US Army Corps of Engineers®
BUILDING STRONG®

FINAL PROPOSED PLAN

OCCIDENTAL CHEMICAL CORPORATION PROPERTY AT THE FORMER LAKE ONTARIO ORDNANCE WORKS, NIAGARA COUNTY, NEW YORK

AUTHORIZED PROJECT UNDER THE

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM FOR FORMERLY USED DEFENSE SITES

December 2016

Prepared by:

U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207-3199

This page intentionally left blank

ACRYONYMS, ABBREVIATIONS AND UNITS OF MEASURE

AOC	area of concern
AOI	area of interest
ARAR	applicable or relevant and appropriate requirement
bgs	below the ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EPA	Environmental Protection Agency (U.S.)
EU	Exposure Unit
FS	feasibility study
ft	feet/foot
FUDS	Formerly Used Defense Sites
IC	institutional control
LOOW	Lake Ontario Ordnance Works
LTM	long-term monitoring
LUC	land-use control
m	meter/meters
m^3	cubic meters
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OCCP	Occidental Chemical Corporation Property
PP	proposed plan
ppm	parts per million
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RG	remediation goal
RI	remedial investigation
SARA	Superfund Amendments and Reauthorization Act
TNT	trinitrotoluene
TSDF	transportation, storage and disposal facility
USACE	U.S. Army Corps of Engineers
yd^3	cubic yards

This page intentionally left blank

GLOSSARY OF TERMS

Administrative Record	Site information is compiled in an Administrative Record file and placed in a general information repository for public review. It is a body of documents that forms the basis for the selection of a particular response at a site.
Carcinogenic (Cancer) Risk	The likelihood that an individual will develop cancer from direct exposure to chemicals classified as carcinogens, or known to cause cancer. The U.S. Environmental Protection Agency (EPA) defines acceptable cancer risk ranges resulting from chemical exposure as one additional cancer case in a population of 1,000,000 (10^{-6}) to no more than one additional cancer case in a population of 10,000 (10^{-4}).
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	A federal law enacted in 1980 and amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA) and in 2001 by the Small Business Liability Relief and Brownfields Revitalization Act, which concerns investigation and response actions regarding hazardous substances, pollutants, and contaminants.
Defense Environmental Restoration Program (DERP)	Established law authorizing environmental investigation and cleanup at sites in the United States and its territories that the U.S. Department of Defense (DoD) either currently owns or owned in the past.
Department of Defense (DoD)	An executive branch department of the U.S. federal government charged with coordinating and supervising all agencies and functions of the government concerned directly with national security and the U.S. Armed Forces.
Environmental Monitoring	The act of collecting information about the environment over a period of time.
Environmental Protection Agency (EPA) (U.S.)	An agency of the federal government established in 1970 and charged with protecting human health and the environment. The EPA is responsible for setting the procedures for evaluating risks to human health and the environment, and for defining when the risks are unacceptable and therefore remedial action is warranted.
Feasibility Study (FS)	An FS presents the development, screening, and detailed evaluation of various remedial action alternatives for a site.
Formerly Used Defense Sites (FUDS)	Properties that, prior to October 16, 1986, were owned, leased, or otherwise possessed by the U.S. government and were the responsibility of the DoD.
Hazard Index	Noncancer causing health effects are expressed as a hazard index, which is a ratio of estimated exposure deemed acceptable. Any hazard index above 1 indicates the potential for adverse (noncancer) health effects to occur.
Human Health Risk Assessment	An evaluation of the risk posed to human health should remedial activities not be implemented.
National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	Provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.
No Action	A designation for a site that has been determined to require no further investigation or remedial action to address potential hazardous substances, pollutants, or contaminants.

Proposed Plan	In the first step in the remedy selection process, the lead agency identifies the alternative that best meets the requirements in CERCLA 300.430(f)(1) and presents that alternative to the public in a proposed plan. The purpose of the proposed plan is to provide the public with a reasonable opportunity to comment on the proposed remedial action and to participate in the selection of remedial action at a site.
Public Comment Period	The time allowed for the members of an affected community to express views and concerns regarding an action proposed to be taken by the Corps of Engineers.
Receptor	Humans, animals, or plants that may be exposed to contaminants at a site.
Record of Decision	A public document that describes the remedy selected for a site, the basis for the choice of that remedy, and provides responses to public comments.
Remedial Action	Action of the lead remedial agent to eliminate or minimize the risk to receptors at a site.
Remedial Action Objective	Objectives of remedial actions developed based on contaminated media, contaminants of concern, potential receptors and exposure scenarios, human health and/or ecological risk assessment, and attainment of regulatory cleanup levels that may exist.
Remedial Investigation (RI)	A study of a site that determines the nature and extent of chemical releases, evaluates the fate and transport of those releases, and estimates the associated current and long-term risks.
Screening Level Ecological Risk Assessment	A determination of whether site chemicals have the potential to cause adverse effects to sensitive ecological features found at a site.
U.S. Army Corps of Engineers (USACE)	A branch of the U.S. Army with special expertise in carrying out CERCLA/NCP investigations and response actions at former U.S. Army sites.

U.S. ARMY CORPS OF ENGINEERS ANNOUNCES PROPOSED PLAN

The public is invited to review and comment on this *Proposed Plan for the Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works*. The Corps of Engineers prepared this document as part of its investigations of the former Lake Ontario Ordnance Works (LOOW). This proposed plan (PP) summarizes the rationale for the excavation and off-site disposal of soil containing lead and 2,4,6-trinitrotoluene (TNT) above remediation goals (RGs) at Area of Concern (AOC) 1 (Exposure Unit [EU] 8) within the Occidental Chemical Corporation Property (OCCP) on the former LOOW. Other AOCs within OCCP (AOCs 2, 3, 4, 5, and 6) don't require any further action by the DoD. The OCCP is located in the Town of Porter, Niagara County, New York.

The U.S. Army Corps of Engineers Buffalo District is issuing this document for the U.S. Army as the DoD administrative agent for the Defense Environmental Restoration Program [for] Formerly Used Defense Sites (DERP–FUDS). The Corps of Engineers executes DERP–FUDS in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan.

Public Comment Period

December 5, 2016 – February 7, 2017

The Corps will accept written comments on the proposed plan during the public comment period. Written comments may be submitted by email to derpfuds@usace.army.mil or postal mail to:

U. S. Army Corps of Engineers
Special Projects Branch
Environmental Project Management Team
1776 Niagara Street
Buffalo, NY 14207-3199

Public Meeting

January 11, 2017 @ 6:30 PM

Lewiston Senior Center
4361 Lower River Road
Youngstown, NY 14171

For more information, the administrative record file is publically accessible electronically at:

Lewiston Public Library
305 South 8th Street
Lewiston, NY 14092

Youngstown Free Library
240 Lockport Street
Youngstown, NY 14174

Or by appointment only:

1-800-833-6390 (Option 4)
U.S. Army Corps of Engineers Buffalo District
1776 Niagara Street
Buffalo, NY 14207

The purpose of this document is to solicit input from the public about the Corps of Engineers' preferred alternative, Alternative 4: Excavation and Off-Site Disposal, to address soil contamination at AOC 1 of the OCCP. The preferred alternative may be modified based on any new information acquired during a public comment period. The Corps of Engineers encourages the public to review and comment on all the alternatives discussed in this PP.

Members of the public who wish to comment on this PP may submit their comments in writing to the Corps of Engineers at the following address:

U.S. Army Corps of Engineers, Buffalo District
Special Projects Branch, Environmental Project Management Team
1776 Niagara Street
Buffalo, NY 14207-3199

Comments may also be submitted by sending an email to *derpfuds@usace.army.mil*. Please refer to this PP or the LOOW in any comments. If there are any questions regarding the comment process or the PP, please direct them to the address noted above or call 1-800-833-6390 (Option 4).

SITE HISTORY

Prior to development of the LOOW, the OCCP was mixed agricultural land (e.g., forest, orchard, and farms with some ponds). In 1942, the War Department obtained a 7,500-acre parcel of land in northwestern Niagara County, New York, to construct a TNT production facility called the LOOW. Production operations, production support, and storage occupied 2,500 acres of the eastern portion of the LOOW. The Army left the remaining 5,000 acres undeveloped to serve as a buffer zone for the TNT production facility and to allow for its possible expansion (Figure 1).

The U.S. Congress transferred the entire 5,000-acre buffer zone of the former LOOW to the General Services Administration in 1945 for sale to private landowners (USACE 2013). The Hooker Chemical and Plastics Corporations purchased a 304-acreparcel from a private landowner in 1975; it later sold the parcel to the Occidental Chemical Corporation (USACE 2013), a wholly-owned subsidiary of Occidental Petroleum Corporation, which currently owns the property. Use and ownership of the OCCP for the period between 1945 and 1975 is unknown. However, a number of remarks provided in a document that interpreted historical aerial photographs from the 1950s refer to local farming (U.S. Army Topographic Engineering Center 2002). This suggests the property may have been used for agricultural purposes during that time.

The OCCP is a 304-acre parcel situated in the undeveloped buffer zone of the former LOOW (Figure 2). Historical aerial photographs from the late 1930s through the mid-1950s show a fenced area in the southwest portion of the property, a dirt road leading to a pond in the east-central portion of the property, and structures east of the fenced area in the southwest portion of the property. Numerous aerial anomalies were noted on this parcel in photographs from 1944 and 1951. The anomaly at AOC 1 was present in 1944, while the TNT plant was operational. The size and shape of this anomaly are similar in the 1944 and 1951 aerial photographs, which suggest that fill in this area is related to DoD activities.

The only area for which action is being proposed is AOC 1; it is approximately 425 feet [ft] by 325 ft (130 meters (m) by 99 m) and is located in the southwest portion of the OCCP (Figure 2). The U.S. Army Corps of Engineers designated AOC 1 as EU 8 for the evaluation of potential human health and environmental risks.

SITE CHARACTERISTICS

Extensive geologic investigations have been conducted throughout much of the former LOOW. Subsurface data indicates that the area is underlain by approximately 30 to 60 ft of unconsolidated glacial deposits that overlie shale bedrock of the Queenston Formation. Subsurface stratigraphy is generally characterized by glacial till that includes an upper clay till consisting of primarily silty clay and clay, upper and middle silt tills that contain fine sand, silty sand with clay, and clay-sand mixtures with occasional traces of gravel. A glaciolacustrine clay layer is present between 12 and 20 ft below the ground surface (bgs) (USACE 2002).

Groundwater occurs within a discontinuous upper water-bearing zone and a confined lower water-bearing zone. These water-bearing zones are separated by the glaciolacustrine clay layer.

During operation of the former LOOW, a system of drainage ditches was constructed and maintained to drain surface water runoff to a Central Drainage Ditch. The ditches were temporary in nature. They included preexisting agricultural ditches that had been used to irrigate farmland and drainage ditches constructed during DoD development. The Southwest Drainage

Ditch is a receiving surface water body that hydraulically separates the OCCP from the Lewiston-Porter School District property to the west.

AOC 1 is located within a freshwater forested/shrub wetland designated LE-18 according to aerial imagery available at New York State Orthos Online for Niagara County (New York Statewide Digital Orthoimagery Program 2014). Impacts to the state-mapped wetland(s) would require the property owner to follow proper permitting procedures. Future development permits would be difficult to obtain if the wetlands were to be impacted.

The OCCP is now vacant, and the portion that contains AOC 1 is zoned low-density residential. Future use has been identified as industrial (Smith 2004). There are no former DoD structures on the OCCP. Historical aerial photographs of the OCCP show the presence of disturbed ground, small bermed clearings, and mounded material or debris piles that appeared during the time of DoD ownership. AOC 1 contains evidence of municipal waste (e.g., beverage containers, asphalt shingles, and tires) and construction debris (e.g., terra cotta pipes, transite siding, ceramic electrical junctions, and deteriorated steel drums). Most of this material appears to have been placed there during DoD ownership and relates to past DoD activities (U.S. Army Topographic Engineering Center 2002).

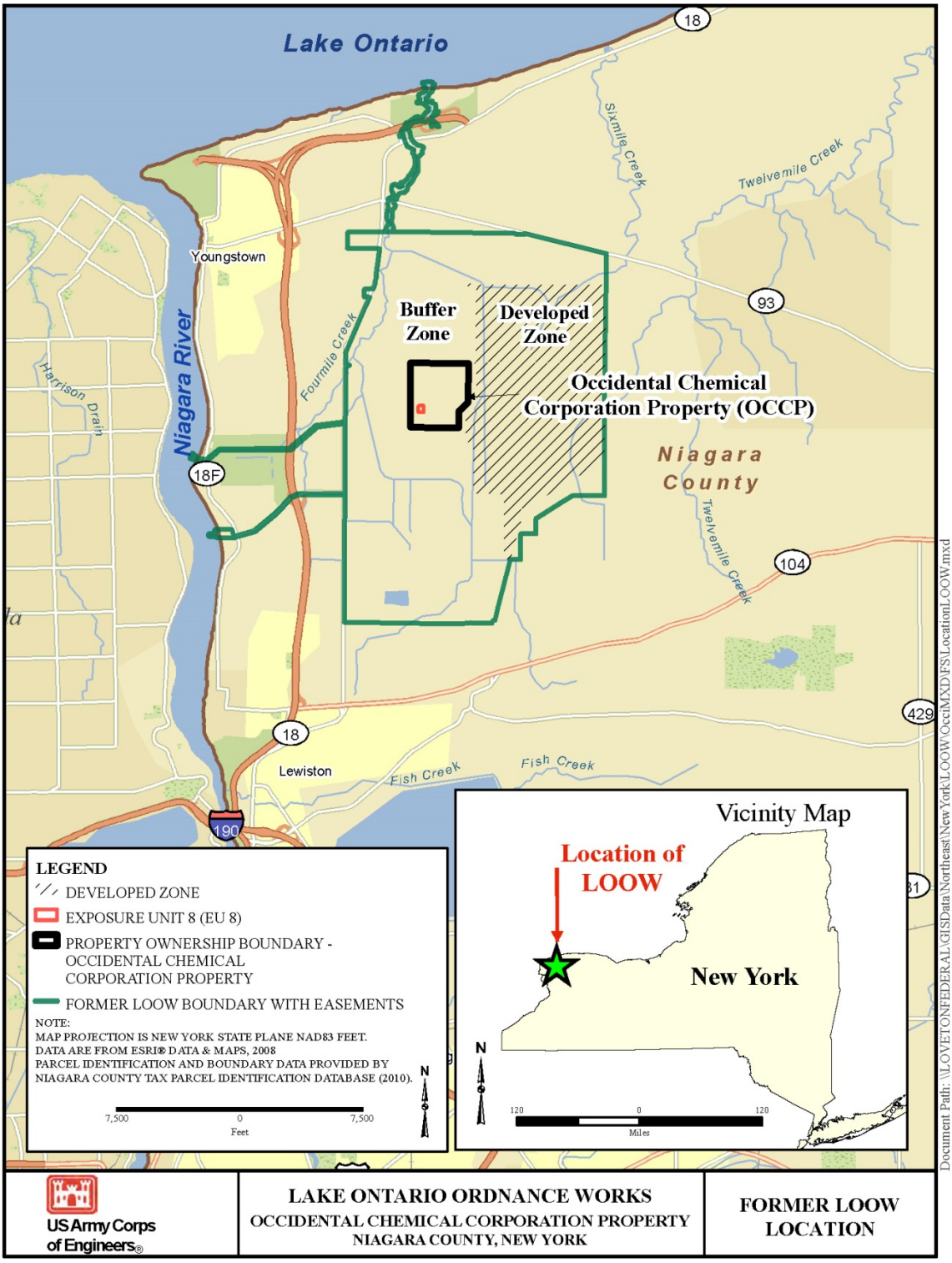

Figure 1. Former LOOW Location

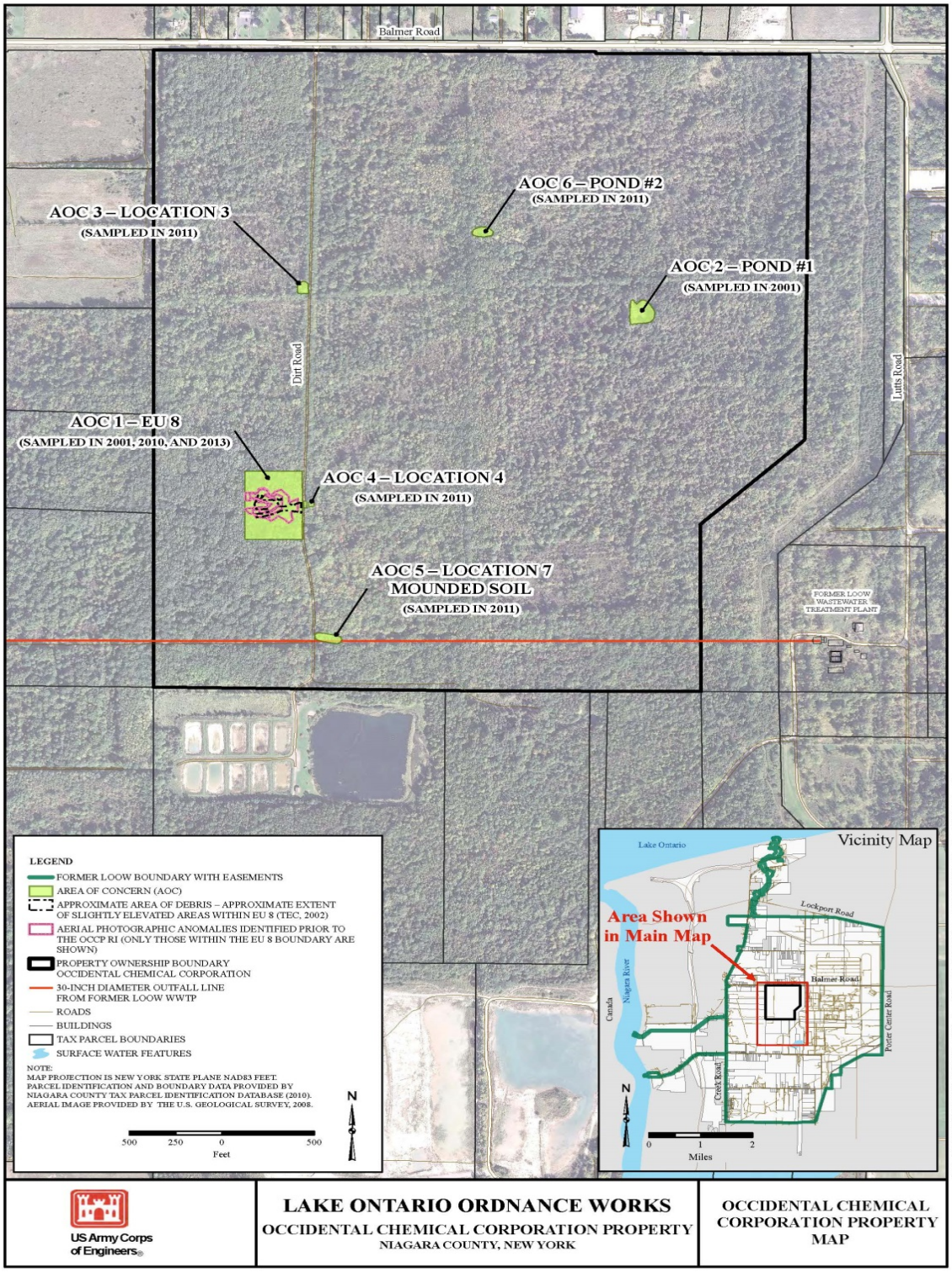

Figure 2. Occidental Chemical Corporation Property Map

SITE INVESTIGATIONS

The U.S. Army Corps of Engineers first investigated portions of the OCCP during a LOOW site-wide Phase II remedial investigation (RI) (USACE 2002). Subsequent investigations of other OCCP areas included a Small Bermed Clearing Investigation (USACE 2004) and a Phase III RI, which focused on underground utilities across the former LOOW (USACE 2008a). In 2008, the Corps of Engineers performed risk assessments on ten potential DoD-impacted areas across the former LOOW that warranted further evaluation. AOC 1 was designated EU 8 and an initial risk evaluation was conducted (USACE 2008b, c).

In 2013, the Corps of Engineers conducted a more comprehensive investigation of the entire OCCP parcel. It expanded upon previous investigations of the property (especially at AOC 1) and also investigated potential DoD-related ground disturbances identified in the historical aerial photographs. Based on the *Examination of Historical Aerial Photography—Selected Sites, Former LOOW* (U.S. Army Topographic Engineering Center 2002), 39 areas of interest (AOIs) within the OCCP were prioritized and preliminarily assessed. Following the assessment of each AOI for evidence of potential environmental impacts from former DoD operations, six AOCs, AOC 1 through AOC 6, were selected for further investigation. They are illustrated on Figure 2 and described below.

- AOC 1—Former dump area identified as a "presumed storage area" (1944 aerial photograph) and "disturbed ground" (1951 aerial photograph)
- AOC 2—Pond located in the eastern section of the OCCP
- AOC 3—Small dump area the Corps of Engineers identified during site reconnaissance in 2010
- AOC 4—Location of two buildings and a small structure shown in a 1944 aerial photograph
- AOC 5—Mounded material at the intersection of a dirt road and 30-inch outfall line the Corps of Engineers identified during site reconnaissance in 2010
- AOC 6—Pond located in the north-central section of the OCCP

The *Final Remedial Investigation Report for the Occidental Chemical Corporation Property at Formerly Used Defense Site Former Lake Ontario Ordnance Works, Niagara County, New York* (USACE 2013) documents the investigation results. The RI also included an updated risk assessment for EU 8 (AOC 1). Elevated concentrations of lead and 2,4,6-TNT were found in AOC 1 soils and fill that could pose risk to possible future users of the site. The contamination was identified within an area of fill that contains deteriorated steel 55-gallon drums. Maximum detected concentrations included 2,760 milligrams per kilogram (mg/kg) for lead and 19,000 mg/kg for 2,4,6-TNT. Concentrations exceeding RGs are generally confined to an area in the central portion of AOC 1 that is 55 ft by 100 ft (17 m by 30.5 m). They extend to a depth of 3 ft (1 m) bgs (Figure 3).

The Corps of Engineers determined there was negligible risk to any receptors from exposure to constituents in soil, sediment, and surface water at AOC 2, AOC 3, AOC 4, AOC 5, and AOC 6. The RI recommended no further environmental action or management for these AOCs.

Unacceptable risk associated with contaminants detected in soil at AOC 1 was identified and the RI recommended further environmental action and management. The *Final Feasibility Study Exposure Unit 8 – Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works Site, Niagara County, New York* (USACE 2015) evaluated potential impacts to groundwater from the soil contaminants and also remedial alternatives for soil. The total volume of soil with concentrations greater than the RGs was estimated at 611 cubic yards [yd^3] (467 cubic meters (m^3)). The concentrations reported in subsurface soil don't suggest an impact to groundwater; soil is the only medium of concern at AOC 1.

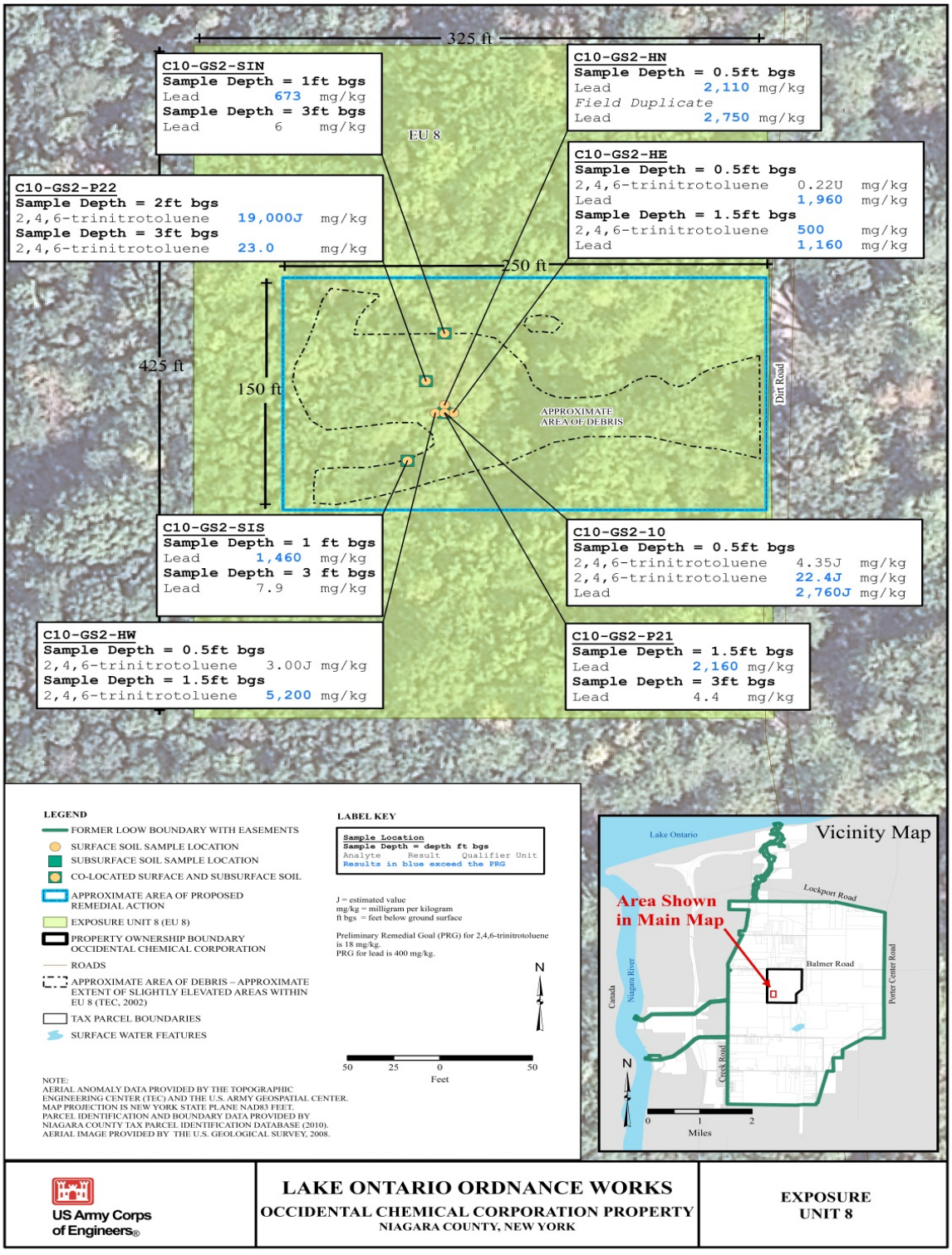

Figure 3. AOC 1 Extent of Soil Contamination

COMMUNITY OUTREACH EFFORTS DURING DEVELOPMENT OF THE FEASIBILITY STUDY

The Corps of Engineers performed the following activities to promote public involvement and awareness of the Feasibility Study for OCCP at LOOW:

- A public workshop was held at the Lewiston Senior Center in June 2015
- A fact sheet was distributed to stakeholders and interested members of the public during September 2015
- The document was posted at http://www.lrb.usace.army.mil/Missions/HTRW/DERPFUDS/LakeOntarioOrdnanceWorks.aspx

SUMMARY OF SITE RISKS

The Corps of Engineers conducted a human health baseline risk assessment and a screening level ecological risk assessment to determine the current and potential future effects of constituents of potential concern on human health and the environment (USACE 2013). The OCCP property is currently vacant and the portion that contains AOC 1 (EU 8) is zoned low-density residential, although future use has been identified as industrial. Therefore, a range of potential future users were evaluated in the human health risk assessment. It is the Corps of Engineers'current judgment that the preferred alternative identified in this PP, or one of the other active measures considered in this PP, is necessary to protect human health or welfare or the environment from actual or threatened releases of hazardous substances into the environment at AOC 1 (EU 8).

What are the "Constituents of Concern"?

The Corps of Engineers has identified two contaminants that pose the greatest potential risk to human health at EU 8.

Lead: Soil samples containing elevated lead concentrations were collected from surface soil located near deteriorated drums. Based on proximity to elevated concentrations of 2,4,6-TNT, the lead may also be attributed to former DoD activities. Lead is a naturally occurring element that can be harmful to humans, particularly children under the age of six, when ingested or inhaled. Lead poisoning can cause a number of adverse human health effects, but it is particularly detrimental to the neurological development of children.

For hundreds of years, lead has been mined, smelted, refined, and used in products (e.g., as an additive in paint, gasoline, leaded pipes, solder, crystal, and ceramics). Natural levels of lead in soil occur up to 55 parts per million (ppm) locally and 63 ppm for New York State. Mining, smelting, and refining activities have resulted in substantial increases in lead levels in the environment.

2,4,6-TNT: Major manufacturing of TNT began in the United States in 1916 at the beginning of World War I. It was produced in enormous quantities both commercially and at government ammunition plants for use in military munitions in World War I and World War II.

In 1942, the War Department obtained a 7,500-acre parcel of land in northwestern Niagara County, New York, for the construction of a TNT production facility designated as the LOOW. In 1943, after nine months of operation, the former LOOW was decommissioned due to excess TNT production at other War Department facilities.

Unused TNT may have been disposed of at EU 8 and released to the environment via the disposal process.

The primary routes of exposure to TNT in manufacturing environments are inhalation of dust and ingestion and dermal sorption of TNT particulates; significant health effects can include liver necrosis and aplastic anemia.

The Environmental Protection Agency (EPA) considers TNT to be a possible human carcinogen since TNT causes bladder cancer in laboratory rats.

HUMAN HEALTH RISKS

Of all the OCCP areas investigated, only AOC 1 (EU 8) required a full baseline human health risk assessment. The other AOCs were subjected to screening level human health and ecological risk assessments. These screening level assessments are performed by comparing the maximum detected concentrations of constituents of potential concern to risk-based concentrations developed by the USEPA to protect human health and ecological receptors. They are generally very conservative and indicate when chemicals are present that warrant further evaluation in a baseline risk assessment. These screening level assessments of other AOCs indicated that ecological and human exposure to chemicals in soil, sediment, and/or surface water would result in negligible risk. No further action is needed for these AOCs. Also, based on analytical data collected from a subset of small bermed clearings, the Corps of Engineers determined that they don't present a potential risk and recommended no further environmental investigation (USACE 2004).

The human health risk assessment for AOC 1 (EU 8) considered the most reasonably anticipated receptors and included an assessment for potential future resident adults and children as a conservative measure. Results indicate that the cumulative carcinogenic risks exceed the EPA acceptable risk range for those receptors. Carcinogenic risks were driven by 2,4,6-TNT in total soil, with the primary exposure routes being ingestion and also dermal contact. Noncarcinogenic health hazards for an adult trespasser, adolescent trespasser, maintenance worker, commercial worker, construction worker, and resident adult and child exceed the threshold hazard index value of 1. Noncarcinogenic hazards are almost exclusively due to 2,4,6-TNT. Lead in surface soil is a potential concern for a resident child based on an EPA lead uptake model, which considered incidental ingestion of contaminated soil and inhalation of contaminated fugitive dust.

ECOLOGICAL RISKS

AOC 1 (EU 8) was found to have high concentrations of metals and explosives, to the extent that lower trophic level receptors (plants and invertebrates) and higher trophic level receptors (shrew, rabbit, robin, and hawk) are potentially at risk from exposure to these contaminants. Achievement of the remedial action objective (RAO) based on the protection of human health will reduce elevated concentrations of 2,4,6-TNT and lead and concurrently decrease the risks to ecological receptors.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Table 3-1 of the FS (USACE 2015) listed the following substantive, non-procedural, non-permit-related parts of regulations as potential applicable or relevant and appropriate requirements (ARARs) to ensure the protectiveness of the proposed remedial actions at the site.

Details regarding the ARAR selection process can be found in Section 3.0 of the FS (USACE 2015). No ARARs were identified for the preferred alternative identified in this PP.

REMEDIAL ACTION OBJECTIVE

The remedial action objective for AOC 1 is to prevent direct contact with constituents of concern (COCs) in total soil that cause an unacceptable risk to an exposed hypothetical potential future resident. For 2,4,6-TNT, the exposure pathways that are driving risk and need to be mitigated are incidental ingestion and dermal contact with contaminated soil, while for lead, incidental ingestion of contaminated soil is the dominant exposure pathway. To meet this objective, risk-based RGs were developed for COCs in the total soil that contribute 10 percent or greater to cumulative estimated carcinogenic risks or have an estimated target organ-specific noncancer hazard index greater than 1. The risk-based RGs were developed to be protective for potentially exposed resident adult and child receptors; they are levels that are safe to remain in place at the site. The RGs are presented in the following table.

Summary of Human Health RGs for Total Soil at the OCCP—AOC 1 (EU 8)

Chemical of Concern	Maximum Detected Concentration (mg/kg)	RG (mg/kg)	Basis
Receptor(s): Resident Adult and Child			
Explosives			
2,4,6-TNT	19,000	18	Risk-based (carcinogenic, $>10^{-6}$)
Metals			
Lead	2,760	400	Risk-based

Legend:
2,4,6-TNT = 2,4,6-trinitrotoluene
mg/kg = milligrams per kilogram
RG = remediation goal

The estimated volume of COC-contaminated soil exhibiting concentrations above the RGs within AOC 1 (EU 8) is 611 yd^3 (467 $m^{3)}$, which includes approximately 204 yd^3 (156 $m^{3)}$ of debris. The contaminated area encompasses approximately 5,500 square feet. Total lead was detected in the surface soil at concentrations greater than 20 times the toxicity characteristic level provided in 40 CFR 261.64. This suggests that excavated surface soil may be classified as hazardous waste (Code D008).

SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives for AOC 1 (EU 8) are presented below. They are numbered to correspond with the FS.

The Corps of Engineers identified five remedial alternatives for detailed analysis to address the contaminants in total soil at AOC 1. The alternatives were developed by combining general response actions, technology types, and process options retained from a screening process conducted in the FS. All alternatives, except Alterantive 1, were developed to address the contaminants in soil at AOC 1 and thereby meet the RAO.

Alternative 1: No Action

The No Action alternative is required under *40 CFR 300: National Oil and Hazardous Substances Pollution Contingency Plan* (U.S. EPA 1994) for the FS as a baseline against which all other alternatives are compared. Under this alternative, there would be no remedial response actions implemented to address 2,4,6-TNT and lead in total soil. Engineering and land-use controls (LUCs) would not be implemented. There would be no public awareness or education training about potential risks associated with the contaminated soil. There are no costs associated with Alternative 1.

Alternative 2: Land-Use Controls

This alternative includes implementing LUCs/institutional controls (ICs) and engineering controls/access restrictions to prevent potential exposure to contaminated soil. The contaminated soil would not be treated or removed. This alternative would prohibit recreational use of and access to AOC 1. It limits land or resource use by providing information that helps modify, limit, or eliminate human contact on site. The ICs and engineering controls/access restrictions may include environmental easements, deed restrictions, deed notices, consent orders, groundwater use restrictions, fencing, access controls, and signage. The alternative includes long-term monitoring (LTM) and maintenance with periodic (every five years) reviews for a minimum of 30 years. The estimated cost associated with Alternative 2 is $3,049,326; the annual operations, maintenance, and monitoring cost is $2,684,465 and the capital cost is $364,861.

Alternative 3: Landfill Cap

This alternative includes placement of a low permeability cap over the contaminated soil to prevent human and ecological exposure to the contaminants. A Resource Conservation and Recovery Act (RCRA) Subtitle C-equivalent cap would be placed over the contaminated fill area and keyed into the underlying native clay. The cap would generally consist of an upper layer (i.e., vegetative cover and topsoil), a drainage layer, a low permeability layer (i.e., synthetic liner over compacted clay), and a grading layer. The alternative includes LUCs, LTM, and maintenance with periodic (every five years) reviews to assess effectiveness of the remedial action. The estimated cost associated with Alternative 3 is $5,510,363; the annual operations, maintenance, and monitoring cost is $4,935,528 and the capital cost is $574,836.

Alternative 4: Excavation and Off-Site Disposal

This alternative includes excavating and disposing off site all impacted soil that contains 2,4,6-TNT and lead above the RGs. Excavated soil and comingled debris would be disposed of at a permitted transportation, storage, and disposal facility (TSDF). Some pretreatment/stabilization of contaminated soil may be necessary to meet land disposal restrictions if analytical data determines that the contaminated soil is RCRA hazardous waste in accordance with 40 CFR Part 261. Area of Concern 1 would be restored to a condition that allows for unlimited use and unrestricted exposure. Soil sampling would be performed to confirm that contaminated soil above the RGs has been removed The estimated cost associated with Alternative 4 is $846,045; the annual operations, maintenance, and monitoring cost is $0; and the capital cost is $846,045.

Alternative 5: In Situ Chemical Reduction/Oxidation and Stabilization

This alternative includes on-site treatment of contaminated soil using chemical reduction/ oxidation to reduce the 2,4,6-TNT concentrations and stabilize lead in soil. Debris comingled with the contaminated soil would be removed prior to soil treatment. The debris would be disposed of at a permitted TSDF. Contaminated soil would be treated on site and would remain in AOC 1. Soil sampling would be performed to confirm that contaminated soil above the RGs has been treated. This alternative includes LUCs, LTM, and maintenance with periodic (every five years) reviews to evaluate effectiveness of the remedial action. The estimated cost associated with Alternative 5 is $6,370,882; the annual operations, maintenance, and monitoring cost is $4,935,528, and the capital cost is $1,435,354.

EVALUATION OF ALTERNATIVES

The Corps of Engineers used nine CERCLA criteria, discussed below, to evaluate the remediation alternatives and select a remedy. This section summarizes the relative performance of each alternative against the nine criteria and how each compares to the other alternatives under consideration. A detailed analysis of alternatives is provided in the FS (USACE 2015).

The nine criteria consist of two threshold criteria, five balancing criteria, and two modifying criteria. The threshold criteria include overall protectiveness of human health and the environment and compliance with ARARs. These must be met by any remedial alternative for it to be considered a viable remedy.

The five balancing criteria include long-term effectiveness and permanence; short-term effectiveness; reduction of toxicity, mobility, and volume through treatment; implementability; and cost. They are the primary criteria upon which the detailed analysis was based.

The remaining two criteria include state acceptance and community acceptance. They are typically evaluated following a public comment period on the PP and will be addressed during preparation of a decision document.

CERCLA Evaluation Criteria for Remedial Alternatives

Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to human health and the environment through ICs, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets cleanup criteria, standards of control, or requirements of other environmental laws and regulations that pertain to the contamination, or whether a waiver is justified.
Long-Term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume 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.

CERCLA Evaluation Criteria for Remedial Alternatives

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, and present-worth cost. Present-worth cost 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.
State/Support Agency Acceptance considers whether the state agrees with the Corps of Engineers' analyses and recommendations, as described in the RI/FS and PP.
Community Acceptance considers whether the local community agrees with the Corps of Engineers' analyses and preferred alternative. Comments received on the PP are an important indicator of community acceptance.

1. Overall Protection of Human Health and the Environment

All remedial alternatives, except Alternative 1 (No Action) and Alternative 2 (LUCs) would be protective of human health and the environment. If no action is taken at AOC 1, the risks to an adolescent trespasser, maintenance worker, commercial worker, construction worker, and resident adult and child receptors would continue to exceed the threshold hazard index and acceptable carcinogenic risk range (residential adult and child). Alternative 2 would be protective of human health but may not be protective of the environment. Alternatives 3, 4, and 5 would be effective in protecting human health and the environment and would achieve RAO. Because Alternative 1 isn't protective of human health and the environment, it is eliminated from consideration under the five balancing criteria.

2. Compliance with ARARs

Alternatives 1 and 2 would not comply with ARARs and would not satisfy the statutory preference for treatment as a principal element of remedial response. Alternatives 3 and 5 would comply with ARARs. There were no ARARs identified for Alternative 4.

3. Short-Term Effectiveness

Alternatives 2, 3, 4, and 5 are rated high for short-term effectiveness. Potential risks to the community, site personnel, and the environment during implementation of Alternatives 3, 4, and 5 could be mitigated by using established procedures for worker safety and health; air monitoring; water management; erosion and sedimentation controls; and waste management, transportation, and disposal.

4. Long-Term Effectiveness and Permanence

Alternative 2 would not be effective in the long term because environmental exposures may occur. Alternative 3 would reduce the mobility of the contaminants, and it would eliminate risk to potential future receptors. The LUCs and LTM would ensure that any exposure to human and environmental receptors would remain within acceptable levels. Alternative 4 provides the greatest long-term effectiveness because it would remove, for permanent disposal off site, all soils above risk-based RGs. Alternative 5 is expected to reduce the concentrations of 2,4,6-TNT in soil to below the risk-based RGs and would reduce the mobility of lead in soil. However, this alternative would require LUCs and LTM after implementation to demonstrate the long-term effectiveness of the remedy with respect to stabilizing lead in soil.

5. Reduction of Toxicology, Mobility, and/or Volume Through Treatment

Alternative 2 doesn't actively treat or remove the contaminants. Reduction of the toxicity, mobility, and/or volume of the contaminants would only occur by natural attenuation processes. Alternative 3 won't reduce the toxicity or volume of contaminants but would reduce their mobility in soil. Alternative 4 permanently eliminates the toxicity, mobility, and volume of contaminants at AOC 1. Waste treatment at the TSDF, if necessary, would reduce the toxicity and/or volume of the contaminants. The facility's engineering controls would reduce contaminant mobility at the TSDF. Alternative 5 would reduce the toxicity, volume, and mobility of the contaminated soil and may require LUCs and LTM after implementation.

6. Implementability

Alternative 4 is rated the highest for implementability because the equipment, materials, and labor are readily available. Alternative 4 is technically and administratively feasible. Alternatives 2, 3, and 5 are technically feasible because equipment, materials, and labor are readily available to implement the remedies. However, their administrative feasibility is considered low because the property isn't owned by the federal government.

7. Cost

Alternative 4 has the lowest total cost. Total costs for Alternatives 2, 3, and 5 are approximately 3.5 to 7.5 times greater than Alternative 4.

8. State/Support Agency Acceptance

State/support agency acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the decision document for the OCCP at the former LOOW.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the decision document.

The following table summarizes the screening and comparative analysis of all potential alternatives for remediating contaminated soil at AOC 1.

SUPPORT AGENCY COORDINATION

The New York State Department of Environmental Conservation reviewed the FS, concurred with the alternatives evaluated, and concurred with how the alternatives were screened and analyzed. The Department will have an opportunity to review this PP and provide their support, or lack thereof, of the preferred alternative. The Department's response will be documented in a responsiveness summary, which is included in a decision document for the site.

Comparative Analysis of Alternatives for COCs in Total Soil at OCCP—AOC 1

Alternative	Protection of Human Health and the Environment	Compliance with ARARs	Short-Term Effectiveness	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Implementability	Costs ($–2015)		
							Total	Capital	Operation, Maintenance, and Monitoring
Alternative 1: No Action	○	○	●	○	○	◌	$0	$0	$0
Alternative 2: Land-Use Controls	◌	○	●	○	○	◌	$3,049,326	$364,861	$2,684,465
Alternative 3: Landfill Cap	●	●	●	◌	◌	◌	$5,510,363	$574,836	$4,935,528
Alternative 4: Excavation and Off-Site Disposal	●	●	●	●	●	●	$846,045	$846,045	$0
Alternative 5: In Situ Chemical Reduction/Oxidation and Stabilization	●	●	●	◌	●	◌	$6,370,882	$1,435,354	$4,935,528

Legend:
ARARs—applicable or relevant and appropriate requirements
COC – constituent of concern
HH&E – human health and the environment

Ratings			
Factors	●	◌	○
Protection of Human Health and the Environment	Protective	Moderate rating or not all factors addressed	Not protective
Compliance with ARARs	Compliant or No ARARs were identified	Moderate rating or not all factors addressed	Noncompliant
Short-Term Effectiveness	Protective of the community and workers during the remedial action, low environmental impacts, low period of time to achieve remedial action objectives	Moderate rating or not all factors addressed	Not protective of the community and workers during the remedial action, high environmental impacts, long period of time to achieve remedial action objectives
Long-Term Effectiveness and Permanence	Low residual risk, adequate and reliable controls	Moderate rating or not all factors addressed	High residual risk, inadequate and unreliable controls
Reduction of Toxicity, Mobility, or Volume Through Treatment	Will reduce toxicity, mobility, and volume through treatment	Moderate rating or not all factors addressed	Won’t reduce toxicity, mobility, and volume through treatment
Implementability	Easy to implement, available services and materials, administratively feasible	Moderate rating or not all factors addressed	Difficult to implement, limited availability of services and materials, low administrative feasibility

This page intentionally left blank

SUMMARY OF THE PREFERRED ALTERNATIVE

The Corps of Engineers prefers Alternative 4, Excavation and Off-Site Disposal, to address contaminated soils at AOC 1. All soils exceeding the RGs will be excavated and transported off site to a permitted TSDF. It will attain the RAO. Alternative 4 is considered protective in the long term because all contaminated soils exceeding the risk-based RGs will be removed from the site. Alternative 4 also provides the best balance of long-term effectiveness, short-term effectiveness, and cost. It has the highest implementability rating of the evaluated alternatives.

The Corps of Engineers expects the preferred alternative to satisfy the following statutory requirements for CERCLA § 121(b): (1) be protective of human health and the environment; (2) be cost-effective; and (3) utilize permanent solutions that will preclude any future environmental impact.

REFERENCES

Public Comment Period

December 5, 2016 – February 7, 2017

The Corps of Engineers will accept written comments on the Proposed Plan during the public comment period. Written comments may be submitted to:

U. S. Army Corps of Engineers
Special Projects Branch
Environmental Project Management Team
1776 Niagara Street
Buffalo, NY 14207-3199

Public Meeting

January 11, 2017 @ 6:30 PM

Lewiston Senior Center
4361 Lower River Road
Youngstown, NY 14171

For more information, the administrative record file is accessible electronically at:

Lewiston Public Library
305 South 8th Street
Lewiston, NY 14092

Youngstown Free Library
240 Lockport Street
Youngstown, NY 14174

Or by appointment only:

1-800-833-6390 (Option 4)
U.S. Army Corps of Engineers Buffalo District
1776 Niagara Street
Buffalo, NY 14207

New York Statewide Digital Orthoimagery Program, 2014. http://gis.ny.gov/gateway/orthoprogram/lot14/niagara.htm May.

Smith, Peter and Company, Inc. 2004. *A Comprehensive Plan for the Town of Porter: Connecting our Past with Our Future.* August.

USACE 2002. *Final Report of Results for the Phase II Remedial Investigation at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.* Prepared by EA. February.

USACE 2004. *Small-Bermed Clearing Supplemental Investigation Summary Report.* March.

USACE 2008a. *Report of Results for the Remedial Investigations of Underground Utility Lines, Formerly Used by the Department of Defense, Lake Ontario Ordnance Works (LOOW), Niagara County, NY. Final.* Prepared by EA. September.

USACE 2008b. *Final Human Health Risk Assessment of Selected Exposure Units (EU1–EU6, EU8, EU9, EU10) at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, NY, Volumes I–V.* Prepared by EA. December.

USACE 2008c. *Final Screening Level Ecological Risk Assessment of Selected Exposure Units Within the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.* Prepared by EA. December.

USACE 2013. *Final Remedial Investigation Report for the Occidental Chemical Corporation Property at Formerly Used Defense Site Former Lake Ontario Ordnance Works, Niagara County, New York.* April.

USACE 2015. *Final Feasibility Study Exposure Unit 8—Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works Site, Niagara County, New York.* June.

U.S. Army Topographic Engineering Center 2002. *Examination of Historical Aerial Photography—Selected Sites, Former LOOW.* September.

U.S. EPA 1994. *National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule. 59 FR 47384.* September.

This page intentionally left blank

Tear off sheet

Please Print Your Comments Below

Your input on the *Proposed Plan for the Occidental Chemical Corporation Property at the Former Lake Ontario Ordnance Works* is important to the Corps of Engineers. Comments provided by the public are valuable in helping the Corps of Engineers select a final remedy for AOC 1.

You may use the space below to write your comments. Then fold and mail this tear off sheet to the U.S. Army Corps of Engineers Buffalo District. Comments must be postmarked by 07 February 2017. If you have questions regarding the proposed plan, please contact the Corps of Engineers Buffalo District Environmental Project Management Team at *derpfuds@usace.army.mil* or call 1-800-833-6390 (Option 4).

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Submitted by:

Name: _____

Organization: _____

Address: _____

_____

_____

Tape Here

Tape here

Tape here

2nd Fold Here

Please Affix First Class Postage

U. S. Army Corps of Engineers
Special Projects Branch
Environmental Project Management Team
1776 Niagara Street
Buffalo, NY 14207-3199

1st Fold Here