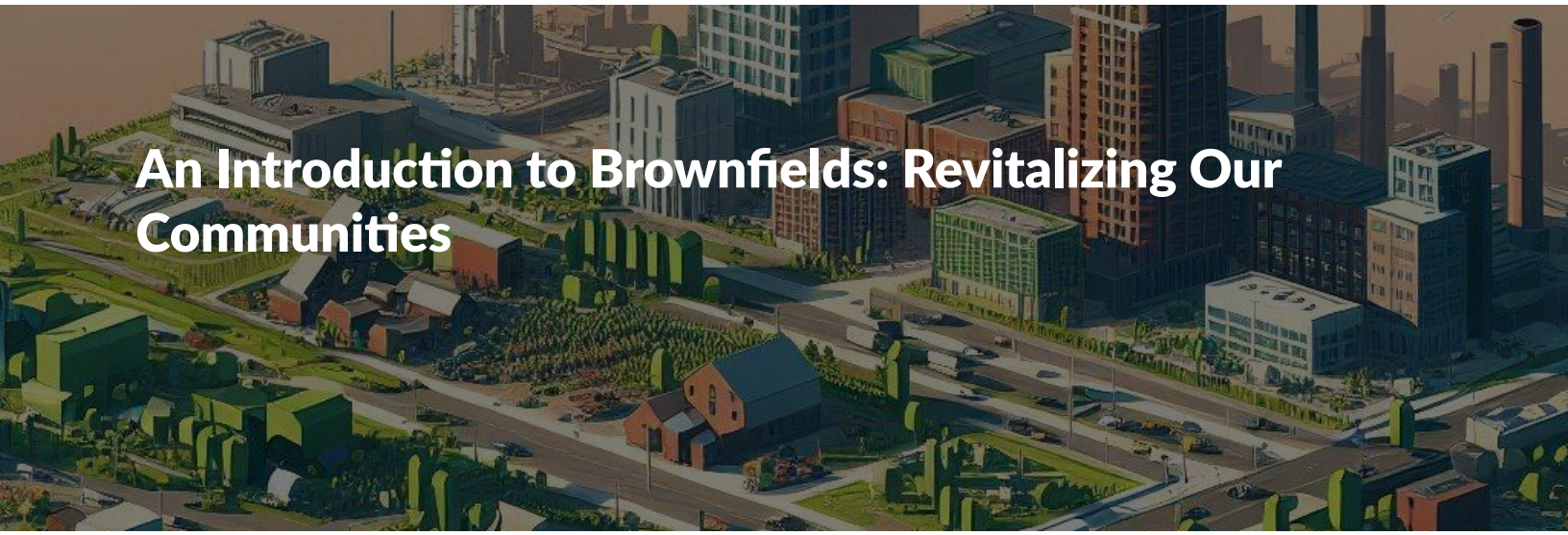


An Introduction to Brownfields: Revitalizing Our Communities

BCONE
BROWNFIELD COALITION OF THE NORTHEAST

Course Overview: Brownfields are contaminated or potentially contaminated properties that are underutilized and have the potential for revitalization. This course provides foundational knowledge for navigating the complexities of brownfield redevelopment. Whether you are a seasoned professional or new to the field, understanding the basics is crucial.

Remember, brownfield redevelopment is not only about transforming contaminated sites but also revitalizing communities. By mastering the fundamentals, you will be better equipped to contribute to sustainable and resilient development.

In addition to federal laws impacting the remediation and redevelopment of contaminated sites, many states have adopted programs geared toward facilitating the revitalization of brownfield sites. This introduction focuses on the federal brownfields framework; certain state-specific programs will be covered in other courses.

Course Duration: This course should take you approximately 60 minutes to complete.

Learning Objectives

Learning Objectives

This course contains six lessons that will guide you through the foundations of brownfields.

Please review the learning objectives below by placing a check in each box.

By the completion of this course, you will be able to:

- [ ] Define the term "brownfields" and its key characteristics.
- [ ] Explain the economic, environmental, and social challenges and opportunities of brownfield sites.
- [ ] Describe the federal and state policies and programs that regulate brownfield redevelopment efforts.
- [ ] Examine the financial aspects of brownfield redevelopment.
- [ ] Explain the purpose and key activities of an environmental site assessment.
- [ ] Identify common brownfield site contaminants and their impacts on human health.

- [ ] Recognize the different remediation techniques during brownfield redevelopment.
- [ ] Highlight strategies for effective stakeholder engagement.
- [ ] Learn about two real-life brownfield redevelopment success stories.

Complete the content above before moving on.

Lesson 2 of 9

Introduction to Brownfields

As noted in the course introduction, this course focuses on federal laws regarding brownfield sites. State brownfield programs may apply different definitions and legal standards.

What is a brownfield?

According to the United States Environmental Protection Agency (EPA)*, 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.

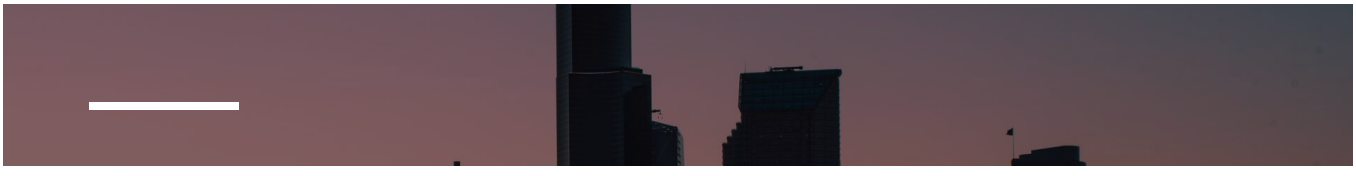
Brownfields are properties where the current or future use is affected by real or perceived contamination.

*This link references an archived section of the US EPA website. To view the current US EPA Brownfields site, click here https://www.epa.gov/brownfields

During the Industrial Revolution, rapid urbanization and industrial activities led to the creation of numerous industrial sites and blighted properties. Factories, gas stations, dry cleaners, and other commercial operations often disposed of waste improperly, leading to soil and groundwater contamination. As industries evolved or relocated, many of these sites were abandoned, leaving behind environmental hazards.

The Emergence of the Term "Brownfield"

The term "brownfield" was first used in the early 1990s and was officially recognized in describing contaminated sites on June 28, 1992, at a hearing held in the US Congress and hosted by the Northeast Midwest Congressional Coalition. This hearing helped coin the term moving forward and distinguished these sites from "greenfields," which are undeveloped lands.



Complete the content above before moving on.

Key Characteristics of Brownfields

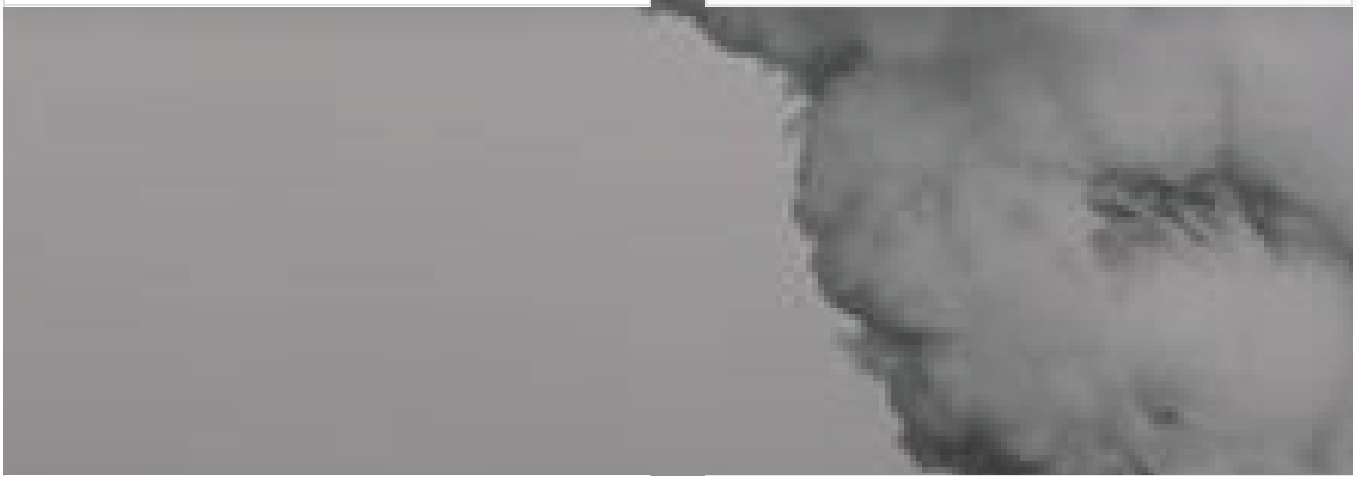
Click on each of the images below to learn about the key characteristics of brownfields.

Contamination

Brownfields may contain hazardous substances, pollutants, or contaminants such as petroleum, heavy metals, or industrial chemicals.

Location

These sites can be found almost anywhere but they are more abundant in struggling neighborhoods with deteriorating infrastructure.

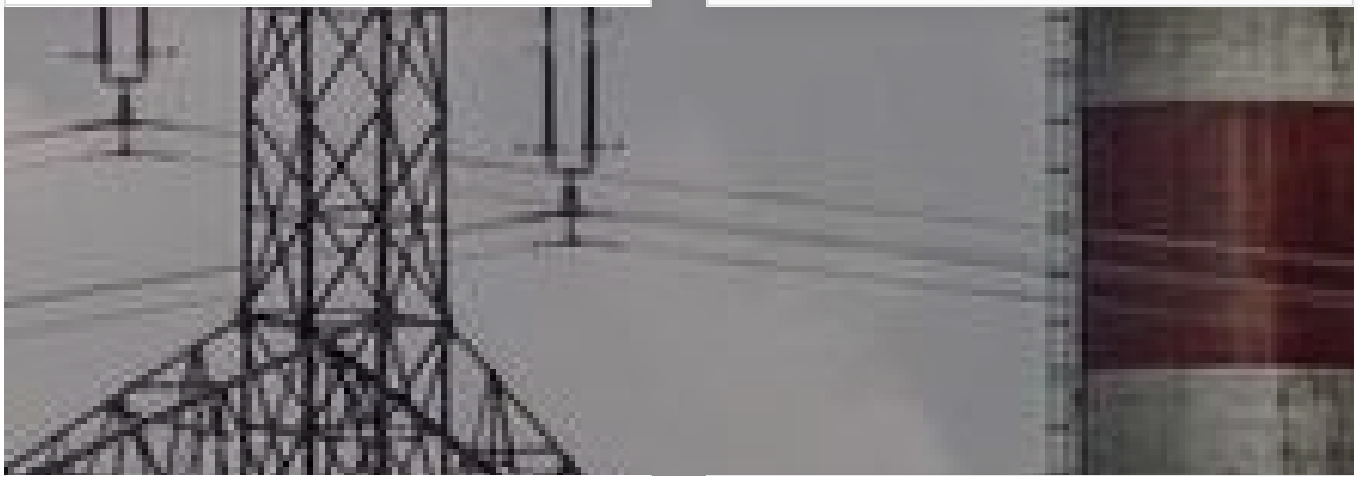


Underutilization

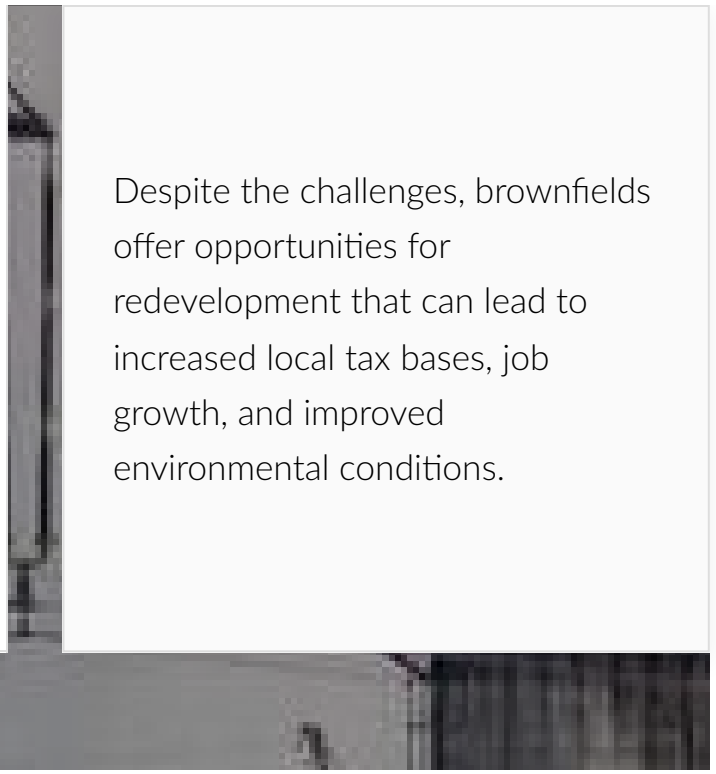
Brownfield properties may be vacant, abandoned, or occupied, but they share one common trait: they are underutilized. Brownfield sites vary in size, location, age, and past use; they can be anything from an old factory to a small corner gas station or dry cleaner.

Redevelopment Challenges

The presence of contamination poses significant barriers to redevelopment, requiring environmental assessments and cleanup.



Potential for Revitalization



Despite the challenges, brownfields offer opportunities for redevelopment that can lead to increased local tax bases, job growth, and improved environmental conditions.

Note: It is not uncommon for a brownfield assessment to find no environmental concerns and no additional investigation is recommended.

Complete the content above before moving on.

Economic, Environmental, and Social Implications of Brownfields

Brownfield sites often pose economic, environmental, and social challenges but also offer opportunities for redevelopment and revitalization.

Click on each of the tabs below to learn more about the challenges and opportunities.

ECONOMIC | ENVIRONMENTAL | SOCIAL

Economically, brownfields present both challenges and opportunities:

- **Challenges:** Because it can be costly to clean up a contaminated site, significant investments are needed to accomplish any project. Brownfield sites have an impact on local property values and often discourage other development investments in the surrounding areas.
- **Opportunities:** Redeveloping brownfields can have a direct impact on local economies and is useful in creating jobs, attracting new businesses, increasing real estate tax revenues for local government, and increasing property values for property owners.

ECONOMIC | ENVIRONMENTAL | SOCIAL

Environmentally, brownfields can pose serious risks:

- **Contamination:** There are a variety of contaminants in brownfield sites that may include heavy metals, petroleum products, and industrial solvents. These contaminants have a dangerous effect on the soil, water, and air.
- **Remediation:** When contaminated sites are cleaned through brownfield programs, it can reduce the hazards posed to the environment, improve public health, and restore various ecosystems. Many successful remediation efforts have resulted in public parks, new residential or commercial spaces, and improved urban sustainability.

ECONOMIC | ENVIRONMENTAL | SOCIAL

Socially, brownfields impact communities in various ways:

- **Blight and Stigma:** Urban blight is a common result of abandoned and contaminated sites. This reduces the quality of life for many people and stigmatizes neighborhoods.
- **Community Revitalization:** Completed redevelopment projects can build community pride and improve the safety of a community. When the public is involved in the process, it ensures that the efforts meet their local needs and promotes a sustainable and equitable experience for the community.

Brownfields represent a complex challenge but also a significant opportunity for sustainable urban development. Addressing these sites holistically can lead to economic revitalization, environmental restoration, and social renewal.

Complete the content above before moving on.

Knowledge Check

Let's test your understanding of this section with a quick knowledge check.

True or False: Public health is a major concern in the remediation of brownfields.

- ◯ True
- ◯ False

SUBMIT

Match each of the characteristics of brownfields with the correct description by dragging the **title** (left-hand column) to the applicable **description** (right-hand column):

Underutilization	Brownfields may contain hazardous substances, pollutants, or contaminants.
Potential for Revitalization	These sites are typically found in urban areas, often in struggling neighborhoods.
Contamination	Brownfields are usually abandoned or underused properties.
Redevelopment Challenges	The presence of contamination poses significant barriers to redevelopment.

Location

Despite the challenges, brownfields offer opportunities for redevelopment.

SUBMIT

Complete the content above before moving on.

Now that we have covered the background of brownfields, let's look at the legal and regulatory framework in the next section.

CONTINUE

Lesson 3 of 9

Legal and Regulatory Framework

Federal Policy and Program Development

The federal government's commitment to addressing brownfields has evolved significantly over the decades.

Beginning with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, which laid the groundwork for brownfield remediation, the timeline includes key legislative acts such as the Brownfields Revitalization Act of 2002 and subsequent amendments. These efforts have been bolstered by various federal programs and initiatives, reflecting a growing recognition of the importance of environmental cleanup and sustainable redevelopment

The timeline below highlights the pivotal milestones in federal policy and program development aimed at revitalizing brownfield sites.

Key Milestones

1980

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), more commonly known as Superfund, was enacted by Congress in 1980. CERCLA provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. It also establishes liability for parties responsible for contamination.

1995

US EPA Brownfields Program

The Brownfields Program was launched in 1995 by the Environmental Protection Agency (EPA) with the goal of addressing the various challenges of the growing number of contaminated

sites across the country. The program aimed to encourage the cleanup and reuse of brownfields by providing grants, technical assistance, and regulatory guidance.

2002

The Small Business Liability Relief and Brownfields Revitalization Act

The Small Business Liability Relief and Brownfields Revitalization Act was enacted and amended regulations within CERCLA, providing further financial assistance and liability protections for brownfield redevelopment.

2018

The BUILD Act

The BUILD Act (Brownfields Utilization, Investment, and Local Development Act) was passed, enhancing funding and expanding the scope of the Brownfields Program.

2021

Infrastructure and Investment and Jobs Act

Under the 2021 Bipartisan Infrastructure legislation, Congress provided $1.5 billion in funding to support brownfields, which is the largest

> investment in US brownfields infrastructure ever.

Complete the content above before moving on.

State and Local Regulations

Because of the prevalence of brownfields across the United States, these sites have a significant impact on local communities. While the importance of federal programs cannot be understated, state and local efforts also need to address the sites with policy and programs to help revitalize their communities.

State regulations vary but often include:

- **Voluntary Cleanup Programs (VCPs):** A Voluntary Cleanup Program (VCP) is an initiative that encourages property owners, developers, and other stakeholders to voluntarily clean up contaminated sites. These programs are typically administered

by state environmental agencies and offer incentives such as liability protection, financial assistance, and technical support to participants. The goal is to facilitate the remediation and redevelopment of brownfields and other contaminated properties, making them safe for reuse and reducing environmental hazards.

- **State Superfund Programs:** State Superfund Programs are designed to address contaminated sites that pose significant risks to public health and the environment. These programs operate under the framework of the federal Superfund program but are managed at the state level, allowing for more localized and tailored approaches to site remediation.
- **Brownfield Redevelopment Authorities:** Brownfield redevelopment authorities at the state level play a crucial role in transforming contaminated or underutilized properties into productive community assets. Two states with active authorities are North Carolina and Michigan. Many states also have brownfield redevelopment programs which are administered through their economic development authorities.

Complete the content above before moving on.

Liability Considerations

Under Comprehensive Environmental Response Compensation and Liability Act (CERCLA), also known as the federal Superfund law, current owners and operators, and past owners and operators, at a minimum, are all strictly and joint and severally liable for any required remediation regardless of whether these parties caused the contamination. This liability scheme led to the creation of brownfield sites throughout the country when owners were faced

with demands to remedy contamination they could not afford to remediate.

To avoid CERCLA liability, some liability defenses were adopted into the CERCLA law in 2002. If a buyer of suspect or known contaminated real property complies with the All-Appropriate Inquiry (AAI) requirements (i.e. exercises "due diligence" generally by at least performing a Phase I Environmental Site Assessment) before the property acquisition, and provided they continue to exercise "due care" after property acquisition:

- **Innocent Purchaser Defense** – Prospective Purchaser obtains a "Clean" Phase I Report and has no reason to know the property is contaminated.
- **Bona Fide Prospective Purchaser Defense** – Prospective Purchaser obtains a "Dirty" Phase I Report and therefore has reason to know the property is contaminated but exercises appropriate due care (i.e. prevents any ongoing releases from continuing and allows the government to access the site)

Phase I Report must be dated within 180 days of property acquisition and prepared for the exact buyer entity acquiring the property (not the parent company).

Note: When performing a site assessment, it is important to address possible PFAS emerging contaminants based on prior

uses (e.g. laundromats as opposed to dry cleaners are now also suspect contaminated sites).

Many state brownfield programs provide more direct liability releases, in addition to these federal defenses, if the party cleans up the site through the state program. Some of these releases include relief from off-site liability, which is often the most significant aspect of the liability release.

Complete the content above before moving on.

Knowledge Check

Let's test your understanding of this section with a quick knowledge check.

Which federal legislation is commonly referred to as "Superfund"?

- The Small Business Liability Relief and Brownfields Revitalization Act
- The Brownfields Program

- ○ The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- ○ The BUILD Act

SUBMIT

Do you have to commission a Phase I report before acquiring a former commercial or industrial site with a suspect brownfield history to avoid Superfund liability?

- ○ Yes
- ○ No

SUBMIT

According to a 2022 EPA study, how many people live within half a mile of a brownfield site in the United States?

- ○ 10 million

- ○ 340,000
- ○ 100 million
- ○ 34 million

SUBMIT

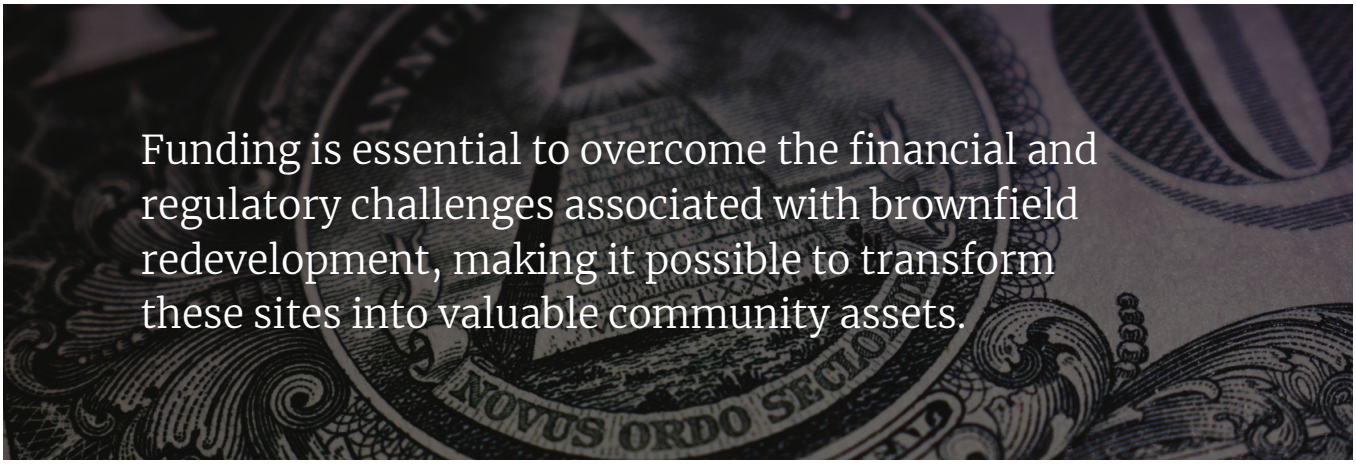
Complete the content above before moving on.

The legal and regulatory framework is vital to understanding the scope of brownfield redevelopment. Next, let's dig deeper into the financial strategies for funding brownfield redevelopment.

CONTINUE

Lesson 4 of 9

Financial Strategies



Funding Mechanisms for Brownfield Redevelopment

There are three primary funding mechanisms that help to support brownfield redevelopment initiatives:

1

Grants: Grants are a primary source of funding for brownfield projects. They are typically provided by federal, state, and local governments, as well as private foundations.

Key federal grants include:

- **EPA Brownfields Assessment Grants:** These grants fund the assessment of brownfield sites to determine the extent of contamination.

- **EPA Brownfields Cleanup Grants:** These grants support the actual cleanup of contaminated sites.
- **HUD Community Development Block Grants (CDBG):** Offered by the US Housing and Urban Development (HUD), these grants can be used for brownfield redevelopment in low to moderate income communities.

2

Tax Credits: Under prior law, qualifying environmental cleanup costs could be deducted by the taxpayer in the year in which they were incurred. This incentive expired in the early 2010s and, despite efforts to reintroduce an extender, it has not been revived.

Important tax credits include:

- **Federal Brownfields Tax Incentive:** Allows environmental cleanup costs to be fully deducted in the year they are incurred.
- **Other Tax Credits:** Many brownfield redevelopment projects are, by virtue of the site or project characteristics unrelated to the brownfield, eligfor various tax incentives which may be combined as part of the "capital stack" supporting the redevelopment. These include, for example, the federal rehabilitation tax credit for historic structures, the low-income housing tax credit for income-restricted houses, the New Markets Tax Credit, and others. Many states have state-law analogues of the various federal tax credits which further support the viability of the redevelopment project.
- **State and Other Local Tax Incentives:** Several states have enacted legislation authorizing significant tax incentives linked to remediating and redeveloping brownfield sites.

3

Loans: Loans provide upfront capital for brownfield projects, often with favorable terms and in some cases the loans are forgivable.

Notable loan programs include:

- **EPA Brownfields Revolving Loan Fund (RLF):** Offers low-interest loans for cleanup activities.
- **State and Local Loan Programs:** Various states and municipalities also offer loans tailored to brownfield redevelopment.

Complete the content above before moving on.

Cost Estimation and Brownfield Redevelopment

Accurate cost estimation and budgeting are crucial for the success of brownfield projects.

The process involves three critical steps:

1. Site Assessment
2. Cleanup Planning
3. Budgeting

Site Assessment:

- **Phase I Environmental Site Assessment (ESA):** Answers the question "What environmental issues are likely to exist at this site?" The Phase I ESA uses existing information to identify potential threats to human health or the environment based on current and past uses of the site. A Phase I ESA does not involve collecting or analyzing environmental samples.
- **Phase II ESA:** Answers the question: "Does the site have contamination issues?" The Phase II ESA involves sampling and laboratory analysis to confirm if contamination exists.

Cleanup Planning:

- **Remedial Investigation/Feasibility Study (RI/FS):** Determines the extent of contamination and evaluates cleanup options.
- **Remedial Action Plan (RAP):** Outlines the chosen cleanup method and associated costs.

Budgeting:

- **Expenses:** Includes expenses for site assessment, cleanup, and redevelopment project management, legal fees, and contingencies.
- **Funding Sources:** Identify and secure grants, loans, and tax credits to cover costs of the redevelopment.

Note: Timing is a key factor in budgeting. Although tax credits are often considered a funding source for redevelopment projects, their value may not be fully established until after completion of an audit with taxing authorities. Projects often seek "bridge loan" funding for the cleanup and construction phases until tax credits are finalized.

2023 Brownfields Federal Programs Guide

Click on this EPA resource for more information on the funding sources that support brownfield redevelopment.

CLICK HERE

Complete the content above before moving on.

Knowledge Check

Let's test your understanding of this section with a quick knowledge check.

True or False: A Phase II ESA determines if a site has contamination issues.

- True
- False

SUBMIT

Match each of the grant programs (left-hand column) by dragging the tab to the correct description (right-hand column).

HUD Community Development Block Grants	Funds the assessment of brownfield sites to determine the extent of contamination.
EPA Brownfields Cleanup Grants	Support the actual cleanup of contaminated sites.
EPA Brownfields Assessment Grants	Can be used for brownfield redevelopment in low to moderate income communities.

SUBMIT

Next, we are going to review the basics of site assessment and remediation.

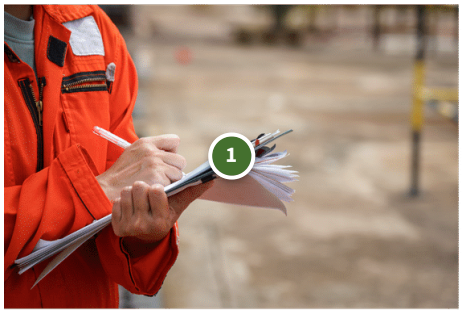
Complete the content above before moving on.

Site Assessment and Remediation

The Phases of Site Assessment

There are three primary phases of an Environmental Site Assessment (ESA). Each phase has a specific purpose and key activities to achieve critical outcomes.

Click on the numbers for each phase in the images below to learn more about each phase.




Phase I

Purpose: A “paper” investigation of the historical uses and operations that could have resulted in potential or existing environmental contamination, and which is required to meet due diligence obligations and avoid liabilities.

Activities:

1. **Records Review:** Examine historical and current land use records, maps, and photographs.
2. **Site Inspection:** Conduct a visual inspection of the property and surrounding areas.
3. **Interviews:** Speak with current and past property owners, neighbors, and local officials.
4. **Report Preparation:** Summarize findings and determine if recognized environmental conditions (RECs) have been identified such that a Phase II subsurface investigation may be required.



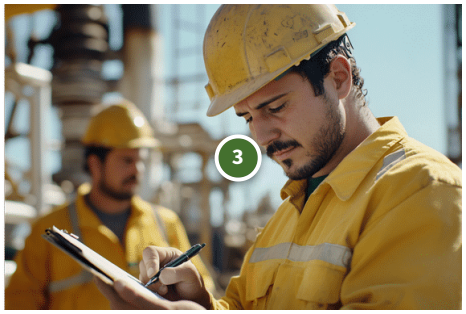
Phase II

Purpose: To perform an invasive subsurface investigation to confirm the presence of contaminants identified in Phase I RECs and assess the extent of contamination.

Activities:

1. **Sampling and Analysis:** Collect soil, groundwater, and air samples for laboratory analysis.
2. **Risk Assessment:** Evaluate the nature and extent of the contamination and its potential risks to human health and the environment.
3. **Report Preparation:** Document findings typically compared to applicable cleanup standards based on anticipated land use.





Phase III

Purpose: Depending on brownfield program, either perform a more detailed investigation to develop a detailed plan for remediation based on Phase II findings or prepare a remedial action work plan to remediate the contamination.

Activities:

1. **Feasibility Study:** Assess various remediation options and their effectiveness given the planned use and to avoid future exposures.
2. **Remediation Plan:** Outline the steps for cleaning up the site, including timelines and costs.
3. **Regulatory Approval:** Gain permits and approvals that are necessary from each respective regulatory agency.

Next, let's consider the common contaminants found at brownfield sites and their impact on human health.

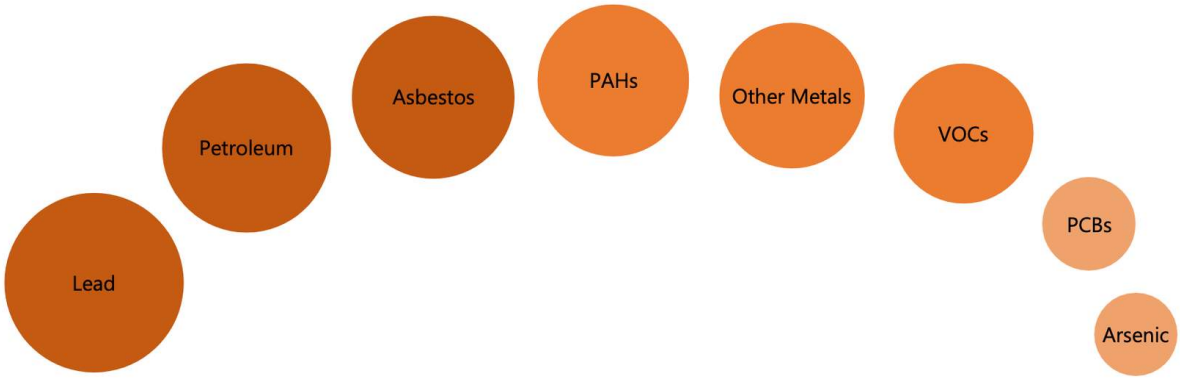
Complete the content above before moving on.

Common Environmental Contaminants and Their Impacts

Brownfield sites often contain a variety of contaminants due to past industrial and commercial activities.

Brownfield properties are often overlooked for reuse or redevelopment due to fear of environmental contamination. Understanding the types of contaminants present (or potentially present) and how people may be exposed to these contaminants will help a community plan cleanup and site reuse options that limit exposure risk.

Below are the contaminants most commonly reported from brownfields cleaned up using U.S. EPA grant funds. Each circle's size reflects how often the contaminant was reported to the U.S. EPA. (Source: Environmental EPA: Contaminants Often Found at Brownfield Sites)



Contaminant	Substance Type	Examples of Past Uses
1. Lead (Pb)	Metals	Mining, fuel, paint, inks, piping, batteries, ammunition
2. Petroleum	Oil, hydrocarbon compounds	Drill and refining, fuel, chemical and plastic production
3. Asbestos	Fiber in rock	Mining and processing, piping, insulation, fire proofing, brakes
4. Polycyclic aromatic hydrocarbons (PAHs)	Hydrocarbon compounds, combustion byproduct	Coal tar, creosote, soot, fire, industry/ manufacturing byproduct
5. Other metals	Metals	Metal fabrication, plating, mining, industry/ manufacturing
6. Volatile organic compounds (VOCs)	Manmade chemicals	Industry and commercial product solvents, degreasers, paint strippers, dry cleaning
7. Polychlorinated Biphenyls (PCBs)	Manmade chemicals	Heat and electrical transfer fluids, lubricants, paint and caulk, manufacturing, power plant
8. Arsenic (As)	Metals	Pesticides, agriculture, manufacturing, wood preservative

(Source: Environmental EPA: Contaminants Often Found at Brownfield Sites)

Complete the content above before moving on.

Impacts of Contaminants on Health

Contaminants can cause a range of health effects when a person is exposed, and the contaminant is absorbed into the body. Exposure pathways refer to the ways people come into contact or are exposed to a contaminant. The extent of exposure and absorption depends on:

- how much contaminant is present,
- how a person is exposed, how often, and,
- how long they are exposed.

Sensitive populations may be at a greater risk from exposures, such as children, the elderly and those with chronic conditions.

Exposure Pathways

The three basic exposure pathways are

1. breathing,
2. eating or drinking, and
3. direct contact with the skin.

Of the three, breathing and eating or drinking are the most common but all three can occur.

When contaminants attach to small dust and soil particles or occur as a vapor, **breathing** can expose people.

Exposure can occur when people **eat or drink** contaminated water, food, dusts or soils. Children that suck their fingers or chew toys contaminated with dust or soils may be exposed.

Skin can absorb some forms of contaminants from **direct contact** with contaminated dust and soil particles, the contaminants or vapors.

(Source: Environmental EPA: Contaminants Often Found at Brownfield Sites)

Potential Health Impacts

The table below lists the potential health impacts of the common contaminants

Contaminant	Potential Health Effects
1. Lead (Pb)	Damage to brain, nerves, organs, and bone; cancer
2. Petroleum	Headache; nervous system, immune, liver, kidney, and respiratory damage; cancer
3. Asbestos	Lung scarring, mesothelioma and lung cancer
4. Polycyclic aromatic hydrocarbons (PAHs)	Liver disorders; cancer
5. Other metals [2-5]	Immune, cardiovascular, developmental, gastrointestinal, neurological, reproductive, respiratory and kidney damage; cancer
6. Volatile organic compounds (VOCs)	Eye irritation; nausea; liver, kidney and nervous system damage; birth defects; cancer
7. Polychlorinated Biphenyls (PCBs)	Disruption or damage to the immune, hormone and neurological system; liver and skin disease
8. Arsenic (As)	Nausea, vomiting and stomach pain; blood disorders; nerve damage; skin disease; lung and skin cancer

[1] U.S. EPA grant recipients are required to report the presence of contaminants found and cleaned up through U.S. EPA's Assessment, Cleanup and Redevelopment Exchange System (ACRES). The following information is based on grant recipient reported cleanups completed at 1,417 sites from 2006-2018. This data is publicly available at www.epa.gov/cleanups/cleanups-my-community
[2] Other metals category includes a range of metals not limited to the heavy metals listed below
[3] Cadmium, Integrated Risk Information System, U.S. Environmental Protection Agency. https://cfpub.epa.gov/ncrea/iris2/chemicalLanding.cfm?substance_nmbr=141
[4] Chromium Compounds, U.S. Environmental Protection Agency. https://www.epa.gov/sites/production/files/2016-09/documents/chromium-compounds.pdf
[5] Mercury, U.S. Environmental Protection Agency. https://www.epa.gov/mercury

(Source: Environmental EPA: Contaminants Often Found at Brownfield Sites)

Before we wrap up this section, let's review the different types of remediation techniques used in brownfield redevelopment.

CONTINUE

Remediation Techniques

There are various remediation techniques used for brownfield sites, depending on various factors. Each of these techniques has both advantages and disadvantages to their approach.

Click on the START button below to review the various remediation techniques.

An Overview of Remediation Techniques

Step 2

Capping

Capping is one of the most common remediation techniques used.

"Capping involves placing a cover over contaminated material such as landfill waste or contaminated soil. Such covers are called “caps.” Caps do not destroy or remove contaminants. Instead, they isolate them and keep them in place to avoid the spread of contamination." - USEPA

Caps are often asphalt or concrete, or even a layer of soil planted with grass.

- **Advantages:** Can be integrated into the reuse of the site, such as a parking lot or building foundation. Caps are typically less expensive and require less time to complete than other remediation methods.
- **Disadvantages:** Typically, a deed restriction is required to notify property owners, and potential buyers of the cap. Caps require on-going monitoring and maintenance.

Step 3

Excavation and Removal

This involves physically removing contaminated soil and transporting it to a disposal facility. This is sometimes referred to as "dig and haul." A typical scenario might include digging out contaminated soil with an excavator and transporting the contaminated soil on trucks.

- **Advantages:** Immediate removal of contaminants.
- **Disadvantages:** There is a significant cost associated with this and there is the risk of potential exposure during transportation. Also, there is potential increased truck traffic and emissions from truck traffic.

Step 4

In-Situ Chemical Oxidation

This process involves injecting oxidizing agents into the contaminated soil or groundwater to break down pollutants.

- **Advantages:** Treats contaminants in place, reducing exposure risks.
- **Disadvantages:** This process requires careful control of the agents to avoid further complications of the site contamination. The effectiveness also depends on the geology of the site. In order for the oxidizing agents to work, they need to be able to reach the contaminated soil or groundwater. Certain types of soil, such as clay may block the movement of the oxidizing agents.

Step 5

Bioremediation

This technique uses microorganisms to degrade organic contaminants in soil and groundwater.

- **Advantages:** Environmentally friendly and cost-effective.
- **Disadvantages:** This process takes much longer to complete, and may not address all of the site contaminants.

Step 6

Phytoremediation

Phytoremediation involves using plants to absorb, concentrate, and/or degrade contaminants.

- **Advantages:** Low cost and aesthetically pleasing.
- **Disadvantages:** The remediation of contaminants is limited to shallow contamination and also requires maintenance on an ongoing basis.

Step 7

Soil Vapor Extraction (SVE)

SVE involves removing volatile contaminants from soil by vacuum extraction.

- **Advantages:** Effective for VOCs and other volatile contaminants.
- **Disadvantages:** Specialized equipment is needed for this technique along with monitoring to ensure it is completed properly.

Complete the content above before moving on.

Knowledge Check

Let's test your understanding of this section with a quick knowledge check.

True or False: Phytoremediation involves injecting oxidizing agents into the contaminated soil or groundwater to break down pollutants.

- True
- Falso

SUBMIT

True or False: The three exposure pathways are eating/drinking, breathing, and direct contact?

- ◯ True
- ◯ False

SUBMIT

Next, we will review best practices for stakeholder engagement in brownfield redevelopment efforts.

Complete the content above before moving on.

Stakeholder Engagement

Stakeholder Engagement

To ensure that brownfield redevelopment efforts are successful in the long-term, careful consideration must be given to the engagement with key stakeholders and the involvement of the local community (public).

Key Stakeholders:

- **Community Engagement:** Involve community members from the outset to ensure their needs and concerns are addressed.
- **Local Government Role:** Local governments can provide regulatory support, funding, and resources. They can also facilitate connections between stakeholders.
- **Developer Partnerships:** Developers bring expertise in construction and finance. Collaborating with them early can help align project goals and streamline the

redevelopment process.

Public Participation

Keep the public informed about project plans, potential risks, and benefits. **Transparency builds trust and reduces opposition**.

Ensure that all community members, including marginalized groups, **have a voice** in the process. This can be achieved through diverse outreach methods.

Provide multiple avenues for public feedback, such as online platforms (surveys and questionnaires), public forums (meetings and focus groups), and comment periods.

Strategies for More Effective Stakeholder Engagement

Working with others can sometimes have challenges, especially when there are competing interests. Below are some strategies for collaboration, addressing concerns,

and building consensus with stakeholders.

Collaboration

Collaboration is critical to building strong partnerships with the community, local government, and developers.

Effective collaboration strategies include:

- establishing clear communication channels,

Addressing Concerns

Make sure to proactively identify and address concerns related to health, safety, and environmental impacts. If conflict arises, use mediation and negotiation techniques to resolve conflicts and find mutually acceptable solutions.

Steps to Address Concerns:

Building Consensus

When you work to build consensus, this means that everyone is satisfied with the solution.

- **Facilitate Dialogue**: Encourage open and respectful dialogue among stakeholders.
- **Highlight Benefits:** Emphasize the long-term benefits of the

Complete the content above before moving on.

Knowledge Check

Let's test your understanding of this section with a quick knowledge check.

What are three strategies for stakeholder engagement?

- Asking Questions, Negotiation, and Building Consensus
- Team building, Process Improvement, and Collaboration

Collaboration, Building Consensus, and Addressing Concerns

SUBMIT

We have covered a lot of ground so far, let's put everything you know about brownfields together and learn about two real-life success stories next.

Complete the content above before moving on.

Brownfield Success Stories

Brownfield Success Stories

The examples below are just two of countless success stories related to brownfield redevelopment. As you watch these videos, think about what you learned in this course and how it applies to both of these stories.

Brownfield Redevelopment at Hoboken Heights

The Brownfield Redevelopment at Hoboken Heights in Union City, New Jersey, is a notable project aimed at revitalizing a previously contaminated and underutilized industrial site.

This area has a rich history of industrial activity that left behind contaminated and underutilized properties. In the late 20th century, as manufacturing and port-related jobs moved away, many buildings fell into disrepair, and the area saw a decline in middle-class residents. This set the stage for the brownfield redevelopment project, which aimed to revitalize the area by cleaning up contamination and repurposing the land for new, mixed-use developments.

Through innovative remediation techniques such as soil blending and hot spot excavation, the project has transformed the area, minimizing development costs and removing barriers to redevelopment. This effort not only revitalized the local environment but also promoted sustainable growth and community development.

Click on the video below to learn more about the Hoboken Heights project.

Pittsburgh's Brownfield Success

Once known as the “Steel City,” Pittsburgh faced significant challenges when its steel industry declined in the late 20th century. Large tracts of industrial land were left abandoned, posing environmental and economic hurdles. However, through visionary planning and community collaboration, these brownfield sites have been revitalized into vibrant, thriving neighborhoods.

Explore key projects like the Pittsburgh Technology Center, SouthSide Works, and Hazelwood Green. See how public-private partnerships, sustainable practices, and community engagement have turned these once-contaminated sites into hubs of innovation, green spaces, and economic growth.

Watch the inspiring journey of Pittsburgh’s brownfield redevelopment, showcasing how a city can reinvent itself and create a brighter future for its residents.

Click on the video below to learn more about the transformations that took place in the city of Pittsburgh.

Additional Success Stories

The more you can focus on success, the more effective your work will be with prospective stakeholders. Use the resource below to learn more about other brownfield redevelopment success stories across the nation.

Brownfield Success Stories

Click on the EPA link to read about other success stories of brownfield redevelopment.

CLICK HERE

You are almost finished with this course. Before we complete the course, let's review a summary of key concepts and the additional resources that are available to you.

Complete the content above before moving on.

Lesson 8 of 9

Supporting Community Revitalization

Supporting Community Revitalization

Understanding brownfields is essential for environmental professionals who aim to support the revitalization of their communities. By gaining a solid grasp of the basics, you can navigate the complexities of brownfield projects more effectively, ensuring that these sites are transformed from liabilities into assets.

Knowledge of brownfields encompasses several critical areas, including site assessment, remediation techniques, and regulatory frameworks. You must be adept at identifying

contamination, understanding the risks involved, and implementing appropriate cleanup strategies.

Familiarity with federal and state regulations, such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), is also crucial. This legal knowledge helps you manage liability issues and secure funding for remediation efforts, making the redevelopment process smoother and more efficient.

The revitalization of brownfields plays a significant role in community development. Redeveloping these sites can lead to numerous benefits, such as improved public health, increased property values, and economic growth.

Cleaned-up brownfields can attract new businesses, create jobs, and provide much-needed green spaces or community facilities. Moreover, involving the community in the redevelopment process ensures that the projects meet local needs and gain public support, fostering a sense of ownership and pride among residents.

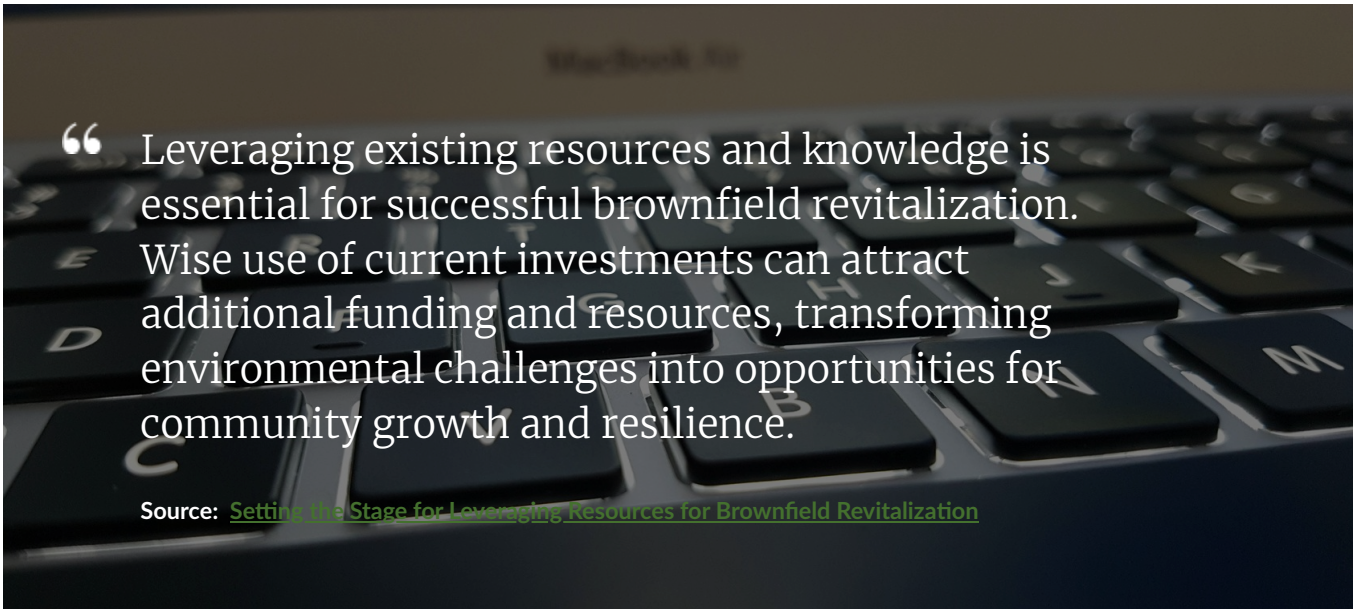
In summary, a thorough understanding of brownfields and their management is vital for anyone who is dedicated to community revitalization. By transforming contaminated sites into productive properties, you can help create healthier, more vibrant communities, driving sustainable development and economic prosperity.

Let's look at some helpful resources to learn more about brownfield redevelopment.

Complete the content above before moving on.

Lesson 9 of 9

Course Resources



Course Resources

There are a variety of helpful resources to learn more about brownfields. Take time to access and review the list of resources below.

US Environmental Protection Agency

Home page for the US EPA Brownfields Programs.

CLICK HERE

2023 Brownfields Federal Programs Guide

For more information about the funding sources that support brownfield redevelopment.

CLICK HERE

Environmental Contaminants Often Found at Brownfield Sites

A 2019 US EPA job aid providing information about common contaminants and their effects of human health.

CLICK HERE

Brownfield Success Stories

Read more about various brownfield redevelopment success stories.

CLICK HERE

Brownfield Coalition of the Northeast (BCONE)

BCONE's mission is to provide a platform for the exchange of ideas/best practices on the benefits of brownfield remediation, resilience and sustainable redevelopment.

CLICK HERE

Course Acknowledgements

The following professionals provided input and direction for the design and development of this course:

- Melina Ambrosino
- Robert Crespi
- Anne Lazo
- Elizabeth Limbrick
- George Naslas, Environmental Practice Leader at Weston & Sampson, naslasg@wseinc.com
- Linda Shaw
- Michael Tyszko

Congratulations! You have completed this course.

Click Continue to exit the course.

CONTINUE