Brownfield Clean Up Guide

A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. https://www.epa.gov/brownfields/overview-epas-brownfields-program

CDPHE Process	City Process
EPA role To achieve these goals, RCRA(EPA's law Resource Conservation and recovery Act) established three distinct, yet interrelated, programs: • The solid waste program, under RCRA Subtitle D, encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, … https://www.epa.gov/history/epa-history-resource-conservation-and-recovery-act  COLORADO **Brownfields and Voluntary Cleanup and Redevelopment Program (VCP)** **Colorado Department of Public Health and Environment (CDPHE)** **Hazardous Materials and Waste Management Division** 4300 Cherry Creek Drive South Denver, CO 80246-1530 http://www.cdphe.state.co.us/HM/index.htm **Contacts:** Superfund/ Brownfields Unit Leader: Doug Jamison, doug.jamison@state.co.us, 303-692-3404 Brownfields Program Coordinator: Mark Rudolph, mark.rudolph@state.co.us, 303-692-3311 Voluntary Cleanup and Redevelopment Program: Fonda Apostolopoulos, fonda.apostolopoulos@state.co.us, 303-692-3411 PROGRAM DETAILS • **Funding Source(s) for the Program:** VCP fees (80%) and federal grants (20%) • **Cost to enter program or fees for service:** Application fee is $2,000. Hourly review fee is $95. • **Sites Enrolled in VCP:** Approximately 70 applications are processed each year. • **Sites Completed under VCP:** As of January 2017, a total of 1,195 sites have been completed under the VCP. PROGRAM The Colorado Department of Public Health and Environment (CDPHE) established the Voluntary Cleanup and Redevelopment Program (VCP) in 1994 to provide public and private property owners with the resources to facilitate cleanups as well as assurances against regulatory enforcement. https://www.colorado.gov/pacific/cdphe/voluntary-cleanup **Financial Elements** **Assessment and Cleanup Funding** • Colorado Brownfields Revolving Loan Fund – Encourages the cleanup of unused or under-used contaminated properties. The Fund offers financing with reduced interest rates, flexible loan terms, and flexibility in acceptable forms of collateral. The fund can also provide sub-grants to local governments. https://www.colorado.gov/pacific/cdphe/brownfields-revolving-loan-fund • Targeted Brownfields Assessments – The state performs targeted site assessments to characterize the nature and extent of site contamination. This characterization is at no cost to the property owner, and provides assistance in quantifying the need for and potential cost of cleanup. Sites are eligible if they are not on the National Priorities List (NPL) or under enforcement or other action by a government agency. For a private party to be eligible there must be a clear public benefit. **Incentives** • Sub-Grants – State Brownfields grants are available to local governments and non-profits to help pay for cleanup of contaminated properties and facilitate redevelopment of those properties. • State Income Tax Credit for Environmental Remediation of Contaminated Land - In 2014, the Colorado General Assembly passed Senate Bill 14-073 providing a tax credit for environmental remediation of contaminated land within the State. The law provided a 40 % tax credit on cleanup expenses up to $750,000 and a 30% credit on cleanup expenses greater than $750,000 up to $1,500,000. Taxpayers and qualified entities may transfer the credit. **Liability Relief Provisions** Colorado statute provides that voluntary cleanup plans are not enforceable against a property owner (unless the owner fails to implement the plan after initiating a voluntary cleanup). In addition, information provided by a property owner to support a voluntary cleanup plan or no action petition does not give CDPHE an independent basis to seek penalties from the property owner pursuant to state environmental statutes or regulations. **Program Elements** **Methods/Standards/Controls** No formal Risk-Based Corrective Action or comparable/informal process is in place; VCP applicants choose from various cleanup standards or perform risk assessments. State allows risk-based closures. **Contaminants Covered** Hazardous substances and solid wastes including petroleum contaminants, asbestos, lead paint, and methamphetamine derived contaminants are all covered. **Institutional Controls (IC)** While Colorado does not have enforcement authority under its state Superfund program, the most recent amendments to the Hazardous Waste Sites Act authorize the use of environmental covenants that run with the land (Colorado Revised Statutes (CRS) §§ Sec. 25–15–317 through 327). CDPHE may use environmental covenants under the VCP if the owner requests it, however it is not compulsory. If the property owner fails to comply with an environmental covenant, CDPHE may issue an order requiring compliance and may request that the Attorney General bring a suit to enforce the terms of the covenant. **IC Tracking:** Colorado is required to maintain an inventory of all sites and facilities at which hazardous substances have been disposed of in the state. As of July 1, 2001 the state is tracking ICs at state cleanup program sites, Resource Conservation and Recovery Act (RCRA) cleanup sites, Superfund sites, federal facility sites, and VCP sites through the database. Colorado is required to create and maintain a registry of all environmental covenants, including any modifications or terminations of the covenants under the 2001 amendments to the Hazardous Waste Sites Act. The database is available to the public at: https://www.colorado.gov/pacific/cdphe/hmcovenants. **IC Oversight and Monitoring:** Colorado's long-term stewardship provisions include monitoring, ICs and enforcement. The following Web address is a link to the state's public database that maintains an inventory of sites, maps sites, and/or tracks institutional controls. The links also provide additional information regarding contaminated sites in the state. https://www.colorado.gov/pacific/cdphe/categories/services-and-information/environment/environmental-cleanup **Other Land Programs** **Superfund Program** https://www.colorado.gov/pacific/cdphe/superfund-sites 51 https://nepis.epa.gov/Exe/tiff2png.cgi/P100TG35.PNG?-r+75+-g+7+D%3A%5CZYFILES%5CINDEX%20DATA%5C16THRU20%5CTIFF%5C00000238%5CP100TG35.TIF	DEVELOPMENT ENGINEERING/TRAFFIC Contact: Kyle Gillitzer Phone: 720-898-7656 Email: kgillitzer@arvada.org Additional Comments Not Specifically Identified by a Mark-up: Colorado Department of Public Health and Environment (CDPHE) approval of the Voluntary Clean Up (VCUP) application will be required prior to approval of the DA. CDPHE approval of the VCUP completion signified by the No Action Determination will be required prior to certificate of occupancy issuance for the site. A 404 permit from the Army Corps of Engineers will be required to be approved for work along Ralston Creek and the northern portion of this site. Please include a copy of this permit with your next submittal. Please reach out to me with any questions. Additional Items to Include With Next Submittal: The stream bank stabilization plan for Ralston Creek along your property frontage must be included with your next submittal. The plan will need to be coordinated and approved by MHFD. Include a turning analysis for the site showing adequate ability for the large anticipated vehicles to be able to turn and maneuver throughout the site. Include an Autoturn program analysis showing vehicles can navigate proposed path including large trucks if necessary. Include roadway plan and profile sheet or detail for the portion of ROW you will be required to construct. A utility report with water modeling for the reducer is required for the site. 404 permit. STORMWATER Contact: Jake Moyer Phone/email: 720-898-7812/jmoyer@arvada.org Additional Comments Not Identified by a Mark-up: Stormwater Group reserves the right to provide additional comments on subsequent submissions. Additional Items to Include With Next Submittal: Recommend an alternative approach to address water quality aside from a detention pond. Considering the existing contaminants on site, a more comprehensive design including, but not limited to, infiltration control measures (rain gardens) or a constructed wetland would be preferred. Include updated Operation and Maintenance

CDPHE Role

"Once they have completed the site characterization, the developers will be submitting an application to the Voluntary Cleanup Program along with setting up a "meeting" (not sure where or how) with the neighborhood to go over the results and their development plans. Please understand that the state will only be looking at soil, groundwater and surface water data to determine if the development plans will be protective of human health and the environment. The state will have no say in the zoning or development plans on the site, as this will fall onto the City of Arvada."

<fonda.apostolopoulos@state.co.us> Fri, Mar 10, 3:00 PM

"Adequate groundwater characterization is a key indicator of what's inside a landfill. Adequate characterization includes soil samples, groundwater/surface water samples, test pits, and ground penetrating radar. After that has been performed, it will give us a very good idea of what we're dealing with."

Apostolopoulos - CDPHE, Fonda <fonda.apostolopoulos@state.co.us> Sat, Feb 11, 10:48 AM

My understanding is that the current owner is going to propose a similar redevelopment plan, as the previous applicant (outside and building storage), and it would require methane mitigation for the buildings, armoring of the embankment of the adjacent stream, and a Materials Management Plan for possible soil removal.

Apostolopoulos - CDPHE, Fonda <fonda.apostolopoulos@state.co.us> Fri, Feb 10, 5:06 PM

FLOODPLAIN Contact: Andy Stewart Phone: 720-898-7644 Email: astewart@arvada.org

Additional Items to Include With Next Submittal: Same as Kyle's comment: "The stream bank stabilization plan for Ralston Creek along your property frontage must be included with your next submittal. The plan will need to be coordinated and approved by MHFD." Any work in a floodway must be reviewed to determine if the project will increase flood heights. An engineering analysis must be conducted before a permit can be issued. The community's permit file must have a record of the results of this analysis, which can be in the form of a No-rise Certification. This No-rise Certification must be supported by technical data and signed by a registered professional engineer.

Questions:

1) What type of research for models of land reuse has been done to demonstrate “successful” re-development of closed, unregulated landfills? I located examples for soccer fields, golf courses, walking paths, parks, etc. If you have evidence of surface use for storing heavy equipment, trucks, or RV’s, please share. We are interested in safety and environmental issues of existing RV storage lots redeveloped on closed, unregulated landfills.

2) We understand that ground water sampling and values are indicators of characterization of the contents of unregulated landfills. What measurement is used to validate the stability and property of substructure matter---various types of soils mixed with decaying matter? What data is available to demonstrate the "strength and durability" of this type of substructure? If the substructure is unstable, can shifting influence ground water and subsequent charcterization change with time---references please?

3) How does the proposed RV storage re-development plan meet a layman's expectation of landscape architecture as per Wikipedia and ASLA definition?

“Landscape architecture is the design of outdoor areas, landmarks, and structures to achieve environmental, social-behavioural, or aesthetic outcomes.[2] It involves the systematic design and general engineering of various structures for construction and human use, investigation of existing social, ecological, and soil conditions and processes in the landscape, and the design of other interventions that will produce desired outcomes.” Wikipedia

“Landscape architecture involves the planning, design, management, and nurturing of the built and natural environments. With their unique skill set, landscape architects work to improve human and environmental health in all communities. They plan and design parks, campuses, streetscapes, trails, plazas, residences, and other projects that strengthen communities.”

https://www.asla.org/aboutlandscapearchitecture.aspx

Example of subsurface soil displacement and visual boundaries from Norris Designs website:

Maryland Creek Park & Trails----PUBLISHED 3/21/2023--**Silverthorne**

Previously **an old dumping site for local mining activity**, the land where Maryland Creek Park now resides was once full of large pieces of concrete, logs, and deteriorated soil. **Soil studies for the site were erratic and inconsistent, which impacted site preparation.** The entire site is filled with soil and imported topsoil to level the playing fields. **Concrete was avoided in the design because of how the soils settle unevenly — in some places, up to a two-foot difference. Instead, asphalt paving and decorative bricks were used for their flexibility.**

While it couldn't be avoided, the **team focused on incorporating berms and screening to create safe spaces** that felt separated from the highway. The layout of the site also changed several times to ensure the playground was tucked far away from the highway and that users felt immersed once they were in the park. The **incorporation of screening boundaries to the adjacent community were also an intentional decision so that the park felt open to visitors while the residential community retained some privacy**. The d**esign also ensured that all boundaries are safe for wildlife and promote wildlife movement** through the park and accompanying trail system.

The park blends the idea of recreation and restoration — providing the opportunity for people to **discover the wonder of nature in a seemingly everyday setting**.

Largely, the design team focused on preserving the naturalized environment as much as possible rather than changing it.

https://www.norris-design.com/in-the-news/blending-recreation-restoration-maryland-creek-park-trails/

Landfill Stability Research:

The new regulations control the future management of hazardous waste, but do not address the health and environmental problems from past disposal practices.
https://www.epa.gov/archive/epa/aboutepa/epas-hazardous-waste-regulations-effective-november-19-1980.html

"Landfill stability is closely related to the engineering behavior of municiple solid waste (MSW). For example, assessing the stability of landfill slopes requires an understanding of the shear strength of MSW [3–6]. In addition, the expansion of a landfill may lead to the settlement of the existing landfill and expanded landfill, which may cause problems with the linear system and slope stability [7]"
https://www.hindawi.com/journals/ace/2021/5574238/

"Instability phenomena in waste landfills are not rare and the consequences are more severe than ones for typical landslide, having also environmental impact. Old waste dumps are often located in dried (or partially dried) valleys, natural gulches or ravines, therefore waste is often placed on sloped ground. Their mechanical characteristics are often very poor and, due to lack of drainage systems, are in saturated state. Therefore, instability can appear at every stage of the operation, during the closure or post-closing. The paper presents some aspects related to specific instability phenomena in waste landfills and dumps and to stability analysis in saturated and unsaturated state using numerical methods. As well, it presents a case study of an old dumpsite in Romania where a landslide occurred during the closing works and for which a consolidation solution was proposed, based on drainage and mechanical consolidation. Numerical modeling has been used for simulating the effect of the drainage and for evaluating the gain in stability, considering the unsaturated final state of the drained waste."
https://www.researchgate.net/publication/315909450_Instability_Phenomena_in_Municipal_Waste_Landfill_Numerical_Modeling_in_Saturated_and_Unsaturated_Conditions

"A series of ecological indicators is used to evaluate and measure land quality: land soil quality, land soil stability, land landscape function, land infiltration, land infiltration rate, land runoff, land vegetative cover, land rills and gullies, land pedestals and terracettes, land bare ground, land litter, land soil surface loss, land plant mortality, and land integrity. The three attributes – soil stability, hydrologic function, and integrity of the biotic community – are also used as a common description of the quality of land."
https://www.sciencedirect.com/topics/earth-and-planetary-sciences/soil-stability

"Unregulated solid waste landfills are causing severe environmental impacts for environment and human health due to the formation of leachates and landfill gas during decomposition of organic wastes. Common problems that usually be faced with these sites are visual pollution, air pollution, water pollution, soil contamination, spreading of waste, spreading of diseases, subsidence and odor. Therefore the rehabilitation of waste dumping sites has become a matter of importance for controlling these adverse effects."
https://link.springer.com/chapter/10.1007/978-3-540-69313-0_101

Landscape architects…

- design public spaces such as parks, campuses, streetscapes, and urban gathering places that **create community identity and public life**
- **create sustainable and active communitie**s with infrastructure for walking, bicycling, and other forms of transportation
- improve air quality and **lower urban temperatures with green spaces**
- solve infrastructure problems such as increased flooding from storm water and rising sea levels
- collaborate with private clients to **make memorable places** for work, living and recreation
- **conserve natural and agricultural landscapes by working with communities on landscape stewardship**

Landscape Architecture encompasses the *art* and *science* of land design, planning, and management.

- Its *science* involves the conservation and management of natural resources.
- Its *art* is the creation of outdoor spaces that are enjoyable, comfortable, and safe.

https://www.uky.edu/academics/bachelors/college-agriculture-food-environment/landscape-architectur

LANDSCAPE ARCHITECTURE

Studying Landscape Architecture at CSU is an adventure. Taking part in a challenging course of study, students prepare themselves for careers in a field whose enormous potential has only begun to be recognized. Landscape Architecture students study design as accomplished landscape architects see it: **shaping spaces as well as planning and preserving them**.

Landscape architects lead the stewardship, planning, and design of built and natural environments. Throughout the program, **emphasis is on the relationship between design, nature, and society**: the **impact of environments on the individual as well as the impact of users on the environment**.

https://catalog.colostate.edu/general-catalog/colleges/agricultural-sciences/horticulture-landscape-architecture/landscape-architecture-major/

Landscape Architecture

Our Bachelor of Landscape Architecture (BLA) program will equip you with the tools and skills you need to **address complex social, economic, and environmental challenges.**

- How do neighborhoods take shape?
- **Who turns empty lots downtown into bustling community spaces with rain gardens and green zones?**
- How are unused railroad lines transformed into paths for biking, walking, and bird watching?

https://landarch.illinois.edu/programs/bachelor-of-landscape-architecture/

What is Landscape Architecture?

The definition of landscape architecture by the American Society of Landscape Architects (ASLA) is “the science and art of design, planning, **management and stewardship of the land.** Landscape architecture involves natural and built elements, cultural and scientific knowledge, and concern for resource conservation to the end that the resulting environment serves a useful and enjoyable purpose. Successful landscape architecture maximizes use of the land, adds value to a project and minimizes costs, all with minimum disruption to nature”.

Landscape Architecture is a rewarding and important green career in high demand especially as development continue to impact the natural environment. As the Landscape Institute in the UK defines it, landscape architecture is “a creative profession, skilled in strategic planning, delivery and management. It is rooted in an understanding of how the environment works and what makes each place unique.”2 Landscape architects are both “artists” and “doctors” to the outdoor spaces. They not only add beautifications to the land, but also solve complex environmental problems and create a quality environment for people’s health and well-being. In many projects, landscape architects actively collaborate with other disciplines, including architects, civil engineers and city planners.

https://extension.okstate.edu/fact-sheets/what-is-landscape-architecture.html

Landscape Architecture

Landscape Architecture is the design profession that applies artistic, scientific and technical knowledge and skills to the analysis, design, planning, development and management of built and natural environments across scales from local to global.

Landscape architects have an appreciation and understanding of natural and cultural processes, a creative imagination, technical expertise and a commitment to improve or preserve the physical environment for human use and to protect resources and other life forms on the planet.

https://www.canr.msu.edu/spdc/programs/landscape-architecture/la_undergraduate_degree