 2022a), two rounds of surface water and sediment sampling were conducted in Reeder Creek and from drainage ditches which drain surface water from OD Hill. The identification of COPCs in surface water are detailed in the FS, Section 1.3.4, Appendix B1 (Section 2.2.2 and Table 2.5) and Appendix E (Section 4.2.3) (Parsons, 2022b). In the HHRA evaluation, no COCs were identified in samples collected upstream of Reeder Creek, within the portions of Reeder Creek inside the MRS or surface water in the drainage ditches entering Reeder Creek. No COECs were identified in surface water (Parsons, 2022b; Appendix B2 – BERA).

Surface water was reevaluated in the 2020/2021 SSC and was analyzed for VOCs, SVOCs, perchlorate, metals, explosives, phosphorus, and orthophosphate (Parsons, 2022a). Surface water samples were collected during two rounds of sampling at five locations within the OD Grounds MRS: two locations were in Reeder Creek downgradient of OD Hill and three locations were in ephemeral drainage pathways flowing into Reeder Creek. During both rounds, no VOCs, SVOCs, explosives, or perchlorate exceeded applicable **screening levels** except for the exceedance of three SVOCs (2,4-dimethylphenol, benzoic acid and phenol) within one of the drainage ditches (Parsons, 2022a; Table 8, Figure 6). These SVOCs were only detected in this location once and were not detected in Reeder Creek, suggesting they are not consistent. Surface water concentrations do not suggest major impacts downgradient of OD Grounds (**Table 5**). Some typical natural elements (aluminum, iron, manganese) have also been detected at concentrations greater than **screening levels**. Within the OD Grounds MRS, aluminum was detected in surface water at concentrations similar to, or below, concentrations observed at upgradient locations, suggesting that background concentrations of aluminum in surface water are elevated prior to entering the OD Grounds MRS. These concentrations are not indicative of an environmental release related to historical use of the MRS. **Screening levels** for iron and manganese are based on aesthetic standards so they are not considered contaminants at OD Grounds. Additional sampling during the RD will confirm that the single detections of SVOCs and mercury above their respective **screening levels** are not pervasive or persistent within OD Grounds MRS surface water.

*Sediment*

Historically, sediment samples were collected from Reeder Creek in the late 1990s. However, subsequent to sample collection, remedial actions were completed in the creek related to remediation efforts at the OB Grounds, resulting in the removal of all sediment from the creek bed in the vicinity of the OD Grounds. Therefore, historical samples are not representative of current conditions. In addition, Reeder Creek is currently inspected annually, and observations confirm that there is no sediment in the creek adjacent to OB Grounds and the OD Hill. Therefore, sediment was not evaluated in the HHRA or BERA.

Sediment was re-evaluated in the 2020/2021 SSC from areas upstream and downstream of the remediated portion of Reeder Creek. The samples were analyzed for VOCs, SVOCs, perchlorate, metals, explosives, phosphorus, and orthophosphate. Collocated with surface water samples, sediment and ditch soil samples were collected during two rounds of sampling at five locations within the OD Grounds MRS: two sediment locations were in Reeder Creek downstream of the remediated portion of the creek and three ditch soil locations were in drainage pathways flowing into Reeder Creek. For comparison purposes during the SSC, sediment samples were also collected from locations upgradient and outside of the OD Grounds MRS within the Reeder Creek watershed. Detections of VOCs, SVOCs, explosives, or perchlorate did not exceed their respective **screening levels** in the sediment or ditch soil samples within the MRS. Five metals (chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations greater than their **screening levels** in locations within the MRS (Parsons, 2022a; Table 10, Figure 6). Metals concentrations in sediment and ditch soil were observed above the SSC project action limits (PALs) (i.e., USEPA Regional Screening Level [RSL] Resident Soil or New York State [NYS] Unrestricted Use Soil Cleanup Objective [SCO]), particularly at ditch soil locations within drainage pathways near OD Hill. The sediment and ditch soil concentrations within the MRS are consistent or lower than concentrations from previous studies (i.e., ditch soil from the ESI) and will be re-evaluated for metals concentrations during the RD (**Table 5**).

**Table 5. Summary of Chemicals of Concern**

| Media | COCs Determined in the HHRA | COECs Determined in the BERA | Analytes Detected Above Screening Levels (2020/2021 SSC) |
|---|---|---|---|
| Surface Soil (OD Hill) | • Aroclor-1254<br>• Cadmium | • Copper<br>• Lead<br>• Mercury<br>• bis(2-ethylhexyl)phthalate<br>• di-n-butylphthalate<br>• Endosulfan I | • Not Sampled |
| Surface Soil (Kickout Area) | • MCPA<br>• Cobalt<br>• Manganese | • Copper<br>• Lead<br>• bis(2-ethylhexyl)phthalate | • Not Sampled |
| Combined Surface and Subsurface Soil (OD Hill) | • Aroclor-1254<br>• Cadmium | • n/a | • Not Sampled |
| Groundwater[1] | • Arsenic<br>• Cobalt<br>• Manganese<br>• Thallium | • n/a | Upper water bearing zone<br>• Iron<br>• Manganese<br>Lower water bearing zone<br>• Antimony<br>• Chromium<br>• Iron |
| Surface[1] Water | • None | • None | • Aluminum<br>• Iron<br>• Manganese<br>• Mercury<br>• 2,4-Dimethylphenol (1 detect)<br>• Benzoic Acid (1 detect) |

| | | | |
|---|---|---|---|
| | | | • Phenol (1 detect) |
| Sediment[1] | • Not evaluated | • Not evaluated | • Copper<br>• Mercury<br>• Nickel<br>• Zinc |
| Ditch Soil | • Evaluated as surface soil | • Evaluated as surface soil | • Chromium<br>• Copper<br>• Lead<br>• Mercury<br>• Nickel<br>• Zinc |

(1) Groundwater, surface water, and sediment are not media of concern. Further rationale is provided in the section of this Proposed Plan titled *Nature and Extent of Contamination*.

# PRINCIPAL THREAT WASTE

The NCP establishes an expectation that USEPA will use treatment to address the principal threats posed by a site wherever practicable [NCP 300.430(a)(1)(iii)(A)]. Identifying principal threat wastes (PTWs) combines concepts of both hazard and risk. In general, PTWs are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-PTWs are those source materials that generally can be reliably contained and would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Some munitions previously found at the OD Grounds MRS during investigation were considered to be a PTW and were destroyed by open detonation.

UXO or **Discarded Military Munitions** (**DMM**), if any, that remain present at Seneca Army Depot may constitute a principal threat to human health at Seneca, due to the potential for the material to pose an explosive hazard if moved, handled, or disturbed. If UXO or DMM are later encountered or surfaces in those areas originally addressed by the selected remedy, Department of Defense (DoD) explosive ordnance disposal personnel or similarly qualified personnel will evaluate it to determine if it poses an explosive hazard. UXO or DMM that is determined to pose an explosive hazard (may also be categorized as MEC) will normally be treated within the OD Grounds MRS or removed for destruction in accordance with applicable DoD explosives safety standards, and applicable environmental laws and regulations. The Army and the USEPA will consult, in accordance with the terms of the Seneca Army Depot Federal Facility Agreement (FFA), to make a determination as to whether the UXO or DMM encountered and determined to pose an explosive hazard should be classified as a PTW, as defined by CERCLA, the NCP, and USEPA guidance. If the UXO or DMM are determined to be a PTW, the Army will take the necessary actions to ensure protectiveness of human health and the environment to address unacceptable risks posed by the UXO or DMM designated as a PTW.

# SCOPE AND ROLE OF RESPONSE ACTION

The scope of the response action at the OD Grounds MRS is to conduct remedial activities that will minimize current and future human and ecological exposure to MEC in soil and MC and other analytes in media present within the MRS. Upon completion of the ROD, the next contract action is a Remedial Design (RD) task, with the goal to provide sufficient data and information to support the Army when contracting the remedial action at the OD Grounds. The RD fieldwork is anticipated to include geophysics; MC sampling and analysis of soil, ditch soil, surface water, groundwater, and sediment; surface removal of MD and MEC; gathering information on the dimensions and volume of OD Hill; and vegetation removal. Upon completion of the RD, the selected remedy as presented in the ROD will be performed in the remedial action phase.

Subsequent to the remedial action, and with regulatory and Army approval, a Finding of Suitability to Transfer (FOST) will be filed with the deed of the OD Grounds parcel to identify any restrictions which are to run with the deed. The OD Grounds property via the deed and any associated easements, would then be transferred to private landowners. Following the transfer, the Army will still manage and oversee the remedial action and perform five-year reviews to evaluate whether the selected remedy remains protective of human health and the environment and recommend further steps to be taken if it does not.

The land at the OB Grounds was used for demilitarization of munitions for approximately forty years. The open burning procedure involved the preparation of combustible beds of pallets and wooden boxes on the pads followed by the placement of ammunition or the components to be demilitarized on the beds. A trail of propellant was placed on the ground leading to the combustible bed. Once ignited the energetic material was allowed to burn until only ash and casing residues remained. Items burned included various military munitions such as propellants and projectiles. The burning of munitions had been performed at designated burning pads, which ranged in size from approximately 100 by 100 feet to 300 by 800 feet. Designated munitions waste was open-burned on the nine separate burning pads until 1987. After 1987, munitions were destroyed by burning them within an aboveground steel tray to minimize the impact of the burning on the environment.

A Remedial Action, as selected in the 1999 ROD for the OB Grounds, was conducted between 1998 and 2004 to achieve the remediation objectives for the OB Grounds. A munitions removal action conducted DGM and soil sifting to remove MEC contamination (EODT, 2001). A soil remedy included excavation and disposal of soils with concentrations of lead greater than 500 mg/kg, removal of sediment from Reeder Creek in areas adjacent to the OB Grounds, application of 9 inches of clean soil cover to areas where lead concentrations exceed 60 mg/kg, and establishment of a vegetative cover to prevent soil erosion (Weston, 2005b).

Other actions underway at SEDA include LTM of chlorinated VOCs in groundwater at the Ash Landfill, LTM of metals in groundwater at SEAD-16, LTM of benzene, toluene, ethyl benzene and xylenes (BTEX) at SEAD-25; a site inspection (SI) for per- and polyfluoroalkyl substances (PFAS) at 34 Areas of Concern (AOCs) including the OD Grounds; a PFAS remedial investigation (RI) at five AOCs – Firehouse, Building 103; SEAD-25, SEAD-26, and SEAD-122D/122E; and an optimization of land use controls (LUCs) at 42 AOCs within SEDA. Documents regarding other actions at SEDA are available at the Seneca Administrative Record website.

# SUMMARY OF RISKS

## What is Risk and How is it Calculated

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases. A four-step process is utilized for assessing site related human health risks for reasonable maximum exposure scenarios.

*Step 1. Hazard Identification*: In this step, the COPCs at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

*Step 2. Exposure Assessment*: In this step, the different pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and/or groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

*Step 3. Toxicity Assessment*: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health hazards.

*Step 4. Risk Characterization*: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all chemicals of concern. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a $10^{-4}$ cancer risk means a "one in ten thousand excess cancer risk;" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the exposure assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of $10^{-4}$ to $10^{-6}$, corresponding to a one in ten thousand to a one in a million excess cancer risk. For noncancer health effects, a **"hazard index" (HI)** is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is $10^{-6}$ for cancer risk and an HI of less than or equal to 1 for a noncancer health hazard. Chemicals that exceed a $10^{-4}$ cancer risk or an HI of 1 are typically those that will require remedial action at the OD Grounds MRS and were identified as COCs.

An ecological risk assessment is often conducted alongside a human health risk assessment. Ecological risk assessments evaluate how likely it is that the environment and receptors within it might be impacted by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases. The Ecological risk assessment follows a 3-step process.

*Step 1. Problem Formulation:* the objective of problem formulation is to refine the objectives for the risk assessment, determine which ecological entities are at risk, and determine which characteristics are important to protect.

*Step 2. Analysis:* The objective of the analysis phase is to evaluate ecological responses to stressors under exposure conditions of interest. Risk assessors assess exposure by determining which receptors (e.g., plants, animals) are or are likely to be exposed and to what degree they would be exposed. They also evaluate stressor-response relationships or ecological effects. They analyze what is known about the relationship between the magnitude of a stressor and likelihood or magnitude of effects in the entities of concern.

*Step 3. Risk Characterization:* The objective of the risk characterization phase is to use the results of analysis to estimate the risk posed to the ecological assessment endpoints. The risk assessor describes the risk; indicates the overall degree of confidence in the risk estimates; summarizes uncertainties; cites evidence supporting exposure, stressor-response, and risk estimates; and interprets the adversity of ecological effects.

## Summary of MEC Hazards and Risks

Based on the evidence of MEC and/or MD found, MEC hazards are present at the OD Grounds MRS. These MEC hazards are potentially present throughout the MRS, on either the surface or in the subsurface. MEC hazard assessments were performed to qualitatively evaluate the MEC hazards. The MEC hazard assessment (HA) method, developed collaboratively by the DoD, USEPA, and State regulatory agencies, generates a score and a corresponding "Hazard Level" ranging from 1 (highest) to 4 (lowest) that provides a qualitative indication of the MEC hazard in each area (these are not quantitative measures of explosive hazard) to show relative risk reduction of remedial alternatives to inform the CERCLA decision process (Note: MEC HA scores for each alternative are presented in **Table 16**). The results of the MEC HA for the OD Hill and Kickout Area are summarized in **Table 7** and the full MEC HA is available in Appendix C1 of the FS (Parsons, 2022b).

**Table 7.**
**Summary of MEC Hazard Assessment Results**

| Assessment Area | Baseline MEC Hazard Assessment Score | Hazard Level | Potential Explosive Hazard Conditions |
|---|---|---|---|
| OD Hill | 845 | 1 | Highest |
| Kickout Area | 695 | 3 | Moderate |

The Army has developed another method for evaluating risks from explosive hazards. This qualitative risk assessment technique hereafter referred to as the "Risk Management Method" (RMM) is described in the study paper titled "Decision Logic to Assess Risks Associated with Explosive Hazards, and to Develop **Remedial Action Objectives** (**RAOs**) for MRSs" (USACE, 2016). The RMM provides an assessment of the explosive hazards associated with MEC at an MRS by evaluating MRS-specific conditions and human issues that affect the likelihood that a MEC accident will occur. The RMM is described in a final study paper that was established as interim guidance by USACE on January 3, 2017, for a two-year trial period, which was extended to 2022 (USACE, 2020). The RMM is a DoD developed tool used to evaluate baseline risk at a site. An updated version was distributed in July 2023, but a previous version was used during the RI evaluation at the OD Grounds MRS which resulted in an unacceptable risk determination. The RMM, originally referred to in the FS as the "MEC Risk Assessment" evaluated the risk associated with MEC exposure considering both current land use conditions and planned future land use conditions at the Kickout Area and the OD Hill. The results of the RMM are shown in **Table 8**. It should be noted that both MEC risk assessment methodologies (i.e., MEC HA and RMM) resulted in evaluation that had similar conclusions for the various alternatives evaluated in the FS and presented in this Proposed Plan. Both the OD Hill and Kickout Area show moderate to high or unacceptable MEC hazard risks.

**Table 8.**
**Summary of MEC Risk Management Method (RMM) Results**

| Assessment Area | RMM Conclusions | |
|---|---|---|
| | Current Land Use Conditions | Planned Future Land Use Conditions |
| OD Hill | Unacceptable Risk | Unacceptable Risk |
| Kickout Area | Unacceptable Risk | Unacceptable Risk |

## Summary of Human Health and Ecological Risks

As discussed in a prior section of this Proposed Plan titled *Munitions Constituents and Other Analytes*, samples of soil, ditch soil, groundwater, surface water, and sediment were collected and analyzed for potential contaminants associated with activities in the MRS. The analytical sampling results from these sampling efforts were evaluated in a baseline HHRA (Parsons, 2022b) and BERA (Parsons, 2022b). The baseline HHRA and BERA evaluated data collected between 1993 and 2010 from the MRS, while a supplemental HHRA (included as an attachment in Parsons, 2022b) was conducted based on perchlorate data collected in 2018 and 2019. The risk assessments were conducted prior to the SSC; therefore, the risk assessments do not include data collected in support of the SSC. In accordance with the site-specific conceptual site model (CSM), risk to humans exposed to MC and other analyte contamination found within the OD Hill and Kickout Area was evaluated for the following potential human exposure scenarios:

- Hypothetical future residents (adults and children);
- Hypothetical future excavation / construction workers;
- Future park workers; and
- Current and future recreational users (adults and children).

Exposure scenarios selected for evaluation are anticipated to account for the range of reasonably anticipated exposures under current and future land use conditions at SEDA.

### *Human Health Risk*

The quantitative results of the HHRA are presented in the FS (Appendix B1, Table 2.80, Parsons, 2022b). **Table 9** of this Proposed Plan summarizes the results of the HHRA. Based on the conclusions of the risk assessment, there is an unacceptable noncarcinogenic hazard to the hypothetical child resident exposed to soil at the OD Hill within the OD Grounds MRS. This hazard is driven primarily by the concentrations of Aroclor-1254 and cadmium found in soil (**Hazard Quotient [HQ]**=1.78 and HQ=1.3, respectively, for the hypothetical child resident). Each of these analytes has an HQ greater than 1, indicating a potential hazard and were identified as COCs.

The conclusions of the risk assessment (Parsons, 2022b) also indicate there is an unacceptable noncarcinogenic hazard to the hypothetical child resident associated with exposure to soil at the Kickout Area within the OD Grounds MRS. This hazard is driven by the concentrations of cobalt found in soil. Cobalt has an HQ greater than 1, indicating a potential hazard, and was identified as a COC.

The conclusions of the risk assessment (Parsons, 2022b) indicate that there is unacceptable risk to a future resident due to exposure to groundwater ($1.8 \times 10^{-4}$), along with unacceptable hazards to a future adult/child resident (HI=30/51), future park worker (HI=19), and adult/child recreational user (HI=2.0/3.4).

Subsequent to the HHRA, the SSC was conducted, consisting of three rounds of groundwater sampling taking place in July 2020, September 2020, and March 2021 and two rounds of surface water and sediment/ditch soil sampling conducted in July 2020 and April 2021. Based on the results of the 2020/2021 SSC groundwater sampling, groundwater is not a medium of concern (SSC, Tables 3 and 5; Parsons, 2022a). Based on 40 Code of Federal Regulations (CFR) 300.430(a)(1)(iii)(F), the USEPA expects to return usable groundwater to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site.

Potential risks associated with exposure to lead are evaluated using methods different from those used for carcinogens and noncarcinogens. The end point for lead evaluation is a blood lead level, rather than a carcinogenic risk or HQ. Therefore, lead is not included in the cumulative risk calculations. Lead is evaluated using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model for children (USEPA 2007) or the USEPA Adult Lead Model (ALM) (USEPA 2003; 2009b). These models estimate potential blood lead (Pb) concentrations (micrograms [µg]-Pb per deciliter [dL]-blood) based on assumed exposures to lead in environmental media.

The predicted blood-lead concentrations will be compared to the blood-lead level of concern of 10 µg/dL (USEPA 2007). USEPA typically considers that action may be warranted if the 95th percentile predicted blood-lead concentration exceeds 10 µg/dL (i.e., action may be considered if there is greater than a 5% chance a receptor exposed to lead could have a blood-lead level greater than 10 µg/dL). However, based on USEPA's current approach, blood-lead concentrations less than 10 µg/dL do not require further management of the risk associated with exposure to lead.

Since the most sensitive adult receptor is an exposed pregnant adult, the ALM is used to determine the potential for unacceptable fetal blood lead levels following the mother's exposure to lead-contaminated soil. Exposure to lead in surface or subsurface soil is not expected to elevate fetal blood lead levels above the threshold of 10 µg/dL, based on the 95% UCL on the mean soil lead concentration.

The IEUBK evaluates the potential for child exposure to result in blood lead levels greater than the threshold of 10 µg/dL. To do so, it evaluates lead exposure from all potential sources, including soil, water, diet, and air. To evaluate the potential lead concentrations observed in soil, groundwater, and surface water at the OD Grounds to result in elevated blood lead levels in children that may be present on the MRS, the IEUBK model was run using the 95% UCL on the mean lead concentrations for surface soil, the concentration for combined surface and subsurface soil, the concentration for each monitoring well, and the concentration for surface water at the MRS. Exposure to lead in soil and groundwater by hypothetical future child residents results in a predicted blood lead level greater than 10 µg/dL, in greater than 5% of the exposed children, only in well MW45-4, the well with the highest observed lead concentration.

Subsequent to the Risk Assessment conducted in the FS (Parsons, 2022b), the USEPA updated residential soil lead guidance and revised the default blood lead level used in the IEUBK (v2) and ALM model risk estimates from 10 µg/dL to 5 µg/dL (USEPA, 2021; USEPA, 2024a). Additional analytical sampling conducted during the RD will include a recalculation of the potential risks associated with exposure to lead using the revised blood level. As appropriate, concentrations from historical samples will be considered as part of the evaluation.

### *Ecological Risk*

**Table 10** summarizes the conclusions of the BERA. Based on the risk assessment, LOAEL-based HQs greater than one indicate that there may be a potential for unacceptable ecological risks within the OD Hill area from small mammal exposures to copper; and bird exposures to copper, lead, mercury, bis(2-ethylhexyl)phthalate and di-n-butylphthalate; The potential for adverse effects from exposure to bis(2-ethylhexyl)phthalate and di-n-butylphthalate may not be significant given their limited spatial coverage and use of the maximum concentration to derive their dietary exposure values.

Plant and soil invertebrate exposures in the OD Hill Area resulted in no observed adverse effect level (NOAEL)-based HQs greater than one from exposures to copper, iron, manganese, mercury, nickel, selenium, thallium, zinc, di-n-butylphthalate, dieldrin, endosulfan I, endrin, endrin aldehyde, and methoxychlor. Elevated NOAEL-based HQs, greater than 10, were calculated only for direct exposure to copper, mercury, di-n-butylphthalate, and endosulfan I. Detected concentrations of copper and mercury may have a potential for adverse effects on soil invertebrates. The extent and likelihood of adverse effects, however, are highly dependent on site-specific soil conditions that determine bioavailability such as pH, redox potential, and the presence of binding compounds. Di-n-butylphthalate and endosulfan I, however, were evaluated based on maximum detected concentrations and had relatively limited spatial coverage which makes it unlikely that these compounds pose a significant risk to soil invertebrates throughout the OD Hill area.

There are no unacceptable risks to ecological receptors exposed to surface water in the OD Hill area. Sediment was not evaluated in the ecological risk assessment, because there was no sediment present within the MRS. Ditch soil was evaluated as surface soil in the ecological risk assessment.

In the Kickout Area, LOAEL-based HQs marginally greater than one indicate that there may be a potential for unacceptable ecological risks from bird exposures to copper, lead and bis(2-ethylhexyl) phthalate (LOAEL-based HQs of 1.1, 1.8 and 1.5, respectively). Exposure concentrations for those **chemicals of potential ecological concern**

**(COPECs)** may indicate a potential for adverse effects on omnivore and insectivore avian receptors. The extent and likelihood of adverse effects is highly dependent on site-specific soil conditions that determine their bioavailability. For bis(2-ethylhexyl) phthalate, the potential for unacceptable risks is likely not significant because of its limited spatial coverage and the use of the maximum detected concentration as the Exposure Point Concentration. Therefore, exposure concentrations for copper and lead may indicate a potential for adverse effects on omnivore and insectivore avian receptors in surface soil.

Plant and soil invertebrate exposures in the Kickout Area resulted in NOAEL-based HQs for barium, cobalt, copper, iron, manganese, mercury, zinc, and endosulfan I. Because HQ calculations assumed a 100% metals bioavailability, exposure concentrations are not likely indicative of adverse effects on plants or soil invertebrates. Elevated NOAEL-based HQs, greater than 10, were calculated only for direct exposure to mercury and endosulfan I. Detected concentrations of mercury may have a potential for adverse effects on soil invertebrates. The extent and likelihood of adverse effects, however, are highly dependent on site-specific soil conditions that determine bioavailability such as pH, redox potential, and the presence of binding compounds. For endosulfan I, the potential for unacceptable risks is likely not significant because of its limited spatial coverage and the use of the maximum detected concentration as the Exposure Point Concentration. Therefore, endosulfan I is unlikely to pose a significant risk to soil invertebrates throughout the Kickout Area.

There are no unacceptable risks to ecological receptors exposed to surface water. Sediment was not evaluated in the ecological risk assessment, because there was no sediment present within the MRS.

## Risk Assessment Conclusions

Based on the conclusion that unacceptable risks from potential exposure to MEC and MC are present at the OD Grounds MRS, the FS evaluated potential further actions. It is the current judgment of the U.S. Army (lead agency) that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or potential future interaction with MEC and MC and other analytes.

**Table 9.**
**Human Health Quantitative Cumulative Risk Summary for all Media**

| Receptor and Medium | Exposure Pathways | Total Carcinogenic Risk (1) | Carcinogenic Risk Drivers (4) | Total Hazard Index - Child (1) | Non-Carcinogenic Risk Drivers (Child) (4) | Total Hazard Index - Adult (1) | Non-Carcinogenic Risk Drivers (Adult) (4) |
|---|---|---|---|---|---|---|---|
| **Receptor: Hypothetical Future Resident** | | | | | | | |
| Surface Soil (0 - ≤ 2 feet bgs) - OD Hill Area | Ingestion, Dermal Contact, Inhalation | 2.8E-05 | -- | **5.8** | **Aroclor-1254 31%**<br>**Cadmium 30%** | 0.60 | -- |
| Combined Surface and Subsurface Soil (0 - ≤ 15 feet bgs) | Ingestion, Dermal Contact, Inhalation | 5.8E-05 | -- | **5.3** | **Aroclor-1254 33%**<br>**Cadmium 25%** | 0.55 | -- |
| Groundwater - MW 45-4 (2) (5) | Ingestion, Dermal Contact | **1.8E-04** | **Arsenic 100%** | **51** | **Cobalt 31%**<br>**Manganese 21%**<br>**Thallium 33%** | **30** | **Cobalt 31%**<br>**Manganese 22%**<br>**Thallium 33%** |
| Surface Soil (0 - ≤ 2 feet bgs) - Kickout Area | Ingestion, Dermal Contact, Inhalation | 6.7E-07 | -- | **3.0** | **MCPA 10%**<br>**Cobalt 63%** | 0.32 | -- |
| Surface Water - Drainage ditches within the MRS (3) | Ingestion, Dermal Contact | 4.6E-07 | -- | 0.63 | -- | 0.22 | -- |
| **Receptor: Hypothetical Future Excavation/ Construction Worker** | | | | | | | |
| Surface Soil (0 - ≤ 2 feet bgs) - OD Hill Area | Ingestion, Dermal Contact, Inhalation | 8.2E-08 | -- | -- | -- | 0.14 | -- |
| Combined Surface and Subsurface Soil (0 - ≤ 15 feet bgs) | Ingestion, Dermal Contact, Inhalation | 6.3E-08 | -- | -- | -- | 0.046 | -- |
| Groundwater - MW 45-4 (2) | Ingestion, Dermal Contact | 1.9E-08 | -- | -- | -- | 0.13 | -- |
| Surface Soil (0 - ≤ 2 feet bgs) - Kickout Area | Ingestion, Dermal Contact, Inhalation | 1.6E-08 | -- | -- | -- | 0.025 | -- |
| Surface Water - Drainage ditches within the MRS(3) | Ingestion, Dermal Contact | 1.5E-09 | -- | -- | -- | 0.032 | -- |

| Receptor and Medium | Exposure Pathways | Total Carcinogenic Risk (1) | Carcinogenic Risk Drivers (4) | Total Hazard Index - Child (1) | Non-Carcinogenic Risk Drivers (Child) (4) | Total Hazard Index - Adult (1) | Non-Carcinogenic Risk Drivers (Adult) (4) |
|---|---|---|---|---|---|---|---|
| **Receptor: Future Park Worker** | | | | | | | |
| Surface Soil (0 - ≤ 2 feet bgs) - OD Hill Area | Ingestion, Dermal Contact, Inhalation | 5.6E-06 | -- | -- | -- | 0.37 | |
| Groundwater - MW 45-4 (2) (5) | Ingestion, Dermal Contact | 9.8E-05 | -- | -- | -- | **19** | **Cobalt 32%**<br>**Manganese 20%**<br>**Thallium 34%** |
| Surface Soil (0 - ≤ 2 feet bgs) - Kickout Area | Ingestion, Dermal Contact, Inhalation | 2.9E-06 | -- | -- | -- | 0.19 | |
| Surface Water - Drainage ditches within the MRS (3) | Ingestion, Dermal Contact | 1.0E-07 | -- | -- | -- | 0.026 | |
| **Receptor: Current and Future Recreational User** | | | | | | | |
| Surface Soil (0 - ≤ 2 feet bgs) - OD Hill Area | Ingestion, Dermal Contact, Inhalation | 1.8E-06 | -- | 0.39 | -- | 0.039 | -- |
| Groundwater - MW 45-4 (2) | Ingestion, Dermal Contact | 1.3E-05 | -- | **3.4** | **Cobalt 32%**<br>**Manganese 20%**<br>**Thallium 35%** | **2.0** | **Cobalt 32%**<br>**Manganese 20%**<br>**Thallium 34%** |
| Surface Soil (0 - ≤ 2 feet bgs) - Kickout Area | Ingestion, Dermal Contact, Inhalation | 1.0E-06 | -- | 0.000017 | -- | 0.0000016 | -- |
| Surface Water - Drainage ditches within the MRS (3) | Ingestion, Dermal Contact | 6.3E-08 | -- | 0.086 | -- | 0.030 | -- |

(1) Cancer Risks and Hazard Indices were calculated by summing across exposure routes for each receptor.
(2) The greatest risk associated with groundwater is from MW 45-4. For a summary of risk associated with individual wells, see FS, Appendix B-1, Table 2.59 (Parsons, 2022b).
(3) The surface water most likely to be encountered is from the drainage ditches within the OD Grounds MRS. For a summary of risk associated with other surface water bodies, see FS, Appendix B-1, Table 2.79 (Parsons, 2022b).
(4) Percent contribution was calculated by dividing the cancer risk or hazard index of each COPC by the total risk or total HI. COPCs with less than 10% contribution are not shown.
(5) These estimates are based on historic data. Newer data shows lower concentrations. For more information see the Human Health Risk Section of this document or the Human Health Risk Assessment Report Seneca Army Depot Activity OD Grounds (Parsons, 2022b)

-- = Cumulative Hazard not calculated for a child for this receptor.

**Table 10.**
**Summary of Ecological Risk Assessment Results**

| Receptor | Exposure Pathways | Summary of Risks |
|---|---|---|
| Ecological Receptors in the OD Hill Area | Soil and surface water | • A potential for unacceptable ecological risks may be associated with COPECs that have LOAEL-based HQs greater than or equal to 1 for birds and mammals and NOAEL-based HQs greater than 10 for plants and invertebrates. These COPECs are as follows:<br>o Mammals: copper<br>o Birds: copper, lead, mercury, bis(2-ethylhexyl) phthalate and di-n-butylphthalate<br>o Plants/invertebrates: copper, di-n-butylphthalate, and endosulfan I. |
| Ecological Receptors in the Kickout Area | Soil and surface water | • A potential for unacceptable ecological risks may be associated with COPECs that have LOAEL-based HQs greater than or equal to 1 for birds and mammals and NOAEL-based HQs greater than 10 for plants and invertebrates. These COPECs are as follows:<br>o Mammals: none<br>o Birds: copper, lead, and bis(2-ethylhexyl) phthalate<br>o Plants/invertebrates: mercury and endosulfan I. |

# REMEDIAL ACTION OBJECTIVES

Site-specific **Remedial Action Objectives (RAOs)** were developed to address MEC and MC/COPCs based on the known current conditions, the explosive safety hazards, and the potential risks to human and ecological receptors. RAOs address the goals for reducing the explosive hazards from UXO/DMM and/or risks from exposure to soil contamination to ensure protection of human health, safety and the environment (USEPA, 1988). The RAOs are intended to be as specific as possible, but not so specific that the range of alternatives that can be developed is unduly limited.

Remedial action at the OD Grounds MRS is guided by the goal of protecting human health and the environment by reducing unacceptable risks to receptors resulting from exposure to UXO/DMM in soil and MC/COPCs in soil. The site-specific RAOs for the OD Grounds MRS, which are summarized in **Table 12**, will have the effect of protecting human health and the environment and complying with **applicable or relevant and appropriate requirements (ARARs)**.

To document compliance with Federal and State regulations and to determine the impact of the remedial action on the groundwater, the Army proposes to collect groundwater samples as part of the soil remedy. This monitoring will confirm that health-based drinking water standards that would cause unacceptable risk are not exceeded. In the interim, institutional controls to prevent the use of groundwater will be in place.

## Summary of ARARs, "to-be-considered," or other guidance

Three categories of potentially applicable state and federal requirements were reviewed: (1) chemical-specific, (2) location-specific, and (3) action-specific. Chemical-specific ARARs address certain contaminants or class of contaminants and relate to the level of contamination allowed for a specific pollutant in various environmental media. Location-specific ARARs are based on the specific setting and nature of the site. Action-specific ARARs relate to specific actions proposed for implementation at a site. Both location-specific and action-specific ARARs are independent of the media. In addition to ARARs, advisories, criteria, or guidance may be evaluated as **"to be considered" (TBC)**. The NCP provides that the TBC category may include advisories, criteria, or guidance that were developed by USEPA, other federal agencies, or states that may be useful in devising CERCLA remedies. These advisories, criteria, and guidance are not promulgated and, therefore, are not legally enforceable standards such as ARARs.

**Potential Chemical-Specific ARARs, TBCs, or other guidance**

Potential federal and state chemical-specific ARARs, TBCs, or other guidance considered at the OD Grounds MRS include the sources below. USEPA has identified NYSDEC's soil cleanup objectives as an ARAR, a "to-be considered," or other guidance to address contaminated soil at the OD Grounds MRS. The lowest, most stringent values were selected as the **Preliminary Remediation Goals (PRGs)** for the OD Grounds MRS.

- Cleanup levels for hazardous constituents in soil are available in NYS. Surface and subsurface soil chemical concentrations were compared to NYS Subparts 375-6 Remedial Program Soil Cleanup Objectives, Table 375-6.8(b): Restricted Use Soil Cleanup Objectives. 6 CRR-NY Subpart 375-6.8, current through 30 April 2021, includes the SCO tables developed for different categories of future land use (i.e., residential, restricted-residential, commercial, industrial, protection of ecological resources and protection of groundwater) (NYS, 2022a).
- New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document (NYSDEC, 2006) for the calculation of Ecological Soil Cleanup Objectives (ESCOs).
- USEPA RSLs for Residential and Industrial Soil and Protection of Groundwater Soil Screening Levels (SSL) (HQ=1) from the USEPAs Regional Screening Levels – May 2024 (USEPA, 2024b).
- USEPA RSLs for Tap Water (HQ=1) from the USEPAs Regional Screening Levels – May 2024 (USEPA, 2024b).
- NYSDEC Screening and Assessment of Contaminated Sediment, Table 5. Division of Fish, Wildlife and Marine Resources, Bureau of Habitat (NYSDEC, 2014).

**Potential Location-Specific ARARs, "to-be-considered," or other guidance**

Potential federal and state location-specific ARARs considered in connection with this response action include the following:

- None identified.

**Action-Specific ARARs, "to-be-considered," or other guidance**

Action-specific regulations were identified in connection with this response action in association with the installation of soil covers over areas which exceed PRGs.

- NYS DER-10 (2010), Section 5.4 (e) Remedial Action Implementation Compliance, compliance for soil which exists at or is imported to a site.
- NYS DER-10 (2010), Section 4.1 (f) Remedial Goals, Objectives and Factors to Consider, Soil Cover.

## Selection of PRGs

**Preliminary Remediation goals (PRGs)** (i.e., proposed cleanup levels) provide remedial design staff with long-term targets to use during analysis and selection of remedial alternatives. For this reason, PRGs are screening tools rather than the final remediation target or cleanup level and they are designed to be conservative. Ideally, such goals, if achieved, should both comply with ARARs and result in residual risks that fully satisfy the NCP requirements for the protection of human health and the environment. Chemical-specific PRGs are concentration goals for individual chemicals for specific medium and land use combinations at CERCLA sites. There are two general sources of chemical-specific PRGs: (1) concentrations based on ARARs and/or TBCs and (2) concentrations based on risk assessment. ARARs and TBCs include concentration limits set by other environmental regulations. When ARARs do not exist, risk-based PRGs are calculated using USEPA health criteria (i.e., reference doses or cancer slope factors) and default or site-specific exposure assumptions (USEPA, 1991).

There are no promulgated or otherwise established acceptable exposure levels for MEC. Therefore, for purposes of this project, the PRG for MEC is defined as "no unacceptable risk from explosive hazards to human receptors." This PRG will require remedial alternatives to minimize unintentional human exposure to surface or subsurface UXO.

Human health and ecological PRGs were developed to address the MC and other analyte contamination in soil. Selected soil PRGs are summarized in **Table 11**. These PRGs were selected from the lowest, most stringent level of the human health and ecological ARARs and/or TBCs for analytes identified as COCs in the HHRA or in the BERA (Parsons, 2022b). USEPA RSLs and calculated ESCOs from the BERA are also considered for comparison and in situations where there is not an SCO. Residential SCOs were not considered for soil PRGs because land use is expected to remain non-residential in the future. The

Preferred Alternative includes a land use control / institutional control (LUC/IC) prohibiting residential use. Protection of groundwater values were not selected as PRGs since groundwater is not considered a medium of concern at the OD Grounds MRS. Significant groundwater impacts were not observed with soil contamination in place and a history of exposure and routine reworking (See MRS History). This suggests immobile contamination in soil, and the forthcoming remedial action is expected to further reduce the potential contaminant impact to groundwater. No discernable groundwater contaminant plume has been defined, and groundwater contaminant values have decreased over time. PRGs are not proposed for groundwater, surface water or sediment as they are not media of concern at the OD Grounds MRS.

**Table 11**
**OD Grounds Preliminary Remediation Goals (PRGs)**

| Area | Medium | COC | Preliminary Remediation Goal (PRG) (mg/kg)[1] | Basis of PRG[1] | | |
|---|---|---|---|---|---|---|
| | | | | USEPA RSL (HQ=1) Industrial Soil | NYS SCO Protection of Ecological Resources | Site-Specific Ecological Soil Cleanup Objectives (ss-ESCOs)[2] |
| OD Hill | Surface Soil | Aroclor-1254 | 0.97 | X | | |
| | | Cadmium | 4 | | X | |
| | | Copper | 50 | | X | |
| | | Lead | 63 | | X | |
| | | Mercury | 0.18 | | X | |
| | | Bis (2-ethylhexyl) phthalate | 0.38 | | | X |
| | | Di-n-butylphthalate | 0.17 | | | X |
| | | Endosulfan I | 12.8 | | | X |
| OD Hill | Combined Surface and Subsurface Soil (0 to <= 15ft bgs) | Aroclor-1254 | 0.97 | X | | |
| | | Cadmium | 4 | | X | |
| Kickout Area | Surface Soil | MCPA | 410 | X | | |
| | | Cobalt | 350 | X | | |
| | | Manganese | 1,600 | | X | |
| | | Copper | 50 | | X | |
| | | Lead | 63 | | X | |
| | | Mercury | 0.18 | | X | |
| | | Bis (2-ethylhexyl) phthalate | 0.38 | | | X |
| | | Di-n-butylphthalate | 0.17 | | | X |

(1) PRGs were selected to be the lowest of a) USEPA RSL (HQ=1), Industrial Soil; b) NYS SCO Commercial (none selected); c) NYS SCO Protection of Ecological Resources; d) Calculated ESCOs from the BERA (Parsons, 2022b). USEPA RSLs and Calculated ESCOs from the BERA are also considered for comparison and in situations where there is not an SCO.

(2) Site-specific Ecological Soil Cleanup Objectives (ss-ESCOs) were calculated in the BERA (Parsons, 2022b, Appendix B2, Section 5.6.1) following the NYSDEC's methodology presented in the technical support document for development of Ecological Soil Cleanup Objectives (ESCOs) for the state's Brownfield Cleanup Program (NYSDEC, 2006).

**Table 12**
**OD Grounds MRS Remedial Action Objectives**

| Medium | Contaminant | Receptors | Exposure Routes | Remedial Action Objective |
|---|---|---|---|---|
| **Soil** | UXO/DMM | Human (current and future site workers, site visitors, and recreational users) | Direct contact to 18 inches bgs (Site workers conducting grounds and/or site maintenance, such as vegetation maintenance, fence installation, or plowing feed plots)<br>Direct contact to 12 inches bgs (Site visitors/recreational users digging shallow holes or inserting stakes for shelters/tents) | Prevent the exposure of human receptors to UXO/DMM (see **Table 13**) in soil to the associated bgs depths shown in **Table 13** to address the likelihood of exposure based on current and anticipated future land use. |
| **Soil** | MC/COPCs | Human (hypothetical future child residents – unrestricted use scenario) | Direct contact (incidental ingestion or dermal contact) of surface and subsurface soil (Future unrestricted use scenario – children only) | Prevent the exposure of human receptors to contaminated soil above Preliminary Remediation Goals (PRGs) based on current and anticipated future land use.<br>Prevent soil from contaminating groundwater above health-based standards that would result in unacceptable risk.<br>Prevent soil from contaminating surface water |
| **Soil** | MC/COPCs | Ecological species | Dietary exposure of wildlife receptors and/or direct exposure of plants and soil invertebrates | Prevent the exposure of ecological receptors to soils above PRGs. |

(1) See the "Decision Logic to Assess Risks Associated with Explosive Hazards, and to Develop RAOs for MRSs" (USACE, 2016 and 2020).

(2) "It is assumed that removal of contaminated soil and UXO/DMM will result in an improvement of groundwater conditions. Monitoring of groundwater before and after implementation of the soil remedy will confirm that health-based drinking water standards that would cause unacceptable risk are not exceeded. In the interim, institutional controls to prevent the use of groundwater will be in place."

**Table 13**
**OD Grounds MRS Remedial Action Objective Depths**

| Munitions Category | Description | Estimated DGM Detection Depth (inches bgs) (1) | Max. Depth of MEC/MPPEH (inches bgs) (2) | Max. Intrusive Depth (inches bgs) (3) | RAO Depth (inches bgs) (4) |
|---|---|---|---|---|---|
| **Bomb, B1** | Butterfly Bomblets | 11 | 8 | 18 | 8 |
| **Bomb, B2** | 20-lb. Fragmentation Bombs | 45 | 2 | 18 | 2 |
| **Fuze, F1** | Very Small – approx. 2x3-inch or smaller (e.g., small base fuzes, small Russian projectile fuzes, rocket base fuses, some land mine fuzes, etc.) | 8 | 26 | 18 | 26 |
| **Fuze, F2** | Small – Between 2x3-inch and 4x6-inch (e.g., "T-bar" fuzes, artillery projectile fuzes, smaller rocket fuzes, etc.) | 11 | 26 | 18 | 26 |
| **Fuze, F3** | Medium – 100 series bomb fuzes, larger rocket fuzes, etc. | 21 | 18 | 18 | 18 |
| **Fuze, F4** | Large – M60 series base fuzes and similar very heavy, large fuzes | 25 | 9 | 18 | 9 |
| **Grenade, G1** | Hand Grenades | 11 | 12 | 18 | 12 |
| **Grenade, G2** | Rifle Grenades | 11 | 14 | 18 | 14 |
| **Mine, M1** | M1 square mines and "bouncing betty" mines and flares | 25 | 12 | 18 | 12 |
| **Proj., P1** | 20mm/25mm/1.1-inch projectiles and similar | 4 | 36 | 18 | 36 |
| **Proj., P2** | 30mm projectile without cartridge case | 9 | 15 | 18 | 15 |
| **Proj., P3** | 37mm/40mm projectiles without cartridge case, 20mm with cartridge case, 30mm with cartridge case, etc. | 12 | 18 | 18 | 18 |
| **Proj., P4** | 57mm projectiles, 2.36-inch rocket warheads or motors, etc. | 21 | 24 | 18 | 24 |
| **Proj., P5** | 75mm/76mm projectiles, 90mm AP projectiles | 32 | 25 | 18 | 25 |
| **Proj., P6** | 105mm projectiles, 3.5-inch rockets, etc. | 45 | 18 | 18 | 18 |
| **Proj., P7** | 155mm & 120mm projectiles, 6-inch projectiles, 4.2-inch mortars, etc. | 47 | 15 | 18 | 15 |

(1) DGM detection depths were calculated using a 13.9mV threshold for the sum of time gates 1-3, based on the threshold required to detect a 37mm projectile at 12in bgs. All depths are for a horizontally oriented munition. For items without available response curve data, a munition of similar size was used to estimate detection depths.
(2) Maximum Depth of MEC/MPPEH based on **Table 4**.
(3) Maximum Intrusive Depth based on current and future land uses.
(4) RAO depth is based on the Maximum Depth of MEC/MPPEH found during the Phase I and II Investigations and the Munitions Response Action (2012-2014).
(5) Munitions categories are defined in the Final FS (Parsons, 2022b), Appendix E, Section 4.1 Nature and Extent of MEC, Table 4.6.

# SUMMARY OF REMEDIAL ALTERNATIVES

The following remedial alternatives were evaluated for the OD Grounds MRS. **Table 14** summarizes each element of the alternatives.

**Alternative 1 – No-Further Action**

Alternative 1 is the no further action alternative. CERCLA requires the FS to evaluate a no-action alternative and to use it as a baseline for comparison against other alternatives (40 CFR 300.430I). The no further action alternative would leave the OD Grounds MRS undisturbed with no change or continued maintenance to any preexisting site security measures, such as locked gates, to prevent unauthorized access and direct contact with contaminated soil and possible exposure to explosive hazards from potential UXO/DMM.

**Alternative 2 – Land Use Controls (LUCs) Only**

The major components of Alternative 2 include:

- Land use and activity restrictions (i.e., prohibit residential use and intrusive activity without **MEC construction support**).
- Maintenance/upkeep of the perimeter fence, which is a physical deterrent to access, is controlled by the landowner.
- Educational Awareness.
- Annual LUC inspections.

LUCs would be implemented under Alternative 2. LUCs would include an environmental easement to prohibit unauthorized intrusive activities (requiring construction support, if necessary), and implement land use restrictions to prevent the future use of the OD Grounds MRS as a daycare facility, for playgrounds or camping, agriculture/farming, or for residential activities. A fence currently exists around a larger area that contains the OD Grounds MRS. The fence will be maintained in order to identify the OD Grounds MRS as a former OB/OD area and to help educate users about the potential for munitions debris and to alert all users to the **3Rs** (Recognize, Retreat, Report). Note that the fence does not eliminate access to the OD Grounds MRS, as the landowner controls and can permit access to land users. The groundwater is not currently being used, and would not be used in the future, as a potable water source. Currently, a non-groundwater sourced municipal water supply is available for SEDA. Inspections would be performed annually to confirm that restrictions are being followed. In addition, as a part of this alternative SEDA would implement public educational awareness measures that would involve installation of signs, sign upkeep, and annual briefings on potential explosive hazards to future site personnel to alert them to these issues and reinforce the "3Rs" of explosives safety (recognize, retreat, and report). In accordance with Section 121(c) of CERCLA, this alternative is subject to five-year reviews to determine whether the remedy remains protective of human health and the environment. Since MEC RAOs would not be achieved through LUCs alone, Alternative 2 was eliminated from consideration as a standalone alternative.

**Alternative 3 – Consolidate and Cap with Surface and Subsurface Clearance Outside the Cap and LUCs**

The major components of Alternative 3 include:

- Land use and activity restrictions (i.e., prohibit residential use and intrusive activity to uncleared depths without MEC construction support).
- Short-term groundwater use restrictions (i.e., prohibit use as potable source).
- Maintenance/upkeep of the perimeter fence
- Educational Awareness.
- One round of groundwater, surface water, and sediment sampling prior to any remedial action.
- Consolidating soil at the OD Hill which has high densities of metallic debris or soil concentrations above PRGs and installing an engineered cap over the consolidated soil.
- DGM/Advanced Geophysical Classification (AGC) mapping and intrusive investigation to remove UXO/DMM to a depth of detection outside the cap.
- Post-remedial action groundwater, surface water, and sediment sampling to determine the impact of the remedial action on these media in Reeder Creek.
    - If the results are in compliance with Federal and State health-based drinking water standards, no further LUC for groundwater is required.
    - If the results exceed Federal or State health-based drinking water standards and impacts on groundwater are found during post-remedial action groundwater sampling, Groundwater Use Restrictions will stay in place and long-term groundwater monitoring will be undertaken.

- Annual LUC inspections.

In addition to including the LUCs and educational awareness measures described under Alternative 2 (see above), Alternative 3 would involve consolidating soil with high densities of metallic debris and soil above PRGs at the OD Hill and covering that soil with an engineered cap. This alternative would also include DGM/AGC as the primary method of data collection and intrusive investigation of anomalies to complete a MEC clearance in areas of the MRS that were not covered by the engineered cap. If there are any areas where DGM/AGC is not feasible due to the steepness of terrain, presence of water, or other conditions within the MRS, then analog methods may be used. MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., **blow-in-place [BIP]** or consolidated shot procedures). MD resulting from demolition operations or found during the removal would be inspected, verified, and certified as material documented as safe (MDAS) by UXO-qualified personnel before being transported off-site for appropriate disposition.

To document compliance with Federal and State regulations, the Army proposes to collect groundwater samples before and after implementation of the soil remedy. This monitoring will confirm that health-based drinking water standards that would cause unacceptable risk are not exceeded. In the interim, institutional controls to prevent the use of groundwater will be in place. LTM for Alternative 3 would include inspections and maintenance of the engineered cap, groundwater monitoring (if applicable), and LUC inspections for the lifetime of the cap. In accordance with Section 121(c) of CERCLA, this alternative is subject to five-year reviews to determine whether the remedy remains protective of human health and the environment. **Table 14** summarizes each element of this alternative.

**Alternative 4 – Excavate OD Hill and perform surface/subsurface clearance over the entire OD Grounds MRS, and LUCs**

The major components of Alternative 4 include:

- Land use and activity restrictions (i.e., prohibit residential use and intrusive activity to uncleared depths without construction support).
- Short-term groundwater use restrictions (i.e., prohibit use as potable source).
- Maintenance/upkeep of the perimeter fence.
- Educational Awareness.
- One round of groundwater, surface water, and sediment sampling prior to any remedial action.
- Excavation of OD Hill to grade and mechanical separation of UXO/DMM from excavated soil, creating a pile of UXO/DMM, a pile of MD, and pile of processed soil (e.g., loose debris-free soil).
- Confirmatory sampling to be conducted to evaluate whether soil remaining in place meets the PRGs, or if additional excavation is required to achieve the PRGs. In the case where ecologically based PRGs (ss-ESCOs) are exceeded but all other PRGs are achieved, this alternative includes construction of 12-inch soil cover in discrete areas, as needed.
- Following UXO/DMM separation, soil sample collection will be conducted from the excavated and processed soils to determine the potential for the reuse of the soil within the OD Grounds MRS or to support a determination of appropriate disposition for off-site disposal.
- DGM/AGC mapping and intrusive investigation to remove UXO/DMM to a depth of detection over the entire MRS.
- Post-remedial action groundwater, surface water, and sediment sampling to determine the impact of the remedial action on these media in Reeder Creek.
- If the results are in compliance with site ARARs and/or TBCs, no further LUC, and no LTM, for groundwater is required.
- If the results exceed Federal or State health-based drinking water standards and impacts on groundwater are found during post-remedial action groundwater sampling, Groundwater Use Restrictions will stay in place and long-term groundwater monitoring will be undertaken.
- Annual LUC inspections.

Alternative 4 would include the same LUCs as described under Alternative 2 (see above). The geophysical mapping and intrusive investigation components of Alternative 4 are similar to those in Alternative 3 (see above), but instead of consolidating and capping soil at the OD Hill, Alternative 4 would involve the excavation and mechanical processing of the OD Hill to grade to remove UXO/DMM. Additional excavation below the natural grade of OD Hill may be conducted if the density of metallic debris remains high enough that DGM is not practical. All excavated soil will be mechanically processed to separate MEC. Following the excavation of the OD

Hill and any surrounding high-density areas, this alternative would also involve DGM/AGC as the primary method of data collection and intrusive investigation of anomalies to complete MEC clearance in all areas of the MRS (similar to Alternative 3). If there are any areas where DGM/AGC is not feasible due to the steepness of terrain, presence of water, or other conditions within the MRS, then analog methods may be used.

Following the excavation work at the OD Hill and any surrounding high-density areas, confirmatory samples will be collected from the newly exposed surface soil in the footprint of the excavation and compared to the PRGs. In the event that confirmatory sample(s) exceed the PRGs, additional over-excavation may be performed, followed by additional confirmatory sampling until the OD Grounds MRS cleanup goals are met. If sampling within the OD Grounds MRS, in the remaining deeper soils following excavation and processing from the OD Hill and surrounding high-density areas (now surface soil), identifies portions of the remaining in-situ soils that exceed the ss-ESCOs, and that may present a risk to ecological receptors, a soil cover may be used to mitigate this risk. Alternatively, the soil will be excavated and sampled until confirmatory results achieve PRGs, as described above). The soil cover will consist of at least 12-inches of compacted soil borrowed from a source within the OD Grounds MRS where analytes are either not present or at levels below ARARs and/or TBCs. The soil cover will be inspected as part of the annual LUCs inspections.

This alternative will result in three types of "piles": (1) UXO/DMM; (2) MD; and (3) excavated and processed soil free of debris.

- Type (1) UXO/DMM: MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., BIP or consolidated shot procedures).
- Type (2) MD: MD resulting from demolition operations or found during the removal would be inspected, verified, and certified as MDAS by UXO-qualified personnel before being transported off-site for appropriate disposition.
- Type (3) excavated and processed soil free of debris: Excavated soils deemed free from UXO/DMM will be sampled, and soil that meets the PRGs would be left within the OD Grounds MRS for potential reuse as backfill to support the re-grading effort described below. The excavated and processed soils that do not meet the OD Grounds MRS PRGs will be managed for off-site disposal. Waste characterization sampling will be conducted to determine appropriate off-site disposal. If any of the excavated/processed soil is determined to be hazardous, the hazardous soil will be stabilized within the OD Grounds MRS using Portland cement or similar to immobilize the contaminants and render the material as non-hazardous. The material will be sampled again to identify if the material is suitable for non-hazardous disposal. Trucks would be staged to haul the excavated soil off-site to an approved landfill, as needed.

Upon completion of excavation and confirmatory sampling at the OD Hill and any high-density areas, as well as installing any necessary soil covers as described above, the entire excavated area would be graded to restore a natural grade and re-vegetated to promote positive drainage. Pre- and post-RA groundwater monitoring will be conducted to ensure the remedy does not impact groundwater.

LTM for Alternative 4 would include inspections of soil covers, groundwater monitoring (if applicable), and LUC inspections. In accordance with Section 121(c) of CERCLA, this alternative is subject to five-year reviews to determine whether the remedy remains protective of human health and the environment. **Table 14** summarizes each element of this alternative.

**Alternative 5 – Excavate the entire OD Grounds MRS to 1 foot below grade and perform surface/subsurface clearance.**

The major components of Alternative 5 include:

- Land use and activity restrictions (i.e., prohibit residential use and intrusive activity to uncleared depths without construction support).
- Short-term groundwater use restrictions (i.e., prohibit use as potable source).
- One round of groundwater, surface water, and sediment sampling prior to any remedial action.
- Excavation of soil with high densities of metallic debris at and around the OD Hill and to a depth of 1-foot bgs over the entire MRS and mechanical separation of UXO/DMM from that excavated soil.
- Confirmatory sampling to be conducted to evaluate whether soil remaining in place meets

the PRGs, or if additional excavation is required to achieve the PRGs. In the case where ecologically based PRGs (ss-ESCOs) are exceeded but all other PRGs are achieved, this alternative includes construction of 12-inch soil cover in discrete areas, as needed.
- Following UXO/DMM separation, soil sample collection will be conducted from the excavated and processed soils to determine the potential for the reuse of the soil within the OD Grounds MRS or to support a determination of appropriate disposition for off-site disposal.
- DGM/AGC mapping and intrusive investigation to remove UXO/DMM over the entire MRS following the removal and mechanical separation of the top foot of soil.
- Post-remedial action groundwater, surface water, and sediment sampling to determine the impact of the remedial action on these media in Reeder Creek.
- If the results are in compliance with site ARARs and/or TBCs, no further LUC, and no LTM, for groundwater is required.
- If the results exceed Federal or State health-based drinking water standards and impacts on groundwater are found during post-remedial action groundwater sampling, Groundwater Use Restrictions will stay in place and long-term groundwater monitoring will be undertaken.
- Annual LUC inspections.

Alternative 5 would include the same LUCs as described under Alternative 2 (see above). The geophysical mapping and intrusive investigation components of Alternative 5 are similar to those conducted under Alternative 4; however, in addition to excavation of the entire OD Hill, an MRS wide excavation to 1-foot bgs would be performed. Excavation and mechanical processing of soil would be conducted to remove UXO/DMM. The management of the UXO/DMM spoils pile; the MD spoils pile; and the excavated and processed soil (free of debris) spoils pile will be managed in the same manner as described in Alternative 4.

Upon completion of MEC clearance activities, as well as any installing any necessary soil covers, the excavated areas would be graded to restore a natural grade and re-vegetated to promote positive drainage. Pre- and post-RA groundwater monitoring will be conducted to ensure the remedy does not impact groundwater.

LTM for Alternative 5 would include inspections of soil covers, LUC inspections, and potential groundwater monitoring. In accordance with Section 121(c) of CERCLA, this alternative is subject to five-year reviews to determine whether the remedy remains protective of human health and the environment. **Table 14** summarizes each element of this alternative.

**Alternative 6 – Excavate the entire OD Grounds MRS to 3 feet below grade and perform surface/subsurface clearance.**

The major components of Alternative 6 include:

- Land use and activity restrictions (i.e., prohibit residential use and intrusive activity to uncleared depths without construction support).
- Short-term groundwater use restrictions (i.e., prohibit use as potable source).
- One round of groundwater, surface water, and sediment sampling prior to any remedial action.
- Excavation of soil with high densities of metallic debris at and around the OD Hill and to a depth of 3-feet bgs over the entire MRS and mechanical separation of UXO/DMM from that excavated soil, generating a pile of UXO/DMM, a pile of MD, and pile of processed soil (e.g., loose debris-free soil.
- Confirmatory sampling to be conducted to evaluate whether soil remaining in place meets the PRGs, or if additional excavation is required to achieve the PRGs. In the case where ecologically based PRGs (ss-ESCOs) are exceeded but all other PRGs are achieved, this alternative includes construction of 12-inch soil cover in discrete areas, as needed.
- Following UXO/DMM separation, soil sample collection will be conducted from the excavated and processed soils to determine the potential for the reuse of the soil within the OD Grounds MRS or to support a determination of appropriate disposition for off-site disposal.
- DGM/AGC mapping and intrusive investigation to remove UXO/DMM over the entire MRS following the removal and mechanical separation of the top 3 feet of soil.
- Post-remedial action groundwater, surface water, and sediment sampling to determine the impact of the remedial action on these media in Reeder Creek.

- If the results are in compliance with Federal and State health-based drinking water standards, and ARARs and/or TBCs, no further LUC, and no LTM, of the groundwater is required.
- If impacts on groundwater are found during post-remedial action groundwater sampling, Groundwater Use Restrictions will stay in place and long-term groundwater monitoring will be undertaken.
- Annual LUC inspections.

Alternative 6 would include the same LUCs as described under Alternative 2 (see above). The geophysical mapping and intrusive investigation components of Alternative 6 are similar to those conducted under Alternative 4; however, in addition to excavation of the entire OD Hill, an MRS wide excavation to 3-feet bgs would be performed. Excavation and mechanical processing of soil would be conducted to remove UXO/DMM. The management of the UXO/DMM spoils pile; the MD spoils pile; and the excavated and processed soil (free of debris) spoils pile will be managed in the same manner as described in Alternative 4.

Upon completion of MEC clearance activities, as well as installing any necessary soil covers, the excavated areas would be graded to restore a natural grade and re-vegetated to promote positive drainage. Pre- and post-RA groundwater monitoring will be conducted to ensure the remedy does not impact groundwater.

LTM for Alternative 6 would include inspections of soil covers, LUC inspections, and potential groundwater monitoring. In accordance with Section 121(c) of CERCLA, this alternative is subject to five-year reviews to determine whether the remedy remains protective of human health and the environment. **Table 14** summarizes each element of this alternative.

**Table 14.**
**Remedial Action Alternatives**

| Alternative | Contaminant | Key Components |
|---|---|---|
| Alternative 1: No Further Action | N/A | None |
| Alternative 2: Land Use Controls (LUCs) only | UXO/DMM | • Development of an Environmental Easement.<br>• Restrict the OD Grounds MRS to non-residential land use.<br>• Restrict the use of the OD Grounds MRS to exclude use for daycare facilities, playgrounds, agriculture/farming, and camping.<br>• Require MEC construction support for intrusive activities.<br>• Implement educational awareness for workers and visitors.<br>• Maintain the perimeter fence to control access.<br>• Conduct annual LUC inspections and 5-year reviews. |
| | MC/COPCs | • Restrict to non-residential land use. |
| Alternative 3: Consolidate and cap with surface and subsurface clearance outside the cap and LUCs | UXO/DMM | • Consolidate soil with high densities of metallic debris at the OD Hill beneath an engineered cap.<br>• Conduct surface and subsurface MEC removal outside the cap, including DGM/AGC) mapping and intrusive investigation to remove UXO/DMM to a depth of detection outside the cap.<br>• MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., BIP or consolidated shot procedures).<br>• Prohibit intrusive activity within the cap footprint.<br>• Implement LUCs from Alternative 2.<br>  ○ Note that construction support will only be necessary when intrusive activities occur to depths determined to potentially contain residual UXO/DMM based on remedial action data. |
| | MC/COPCs | • Short-term groundwater use restrictions.<br>• Sample groundwater, surface water, and sediment before remedial action.<br>• Consolidate soil with concentrations exceeding PRGs at the OD Hill beneath the engineered cap.<br>• Sample groundwater, surface water, and sediment after remedial action and compare to pre-RA sample results, ARARs and/or TBCs to determine if these media were negatively impacted.<br>• Implement LUCs from Alternative 2.<br>• Conduct long-term groundwater monitoring.<br>  ○ Note that LTM will only be necessary if groundwater sampling results are not in compliance with Federal and State regulations showing impacts to groundwater from the remedial action. |
| Alternative 4: Excavate OD Hill to grade and perform surface/subsurface clearance over the entire OD Grounds MRS, and LUCs | UXO/DMM | • Excavate OD Hill to grade and conduct mechanical separation and sorting to remove UXO/DMM from the excavated soil, creating a pile of UXO/DMM, a pile of MD, and pile of processed soil (e.g., loose debris-free soil).<br>• Conduct surface and subsurface MEC (UXO/DMM) removal over the entire MRS including below the material removed at the OD Hill, including DGM/AGC mapping and intrusive investigation to remove UXO/DMM to a depth of detection over the entire MRS.<br>• MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., BIP or consolidated shot procedures).<br>• Inspect, verify, and certify MD as MDAS by UXO-qualified personnel before being transported off-site for appropriate disposition.<br>• Implement LUCs from Alternative 2.<br>  ○ Note that construction support will only be necessary when intrusive activities occur to depths determined to potentially contain residual UXO/DMM based on remedial action data. |

| Alternative | Contaminant | Key Components |
|---|---|---|
| | MC/COPCs | • Short-term groundwater use restrictions.<br>• Sample groundwater, surface water, and sediment before remedial action.<br>• Sample processed/excavated soil. If results do not exceed PRGs, reuse soils as backfill to support re-grading. If soils exceed PRGs, dispose off-site at appropriate landfill. If soil sampling results from excavated and processed soils exceed PRGs, additional waste characterization sampling will be conducted to determine appropriate off-site disposal.<br>• Conduct confirmatory sampling in the footprint of the excavations and compare results to PRGs. If PRGs are exceeded, additional excavation and sampling will be required to demonstrate that soil remaining in-place meets the PRGs.<br>• If sampling of the excavated areas within the OD Grounds MRS identifies portions of the remaining in-situ soils that exceed the ss-ESCOs, a soil cover may be used to mitigate this risk allowing the soil to stay within the OD Grounds MRS under the soil cover. Alternatively, the soil will be excavated and sampled until confirmatory results achieve PRGs, as described above. The soil cover will consist of at least 12-inches of compacted soil borrowed from a source within the OD Grounds MRS that meets the applicable ARARs and/or TBCs.<br>• Sample groundwater, surface water, and sediment after remedial action and compare pre-RA sample results, ARARs and/or TBCs to determine if these media were negatively impacted.<br>• Implement LUCs from Alternative 2.<br>• Conduct long-term groundwater monitoring.<br>    o Note that LTM will only be necessary if groundwater sampling results are not in compliance with Federal and State regulations showing impacts to groundwater from the remedial action. |
| Alternative 5: Excavate the entire OD Grounds MRS to 1 foot below grade and perform surface/sub-surface clearance | UXO/DMM | • Conduct mechanical separation and sorting to remove UXO/DMM across the entire OD Grounds MRS, including the OD Hill, to 1 foot below grade creating a pile of UXO/DMM, a pile of MD, and pile of processed soil (e.g., loose debris-free soil).<br>• Conduct surface and subsurface MEC (UXO/DMM) removal across the entire OD Grounds MRS followed by mechanical separation and sorting operation. Includes DGM/AGC mapping and intrusive investigation to remove UXO/DMM over the entire MRS following the removal and mechanical separation of the top foot of soil.<br>• MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., BIP or consolidated shot procedures).<br>• Inspect, verify, and certify MD as MDAS by UXO-qualified personnel before being transported off-site for appropriate disposition.<br>• Implement LUCs from Alternative 2.<br>    o Note that construction support will only be necessary when intrusive activities occur to depths determined to potentially contain residual UXO/DMM based on remedial action data. |
| | MC/COPCs | • Short-term groundwater use restrictions.<br>• Sample groundwater, surface water, and sediment before remedial action.<br>• Sample processed/excavated soil. If results do not exceed PRGs, reuse soils as backfill to support re-grading. If soils exceed PRGs, additional waste characterization sampling will be conducted to determine appropriate off-site disposal.<br>• Conduct confirmatory sampling in the footprint of the excavations and compare results to PRGs. If PRGs are exceeded, additional excavation and sampling will be required to demonstrate that soil remaining in-place meets the PRGs.<br>• If sampling of the excavated areas within the OD Grounds MRS identifies portions of the remaining in-situ soils that exceed the ss-ESCOs, a soil cover may be used to mitigate this risk allowing the soil to stay |

| Alternative | Contaminant | Key Components |
|---|---|---|
| | | within the OD Grounds MRS under the soil cover. Alternatively, the soil will be excavated and sampled until confirmatory results achieve PRGs, as described above. The soil cover will consist of at least 12-inches of compacted soil borrowed from a source within the OD Grounds MRS that meets the applicable ARARs and/or TBCs.<br>• Sample groundwater, surface water, and sediment after remedial action and compare pre-RA sample results, ARARs and/or TBCs to determine if these media were negatively impacted.<br>• Implement LUCs from Alternative 2.<br>• Conduct long-term groundwater monitoring.<br>o Note that LTM will only be necessary if groundwater sampling results are not in compliance with Federal and State regulations showing impacts to groundwater from the remedial action. |
| Alternative 6: Excavate the entire OD Grounds MRS and process for off-site disposal | UXO/DMM | • Conduct mechanical separation and sorting to remove UXO/DMM across the entire OD Grounds MRS to greater than 3 ft bgs creating a pile of UXO/DMM, a pile of MD, and pile of processed soil (e.g., loose debris-free soil). Includes DGM/AGC mapping and intrusive investigation to remove UXO/DMM over the entire MRS following the removal and mechanical separation of the top 3 feet of soil.<br>• MEC (UXO/DMM) will be disposed of within the OD Grounds MRS by UXO-qualified personnel using explosive demolition techniques (i.e., BIP or consolidated shot procedures).<br>• Inspect, verify, and certify MD as MDAS by UXO-qualified personnel before being transported off-site for appropriate disposition. |
| | MC/COPCs | • Short-term groundwater use restrictions.<br>• Sample groundwater, surface water, and sediment before remedial action.<br>• Sample processed/excavated soil. If results do not exceed PRGs, reuse soils as backfill to support re-grading. If soil sampling results from excavated and processed soils exceed PRGs, additional waste characterization sampling will be conducted to determine appropriate off-site disposal.<br>• Conduct confirmatory sampling in the footprint of the excavations and compare results to PRGs. If PRGs are exceeded, additional excavation and sampling will be required to demonstrate that soil remaining in-place meets the PRGs.<br>• If sampling of the excavated areas within the OD Grounds MRS identifies portions of the remaining in-situ soils that exceed the ss-ESCOs, a soil cover may be used to mitigate this risk allowing the soil to stay within the OD Grounds MRS under the soil cover. Alternatively, the soil will be excavated and sampled until confirmatory results achieve PRGs, as described above. The soil cover will consist of at least 12-inches of compacted soil borrowed from a source within the OD Grounds MRS that meets with the applicable ARARs and/or TBCs.<br>• Sample groundwater, surface water, and sediment after remedial action and compare pre-RA sample results, ARARs and/or TBCs to determine if these media were negatively impacted.<br>• Implement LUCs from Alternative 2.<br>• Conduct long-term groundwater monitoring.<br>o Note that LTM will only be necessary if groundwater sampling results are not in compliance with Federal and State regulations showing impacts to groundwater from the remedial action. |

# SCREENING OF ALTERNATIVES

The alternatives assembled above were screened for effectiveness, implementability, and cost before being analyzed in the detailed alternative evaluation. This screening process is used to select the most favorable alternatives for a detailed analysis. The screening determined that Alternative 1 is not protective of human health or the environment and

Alternative 2 does not satisfy the statutory preference to reduce toxicity, mobility, or volume of the hazardous substances as their principal element. However, each alternative was retained for analysis to provide comparison with other alternatives. Screening of Alternative 3 determined that this alternative would not be feasible given the hazards of building a cap over MEC contaminated soil and would require a significant amount of maintenance over the long term. While Alternative 6 would be effective, it was not considered implementable due to the excavation of over 1.8 million cubic yards of soil, which would cause significant impacts to the OD Grounds MRS and the habitat at this planned conservation area. The estimated cost of this alternative (over $200 million) was also considered excessive. For this reason, **Alternatives 3 and 6 were screened out at this stage and were not carried forward to the detailed analysis.**

# ALTERNATIVES EVALUATION

A detailed analysis was completed for the various remedial alternatives developed to address the MEC hazards and MC risks identified. The purpose of this detailed analysis was to evaluate and compare the range of remedial action alternatives against the baseline condition (no further action) and each other to select one preferred alternative that was considered the most suitable to address the hazards and/or risks present. The alternatives evaluated are presented here for review by the public.

The detailed analysis involved evaluating each identified remedial alternative against nine criteria, as defined by the NCP (40 CFR 300.430(e)). These nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. A description and purpose of the three groups of criteria follow:

**Threshold criteria** are requirements that each alternative must meet in order to be eligible for selection and include (a) overall protectiveness of human health and the environment and (b) compliance with ARARs.

**Balancing criteria** are used to weigh major trade-offs among alternatives and include:

a) long-term effectiveness and permanence,
b) reduction of toxicity, mobility, and volume (TMV) of contaminants through treatment,
c) short-term effectiveness,
d) implementability, and
e) cost.

**Modifying criteria** include (a) state/support agency acceptance and (b) community acceptance and require review of the remedial alternatives by stakeholders. For this reason, while these criteria may be considered to the extent that information is available during the FS, they can only be fully considered after public comment is received on this Proposed Plan. In the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are equally important as the balancing criteria. The details of the nine evaluation criteria are explained further in **Table 15** below.

**Table 15.**
**Evaluation Criteria for Remedial Action Alternatives**

| | |
|---|---|
| **Threshold Criteria** | **Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. |
| | **Compliance with ARARs** evaluates whether the alternative meets cleanup levels and remedial requirements based on relevant Federal or State environmental statutes or regulations, or whether a waiver is justified. |
| **Balancing Criteria** | **Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time. |
| | **Reduction of TMV of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present. |
| | **Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation. |
| | **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services. |
| | **Cost** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Total present value (TPV) is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent. |
| **Modifying Criteria** | **State/Support Agency Acceptance** considers whether the State agrees with the USACE's analyses and recommendations, as described in the FS and Proposed Plan. |
| | **Community Acceptance** considers whether the local community agrees with USACE's analyses and preferred alternative. Comments received on this Proposed Plan are an important indicator of community acceptance. |

## Detailed Analysis of Alternatives

The FS Report (Parsons, 2022b) provides a detailed description of both the individual and comparative analyses of the remedial alternatives evaluated for the OD Grounds MRS. These analyses are summarized in **Table 16** below. **Table 16** is also color coded based on desirability with respect to each evaluation criterion.

**Table 16. Detailed Analysis of Alternatives**

| Remedial Action Alternative | Threshold Criteria (5) | | Primary Balancing Criteria (5) | | | | | Total Score (3) | Overall Ranking |
|---|---|---|---|---|---|---|---|---|---|
| | Overall Protection of Human Health and Environment | Compliance with ARARs, TBCs, or other guidance | Long-Term Effectiveness | Reduction in toxicity, Mobility, or Volume of Wastes | Short-Term Effectiveness | Implementability | Cost (1) | | |
| **Alternative 1: No-Further Action** | Not protective of human health or environment under planned land use conditions. | Does not comply with chemical specific ARARs. | Not effective over long-term<br>MEC HA Score:<br>845 / 695 (4) | No reduction in toxicity, mobility, or volume of wastes (*no MEC removal*) | No short-term hazards to workers or the surrounding area | Readily implementable (*no actions required*); however, highly unlikely to gain approval | $0 | Does not Meet Threshold Criteria | Excluded |
| | Criterion Not Met | Criterion Not Met | 0 | 0 | 3 | 0 | 3 | | |
| **Alternative 2: LUCs Only** | Does not achieve acceptable risk conditions per Matrix 4.(2) | Does not comply with chemical specific ARARs. | Somewhat effective over long-term assuming LUCs are effective at controlling human behavior<br>MEC HA Score:<br>845 / 695 (4) | No reduction in toxicity, mobility, or volume of wastes (*no MEC removal*) | No short-term hazards to workers or the surrounding area<br>Duration is 10 field days for 5-year review visits. | Readily implementable. | $826,105 | Does not Meet Threshold Criteria | Excluded |
| | Criterion Not Met | Criterion Not Met | 1 | 0 | 3 | 3 | 3 | | |
| **Alternative 4: Excavate OD Hill to grade and perform surface/subsurface clearance over the entire OD Grounds MRS, and LUCs** | Protective of human health and environment under planned land use conditions. | Complies with ARARs through collection of post-detonation samples and waste samples | Effective over long-term; assuming LUCs are maintained and effective; source removal and post-remedial action groundwater sampling reduces risk over the long term<br>MEC HA Score:<br>470 / 445 (4) | Provides substantial reduction in toxicity, mobility, or volume of wastes (*MEC removal at OD Hill and in Kickout Area where 99% of UXO/DMM are anticipated*) | Moderate short-term hazards to workers and surrounding area (*mechanical handling of soil with UXO/DMM at the OD Hill*)<br>Field duration is 40 months.<br>Scored as 2 due to having a shorter duration than Alternative 5. | Readily implementable (*uses well established technologies*) | $15,929,063 | 12 | #1 |
| | Criterion Met | Criterion Met | 3 | 2 | 2 | 3 | 2 | | |
| **Alternative 5: Excavate the entire OD Grounds MRS to 1 foot below grade and perform surface/subsurface clearance** | Protective of human health and environment under planned land use conditions. | Complies with ARARs through collection of post-detonation samples and waste samples | Effective over long-term; assuming LUCs are maintained and effective; source removal and post-remedial action groundwater sampling reduces risk over the long term<br>MEC HA Score:<br>470 / 445 (4) | Provides greatest reduction in toxicity, mobility, or volume of wastes (*MEC removal at OD Hill and in Kickout Area to a greater depth; however, very few UXO/DMM would be expected at the greater depth.*) | Moderate short-term hazards to workers and surrounding area (*mechanical handling of soil with UXO/DMM over the entire MRS*)<br>Field duration is 115 Months.<br>Scored as 0 based on the duration of exposure hours (nearly three times the duration of other alternatives) | Readily implementable (*uses well established technologies*) | $70,754,515 | 9 | #2 |
| | Criterion Met | Criterion Met | 3 | 3 | 0 | 3 | 0 | | |

(1) Costs shown are 30-year costs with a 20% contingency reported as a **Total Present Value (TPV)**. The TPV is based on a discount rate of 0.6 percent.
(2) See the "Decision Logic to Assess Risks Associated with Explosive Hazards, and to Develop RAOs for MRSs" (USACE, 2016 and 2020).
(3) Alternatives were scored 0 to 3 for each screening criterion (0 = least favorable and 3 = most favorable. The total score of all subcategories is the basis for the overall ranking. The alternative with the highest total score represents the most favorable alternative.
(4) MEC HA Scores are shown for the OD Hill and the Kickout Area (see Table 7).
(5) Shading shows alternative desirability with respect to that criterion:

| Most acceptable | Significantly acceptable | Moderately acceptable | Least acceptable |
|---|---|---|---|

# THE PREFERRED ALTERNATIVE

Based on the detailed and comparative analysis of remedial alternatives using the NCP nine criteria presented in this Proposed Plan, the most effective alternative to achieve the remedial objectives for the Seneca OD Grounds MRS is Alternative 4 (Excavate OD Hill to grade, perform surface/subsurface clearance over the entire OD Grounds MRS, and LUCs).

When compared to the other alternatives, Alternative 4 has the lowest relative cost of the removal alternatives ($15.9M TPV) and significantly reduces the UXO/DMM hazard. This alternative is recommended because it provides an acceptable level of MEC reduction for the anticipated future land use, achieves the RAOs, does not require significant long-term maintenance, and is cost-effective. While Alternative 5 is likely to achieve a better reduction in UXO/DMM, the difference in reduction should not be substantially different because the vast majority of the UXO/DMM are expected in the shallow subsurface. Alternative 5 would also still require LUCs and thus would likely result in a similar final condition as Alternative 4.

Based on the information currently available, the Army believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The BRAC Branch anticipates that the preferred alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

# COMMUNITY PARTICIPATION

## Public Comment

The Army is the lead agency for investigating, reporting, and taking remedial actions at the OD Grounds MRS. The FS Report (Parsons, 2022b) is a comprehensive document that describes the history of the OD Grounds MRS, details of previous investigations, the associated risk assessments and their conclusions. Previous reports and this Proposed Plan are part of the Administrative Record for the remedial decision for the OD Grounds and are available for review at the repository listed below.

Public comments are considered before any action is selected and approved. Written comments on this Proposed Plan will be accepted throughout a public comment period between **September 30, 2024** and **November 1, 2024**. A public meeting will take place in **Building 125, Seneca Army Depot, 5786 State Rt. 96, Romulus, NY 14541, on October 9, 2024 from 1:00pm – 7:00 pm** during which a presentation on this Proposed Plan will be given by the Army. Members of the public may provide oral comments to the Army during this public meeting. Correspondence should be postmarked no later than **November 1, 2024** and should be sent to the attention of Mr. Chris Gallo (see below).

## Contact Information

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## Administrative Record

Copies of applicable documents for the Seneca OD Grounds MRS can be accessed at: **https://senecaarmydepotar.com**

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# GLOSSARY OF TERMS

**3Rs** - Military munitions, especially UXO, should be considered extremely hazardous because if touched, moved or disturbed they may explode causing death, serious injury or damage. To protect yourself, your family, your friends and your community, it is important to follow the 3Rs of Explosives Safety should you know or suspect you have come across a military munition:

Recognize – when you may have encountered a munition, and that munitions are dangerous.

Retreat – do not approach, touch, move, or disturb it, but carefully leave the area.

Report – call 911 and advise the police of what you saw and where you saw it.

**Administrative Record** – A compilation of all documents used to determine the appropriate remedial action at the project site.

**Anomaly** – Any item that is detected as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.).

**Applicable or relevant and appropriate requirements (ARAR)** – The Federal and State environmental laws that a selected remedy will meet. These requirements may vary among sites and alternatives.

**Blow-in-place (BIP)** - Once a MEC item has been exposed, it will be inspected, identified, and transported to a designated area for cataloging and eventual disposal. If a MEC item cannot be safely moved to an alternate location for destruction, it will be blown-in-place.

**Chemical of Concern (COC)** – COCs are defined as the chemicals of potential concern (COPCs) that are present at sufficient concentrations to pose a risk to human health or the environment.

**Chemical of Ecological Concern (COEC)** – COECs are defined as the chemicals of potential ecological concern (COPECs) that are present at sufficient concentrations to pose a risk to ecological receptors.

**Chemicals of Potential Concern (COPCs)** – COPCs are defined as any MC that are present at elevated concentrations with regard to local conditions and human health screening levels. COPCs are carried forward for evaluation in the human health risk assessment.

**Chemicals of Potential Ecological Concern (COPEC)** – COPECs are defined as any MC that are present at elevated concentrations with regard to local conditions and ecological screening levels. COPECs are carried forward for evaluation in the ecological risk assessment.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund)** – A federal law that addresses the funding for and remediation of abandoned or uncontrolled hazardous waste sites. This law also establishes criteria for the creation of key documents such as the Remedial Investigation, Feasibility Study, Proposed Plan, and Record of Decision.

**Discarded Military Munitions (DMM)** – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include **UXO**, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

**Feasibility Study (FS)** – The process during which potential remedial alternatives for a site are developed and evaluated to provide the basis of a rationale for remedy selection (40 C.F.R. 300.430).

**Formerly Used Defense Sites (FUDS)** – The DoD is responsible for the environmental restoration (cleanup) of properties that were formerly owned by, leased to or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense prior to October 1986. Such properties are known as Formerly Used Defense Sites or FUDS.

**Hazard Index (HI)** – The Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health.

**Hazard Quotient (HQ)** – The ratio of exposure to toxicity. An HQ<1 indicates that a receptor's dose of a single contaminant is less than the **RfD**, and that toxic noncarcinogenic effects from that chemical are unlikely.

**Munitions Constituents (MC)** – Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

**Munitions Debris (MD)** – Remnants of munitions (e.g., penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal. Munitions debris is confirmed inert and free of explosive hazards by technically qualified personnel.

**Munitions and Explosives of Concern (MEC)** – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (a) **unexploded ordnance**; (b) **discarded military munitions**; or (c) Explosive MC (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

**Munitions and Explosives of Concern (MEC) Construction Support** – Support provided by qualified UXO personnel during construction activities at potential MEC sites to ensure the safety of construction personnel from the harmful effects of UXO. The level of MEC construction support required is determined based on the assessed probability of encountering UXO. For low probabilities of encounter, the UXO personnel will stand by (onsite or on-call) in case the construction contractor encounters MPPEH. For higher probabilities, UXO personnel may be required to conduct subsurface MEC removal in the construction footprint.

**Military Munitions Response Program (MMRP)** - The MMRP is one of two restoration programs under the Defense Environmental Restoration Program which was established to address hazardous substances, pollutants, contaminants and military munitions remaining from past activities at active military installations and formerly used defense sites (FUDS). The other program is the Installation Restoration Program (IRP). The MMRP provides a focused program to address the challenges presented at sites called munitions response sites. Munitions responses are response actions, including investigation, removal actions and remedial actions that address the explosives safety, human health or environmental risks presented by UXO, DMM, and MC.

**Material Potentially Presenting an Explosive Hazard (MPPEH)** - Material owned or controlled by the Department of Defense that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris) or potentially contains a high enough concentration of explosives that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions).

**Munitions Response Site (MRS)** – A discrete location that is known to require a munitions response.

**Preferred Alternative(s)** – The alternative(s) that, when compared to other potential alternatives, was/were determined to best meet the CERCLA evaluation criteria and is proposed for implementation at an MRS.

**Preliminary Remediation Goal (PRG)** – Analytical values developed to provide a target for the analysis of and selection of remedial alternatives. They are a screening tool rather than the final remediation target or cleanup level and they are designed to be conservative.

**Proposed Plan** – A plan that identifies the preferred remedial alternative(s) for a site and is made available to the public for comment.

**Record of Decision (ROD)** - The ROD documents the remedial action plan for a site or operable unit. It certifies that the remedy selection process was carried out in accordance with CERCLA and, to the extent practicable, with the NCP. It describes the technical parameters of the remedy, specifying the methods selected to protect human health and the environment including treatment, engineering, and institutional control components, as well as cleanup levels. It provides the public with a consolidated summary of information about the site and the chosen remedy, including the rationale behind the selection.

**Reference Dose (RfD)** - An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect.

**Remedial Action Objectives (RAOs)** – RAOs provide a general description of what the cleanup will accomplish (e.g., restoration of groundwater to drinking water levels), the cleanup standard, and the area of cleanup for the purpose of protecting human health and the environment. These goals typically serve as the design basis for many of the remedial alternatives.

**Remedial Investigation (RI)** – The remedial investigation serves as the mechanism for collecting data to characterize site conditions, determine the nature of the waste, assess risk to human health and the environment, and conduct treatability testing to evaluate the potential performance and cost of the treatment technologies that are being considered.

**Screening Level** - A screening level is a preliminary estimate of the potential risk posed by a contaminant or substance in a specific environmental media. It is used to determine whether further investigation or action is needed to protect human health and the environment.

**To Be Considered (TBC)** – are non-promulgated criteria, advisories, etc., that can be consulted along with and in addition to ARARs.

**Total Present Value (TPV)** - The amount needed to be set aside at the initial point in time (the "base year," or "Year 0") to ensure funds will be available in the future as they are needed.

**Unexploded Ordnance (UXO)** – Military munitions that: (a) have been primed, fuzed, armed, or otherwise prepared for action; (b) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (c) remain unexploded either by malfunction, design, or any other cause.

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 3Rs | Recognize, Retreat, Report |
| AGC | Advanced Geophysical Classification |
| ALM | Adult Lead Model |
| ARAR | applicable or relevant and appropriate requirement |
| BERA | Baseline Ecological Risk Assessment |
| BRAC | Base Realignment and Closure |
| BIP | blow-in-place |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COC | chemical of concern |
| COEC | chemical of ecological concern |
| COPC | chemical of potential concern |
| COPEC | chemical of potential ecological concern |
| CSM | conceptual site model |
| dL | deciliter |
| DGM | digital geophysical mapping |
| DMM | Discarded Military Munitions |
| DoD | Department of Defense |
| Eco-SSL | ecological soil screening values |
| ESI | Expanded Site Inspection |
| FFA | Federal Facilities Agreement |
| ft | feet |
| FS | feasibility study |
| FUDS | formerly used defense site |
| HA | Hazard Assessments |
| HHRA | Human Health Risk Assessment |
| HI | Hazard Index |
| HQ | Hazard Quotient |
| HTW | hazardous and toxic waste |
| IEUBK | Integrated Exposure Uptake Biokinetic |
| LANL | Los Alamos National Laboratory |
| LOAEL | Lowest-Observable Adverse Effect Level |
| LUC | land use control |
| LTM | Long term monitoring |
| MC | munitions constituents |
| MCPA | 2-methyl-4-chlorophenoxyacetic acid |
| MD | munitions debris |
| MDAS | material documented as safe |
| MEC | munitions and explosives of concern |
| MMRP | Military Munitions Response Program |
| MPPEH | Material Potentially Presenting an Explosive Hazard |
| MRS | Munitions Response Site |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NOAEL | No Observed Adverse Effect Level |
| NYCRR | New York Codes, Rules, and Regulations |
| NYS | New York State |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| OB | Open burn |
| OD | Open detonation |
| OSD | Office of the Secretary of Defense |
| PAL | Project Action Limit |
| PDT | Project Delivery Team |
| PCB | polychlorinated biphenyls |
| PRG | preliminary remediation goal |
| RA | remedial action |

| | |
|---|---|
| RAO | remedial action objective |
| RD | remedial design |
| RfD | reference dose |
| RI | remedial investigation |
| RMM | Risk Management Method |
| ROD | Record of Decision |
| RSL | Regional Screening Levels |
| SCO | Soil Cleanup Objective |
| SEDA | Seneca Army Depot Activity |
| SCIDA | Seneca County Industrial Development Agency |
| ss-ESCO | site specific ecological soil cleanup objective |
| SVOC | Semi-volatile organic compound |
| TBC | to be considered |
| TMV | toxicity, mobility, or volume |
| TPV | total present value |
| U.S. | United States |
| USACE | United States Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| μg | micrograms |
| UXO | Unexploded ordnance |
| VOC | volatile organic compound |