



5050 South Syracuse Street, Suite 1150  
Denver, Colorado 80237  
Phone: (303) 799-6100

October 8, 2023

Brook Svoboda  
Director of Planning and Development  
City of Northglenn  
11701 Community Center Drive  
Northglenn, Colorado 80233

email: [bsvoboda@northglenn.org](mailto:bsvoboda@northglenn.org)

**SUBJECT: DRAFT Analysis of Brownfield Cleanup Alternatives**  
**City of Northglenn – Former Recreation Center**  
**11801 Community Center Drive**  
**Northglenn, Colorado 80233**

Dear Mr. Svoboda:

Atlas Technical Consultants LLC (Atlas) has prepared the attached Draft Analysis of Brownfield Cleanup Alternatives (ABCA) of the proposed cleanup at the above referenced site.

Thank you for the opportunity to assist, and we look forward to the opportunity to provide continuing services to the City.

If you have any questions related to the attached, please contact the undersigned at your convenience.

Respectfully submitted,

**ATLAS TECHNICAL CONSULTANTS, LLC**

A handwritten signature in black ink, appearing to read "Kelly Schmitt".

Kelly Schmitt  
National Brownfields Director  
(414) 828-6863  
[kelly.schmitt@oneatlas.com](mailto:kelly.schmitt@oneatlas.com)

A handwritten signature in black ink, appearing to read "R. Daniel Lewis".

R. Daniel Lewis, P.G.  
Denver Branch Manager  
(303) 248-8846  
[robert.lewis@oneatlas.com](mailto:robert.lewis@oneatlas.com)

Attachment: Draft Analysis of Brownfield Cleanup Alternatives

## DRAFT ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

City of Northglenn – Former Recreation Center  
11801 Community Center Drive, Northglenn, Colorado 80233  
October 2023

This Analysis of Brownfield Cleanup Alternatives (ABCA) was cooperatively prepared by the City of Northglenn (City) and Atlas Technical Consultants, LLC (Atlas) as a requirement for consideration in receiving United States Environmental Protection Agency (EPA) grant monies to remediate the former Northglenn Recreation Center (Rec Center).

The former Rec Center is located at 11801 Community Center Drive in Northglenn, Adams County, Colorado (herein referred to as the property or the site) is currently vacant and in the process of being abated and demolished.

Prior to conveyance of the site to the City of Northglenn, the site was developed with the Brown Reservoir and associated berm. After acquiring the property, the reservoir and associated berm would impact the construction and future use and maintenance of Community Center Drive, and the berm needed to be removed. Removal of the berm eliminated the need for fill to be imported to the site to be redeveloped by the City of Northglenn. More recent environmental investigations have identified elevated levels of certain metals in the soils, which will require remediation prior to redevelopment of the property.

The City of Northglenn, acquired the property, and thus will be the property owner when implementing the work activities discussed in this ABCA, if the coinciding grant application is approved.

### Site Details

Site Name:	Former Northglenn Recreation Center 11801 Community Center Drive Northglenn, Colorado 80233
Property Owner:	City of Northglenn 11701 Community Center Drive Northglenn, Colorado 80233
Site Representative:	Eric Ensey, AICP email: eensity@northglenn.org Senior Planner  City of Northglenn 11701 Community Center Drive Northglenn, Colorado 80233

## Summary of Previous Site Activities

### Site History

The site consists of an approximate 6.85-acre parcel located at 11801 Community Center Drive associated with Adams County Assessor's Parcel Number 0171903214005. The irregularly shaped parcel is improved with an approximately 50,000 square-foot, former municipal Recreation Center constructed in 1975, located on the western half of the property. The eastern half of the property is improved with paved parking and remaining site grounds are improved with landscaped areas and concrete paved walking paths.

The site was originally agricultural land and then owned by the Deal Development Company out of Texas and used as the Brown Reservoir. After acquiring the property, the reservoir's berm was regraded due to it impacting construction of a new road (now Community Center Drive). In 1975 the Northglenn Rec Center was constructed and used until 2022 when a new Rec Center was constructed. The former rec center is currently being demolished in preparation for site cleanup and redevelopment.

### Previous Environmental Assessments/Other Environmental Investigations

- *Phase I Environmental Site Assessment (December 17, 2018, CTL Thompson);*
- *Phase II Environmental Assessment Report (December 30, 2019, Ayres Associates);*
- *Limited Phase II Environmental Site Assessment Report (November 20, 2020, CTL Thompson);*
- *Limited Site Investigation Report (October 25, 2021, Terracon);*
- *Asbestos Inspection Report (August 10, 2022, Terracon);*
- *Asbestos Abatement Work Plan (August 19, 2022, Terracon);*
- *Phase I Environmental Site Assessment (September 22, 2022, Terracon);*
- *Limited Phase II Site Assessment Field Activities (July-September 2022, Terracon); and*
- *Voluntary Cleanup Application (August 28, 2023, Terracon).*

Based on historical information obtained from the previous environmental assessments conducted at the site, the metal impacts observed at the site appear to be located within the footprint of a former reservoir.

Subsurface assessments identified the general lithology to consist of varying thickness of silty and sandy clay fill from surface to 12 feet below ground surface (bgs), and native clay, sandy clay, and claystone to 23 feet bgs.

Contaminants of Concern (COCs) identified (by others) at the site are lead and arsenic. Lead and arsenic concentrations exceeding the EPA Residential and Industrial Regional Screening Levels (RSLs) and/or the Colorado Department of Public Health and Environment (CDPHE) background concentrations for arsenic appear to be primarily located within the upper eight feet of the soil column. Spatially, arsenic impacts exceeding the CDPHE background concentration are widespread across the site, with lead impacts more localized along the eastern edge of the property and underneath the former Recreation Center.

Initial investigations by Ayres and CTL Thompson included limited Toxic Characteristic Leaching Procedure (TCLP) evaluations of either lead and/or arsenic at the site, though several samples collected during those investigations exceeded the 100 milligrams per kilogram (mg/kg) TCLP screening threshold.

In order to evaluate the potential for soils leaching into groundwater, Terracon analyzed soils for leachability, and lead and/or arsenic exceeded the TCLP screening threshold in 56 of the samples analyzed. Lead concentrations in excess of the TCLP maximum contaminant standard of 5 milligrams per liter (mg/L) were reported in 13 of the soil samples collected by Terracon and/or CTL Thompson. Spatially, the lead impacts exceeding the TCLP maximum contaminant standard were located within the soil along the eastern edge of the property and underneath and to the north of the former Recreation Center and from ground surface to about six feet bgs.

Based upon these findings, Terracon and the City of Northglenn development team met with CDPHE personnel to discuss the results of the additional investigations conducted up to and including 2022, and to renew discussions on entering the site into the Voluntary Cleanup Program (VCUP) in advance of an EPA Brownfield Grant application. Based on the data collected from the various investigations, the VCUP administrator, in consultation with CDPHE's epidemiological risk assessment team identified alternative site-specific cleanup levels for soil impacts of 800 mg/kg for lead, and 50 mg/kg for arsenic for residential use, provided any residual soils that were left in place would be capped by both four feet of clean fill, as well as a warning barrier.

## Summary of Site Characterization

The following summary of site conditions is extracted from the VCUP Application (by others) and is based upon prior site investigations.

### Soil Data Summary

Terracon compiled the soil analytical results completed at the property, which were compared to the 2022 EPA RSLs, the CDPHE background concentration for arsenic in Colorado soils (CDPHE, July 2014), the EPA TCLP screening threshold, and the EPA TCLP maximum contaminant level. The following summarizes the testing results:

- Resource Conservation and Recovery Act (RCRA) metal detections included arsenic, barium, cadmium, chromium, lead, silver, and mercury in various soil samples. Concentrations exceeding EPA RSLs, and/or TCLP screening thresholds were limited to lead and arsenic.
- Lead was detected above the laboratory reporting limit in all collected soil samples. Reported concentrations ranged from 5.11 mg/kg (NRC1-026, 8-10 feet (ft)) to 2,120 mg/kg (NRC1-011, 0-2 ft).
- Lead exceeded the TCLP screening threshold of 100 mg/kg in 56 of the 197 samples collected. Subsequent TCLP extraction and analysis for lead detected concentrations exceeding the TCLP maximum contaminant level of 5 milligrams per liter (mg/L) in 11 samples with reported TCLP exceedances ranging from 5.56 mg/L (NRC2-045, 4-6 ft) to 15.8 mg/L (NRC2-043, 4-6 ft).
- Arsenic was detected above the laboratory reporting limit in 177 of the 187 soil samples. The CDPHE recognizes that arsenic can be naturally occurring and has authored the document titled: *Risk Management Guidance for Evaluating Arsenic Concentrations in Soil*, published 2011, revised in 2014 (CDPHE, 2014). This document states that arsenic has been demonstrated to be naturally occurring in Colorado soils at concentrations significantly higher than the national average. The CDPHE developed an average background concentration of arsenic found in certain native Colorado soils averaging 11 mg/kg, with measured concentrations as low as 3 mg/kg and as high as 19 mg/kg.

Terracon compiled the detected arsenic concentrations in the soil borings, which were compared against the average background soil concentration of 11 mg/kg. Of the soil samples with reported arsenic, 62 samples exceeded 11 mg/kg, with concentrations ranging from 11.20 mg/kg (NRC2-043, 6-8 ft) to 331 mg/kg (NRC1-011, 0-2 ft). Voluntary Cleanup Program Application Northglenn Civic Center Development, Northglenn, Colorado, August 28, 2023.

Arsenic exceeded the TCLP screening threshold of 100 mg/kg in 10 of the 197 samples. Subsequent TCLP extraction and analysis for arsenic did not detect concentrations exceeding the TCLP threshold of 5 mg/L.

- Polynuclear Aromatic Hydrocarbons (PAHs) were not reported in the soil samples above the EPA RSLs.
- Volatile Organic Constituents (VOCs) were not reported in soil samples except for acetone which was reported in two soil samples. Reported concentrations were significantly lower than the EPA Residential RSL for acetone, and was believed to be the result of laboratory contamination. The following standards were used for risk determination at the site:

The EPA RSLs for soil (May 2022: Target Cancer Risk (TR) of 1E-6, Hazard Quotient (HQ) or 1.0), were further evaluated where applicable using site-specific cleanup goals, and exposure-route

specific screening levels for residential and composite worker land use; and considered the following:

- The Colorado background concentration for arsenic (11 mg/kg), per the CDPHE;
- Arsenic Concentrations in Soil Risk Management Guidance for Evaluating;
- (Reviewed/ Revised July 2014) and site-specific cleanup goals;
- The CDPHE Water Quality Control Commission published Basic Standards for Groundwater, for groundwater standards (June 30, 2020), referred to as CGWQS in this document; and
- The EPA TCLP screening threshold and EPA TCLP maximum contaminant level for lead and arsenic.

Based on the data collected from the various investigations, the VCUP administrator, in consultation with CDPHE's epidemiological risk assessment team, have identified alternative site-specific cleanup levels for soil impacts as follows:

- 800 mg/kg for lead, and 50 mg/kg for arsenic for residential use at the site, provided the residual soils were capped by four feet of clean fill and a warning barrier is installed. After implementation of the remediation plan described below, potential risks to human health or environment on-site will be considered low.

## Remedial Action Objectives

The objectives of the proposed remedial actions would be to attenuate human exposure risks from lead and/or arsenic in soils; and upon completion of the actions, the site would be available for redevelopment for use by the greater community.

As noted above, maximum residual concentrations of 800 mg/kg for lead, and 50 mg/kg for arsenic for residential use were used for risk determination at the site. These concentrations include the provision the residual soils would be capped by four feet of clean fill, and a warning barrier would be installed.

Upon implementation of the above remedial actions, these objectives would be considered to have been met.

## Analysis of Remedial Alternatives

The remedial action alternatives considered were evaluated using the following criteria:

### Effectiveness

- a. The degree to which the toxicity, mobility, and volume of the contamination is expected to be reduced.

- b. The degree to which a remedial action option, if implemented, will protect public health, safety and welfare and the environment over time.
- c. Taking into account any adverse impacts on public health, safety and welfare and the environment which may be posed during the construction and implementation period until case closure.

#### Implementability

- a. The technical feasibility of constructing and implementing the remedial action option at the Site or facility.
- b. The availability of materials, equipment, technologies and services needed to conduct the remedial action option.
- c. The administrative feasibility of the remedial action option, including activities and time needed to obtain any necessary licenses, permits or approvals; the presence of any federal or state, threatened or endangered species; and the technical feasibility of recycling, treatment, engineering controls, disposal or naturally occurring biodegradation; and the expected time frame needed to achieve the necessary restoration.

#### Cost

- a. The following types of costs are generally associated with the remedial alternatives:
  - Capital costs, including both direct and indirect costs; Initial costs, including design and testing costs.
  - Annual operation and maintenance costs.

#### Reasonableness

- a. Evaluation of whether the alternative is reasonable in nature.

#### Resilience

- a. Resilience to address potential adverse impacts caused by extreme weather events.

Based upon the above criteria, included below is a summary of remedial alternatives considerate to be available and feasible for the site.

#### Summary of Remedial Alternatives: Soil

1. Alternative 1 – No Action.
2. Alternative 2 – (Partial Excavation – Environmental Use Restriction)
3. Alternative 3 – Complete Excavation and Disposal of Impacted Soils

## Detailed Consideration of Remedial Alternatives: Soil

### Alternative 1 – (No Action)

If no action is taken at the site, the impacted near-surface soil will remain on the site and it will impede and complicate redevelopment of the Site and present a potential exposure risk to future occupants or construction workers. Additionally, if the site is not secured, it is possible that either City workers, or the public could come into direct contact with the impacted soils, thus creating a potential environmental, health, and welfare liability for the City. This option is considered the least environmentally protective and the impacts to the environment will likely continue for an indeterminate period.

Implementation of this alternative has no direct cost. However, this option is considered the least environmentally protective and the impacts to the environment will likely continue for an indeterminate period. This alternative does not protect against potential extreme weather events such as large flooding events that could spread contaminated soils offsite. Therefore, implementation of this option is not considered reasonable.

### Alternative 2 – (Partial Excavation– Environmental Use Restriction)

As detailed in the VCUP Application by Terracon, partial excavation for the site is summarized below.

- Excavation and off-site disposal of lead impacted soils above TCLP and lead and arsenic impacted soils above the site-specific soil cleanup levels. TCLP soils would be stabilized on-site for off-site disposal as non-hazardous waste.
- Development of site-specific soil cleanup levels of 800 mg/kg for lead and 50 mg/kg for arsenic. Excavation and off-site disposal of soil exceeding these site specific soil cleanup levels.
- Relocation of soils above EPA Residential RSLs, but below the site-specific soil cleanup levels.
- Regrading of the site and placement of a warning barrier over residual soils exceeding EPA residential RSLs.
- Conducting remediation within proposed utility corridors.
- Import and placement of four feet of clean soil cap above relocated soils.

The advantage of partial, targeted excavation and disposal is that it expeditiously addresses the environmental concerns with respect to the hazardous substances present in the subsurface soil, and removes the more accessible, and more impacted soil from the site. The excavation can focus on source areas or only areas with the highest contaminant concentrations. Soil source removal alleviates any long-term effects with managing soil contamination migration to groundwater and

subsequent groundwater impacts. In addition, removal of shallow impacted soil would have a positive effect on potential human exposure pathways.

As noted, this remedial approach was detailed by Terracon in their VCUP Application, and, was considered to be an acceptable remedial option by the CDPHE. If implemented, the CDPHE determined that human exposure risks would be low. Implementation of this alternative would leave a land use (Restrictive Covenant) in place on the site.

The cost for implementation of this alternative has been estimated around \$2.7 million by Terracon, as part of their VCUP Application to the CDPHE. Implementation of this option is considered most reasonable, as it eliminates the most direct exposure human health pathways, while still leaving some impacted media in place. It also minimizes potential adverse effects due to extreme weather events by eliminating the highest concentrations of soil and placing a four-foot soil cap.

### Alternative 3 – (Complete Excavation and Disposal of Impacted Soils)

This alternative would include the remove of all impacted soils with lead concentrations above 800 mg/kg, and/or arsenic concentrations above 50 mg/kg. This alternative would involve a significant increase in volumes removed. Logistically, some soils with concentrations below these thresholds would require removal as well, due to difficulty of segregating soils on a micro scale from soils with concentrations above these thresholds. Implementation of this alternative would eliminate the need for a warning barrier, and no Restrictive Covenant would be needed for the site.

Implementation of the Complete Excavation alternative would be significantly more costly than either of the other two alternatives. Additionally, human exposure risks to soils would only marginally be improved over the partial removal option, as a four-foot layer of “clean” soils would be installed, a warning barrier would be placed, and soils within utility cuts would be removed. Thereafter, there should be very limited direct exposure to soils present below a barrier, and at depths greater than four feet bgs.

Atlas estimates that implementation of this alternative would result in the removal and disposal of approximately 50% to 100% additional soils removal; with a proportional increase in cost to \$3.4 to \$5.4 million. Implementation of this option is not considered reasonable; as the excavation and disposal of twice as much soils as the partial excavation alternative would only have a negligible favorable impact on potential human exposure potential. This alternative would alleviate concerns associated with adverse impacts caused by extreme weather events as no contamination would be onsite.

## **Selected Alternative**

For the reasons discussed above, Alternative 2 (partial excavation with an environmental use restriction) is the selected alternative for cleanup at the site.