Naval Facilities Engineering Systems Command Southwest
San Diego, California

Final

Proposed Plan

Munitions Response Program Site UXO2

Naval Weapons Station Seal Beach
Detachment Fallbrook
Fallbrook, California

August 2025

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San Diego, California

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Prepared for:

Department of the Navy
Naval Facilities Engineering Systems Command Southwest
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PROPOSED PLAN

MUNITIONS RESPONSE PROGRAM SITE UXO2

NAVAL WEAPONS STATION SEAL BEACH
DETACHMENT FALLBROOK
FALLBROOK, CALIFORNIA

FINAL
AUGUST 2025

Introduction

The United States Department of the Navy (Navy) invites the public to comment on this ***Proposed Plan***[1] (PP) to address soil contamination at ***Munitions Response Program*** (MRP) Site UXO2, Former Small Arms Range and Former Skeet/ Trap Range, at Naval Weapons Station Seal Beach, Detachment Fallbrook (Detachment Fallbrook), in Fallbrook, California (**Figure 1**). This PP summarizes the site history, investigations, and remedial action alternatives evaluated under the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980*** (CERCLA) and explains the basis for choosing the preferred alternative.

The PP is presented with the following outline:

All referenced documents and information presented in this PP are part of the ***Administrative Record*** file for MRP Site UXO2 and are available for public review.

The Navy is issuing this PP as part of its public participation responsibilities under Section 117(a) of CERCLA, Section 300.430(f)(2) of the ***National Oil and Hazardous Substances Pollution Contingency Plan*** (NCP), and ***Executive Order 12580***. CERCLA (commonly known as Superfund) was enacted by the United States Congress in 1980, and was established to address risks from historical wastes to human health and the environment. The NCP provides guidance and procedures for implementing CERCLA.

The Navy is responsible for investigating and remediating contamination that resulted from historical Navy operations at MRP Site UXO2. These investigations were completed according to the requirements of CERCLA. The flowchart (**Figure 2**) illustrates the CERCLA process,

1 ***Bolded and italicized text*** definitions can be found in the Glossary at the end of the Proposed Plan.

Mark Your Calendar for the Public Comment Period

August 7 through September 6, 2025
Submit written comments

The Navy will accept comments on the PP during the public comment period. To submit comments or obtain further information, please refer to the comment insert at the end of this PP.

Attend the Open House Public Meeting

August 21, 2025, from 6–7:30 p.m.

Fallbrook Community Center, Live Oak Room
341 Heald Lane, Fallbrook, CA 92028

The public comment period will include an open house public meeting during which the Navy will provide an overview of the site, investigation findings, remedial alternatives evaluated, and the preferred alternative; answer questions; and receive public comments.

Review the Administrative Record and Information Repository

This PP is based on site-related documents contained in the Administrative Record file, which can provide important background and site investigation information.

Administrative Record

Naval Facilities Engineering Systems Command Southwest
Naval Base San Diego, Building 3519
2965 Mole Road
San Diego, CA 92136

Contact: Ms. Diane Silva
Telephone: (619) 556-1280

Website

https://administrative-records.navfac.navy.mil/?M_7QQL3UURG4XWL

Contact: Mr. Anthony Konzen, PG. CHG.
Detachment Fallbrook Remedial Project Manager
Telephone: (619) 705-5427
Email: navfac_sw_det_fallbrook_rpm@us.navy.mil

CH2M-0007-4525-0011

and MRP Site UXO2 is currently in the PP stage. The Navy, in consultation with regulatory agencies, ***California Department of Toxic Substances Control*** (DTSC) and ***California Regional Water Quality Control Board, San Diego Region*** (RWQCB), will select a final cleanup action for the site and document it in the ***Record of Decision*** (ROD) after all information submitted during the public comment period has been reviewed and considered. The Navy may modify this PP based on new information or public comments. Therefore, the public is encouraged to review and comment on the alternatives. Refer to the instructions on how to provide comments on this PP in the section on Community Participation (Page 20). This PP summarizes the remedial alternatives (Page 15) and explains the basis for identifying the preferred alternative for the MRP Site UXO2 (Page 18). The Navy proposes to select Alternative 4, Excavation and Offsite Disposal of contaminated soil. The components of Alternative 4 are anticipated to achieve unlimited use/unrestricted exposure for the site. This means that MRP Site UXO2 would, with implementation of Alternative 4, pose no unacceptable risk to human health and the environment and that the land could subsequently be used for any purpose with no institutional or engineering controls.

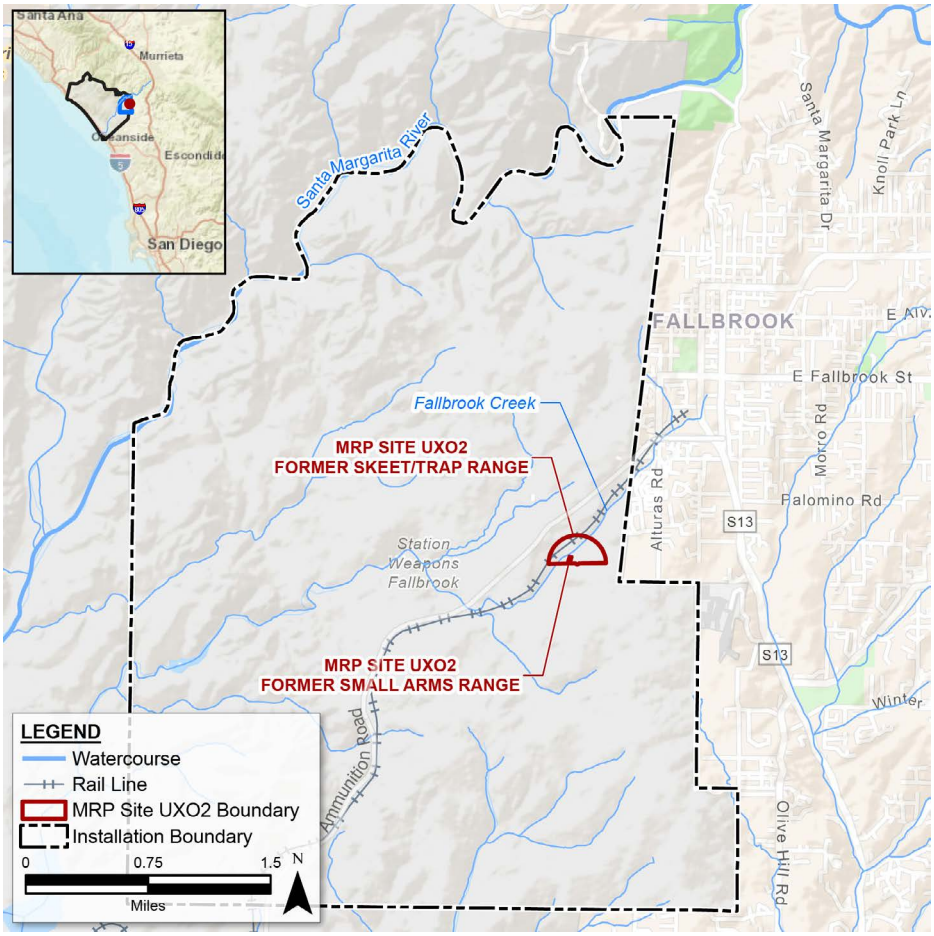
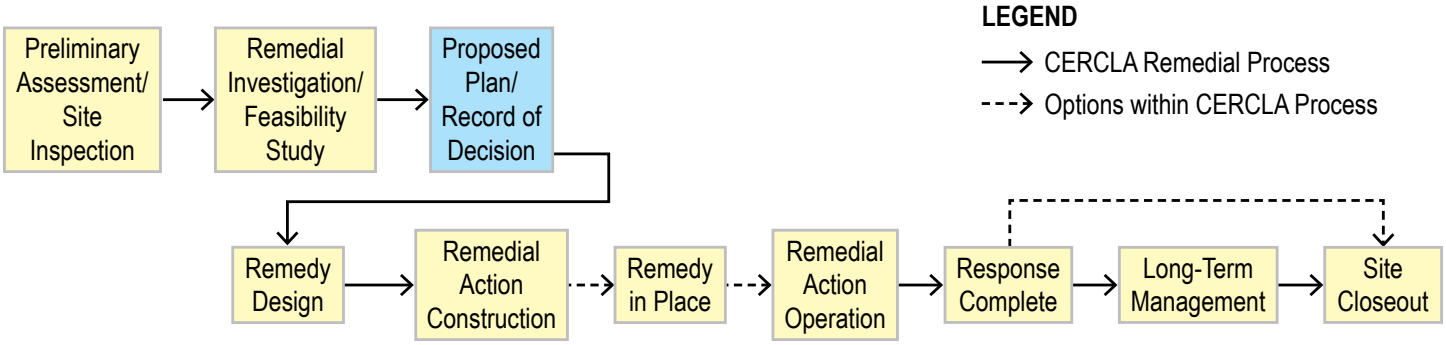


Figure 1 – Installation Location Map



Modified from *Department of the Navy Guidance for Documenting Milestones Throughout the Site Closeout Process,* March 2006

Figure 2 – Navy Environmental Restoration Process for MRP Site UXO2 (CERCLA Process)

Alternative 4 includes the following:

- Excavation of soil that contains lead at concentrations above the residential ***remediation goal*** (RG); as part of this excavation, bullet fragments would be removed to extent possible
- ***Ex situ soil stabilization*** (explained in **Table 3**) and offsite disposal
- Confirmation soil sampling to confirm lead above the RG in soil has been removed
- Use of a hand-held metal detector to confirm the bullet fragments have been removed to the extent possible
- Backfill and compaction of excavated areas
- Site restoration, including restoring native vegetation

Public comments on this PP will be accepted from August 7, 2025, through September 6, 2025. Public comments can be submitted via mail or email throughout the comment period. An open house public meeting will be held at 6:00 p.m. on August 21, 2025, at the Fallbrook Community Center, in Fallbrook, California. Members of the public may also submit written and verbal comments on this PP at the open house public meeting. Please refer to Page 20 for more information on how to submit comments.

Site Background and Characteristics

Detachment Fallbrook is an 8,852-acre installation located approximately 53 miles north of San Diego, in San Diego County, California (**Figure 1**). The installation is south of the Santa Margarita River, approximately 9 miles inland from the Pacific Ocean, and borders Marine Corps Base Camp Pendleton to the west. Detachment Fallbrook is a federally owned facility, operated and managed by the Navy. Detachment Fallbrook reports to Naval Weapons Station Seal Beach, in Seal Beach California. The mission of Detachment Fallbrook is to store, maintain, test, and deliver munitions for naval operations.

MRP Site UXO2 is located near the eastern boundary of Detachment Fallbrook (**Figure 3**). MRP Site UXO2 consists of two former ranges: a Former Small Arms Range and a Former Skeet/Trap Range. The Former Small Arms Range and Former Skeet/Trap Range cover approximately 0.5 acres and 31 acres, respectively. The Former Small Arms Range is located within the Former Skeet/Trap Range (**Figure 3**).

The Former Small Arms Range operated from 1945 to 1991. It was used by the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by non-military personnel and local law enforcement officers. The Small Arms Range included one or more firing line positions, range floor, target area, and earthen target berm that served as a backstop. Ammunition used at the Former Small Arms Range included .38-caliber, .45-caliber, and 9-millimeter rounds. The firing line was located at the north-northeastern end of the range, and the firing direction was to the southwest, towards wooden target structures in the berm located along a hillside (**Figure 3**). The target berm is the area in which bullets and bullet fragments have been detected and is the primary source of soil contamination at the Small Arms Range.

The Former Skeet/Trap Range operated from 1950 to 1987. It was used for recreation by the Marine Security Forces and other Detachment Fallbrook personnel. The Former Skeet/Trap Range consisted of a firing line, a shotfall area where lead shot fell, an arc-shaped target fall area where the skeet/clay targets fell, surrounded by a large arc-shaped safety zone. The firing line and the skeet/trap launching equipment were located on a shelf at the top of the hillside, east of the Small Arms Range target berm. The firing direction was to the north and northwest (**Figure 3**), which was opposite of the firing direction for the Former Small Arms Range. Ammunition use at the Former Skeet/Trap Range was limited to 12 gauge shotgun ammunition. Given the era of operations, the types of skeet/trap (clay targets) were likely made of a limestone matrix with a petroleum/tar pitch binding material. This binding material is a source of ***polycyclic aromatic hydrocarbon*** (PAH). The lead shotfall and broken pieces of skeet/trap targets are the primary sources of potential contamination at the Skeet/Trap Range.

Detachment Fallbrook is Department of Defense property, where military operations are expected to continue in the foreseeable future. The two ranges are closed and there are no current operations at MRP Site UXO2. Potential future land use is expected to remain the same as the current use, which is vacant land that serves as a buffer area for the surrounding munitions operations at Detachment Fallbrook.

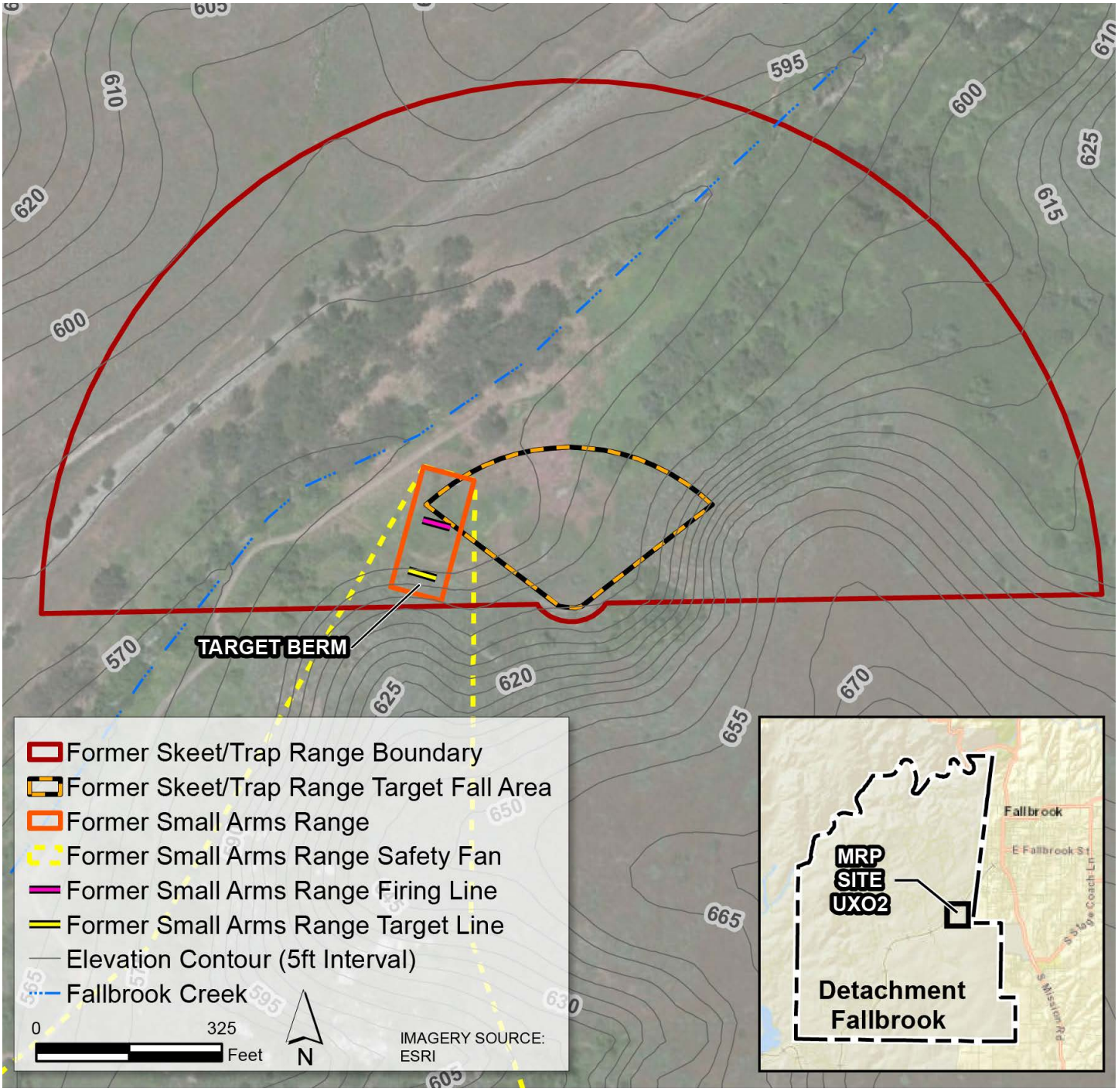


Figure 3 – MRP Site UXO2 Layout

Previous Investigations and Studies

Environmental investigations and studies of MRP Site UXO2 have been conducted since 2006 and have included investigations to identify the potential presence of munitions and site-related contaminants. These environmental investigations included a ***Preliminary Assessment*** (PA) (Malcolm Pirnie, 2006), a ***Site Inspection*** (SI) (ChaduxTt, 2010), a *Step-Out Sampling in Support of the Site Inspection* (ChaduxTt, 2011), a ***Remedial Investigation*** (RI) (CH2M, 2021), and a ***Feasibility Study*** (FS) (CH2M, 2024). Additionally, a Basewide Metals Background Soil Study was conducted to determine metals ***background*** concentrations (SES-TECH, 2012). A brief description of previous investigations and studies and findings are provided in **Table 1**. A total of 139 soil samples collected from discrete locations, 66 ***incremental soil samples*** collected from sampling grid areas, and 5 sediment samples from discrete locations were collected throughout the Former Small Arms Range and Former Skeet/Trap Range. The sample locations and sampling grid areas are shown on **Figures 4, 5,** and **6**.

Table 1 – Previous Investigations and Studies

Previous Investigations/ Studies	Administrative Record Numbers	Dates	Activities and Findings
PA (Malcolm Pirnie, 2006)	000078	2004 and 2005	The PA included a visual survey of the site, personnel interviews, and review of aerial and still photographs. The visual survey of the Former Small Arms Range found several ammunition fragments consistent with small arms use. Some of the wooden target frames and the berm were still intact. However, the visual survey of the Former Skeet/Trap Range did not confirm the presence of lead shot or broken clay skeets. According to personnel interviewed during the PA, the Former Skeet/Trap Range was used infrequently. It was mentioned that it was possible that the soil was disked to minimize vegetation and reduce wildland fire risk, which may have buried evidence of skeet/trap range activities. Based on the information obtained during the PA, it was concluded that only small arms ammunition was used at these sites and there is no history of larger munitions use and MEC or MPPEH.
SI (ChaduxTt, 2010)	000123	2010	The SI included hand-held metal detector-aided visual surveying, site reconnaissance, geologic mapping, collection, and analysis of 65 soil samples throughout MRP Site UXO2 and 2 sediment samples along Fallbrook Creek. Lead in soil was identified as a ***chemical of potential concern*** (COPC), and small arms ammunition debris (bullets, bullet fragments) was identified in soil of the target berm of the Former Small Arms Range. None of the sediment samples exceeded human health or ecological screening levels. Within the Former Skeet/Trap Range target fall area, PAH compounds from the broken and disintegrated skeet/trap targets, were also identified as COPCs. The SI recommended that a metals background evaluation be completed for Detachment Fallbrook and the site-specific results be re-evaluated to determine if the metals concentrations may be related to naturally occurring background concentrations. Additionally, the SI recommended delineation of lead in soil within the Former Small Arms Range earthen target berm, as well as surface soil sampling to define the lateral extent of potential PAH compound impacts in the target fall area.
Step-out Sampling in Support of the Site Inspection (ChaduxTt, 2011)	000145	2011	The objectives of the Step-out Sampling at MRP Site UXO2 were to provide additional characterization of metals in the Former Small Arms Range floor and target berm, eliminate further concern regarding explosive residues at the Former Small Arms Range floor, and further evaluate concentrations of PAH compounds detected at the Former Skeet/Trap Range. To achieve the objectives, 49 soil samples were analyzed for select metals (antimony, arsenic, copper, lead, tin, and zinc), and 12 of those samples were also analyzed for explosives. An additional 20 soil samples were analyzed for PAHs. As part of the step-out sampling, the extent of lead contamination in the Former Small Arms Range earthen target berm was delineated. Also, PAH compounds were detected exceeding residential and industrial screening levels in the Former Skeet/Trap Range target fall area. Based on these findings, additional surface soil grid sampling was recommended to define the lateral extent of potential PAH compound impacts in the Former Skeet/Trap Range target fall area.
Basewide Metals Background Soil Study (SES TECH, 2012)	000305	2012	A sitewide metals background evaluation was completed after the 2011 SI (ChaduxTt, 2011). In this evaluation, soil samples were collected from 28 distributed locations representative of soil derived from local bedrock and analyzed for metals. Results were used to generate a background soil data set specific to Detachment Fallbrook, based on the four bedrock types present at the installation, including the bedrock type at MRP Site UXO2.

Table 1, cont. – Previous Investigations and Studies

Previous Investigations/ Studies	Administrative Record Numbers	Dates	Activities and Findings
RI (CH2M, 2021)	000528	2021	The Incremental Sampling Methodology (ISM) (ITRC, 2003) was used during the RI to provide a better representation of the nature and extent of soil contamination at several areas at MRP Site UXO2. This sampling approach yields more consistent and reproducible results and is designed to reduce data variability, to provide a reasonably unbiased estimate of mean contaminant soil concentrations at MRP Site UXO2. Using the ISM approach, MRP Site UXO2 was divided into three ***Decision Units*** (DUs); Former Small Arms Range DU, Former Skeet/Trap Range DU, and Former Skeet/Trap Range Safety Zone DU. Each DU was further subdivided into soil ***Sampling Units*** (SUs) represented by a sample grid overlay. Incremental samples of soil were then collected from each SU grid cell from 0 to 0.5 foot below ground surface (bgs) and from 0.5 to 1 foot bgs. The incremental samples from each depth were then combined (composited) into one sample for each depth at each SU. • The Former Small Arms Range DU was subdivided into five SUs representing the features of the Former Small Arms Range evaluated during previous investigations (multiple firing line positions, multiple corresponding range floors, and a target area). • The Former Skeet/Trap Range DU was subdivided into 18 SUs. One SU with dimensions of 180 by 75 feet was located in the vicinity of the Former Skeet/Trap Range firing line. Seventeen SUs with approximate dimensions of 90 by 90 feet (with some exceptions) were distributed within the Former Skeet/Trap Range target fall area. • The Former Skeet/Trap Range Safety Zone DU was subdivided into 10 SUs, each with approximate dimensions of 270 by 270 feet. These SUs were systematically configured for a widespread coverage of the Former Skeet/Trap Range Safety Zone to characterize areas where the highest concentrations are expected to occur (closer to the target fall area). A combined total of 66 incremental soil samples were collected from 33 SUs at MRP Site UXO2. The samples were analyzed by the laboratory for the five metals related to small arms ammunition, which include antimony, arsenic, copper, lead, and zinc. Select samples from the Former Skeet/Trap Range were also analyzed for PAH compounds. In addition to the incremental soil samples, five discrete soil samples were collected from the target berm at the Former Small Arms Range. Also, three discrete sediment samples were collected along Fallbrook Creek, with one sample collected upgradient, one at midpoint, and one downgradient of MRP Site UXO2. Using data from the Basewide Metals Background Soil Study (SES TECH, 2012), site-specific background threshold values (BTVs) were established for metals concentrations at MRP Site UXO2. The metal antimony was not detected in the granodiorite bedrock type at MRP Site UXO2. Therefore, a BTV was not established for antimony. Results from the SI and RI soil samples were compared against BTVs and current human and ecological screening levels to define the nature and extent of contamination. A ***Human Health Risk Assessment*** (HHRA) and ***Ecological Risk Assessment*** (ERA) were conducted during the RI to estimate risk from receptor exposure to chemicals of potential concern. Although future land use for MRP Site UXO2 at Fallbrook is continued military/industrial, a hypothetical onsite future resident was also evaluated as a potential receptor, using residential screening levels. An unrestricted (residential) onsite land use scenario generally represents the greatest potential for exposure to site chemicals and was evaluated to provide information to support risk management and future land use decisions. In addition, an evaluation of the ***fate and transport*** of contamination was also performed for MRP Site UXO2.

Table 1, cont. – Previous Investigations and Studies

Previous Investigations/ Studies	Administrative Record Numbers	Dates	Activities and Findings
RI (CH2M, 2021) (continued)	000528	2021	The following is a summary of results and comparison to screening levels at each DU: • In the Former Small Arms Range DU, lead was detected at concentrations exceeding the BTV and residential and industrial screening levels in the incremental soil samples from an SU located near the Former Small Arms Range target berm area. • In the Former Skeet/Trap Range DU, lead was detected at concentrations exceeding the BTV and residential screening levels in a surface incremental soil sample from an SU located near the Former Small Arms Range target berm. This lead detection is most likely the result of ricocheting or misfires that would have occurred during firing towards the Former Small Arms Range target area, suggesting the lead detection is associated with the target berm. The subsurface incremental soil sample from the same SU did not contain lead at concentrations exceeding screening levels. All detected PAH compounds were below human health and ecological screening levels. • In the Former Skeet/Trap Range Safety Zone DU, lead was detected at a concentration exceeding the BTV and residential screening level in the subsurface incremental soil sample from one SU located northwest of the Former Skeet/Trap Range target fall zone. All detected PAH compounds were below human health and ecological screening levels. The HHRA and ERA identified two additional areas that were evaluated using the results of discrete samples (instead of incremental samples) as ***exposure areas*** (EAs). Exposure risks in these two EAs were also assessed separately. The following is a summary of results and comparison to screening levels in these EAs: • In the Former Small Arms Range Target Berm EA, lead was frequently detected in surface soil (0 to 0.5 foot bgs) and shallow subsurface soil (0 to 2 feet bgs) samples at concentrations exceeding the BTV, residential, industrial, and ecological screening levels. • Fallbrook Creek EA – the antimony and zinc concentrations detected in sediment samples exceed the respective soil BTVs and/or ecological screening levels, but concentrations of these metals do not exceed the respective soil human health screening levels. The RI concluded that soil in the target berm and the surrounding target area of the Former Small Arms Range has been impacted with lead by the former range activities. Based on the HHRA, lead in surface and shallow subsurface soil was identified as a primary risk contributor for the hypothetical future resident in the Former Small Arms Range DU. Also, based on results of the HHRA, lead in the Former Small Arms Range DU and the Former Small Arms Range Target Berm EA was identified as a primary risk contributor for surface and shallow subsurface soil for the future industrial worker, future construction worker (shallow subsurface soil only), and the hypothetical future resident. Based on results of the ERA, lead in soil at the Former Small Arms Range Target Berm EA was also identified as a primary risk contributor for an ecological receptor (the CAGN, if they forage within that area). Lead is the only chemical that requires a remedial action at the Former Small Arms Range DU and Former Small Arms Range Target Berm EA. The HHRA and ERA determined that impacts to soil from former shooting range activities at the Former Skeet/Trap Range DU, Skeet/Trap Range Safety Zone DU, and sediment in the Fallbrook Creek EA do not pose unacceptable risk to human health or ecological receptors in these areas. Therefore, no remedial action is necessary at these areas to ensure protection of human health and the environment for unlimited use and unrestricted exposure. The RI also determined that the detected lead and PAH compounds in soil at MRP Site UXO2 are considered stable, and not likely to leach and migrate to surface water or groundwater, based on laboratory testing results of soil pH and organic carbon content of the soil. Therefore, surface water and groundwater are not considered media of concern at MRP Site UXO2. The RI recommended an FS be performed for MRP Site UXO2, to identify and evaluate remedial alternatives to address lead at concentrations that may pose unacceptable risk to the identified human health and ecological receptors, at the Former Small Arms Range target berm area.
FS (CH2M, 2024)	000601	2024	The FS was prepared to identify the ***remedial action objectives*** (RAOs), identify federal and state ***applicable or relevant and appropriate requirements*** (ARARs), and evaluate remedial alternatives for the ***chemicals of concern*** (COCs) (lead in soil) that would satisfy the RAOs. The following remedial alternatives were evaluated to address lead in soil: • Alternative 1 – No Action • Alternative 2 – Soil Cover, Engineering Controls, and Institutional Controls • Alternative 3 – Limited Excavation and Institutional Controls • Alternative 4 – Excavation and Offsite Disposal The evaluation of remedial alternatives from the FS are discussed in more detail in this PP.

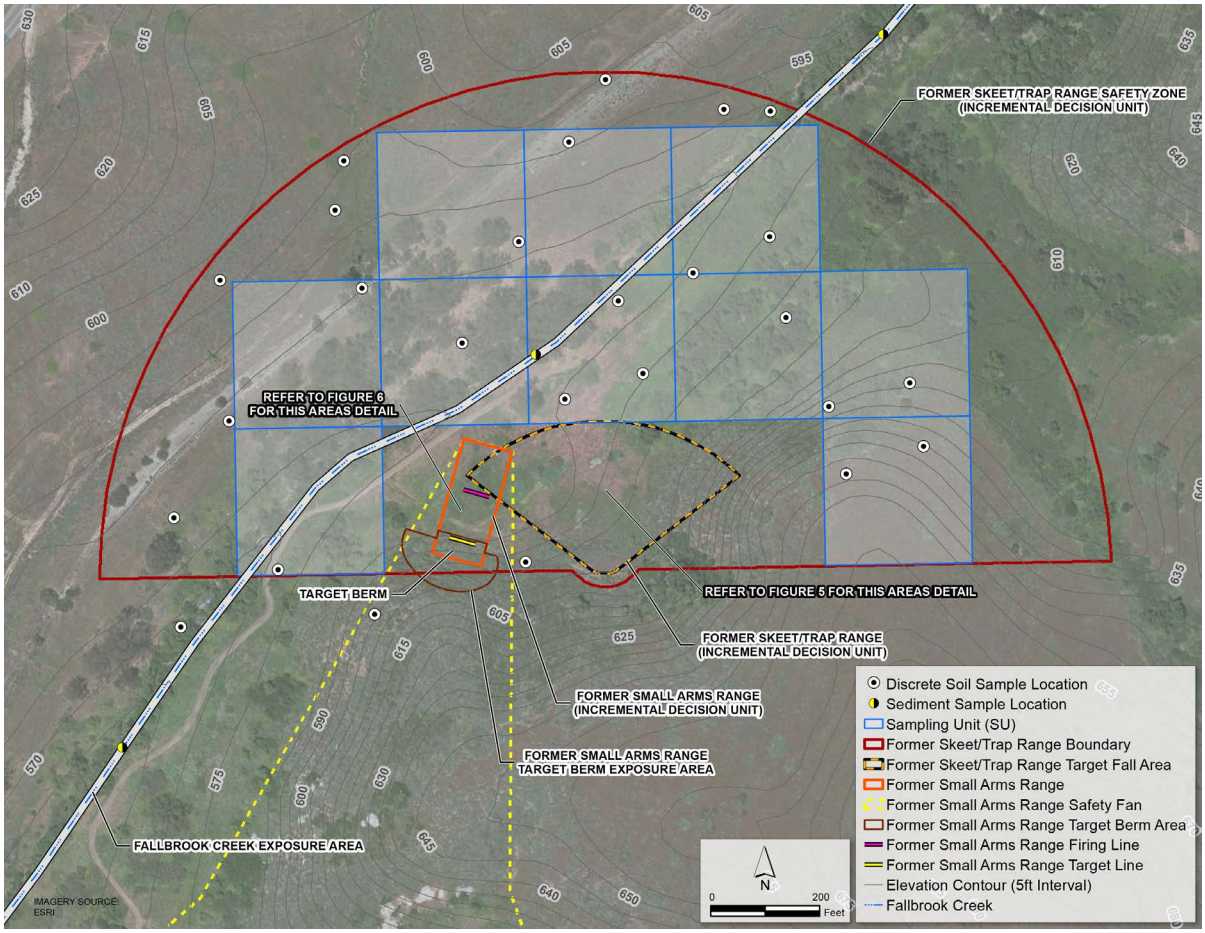


Figure 4 – Distribution of Samples Collected at MRP Site UXO2 – Sitewide

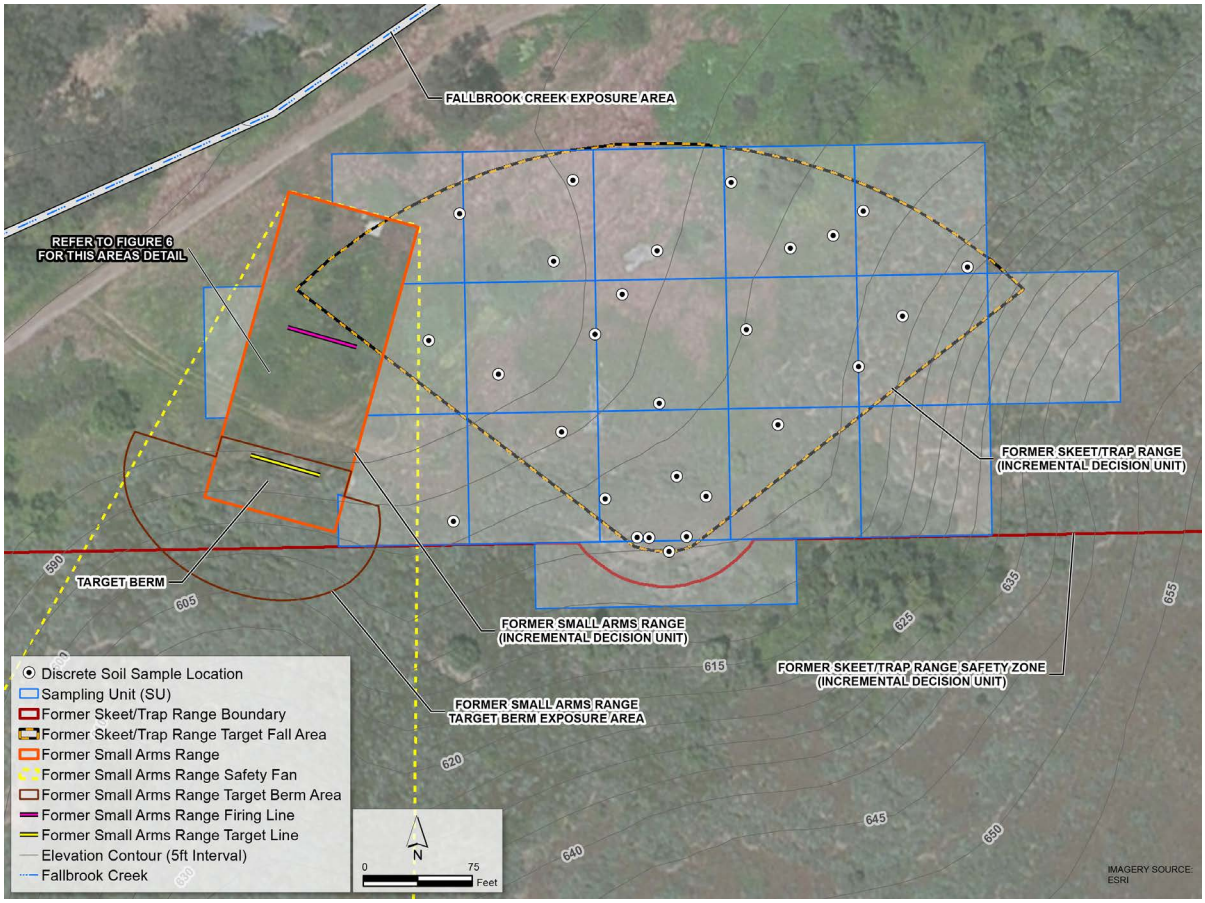


Figure 5 – Distribution of Samples Collected at MRP Site UXO2 – Former Skeet/Trap Range

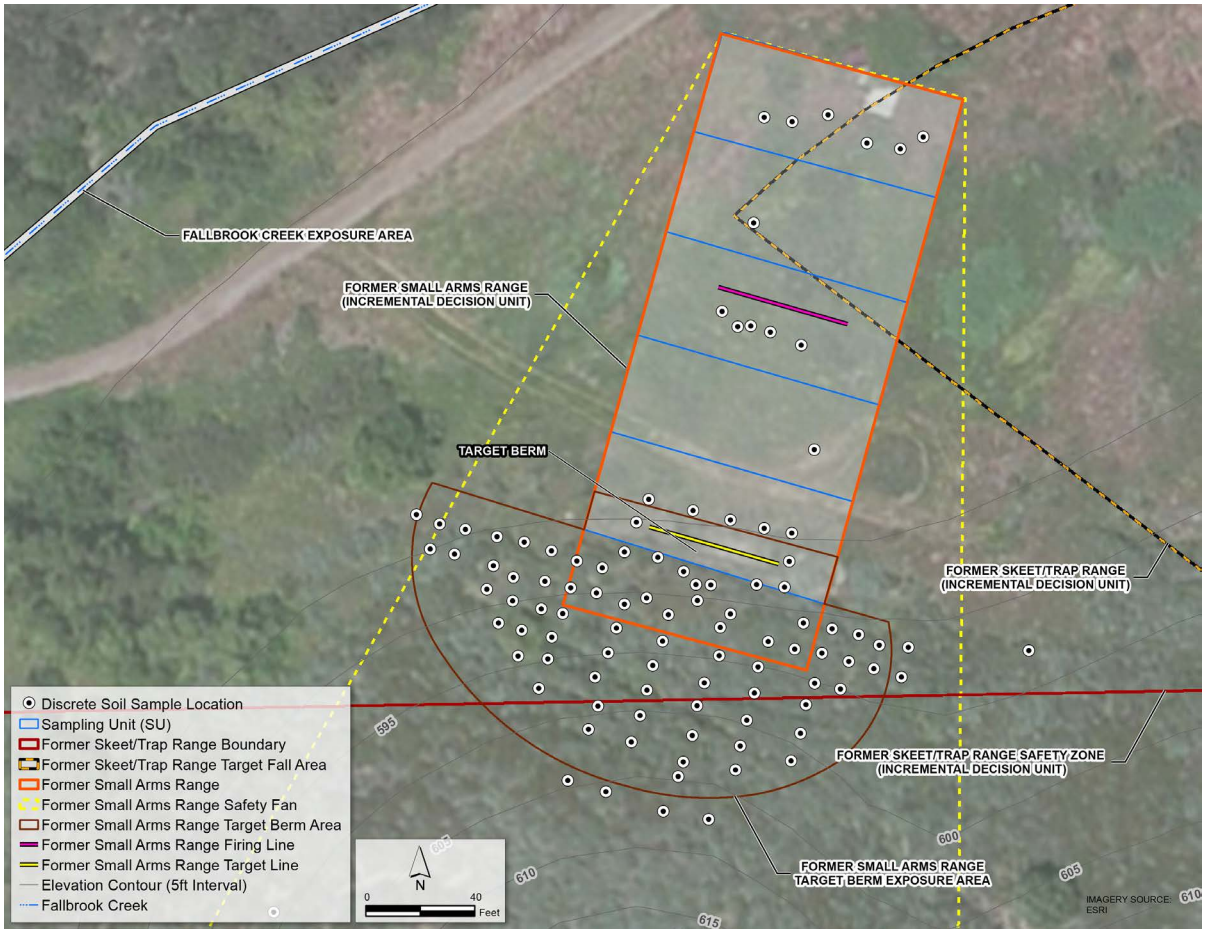


Figure 6 – Distribution of Samples Collected at MRP Site UXO2 – Former Small Arms Range Area

Nature and Extent of Contamination

From previous investigations, no ***munitions and explosives of concern*** (MEC) nor ***material potentially presenting an explosive hazard*** (MPPEH) (other than small arms ammunition) was found during field activities at the Former Small Arms Range or the Former Skeet/Trap Range. This indicates that MRP Site UXO2 was used for training with small arms ammunition only. There are no ***principal threat wastes*** at MRP Site UXO2.

As noted in the RI summary provided in **Table 1**, groundwater and surface water are not considered media of concern for MRP Site UXO2. Based on the CSM, soil and sediment are the media of concern at MRP Site UXO2.

Soil and sediment analytical data from the SI (including the *Step-Out Sampling in Support of the Site Inspection* [ChaduxTt, 2011]) and the RI were compared to naturally occurring background metals concentrations determined during the Basewide Metals Background Soil Study (SES TECH, 2012), human health ***screening levels***, and ecological screening levels. Although reasonably anticipated future land use for MRP Site UXO2 is continued military/industrial, a hypothetical onsite future resident was evaluated as a potential receptor, using residential screening levels. An unrestricted (residential) onsite land use scenario generally represents the most conservative potential for exposure to site chemicals. Therefore, in addition to future industrial land use, residential land use was evaluated to provide information to support risk management and future land use decisions.

Throughout MRP Site UXO2, levels of arsenic and copper were detected at concentrations below background levels. Antimony was detected at concentrations slightly above the ecological screening level in only two samples located within the Former Skeet/Trap Range Safety Zone DU. Zinc was frequently detected at all three DUs at concentrations above background and ecological screening levels but below human health screening levels. Lead was the only metal detected at concentrations above human health screening levels.

The nature and extent of contamination at MRP Site UXO2 was evaluated as defined DUs and EAs. DUs were evaluated using results of incremental samples for each individual DU. EAs were evaluated using results of discrete location samples.

Details about the nature and extent of contamination at each DU and EA identified for MRP Site UXO2 during the RI (**Table 1**) are discussed in the following paragraphs.

- **Former Small Arms Range DU** (**Figure 6**): Lead was detected at concentrations above the residential screening level near the Former Small Arms Range target line and berm. The presence of lead contamination in this location is the result of leaching from bullets and bullet fragments shot toward the target area and into the target berm and is limited in lateral extent. Concentrations of the five metals related to small arms ammunition (antimony, arsenic, copper, lead, and zinc) generally decrease away from the target berm area and with depth and do not extend beyond the Former Small Arms Range safety zone. The vertical extent of lead contamination has not been fully determined; however, concentrations of lead in soil decrease with depth throughout the Former Small Arms Range DU. Furthermore, because the disposition of bullet fragments and bullet casings in this area is expected to be surficial, the presence of lead in deeper soil is unlikely.
- **Former Small Arms Range Target Berm EA** (**Figure 6**): The central portion of the target berm is affected by small arms ammunition impacts. Lead was frequently detected in soil samples from the target berm at concentrations above both residential and industrial screening levels. Antimony was also detected in one sample at a concentration above the residential screening level. Concentrations of metals generally decrease radially away from the target berm and with depth, and do not extend beyond the Former Small Arms Range safety zone. The vertical extent (related to soil penetration depths of small arms ammunition and potential contamination due to leaching of bullets and bullet fragments) is not completely defined; however, the depth of penetration of bullets into the target berm was limited by the type of ammunition (from small arms). Therefore, it is considered sufficiently defined for moving forward to assess remedial alternatives.
- **Former Skeet/Trap Range DU** (**Figure 5**): Lead was detected at concentrations above the residential screening level in a surface incremental soil sample located near the Former Small Arms Range target berm. The elevated lead at this location is most likely the result of ricocheting or misfires that would have occurred during firing toward the Small Arms Range target area, suggesting the lead detection is associated with the target berm rather than the Skeet/Trap Range DU. The subsurface incremental soil sample from the same location did not contain lead at concentrations exceeding screening levels, indicating that the vertical extent of lead was defined. Although PAH compounds were detected in discrete soil samples collected in the Former Skeet/Trap Range target fall area at concentrations that exceeded residential and industrial screening levels during the SI Step-out Sampling (ChaduxTt, 2011), the results of the incremental sampling during the RI (which was designed to provide a reasonably unbiased estimate of mean contaminant soil concentrations) indicated that detected PAH compounds were at concentrations below human health and ecological screening levels. Also, concentrations of metals and PAH compounds were found to generally decrease with distance from the former firing line of the Former Skeet/Trap Range. Based on analytical results, the activities of the Former Skeet/Trap Range did not result in impacts to soil at the Former Skeet/Trap Range DU area. The area in the Former Skeet/Trap Range DU with elevated lead concentrations is attributed to activities of the Former Small Arms Range.
- **Former Skeet/Trap Range Safety Zone DU** (**Figure 4**): Lead was detected at a concentration above the residential screening level in a subsurface incremental soil sample northeast of the Former Skeet/Trap Range target fall zone. The vertical extent of lead contamination has not been fully determined; however, analytical results indicate that lead concentrations generally decrease with depth throughout the Skeet/Trap Range Safety Zone DU. Furthermore, because the disposition of bullet fragments and bullet casings in this area is expected to be surficial, the presence of lead in deeper soil is unlikely. The detected PAH compounds were below human health and ecological screening levels. Low concentrations of metals and PAH compounds throughout the Former Skeet/Trap Range Safety Zone DU suggest this portion of the site was not substantially affected by the Former Skeet/Trap Range activities.

- **Fallbrook Creek EA** (**Figure 4**): In sediment samples collected at Fallbrook Creek, concentrations of antimony, lead, and zinc were above the respective background soil concentrations and ecological screening levels but were below human health screening levels. The lowest concentrations were generally detected in the upgradient sediment sample, and highest concentrations were generally detected in the midpoint sediment sample; however, the relatively low concentrations suggest that impacts on Fallbrook Creek from historical activities at the range are minimal.

Although the vertical extent of lead contamination is not fully defined in two SUs, it is considered sufficiently defined to effectively evaluate remedial alternatives for MRP Site UXO2. Additionally, any uncertainty as to vertical extent would be addressed, in the event of implementation of remedial alternatives featuring excavation, through the measures and parameters incorporated into these alternatives, including (but not limited to) conservative depths of excavation for the impacted soil and the collection of confirmation soil samples to ensure the target contamination is removed as required.

Fate and Transport

Testing results of soil pH and organic carbon to evaluate fate and transport of the metals related to small arms range operations indicate that the soil pH is neutral and organic matter content is high at MRP Site UXO2. Under these conditions, the solubility of lead in soil is very low (ITRC, 2017). Under these conditions, lead tends to bind to soil media. Given the pH and total organic carbon results from soil samples at MRP Site UXO2, lead in soil is immobile and potential migration through surface runoff, erosion, or leaching to groundwater is unlikely. Also, PAH compounds are unlikely to leach to groundwater because they are likely to remain tightly bound to the skeet/trap target matrix material. Therefore, surface water and groundwater are not considered a media of concern at MRP Site UXO2. Soil and sediment are the media of concern for MRP Site UXO2.

Although the broader area slopes toward Fallbrook Creek, the range floor of the Former Small Arms Range and the Former Skeet/Trap Range is generally flat, indicating that localized runoff potential is low. Also, analytical results of sediment samples collected from Fallbrook Creek confirm that transport to other environmental media (groundwater, surface water, and sediment) has not occurred.

Scope and Role of Response Action

MRP Site UXO2 is one of eight MRP sites being addressed at Detachment Fallbrook (MRP Sites UXO1 through UXO8). In addition, 13 ***Installation Restoration Program*** (IRP) sites have been identified at Detachment Fallbrook. Of those, three of the IRP sites have been closed following regulatory approval. The remedial alternatives evaluated for MRP Site UXO2 do not directly include or affect any other IRP or MRP site at Detachment Fallbrook.

Summary of Site Risks

Risk for MRP Site UXO2 is based on the likelihood or probability of COPCs to cause adverse effects to exposed human or ecological ***receptors***. Based on the conceptual site model of nature and extent, the media of potential concern evaluated in the HHRA and ERA as part of the RI are soil and sediment. The processes for conducting HHRA and ERAs are summarized in the inset boxes on Pages 12 and 14. The following subsections summarize the risk assessment results.

Human Health Risk Results

The HHRA evaluated the potential impact on future receptors from exposure to COPCs in surface (0 to 0.5 foot bgs) and shallow subsurface (0 to 1 feet bgs) soil at MRP Site UXO2 based on reasonably anticipated future land use.

Current receptors were not evaluated in the HHRA because the site is not currently used. The following potential human receptors were evaluated as part of the HHRA:

- Future industrial worker
- Future construction worker
- Hypothetical future resident

The HHRA evaluated risks for those receptors, for the three DUs and two EAs identified during the RI (**Table 1**):

- Former Small Arms Range DU
- Former Skeet/Trap Range DU
- Former Skeet/Trap Range Safety Zone DU
- Former Small Arms Range Target Berm EA
- Fallbrook Creek EA

The DUs and EAs are considered separate areas of exposure in the risk assessment, and risks were evaluated separately for each DU and EA.

What is Human Health Risk and How is it Calculated?

An HHRA estimates "baseline risk" posed to receptors exposed to site-related contamination. An HHRA is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. The Navy undertakes a four-step process to estimate baseline risk at a site:

Step 1: Identify Chemicals of Potential Concern

In Step 1, the Navy identifies COPCs for evaluation in the HHRA. All detected organic chemicals are identified as COPCs and are evaluated in the next steps of the HHRA. In addition, metals detected above naturally occurring background concentrations are identified as COPCs and are evaluated in the next steps of the HHRA.

Step 2: Estimate Exposure

In Step 2, the Navy considers the different ways that people might be exposed to the COPCs identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, a "reasonable maximum exposure" scenario is calculated that portrays the highest level of human exposure reasonably expected to occur.

Step 3: Assess Toxicity

In Step 3, the Navy compiles information on the toxicity of the COPCs. The toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse effects and weighs the quality of available toxicological evidence. Two types of adverse effects are evaluated: carcinogenic and noncarcinogenic. For noncarcinogenic effects, information evaluated includes the type of noncarcinogenic effect that is associated with exposure (for example, exposure that could result in liver damage).

Step 4: Characterize Site Risk

In Step 4, the Navy combines the information gathered in the previous steps to evaluate whether exposure to site contaminants is sufficient to cause health effects in people exposed to the site contamination. The results of the three previous steps are combined, evaluated, and summarized. The likelihood of any kind of cancer resulting from exposure to chemicals at a site is generally expressed as an upper- bound probability, for example, a "1 in 10,000 chance" (**Figure 7**). In other words, for every 10,000 people that could be exposed, one extra individual may develop cancer as a result of exposure to site contaminants. For noncarcinogenic health effects, an HI is calculated. The key concept here is that a "threshold level" exists below which noncarcinogenic health effects are not expected to occur, even in sensitive receptors. For noncarcinogenic health effects, the HI can be added based on the particular effect or target organ (for example, if exposure to two or more COPCs at a site would all affect the liver in some way, these are summed for a liver-specific HI).

USEPA's established range for management of residual cancer risks (1×10^{-6} to 1×10^{-4}, or 1 in 1,000,000 to 1 in 10,000) is used by risk managers to determine whether site risks are significant enough to warrant cleanup. When risk is between 1 in 1,000,000 and 1 in 10,000, the Navy, in consultation with the support agencies, makes a decision about the need for a cleanup action based on site-specific factors. The lower end of the range (1 in 1,000,000) is DTSC's point of departure of cancer risks. Risks that do not exceed DTSC's point of departure are considered negligible and do not require action.

An HI at or below 1 is considered an acceptable exposure level for noncancer health hazards and does not warrant a cleanup action. An HI greater than 1 indicates that the estimated dose exceeds a level that is considered safe, and noncancer health effects cannot be ruled out. HIs above 1 may require a cleanup action.

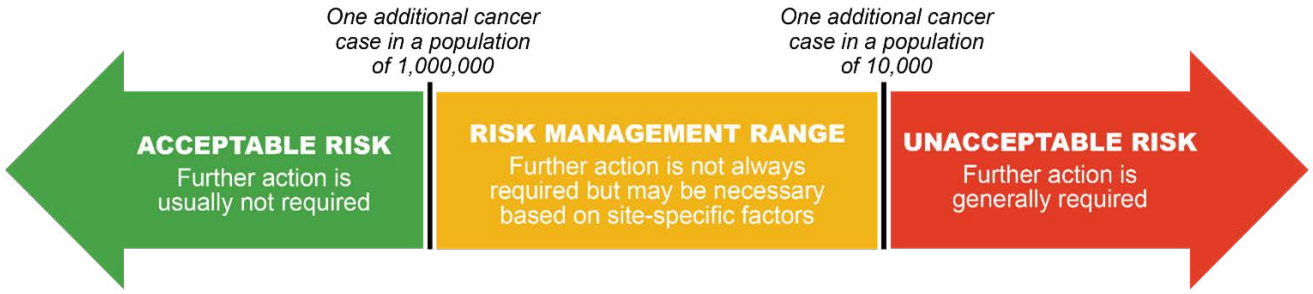


Figure 7 – Cancer Risk Probability

As shown in **Table 2**, cumulative cancer risks were less than the DTSC point of departure of 1×10^{-6} (1 in 1,000,000) and the United States Environmental Protection Agency (USEPA) risk management range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) for all scenarios for each DU and EA. Likewise, cumulative noncancer hazard indexes (HIs) are less than the threshold level of 1 for all scenarios for each DU and EA. The HHRA evaluated the potential for health effects from exposure to lead by comparing the ***exposure point concentration*** (EPC) for lead in surface soil and shallow subsurface soil with the California-recommended screening levels for lead of 80 milligrams per kilogram (mg/kg) for residential exposure and 320 mg/kg for industrial exposure (the industrial use screening level at the time the HHRA was conducted). Lead was identified as a primary risk contributor for two areas:

- Former Small Arms Range DU: The 95% upper confidence limit (**95% UCL**)-based EPCs for lead in surface soil (0 to 0.5 foot bgs) of 120 mg/kg and shallow subsurface soil (0 to 1 foot bgs) of 87.8 mg/kg exceeded the residential screening level of 80 mg/kg (**Table 2**). In addition, the two incremental sample results for lead that exceeded the residential screening level are collocated near the target berm of the Former Small Arms Range.

Table 2 – Summary of MRP Site UXO2 Human Health Risk Assessments

DU or EA[a]	Exposure Medium	Future Industrial Worker		Future Construction Worker		Future Resident		Lead EPC (mg/kg)	Primary Cancer Risk and Noncancer Hazard Contributors
		Cancer Risk	HI	Cancer Risk	HI	Cancer Risk	HI		
Former Small Arms Range DU	Surface Soil[b]	NC	0.0007	—	—	NC	0.01	**120**	Lead[d]
	Shallow Subsurface Soil	NC	0.0006	NC	0.002	NC	0.009	**87.8**	Lead[d]
Former Small Arms Range Target Berm EA	Surface Soil[b]	NC	0.02	—	—	NC	0.4	**853**	Lead[e]
	Shallow Subsurface Soil[c]	NC	0.01	NC	0.04	NC	0.2	**1,100**	Lead[e]
Former Skeet/Trap Range DU	Surface Soil[b]	2 in 100,000,000	0.0005	—	—	2 in 10,000,000	0.008	36.5	*None*
	Shallow Subsurface Soil	2 in 100,000,000	0.0005	3 in 1,000,000,000	0.002	2 in 10,000,000	0.007	25.4	*None*
Former Skeet/Trap Range Safety Zone DU	Surface Soil[b]	3 in 1,000,000,000	0.0006	—	—	3 in 100,000,000	0.009	38.9	*None*
	Shallow Subsurface Soil	2 in 1,000,000,000	0.0006	3 in 10,000,000,000	0.002	2 in 100,000,000	0.009	37.4	*None*
Fallbrook Creek EA	Surface Sediment[b]	NC	0.001	NC	0.004	NC	0.02	13.5	*None*

[a] DUs are evaluated using Incremental Sampling Technology data; EAs are evaluated using discrete data.

[b] Surface soil and surface sediment are 0 to 0.5 foot bgs. Shallow subsurface soil is 0 to 1 foot bgs.

[c] Shallow subsurface soil at the Former Small Arms Range Target Berm is 0 to 2 feet bgs.

[d] Lead was identified as a primary risk contributor because the 95% UCL-based EPCs for lead in surface soil and shallow subsurface soil exceeded the California-recommended residential screening level. Exceedances of the residential screening level are shown **bold**.

[e] Lead was identified as a primary risk contributor because the 95% UCL-based EPCs for lead in surface soil and shallow subsurface soil exceeded the California-recommended residential and industrial screening levels. Exceedances of the residential and industrial screening levels are shown in **red**.

Notes:

-- = exposure medium not evaluated for this receptor

NC = not calculated; none of the COPCs for this DU or EA is carcinogenic

- Former Small Arms Range Target Berm EA: The 95% UCL-based EPCs for lead in surface soil (0 to 0.5 foot bgs) of 853 mg/kg and shallow subsurface soil (0 to 2 feet bgs) of 1,100 mg/kg exceeded the residential screening level of 80 mg/kg and the industrial screening level of 320 mg/kg (at the time the HHRA was conducted) (**Table 2**). This industrial screening level for lead has been updated to a current industrial screening level of 500 mg/kg. Results for lead ranged up to 3,600 mg/kg and substantially exceeded industrial and residential screening levels (more than 10 times the screening levels at some locations).

Based on the results of the HHRA, lead in soil at the Former Small Arms Range DU is above the acceptable risk levels based on EPCs exceeding the residential screening level in surface and shallow subsurface soil. Also, lead in soil at the Former Small Arms Range Target Berm EA is above the acceptable risk levels based on EPCs exceeding the residential and industrial screening levels in surface and shallow subsurface soil.

Ecological Risk Results

The ERA for MRP Site UXO2 included both a Tier 1 SLERA and a Tier 2 BERA (Step 3a). The ERAs evaluated potential risks from soil to terrestrial plants and wildlife and from sediment to benthic invertebrates. These estimates were conducted under the assumption that soil and sediment at MRP Site UXO2 is readily accessible for exposure by these receptors. Similar to the HHRA, the ERA evaluated risks separately for the following DUs and EAs:

- Former Small Arms Range DU
- Former Skeet/Trap Range DU
- Former Skeet/Trap Range Safety Zone DU
- Former Small Arms Range Target Berm EA
- Fallbrook Creek EA

Potential risks were estimated using the ***No Effect and Low Effect Ecological Screening Values*** (ESVs). ESVs for birds and mammals were derived using a food-chain uptake model and no effect and low effect toxicity reference values. The No Effect ESVs are considered the most appropriate for assessing threatened and endangered species including the California gnatcatcher (CAGN) and least Bell's vireo (LBV) that are potentially present at the site. The Low Effect ESVs are considered most appropriate for assessing the receptor populations and communities for nonthreatened and nonendangered species.

What is Ecological Risk and How is it Calculated?

An ERA evaluates the potential adverse effects that exposure to site-related contaminants could have on the plants and wildlife (ecological receptors) that make up ecosystems. The Superfund ERA process follows a phased approach similar to that of the HHRA. The risk assessment results are used to help determine what measures, if any, are necessary to protect ecological receptors.

The ERA is completed in a phased approach whereby each phase is more detailed and focused than the preceding phase. The Tier 1 SLERA uses the most conservative exposure and toxicity assumptions. The Tier 2 BERA (Step 3a) uses more realistic exposure and toxicity assumptions. Within each phase there are three main components:

Problem Formulation includes the following:

- Compiling and reviewing existing information on the site habitat, and ecological receptors that may use the site.
- Evaluating how ecological receptors may be exposed
- Evaluating routes of exposure (for example, ingestion)
- Identifying ecological receptors (plants and animals that could be exposed)
- Identifying exposure media (soil or water)

Analysis includes evaluation of potential ecological exposures and available toxicity or other effects.

Risk Characterization combines the information in the problem formulation and analysis to estimate potential risks to ecological receptors.

HQs are calculated for each media/receptor/chemical to determine whether exposure to a given chemical represents a significant risk of harm to ecological receptors within major functional groups. HQs are calculated based on the types and concentrations of chemicals present and the possible ways ecological receptors could be exposed to them.

A weight of evidence evaluation is used to collectively consider multiple lines of evidence including quantitative (HQs) and qualitative information to determine the outcome for the site:

- The site does not pose an unacceptable risk to ecological receptors and no further action is warranted.
- The site requires further evaluation in the next phase to reduce uncertainty.
- The site poses a potentially unacceptable risk to ecological receptors and risk management is recommended for the media and ecological COCs posing unacceptable risk.

The results of the ERA for all DUs and EAs at MRP Site UXO2 indicate that the concentrations of ***chemicals of potential ecological concern*** found in soils and sediment at MRP Site UXO2 during the SI and RI sampling are below levels that might be expected to pose ecological risk (as indicated by the Low Effect ESVs) to receptor populations and communities for nonthreatened and nonendangered species. However, concentrations of lead in soil at the Former Small Arms Range Target Berm EA pose a potential for unacceptable risk to the CAGN (as indicated by the No Effect ESVs) if they forage within that area. Because of their characteristic foraging of insects and spiders by ground-surface gleaning and fly-catching methods, CAGN exposure to soil is primarily limited to the surface soil horizon (0 to 0.5 foot bgs).

Based on the results of the ERA, lead in soil at the Former Small Arms Range Target Berm was identified as exceeding ESVs for the CAGN.

Remedial Action Objectives

RAOs are environmental goals established to protect human health and the environment and describe what the cleanup will accomplish and serve as the basis for developing cleanup alternatives. Each RAO specifies the COCs, the exposure routes and receptors (organisms exposed), and an acceptable chemical concentration for each exposure pathway and medium (known as a cleanup goal).

The following RAOs are developed for MRP Site UXO2:

- Reduce potential future risk to human health from exposure to lead in surface and shallow subsurface soil at the target berm of the Small Arms Range.
- Reduce potential risk to the CAGN from its exposure to lead in surface and subsurface soil at the target berm of the Small Arms Range.

The remedial goals (RGs) for lead in surface and shallow subsurface soil for human receptors and in surface soil for ecological receptors are based on California's recommended soil screening level of 80 mg/kg for the hypothetical future resident and 500 mg/kg for future industrial and construction workers, and 600 mg/kg for ecological receptors (calculated using no effect toxicity reference value and CAGN exposure and site usage assumptions).

Summary of Remedial Alternatives

The Navy evaluated four remedial alternatives to address hazards associated with receptor exposure to lead-impacted soil at the Small Arms Range target berm. The four alternatives described in **Table 3** and detailed in the FS (CH2M, 2024) are as follows:

- Alternative 1 – No Action
- Alternative 2 – Soil Cover, Engineering Controls, and Institutional Controls
- Alternative 3 – Limited Excavation and Institutional Controls
- Alternative 4 – Excavation and Offsite Disposal

The Navy has identified Alternative 4 as the preferred remedial alternative (**Table 3**). The components of Alternative 4 are relatively straightforward, and once completed, are anticipated to establish unlimited use/unrestricted exposure without engineering or institutional controls at MRP Site UXO2 (pending confirmation sampling and regulatory concurrence).

The No Action alternative does not protect human health and the environment but is required under CERCLA to provide a baseline for comparison purposes.

Evaluation of Alternatives

The Navy evaluated each alternative against the first seven of the ***nine evaluation criteria*** (a description of each of the criteria is provided in the glossary on Page 21). The last two NCP criteria (state acceptance and community acceptance) will be addressed through public comment and regulatory agency review of this PP and are not evaluated here. All alternatives were given a ranking based on the capability of each alternative to meet the NCP criteria. A rating of low indicates that the alternative is unlikely to or will not meet the criteria, while a rating of high indicates that the alternative most effectively meets the criteria. The results of the evaluation are summarized in **Table 4**. The No Action alternative is required to provide a baseline for this comparative analysis.

A detailed comparative analysis of the alternatives and NCP criteria is provided in the FS (CH2M, 2024) and summarized here as follows.

Table 3 – Summary of Remedial Alternatives

Alternative	Details	Cost
1 – No Action	None	$0
2 – Soil Cover, Engineering Controls, and Institutional Controls	Construct a 1-foot-thick soil layer and 1-foot-thick vegetative cover over the Small Arms Range target berm: As a conservative measure, it was assumed that the soil cover would extend over the entire extent of the Former Small Arms Range Target Berm EA (approximately 14,000 square feet). Soil cover would act as a physical barrier to prevent future industrial and construction worker and ecological receptor exposure to lead in soil at concentrations above the industrial and ecological RGs and exposure to any bullet fragments in that soil. Perform biological surveying and monitoring before and during construction of the soil cover. Implement ***institutional controls*** (ICs) to: • Restrict activities that could expose soil with lead concentrations above the industrial RG and bullet fragments in that soil • Prohibit use of the area for future residential or other unrestricted development of the site • Restrict site activities that could compromise the effectiveness of remedy components Implement ***engineering controls*** (ECs) (signs) to warn people of potential risks present at the site. Inspect the ICs, ECs, and the soil cover annually. Perform periodic maintenance of the soil cover and signs.	$1,730,000
3 – Limited Excavation and Institutional Controls	Conduct limited excavation of soil that contains lead concentrations above the industrial and ecological RGs at the Small Arms Range target berm. As a conservative measure, it was assumed that the excavation would extend over the entire extent of the Former Small Arms Range Target Berm EA (approximately 14,000 square feet). Any bullet fragments present within this soil would also be removed. This action includes: • Ex situ stabilization of excavated soil and bullet fragments and offsite disposal. • Confirmation soil sampling to ensure lead in soil above the RG has been removed. • Use of hand-held magnetometer to confirm bullet fragments have been removed to the extent possible. • Limited excavation to prevent future industrial and construction worker and ecological receptor exposure to lead in soil at concentrations above the industrial and ecological RGs and exposure to bullet fragments within that soil. • Perform biological surveying and monitoring before and during the limited excavation. • Restore vegetation. Implement ICs to: • Restrict activities that could expose soil with lead concentrations above the industrial RG and bullet fragments in that soil. • Prohibit use of area for future residential or other unrestricted development of the site. • Restrict site activities that could compromise the effectiveness of remedy components. Inspect the ICs annually.	$2,523,000
4 – Excavation and Offsite Disposal	Excavate soil that contains lead concentrations above the residential RG. Any bullet fragments present within this soil would also be removed. This action includes: • Excavation of the Former Small Arms Range Target Berm EA (approximately 14,000 square feet) to 3 feet relative to the face of the berm (for cost estimating purposes, it was assumed that 100 percent of the area of the Former Small Arms Range Target Berm EA would require excavation). • Excavation of a 1,760 square feet area north of the Former Small Arms Range Target Berm EA to 1.5 feet bgs. • Excavation of 1,850 square feet area northeast of the Former Small Arms Range Target Berm EA to 1.5 feet bgs. Perform biological surveying and monitoring before and during the excavation. Perform ex situ stabilization by mixing excavated soil with lime and phosphate additive stabilizers and/or binding agents to trap and limit the migration of contaminants, and then dispose of soil offsite. Perform confirmation soil sampling to ensure removal of lead above the residential RG. Use of hand-held magnetometer to confirm bullet fragments have been removed to the extent possible. Backfill and compact excavated areas outside the Former Small Arms Range Target Berm EA. Excavation is anticipated to establish unlimited use and unrestricted exposure (pending confirmation sampling and regulatory concurrence) to the site by eliminating future hypothetical resident, future industrial and construction worker, and ecological receptor exposure to lead in soil at concentrations above the residential, industrial, and ecological RGs and exposure to bullet fragments within that soil. Restore vegetation.	$2,569,000

Table 4 – Summary of Comparative Analysis of Alternatives

	Threshold Criteria		Balancing Criteria				
Criteria	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost[a]
1 – No Action	Does Not Meet	Does Not Meet					$0
2 – Soil Cover, Engineering Controls, and Institutional Controls	Meets	Meets					$1,730,000
3 – Limited Excavation and Institutional Controls	Meets	Meets					$2,523,000
4 – Excavation and Offsite Disposal	Meets	Meets					$2,569,000

[a] Capital cost; operations and maintenance costs include annual inspections and reporting, and Five-Year Review. Cost is based on present worth (based on 2017 dollars), 30 year period of performance (inflation = 1.5 percent).

Note:

Blue shading identifies the preferred remedial alternative.

Ranking Comparison Symbols:

Overall Protection of Human Health and the Environment

All of the alternatives evaluated, with the exception of the No Action alternative (Alternative 1), are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the site through application of a soil cover, excavation of soil, ECs, and/or ICs to prevent unacceptable exposure to and lead in soil and bullet fragments in that soil.

Based on the planned continued land use of the area, the components of Alternatives 2, 3, and 4 would provide adequate protection for human receptors (with Alternatives 2 and 3 mitigating future industrial and construction workers and with Alternative 4 also removing the potential for residential exposure) and for ecological receptors, with respect to exposure to lead in soil at concentrations above the human health and ecological RGs and exposure to bullet fragments in that soil.

Compliance with ARARs

Alternatives 2, 3, and 4 are expected to meet identified chemical-, location-, and action-specific potential state and federal ARARs.

Long-Term Effectiveness and Permanence

Alternative 4 ranks the highest for the long-term effectiveness and permanence criterion because the components would remove soil with lead concentrations above residential RGs and bullet fragments in that soil, with the goal of establishing unlimited use and unrestricted exposure at the site, thereby removing the need for long-term ECs and ICs. Of the four alternatives, Alternative 4 is the only one that has the goal of achieving unrestricted land use. Whereas Alternative 2 ranks low-medium for this criterion because it would leave lead in soil at concentrations above the residential RG (and bullet fragments) in place beneath the soil cover engineering control.

As a result, Alternative 2 would require long-term annual inspection of the soil cover and ICs, periodic maintenance of the soil cover, and Five-Year Reviews and reporting. Alternative 3 ranks medium because the components involve long-term annual inspection of the ICs and Five-Year Reviews and reporting. Alternative 3 would provide more long-term effectiveness than Alternative 2 due to its incorporation of partial excavation, but still less than Alternative 4 because Alternative 3 would not remove all soil with lead concentrations above the residential RG or bullet fragments in that soil.

Reduction of Toxicity, Mobility, or Volume through Treatment

Because there are no principal threat wastes at MRP Site UXO2, none of the alternatives included a treatment component of the remedy aside from stabilization of soil for offsite disposal. This NCP criterion is therefore evaluated in the context of removal of lead-contaminated soil.

Alternative 2 is ranked low because it would not reduce the volume of lead-contaminated soil. Alternative 3 is ranked low-medium because it would reduce contaminated soil volume through excavation of lead-impacted soil above the industrial and ecological RGs (and bullet fragments) through removal and offsite disposal. Alternative 4 would provide onsite reduction of lead-impacted soil (and bullet fragments in that soil) through removal, stabilization and offsite disposal. Active treatment, aside from stabilization of soil for disposal, would not be conducted under Alternative 4. Because Alternative 4 would remove a higher volume of lead-impacted soil (and bullet fragments) from the site, Alternative 4 is ranked higher than Alternatives 2 and 3 for this criterion.

Short-Term Effectiveness

Alternatives 2, 3, and 4 would all require a relatively short duration to implement. Planning and constructing the soil cover or completing excavation activities would require about the same amount of time for each alternative. Environmental impacts from implementation of Alternative 2 would be lower than those from Alternatives 3 and 4. Alternative 2 is ranked higher than Alternatives 3 and 4 for this criterion. Alternative 4 is ranked the lowest because complete excavation of lead contaminated soil poses the maximum potential short-term exposures to workers conducting the excavations and the greatest environmental impacts associated with transport for offsite disposal of the largest volume of lead-contaminated soil from among the various alternatives.

Implementability

The implementability of Alternatives 2, 3, and 4, would be similar to each other because the three alternatives would require similar types of skilled labor, supplies, and equipment for soil cover construction (Alternative 2) or excavation (Alternatives 3 and 4). Of the three alternatives, Alternative 4 ranks the highest because it would not require ECs, ICs, or annual IC inspections. Alternative 2 is ranked the lowest because it would require EC installation, implementation of ICs, annual inspections, and periodic maintenance of the soil cover. Alternative 3 would require similar effort as Alternative 2, but without the soil cover and additional effort for sign installation.

Cost

Cost estimates were developed based on site investigation information, using procedures outlined in federal guidance. The cost estimates are order-of-magnitude estimates intended for comparison of the alternatives and are subject to change during the actual remedial design of the preferred alternative.

Based on this information, Alternative 2 is estimated to cost $1,730,000. Alternative 3 is estimated to cost $2,523,000. Alternative 4 is estimated to cost $2,569,000.

State Acceptance

State involvement has been solicited through the CERCLA process. The DTSC and RWQCB support the preferred alternative, and their final concurrence will be solicited following the review of all comments received during the public comment period.

Community Acceptance

Community acceptance will be evaluated after the public comment period for this PP.

Summary and Rationale of the Preferred Alternative

The preferred remedy is Alternative 4, Excavation and Offsite Disposal. A description of the preferred remedy (Alternative 4) is presented in **Table 3**. The proposed areas for excavation and offsite disposal under Alternative 4 are displayed on **Figure 8**. The excavation areas and volumes presented in **Table 3** were estimated (using analytical results and professional judgement) and used to provide a basis for evaluation and cost estimating of the remedial alternatives. However, the specific details of the preferred remedy would be finalized in the design and planning documents before implementation. Additionally, the area, depth, and volume of COC-impacted soil to be excavated may increase during implementation based on the results of the confirmation sampling and field observations. The design and planning documents would also establish (with concurrence from regulatory agencies) the confirmation sampling requirements and how confirmation sampling results would be used to guide the excavation and remedial action completion.

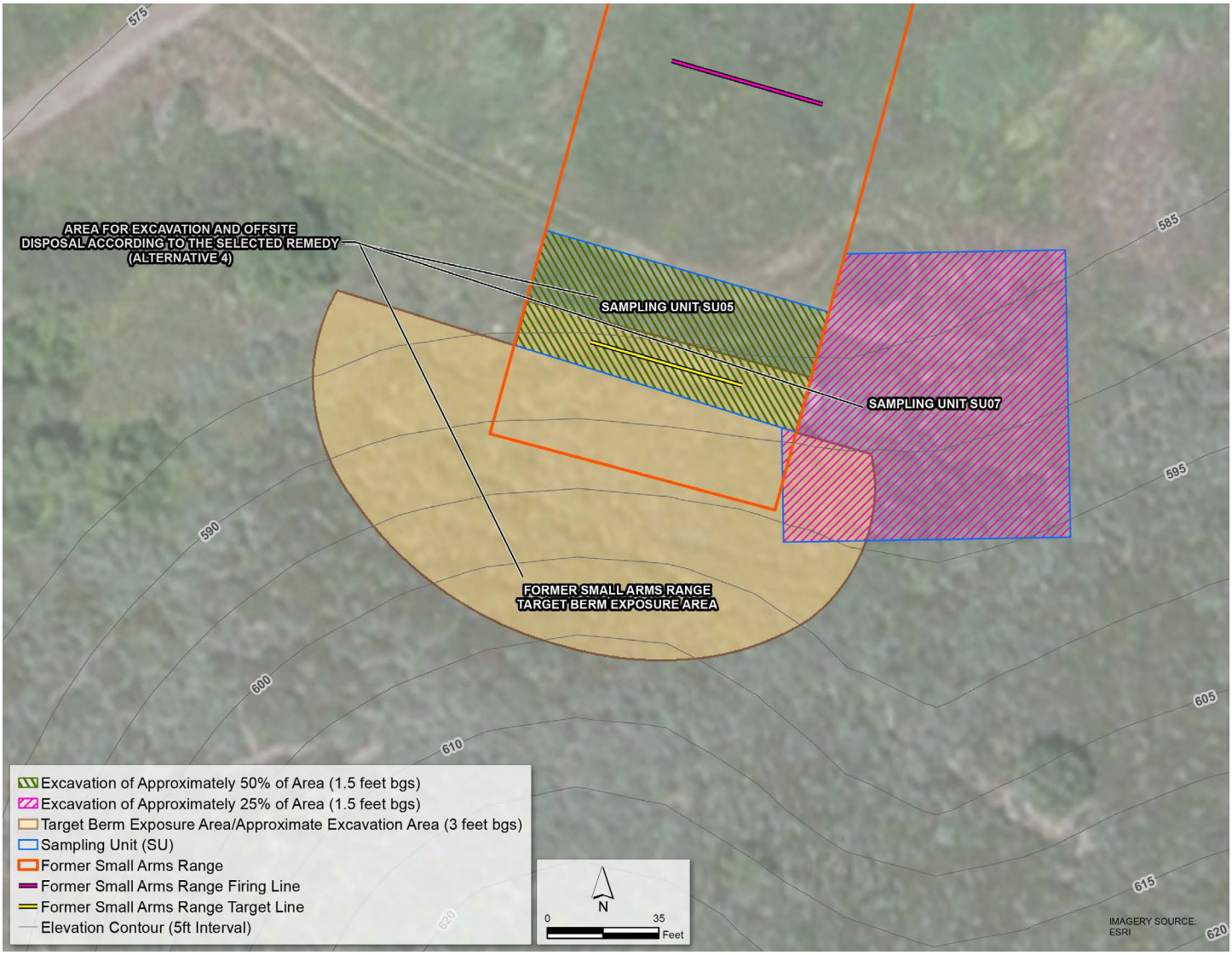


Figure 8 – Proposed Areas for Excavation and Offsite Disposal under Alternative 4

Alternative 4 is preferred because it provides overall protection to human health and the environment by addressing risk to industrial workers, construction workers, hypothetical future residents, and ecological receptors by excavation and offsite disposal of soil impacted by lead and bullet fragments. Although the cost of Alternative 4 is slightly higher than Alternatives 2 and 3, it does not require implementation of ICs and ongoing monitoring and maintenance. Alternative 4 is the only alternative that is anticipated to achieve unlimited use and unrestricted exposure (pending results from the confirmation sampling and regulatory concurrence) resulting in response complete and site closeout of MRP Site UXO2.

The preferred alternative meets the threshold criteria and provides the best balance of trade-offs among the other alternatives with respect to the balancing criteria. The preferred alternative satisfies the following statutory requirements of CERCLA Section 121(b): be protective of human health and the environment, comply with ARARs, be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Because there are no principal threat wastes at MRP Site UXO2, it is not necessary for the preferred alternative to satisfy the preference for treatment as a principal element.

Community Participation

The Navy, DTSC, and the RWQCB provide information regarding the cleanup of Detachment Fallbrook sites to the public through public meetings, open house events, agency websites, the Administrative Record file, and announcements published in the local newspaper. The Navy and the State encourage the public to review the Administrative Record file to gain a more comprehensive understanding of the site and the CERCLA activities that have been conducted at MRP Site UXO2.

Public comments on this PP received during the period from August 7, 2025, through September 6, 2025, will be considered by the Navy, in consultation with the regulatory agencies, prior to selecting a final remedy for MRP Site UXO2. Responses to comments will be addressed in a Responsiveness Summary, presented in the ROD. The ROD will formally document the selected remedy for MRP Site UXO2.

The comment form included with this PP can be used for public comments during the 30-day public comment period. Send written comments to Mr. Anthony Konzen, the Detachment Fallbrook Remedial Project Manager. Written or oral comments can also be submitted during the open house public meeting. Official minutes of the open house public meeting will be recorded to document all public comments made at the meeting.

A Public Notice will be posted in the local papers (such as the Fallbrook and Bonsall Village News, published weekly) announcing when the ROD is available to the public in the information repositories listed herein.

During the comment period (August 7 through September 6, 2025), interested parties may submit written comments to the following address:

Mr. Anthony Konzen, PG, CHG
Detachment Fallbrook Remedial Project Manager

United States Department of the Navy
Naval Facilities Engineering Systems Command Southwest
750 Pacific Highway, 11th Floor
San Diego, California 92132-0058

Email: navfac_sw_det_fallbrook_rpm@us.navy.mil

Information Repository

All information used by the Navy in its remedy selection process for MRP Site UXO2 is contained in the Administrative Record file, located at the Naval Facilities Engineering Systems Command Southwest facility in San Diego, California. The documents for MRP Site UXO2 and other items are available for review at the following locations:

Administrative Records

Naval Facilities Engineering Systems Command Southwest
Naval Base San Diego
Building 3519
2965 Mole Road
San Diego, CA 92136

Contact: Ms. Diane Silva
Telephone: (619) 556-1280

Website:
https://administrative-records.navfac.navy.mil/?M_7QQL3UURG4XWL

For additional information, please contact Detachment Fallbrook Lead Remedial Project Manager, Mr. Anthony Konzen, at (619) 705-5427.

Restoration Advisory Board

A Restoration Advisory Board (RAB) is made up of community members, the Navy, and state regulators, and typically meets to discuss the progress of cleanup activities for Navy installations. RAB meetings, which are open to the public, have not been held for Detachment Fallbrook because of lack of community interest. As such, environmental concerns for this installation can be addressed at the Naval Weapons Station Seal Beach RAB, held in Seal Beach, California. Should community members have interest in creating and attending RAB meetings specific to Detachment Fallbrook, please contact Mr. Anthony Konzen at (619) 705-5427.

Glossary of Terms

95% upper confidence limit (95% UCL): The 95% UCL is a statistical value, which one can be 95 percent confident contains the true highest value of a set of parameters (in this case, average concentrations). For example, if you calculate a 95% UCL for the average concentration of a chemical in an area to be 1 mg/kg, it means that you are 95 percent confident that the true average concentration of the chemical in the area is no more than 1 mg/kg, with only a 5 percent possibility of the average concentration being higher.

Administrative Record: A compilation of information established for all CERCLA sites made available to the public at the start of the remedial investigation (RI) for remedial actions for environmental management actions. Information in the Administrative Record supports the selected remedy for remedial actions and removal actions.

Applicable or relevant and appropriate requirements (ARARs): CERCLA Section 121(d)(l) requires that remedial actions attain (or that the decision document justify the waiver of) environmental regulations, standards, or criteria promulgated under federal or more stringent state laws that are determined to be "applicable or relevant and appropriate requirements." Applicable requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Background: The amount (concentration) of a chemical present in the environment because it is naturally occurring or because it was introduced by humans through activities not associated with a site-related release.

California Department of Toxic Substances Control (DTSC): A part of the California Environmental Protection Agency and the lead environmental regulatory agency for Detachment Fallbrook. Its mission is to protect public health and the environment from toxic substances.

California Regional Water Quality Control Board, San Diego Region (RWQCB): The California water quality authority, which is part of the California Environmental Protection Agency. Its mission is to preserve, enhance, and restore California's water resources.

Cancer Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. The acceptable risk range as defined in the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) is $1x10^{-4}$ to $1x10^{-6}$, meaning there is 1 additional chance in 10,000 ($1x10^{-4}$) to 1 additional chance in 1,000,000 ($1x10^{-6}$) that a person will develop cancer if exposed to a site that is not remediated.

Chemical of concern (COC): Any contaminant that is shown to pose possible human health or ecological risk at a site.

Chemical of potential concern (COPC): Chemical identified in the initial stages of a site investigation that may pose a risk, and so are further investigated to gather data for a risk assessment. If the chemical is a concern to ecological receptors, it is referred to as chemical of potential ecological concern.

Chemical of potential ecological concern: Similar to a COPC, but specifically a chemical that is of potential concern to ecological receptors.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): The federal statute enacted in 1980 and amended in 1986 by the ***Superfund Amendments and Reauthorization Act*** (SARA) that establishes a comprehensive, statutory framework for identifying, investigating, and cleaning up releases of hazardous substances to the environment.

Decision unit (DU): A defined area within a site, that will be characterized by results of incremental sampling. DU is utilized in incremental sampling protocols.

Ecological Risk Assessment (ERA): The application of a formal framework, analytical process, or model to estimate the effects of human action(s) on a natural resource and to interpret the significance of those effects in light of the uncertainties identified in each component of the assessment process. Such analysis includes initial hazard identification, exposure and dose response assessments, and risk characterization.

Ecological screening values (ESVs): Media/toxicity based chemical screening values based on a low probability of unacceptable risks to ecological receptors. For birds and mammals, they are a back-calculated risk-based value specific to a given receptor. They can be based on no effect or low effect toxicity data (for example, No Effect ESV).

Engineering controls (ECs): Physical ***land use controls*** (LUCs) such as physical barriers that limit access to an area of potential risk.

Ex situ stabilization: Group of processes (or technologies) that are often used together (or considered a variation of one technology) to treat an array of wastes including both solids and liquids but for contaminated sites these technologies are primarily used to treat inorganic contaminants in soils and less commonly for sediments.

Executive Order 12580: The order issued by the President of the United States of America that delegates the implementation of CERCLA to the Navy.

Exposure area (EA): A defined area within a site, that will be characterized by results of discrete sampling.

Exposure point concentrations (EPCs): The concentration of a COPC in a medium (e.g., surface soil) that a receptor may be exposed to is called the EPC. EPCs are estimated from measured or modeled concentrations, and pathway-specific intakes (doses) are estimated using hypothetical human receptors for evaluation in the subsequent risk calculations.

Fate and transport: Movement of chemicals through the environment and how their chemical, physical, and/or biological properties may change.

Feasibility study (FS): A feasibility study is a preliminary exploration of a proposed project or undertaking to determine its merits and viability. A feasibility study aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal, and environmental considerations.

Hazard index (HI): The sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways. The HI indicates the risk from the presence of multiple substances at one site, or exposures to the same chemicals through multiple media and pathways.

Human Health Risk Assessment (HHRA): The process used to determine potential risks to humans exposed to environmental contaminants.

Incremental soil samples: Sampling methodology used in the environmental field for taking samples of potentially contaminated soils for chemical analysis in a way that reduces data variability and increases sample representativeness.

Installation Restoration Program (IRP): The Navy IRP includes the identification, investigation, and cleanup of contamination from a hazardous substance or pollutant or contaminant.

Institutional controls (ICs): An administrative and legal LUC that reduces potential hazards by limiting public exposure to contamination. Examples include site access limitations, and restrictions on future land use that would be placed on property deeds or titles if the property is transferred.

Land use control (LUC): Physical, legal, or administrative methods that restrict the use of or limit access to property to reduce risks to human health and the environment. LUCs include engineering controls and institutional controls:

- **Engineering controls (ECs)** are engineered or constructed physical barriers to contain and/or prevent exposure, such as signs and fences.
- **Institutional controls (ICs)** are administrative and legal instruments to limit site use.

Material potentially presenting an explosive hazard (MPPEH): Material owned or controlled by the Department of Defense that, before determination of its explosives safety status, potentially contains explosives or munitions (for example, munitions containers and packaging material; or munitions debris remaining after munitions use, demilitarization, or disposal) or potentially contains a high enough concentration of explosives that the material presents an explosive hazard.

Munitions and explosives of concern (MEC): Refers to specific categories of military munitions that may pose unique explosive risks, including unexploded ordnance, discarded military munitions, or munitions constituents when present in high enough concentrations to pose an explosive hazard.

Munitions Response Program (MRP): The program designed to address Munitions Response actions, including investigation, removal, and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance, discarded military munitions, MPPEH, or MCs.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): 40 Code Federal Regulation 300, which provides the organizational structure and procedures for government responses to oil and hazardous substance spills, releases, and sites where these materials have been released.

Nine Evaluation Criteria:

The NCP outlines the approach for comparing remedial alternatives using the following evaluation criteria:

- **Threshold Criteria:**
  - **Overall Protection of Human Health and the Environment.** Addresses whether a remedy provides adequate protection and how risks posed through each pathway are eliminated, reduced, or controlled through treatment, ECs, or ICs.
  - **Compliance with ARARs.** A statutory requirement for remedy selection either that an alternative will meet all of the ARARs or that there is a good rationale for waiving an ARAR.
- **Balancing Criteria:**
  - **Long-Term Effectiveness and Permanence.** Addresses the expected residual risk that will remain at the site after completion of the remedial action, and the ability of a remedy to maintain reliable protection of human health and the environment in the future and in the short term.
  - **Reduction of Toxicity, Mobility, or Volume through Treatment.** The anticipated performance of the treatment technologies that a remedy may employ in their ability to reduce toxicity, mobility, or volume of contamination.
  - **Short-Term Effectiveness.** The short-term impacts of the alternatives on the neighboring community, the industrial workers, remedial construction workers, and the surrounding environment, including potential threats to human health and the environment associated with the collection, handling, treatment, and transport of hazardous substances. Also includes the time until protectiveness is achieved and the time to achieve cleanup levels.
  - **Implementability.** The technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement an option.
  - **Cost.** Encompasses all construction, operation, and maintenance costs incurred over the life of the project, expressed as the net present value of these costs.
- **Modifying Criteria:**
  - **State Acceptance.** Substantial and meaningful state involvement in the PP.
  - **Community Acceptance.** The public's general response to the alternatives described in the PP and the RI/Feasibility Study (FS) reports. The specific responses to the public comments are addressed in the Responsiveness Summary section of the Record of Decision (ROD).

Polycyclic Aromatic Hydrocarbon Compounds (PAHs): PAH compounds are composed of multiple carbon and hydrogen atoms bonded in a cyclical shape (also called rings). PAH compounds can occur naturally in coal, crude oil, and gasoline. PAHs are also produced by the thermal decomposition (burning) of organic matter. PAH compounds are also found in coal tar, which was used as a binder during the early years of the production of clay skeet targets.

Preliminary Assessment (PA): An initial investigation that identifies potential areas of contamination for further investigation. Consists of a review of available historical information (also known as a records search), aerial photographs, employee interviews, and site visits to gain information concerning installation activities and land use.

Principal threat waste: Wastes that generally will be considered to constitute principal threats include, but are not limited to, the following:

- **Liquid source material.** Waste contained in drums, lagoons, or tanks, or free product in the subsurface (that is, nonaqueous phase liquids) containing contaminants of concern (generally excluding groundwater).
- **Mobile source material.** Surface soil or subsurface soil containing high concentrations of COCs that are (or potentially are) mobile due to wind, evaporation (for example, volatile organic compounds), surface runoff, or subsurface transport.
- **Highly toxic source material.** Buried drummed nonliquid wastes, buried tanks containing nonliquid wastes, or soils containing significant concentrations of highly toxic materials.

Proposed Plan (PP): A document that summarizes remedial alternatives, presents the recommended cleanup action, explains the recommendation, and solicits comments from the community.

Receptor: Any living organism or environmental medium that is exposed to contamination from a discharge.

Record of Decision (ROD): A document that documents and records the decision on the cleanup of a site made by the lead and support agencies, with input from the public through the PP. The lead agency and the supporting agency sign the ROD.

Remedial Action Objectives (RAOs): RAOs are environmental goals established to protect human health and the environment and provide the foundation used to develop cleanup remedies.

Remedial Investigation (RI): A detailed study that includes media sampling to determine the nature and extent of contamination at a site. The RI emphasizes data collection and site characterization including sampling and monitoring as necessary to gather sufficient information to determine the necessity for remedial action and to support the evaluation of remedial alternatives, if necessary. The RI includes a risk assessment, which estimates risks to human health and the environment as a result of the contamination.

Remediation Goal (RG): An acceptable chemical concentration for each exposure pathway (soil, groundwater, and soil gas).

Sampling unit (SU): A further subdivision within a DU, in which an incremental sample will be collected, that is representative of the entire SU.

Screening levels: Risk-based concentration levels established for individual contaminants that are used for initial data comparisons to characterize the potential nature and extent of contamination present at a site. Exceedance of regulatory screening levels does not necessarily represent risk to receptors.

Site Inspection (SI): An onsite investigation to determine whether there is a release or potential release and the nature of the associated threats. The SI consists of limited sampling and analysis designed to verify the findings of the PA. The data collected must also support the decision to continue to the next phase (the RI and possibly the FS) or remove the site from further investigation.

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Notes

Please print or type your comments here, or email comments to navfac_sw_det_fallbrook_rpm@us.navy.mil

Mark Your Calendar for the Public Comment Period

Public Comment Period

August 7 through
September 6, 2025

Submit written comments

The Navy will accept written comments on this Proposed Plan during the 30-day public comment period. Space has been provided at the end of this document to be used for writing comments, or email comments to navfac_sw_det_fallbrook_rpm@us.navy.mil

Attend the Open House Public Meeting

August 21, 2025, 6–7:30 p.m.
Fallbrook Community Center
Live Oak Room
341 Heald Lane
Fallbrook, CA 92028

The Navy will hold an open house public meeting to explain the Proposed Plan. Verbal and written comments will be accepted at this meeting.

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Place stamp here

Attn: Mr. Anthony Konzen
Detachment Fallbrook Remedial Program Manager
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San Diego, CA 92132-0058