Resilient Brownfields Redevelopment

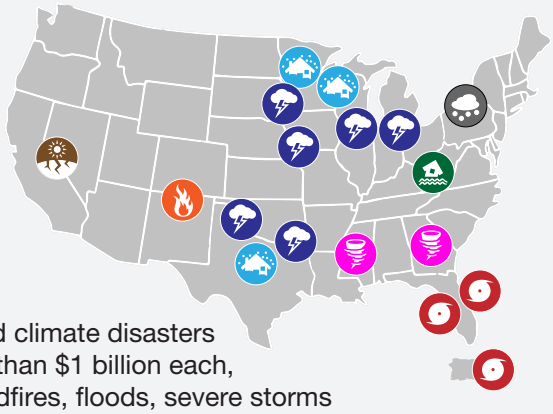
Understanding the Financial Risks of Our Changing Climate

Our once stable climate has become less predictable. Changing climate conditions and uncertainty about those changes can pose significant risks to the safe, long-term reuse of brownfield sites. Better understanding these changing conditions and building resiliency into brownfield site reuse can help communities mitigate those risks and alleviate physical, social and financial hardships when dealing with the aftermath of a climate disaster.

This fact sheet explains:

- How changing climate conditions can make brownfield sites less protective over time.
- The associated financial risks to the community.
- The costs of inaction and not preparing for likely changes and extreme weather.

BILLION DOLLAR DISASTERS IN 2022



In 2022,18 weather and climate disasters caused losses greater than $1 billion each, including droughts, wildfires, floods, severe storms and tropical cyclones.[1]

The costliest 2022 events were Hurricane Ian ($112.9 billion) and the Western and Central U.S. drought/heat wave ($22.1 billion). Damages for the year totaled $165.1 billion.[2]

From 1980 to 2022, the United States sustained 341 weather and climate disasters, each costing $1 billion or more. The cumulative cost exceeds $2.475 trillion.

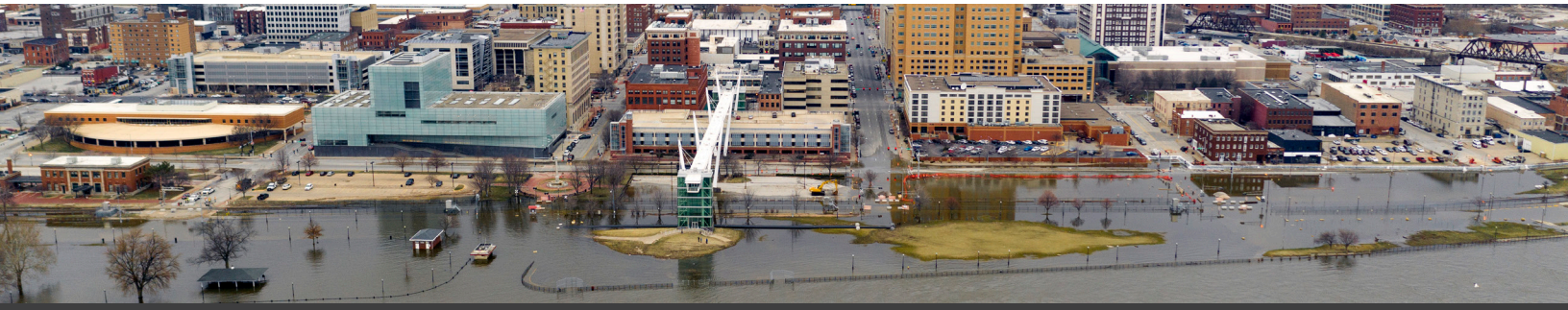
Climate Risks to Brownfield Sites and Community Safety

Changing climate conditions can pose significant risks to the safe, long-term reuse of brownfield sites. Building resiliency into brownfield redevelopment can help communities mitigate those risks and alleviate some physical and financial hardships when dealing with the aftermath of a climate disaster.

- Brownfields are an economic opportunity, but delays in addressing current and future climate vulnerabilities pose financial risks to communities because the site is likely to become costlier to finance, insure, maintain and sell.
- Climate impacts can leave unaddressed brownfield sites susceptible to increased and repeated damage, mobilized contamination, and potential exposures.
- Climate impacts may also reduce the long-term protectiveness of the cleanup and redevelopment if resilience measures are not considered during the site investigation, reuse planning, and remedy design and reuse.

Failing to act to both adapt to and mitigate the effects of climate change across the United States is estimated to reach $14.5 trillion by 2070. This is an increase from the $1.4 trillion in economic losses due to weather, climate and water hazards the United States has experienced over the last 50 years.[3]

[1] NOAA, National Centers for Environmental Information (NCEI), "U.S. Billion-Dollar Weather and Climate Disasters"; 2023. doi:10.25921/stkw-7w73.
[2] All cost estimates are adjusted based on the Consumer Price Index, 2022.
[3] Deloitte, "The Turning Point: A New Economic Climate in the United States"; January 2022.



EPA United States Environmental Protection Agency

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How Extreme Weather and Climate Disasters Affect Brownfields

Sea-Level Rise, Coastal Storms and Saltwater Intrusion

- Sea-level rise and coastal storms pose environmental and health **risks to surrounding communities** because flood waters spread contaminants and compromise structures. There is also a greater risk of saltwater intrusion into groundwater supplies, threatening drinking water availability and quality, changing the soil chemistry, and potentially affecting sites and landfills. Trees and salt-intolerant plantings, agriculture and other landscaping may be compromised. Revegetation with salt-tolerant species, desalinization and additional ecological restoration add costs and may be needed to stabilize vulnerable areas.
- In Houston, Texas, Hurricane Harvey inundated multiple brownfield sites in 2017, **potentially exposing residents to toxic pollution**.
- Severe flooding can also release underground storage tanks and compromise above-ground storage tanks, **potentially exposing residents to petroleum or other hazardous substances**.

Drought

- Drought and low soil moisture can crack clay caps or covers and weaken vegetative cover on capped brownfields and **cause higher erosion rates**.
- Brownfield cleanup using **biodegradation or phytoremediation may be impaired** due to increased heat and drought, reduced soil moisture, and watering restrictions.

Wildfires

- Wildfires at known or unrecognized brownfields **release toxins into the air** and nearby watersheds, threatening entire communities.
- In Rogue Valley, Oregon, the Almeda wildfire burned 2,537 homes and 171 commercial properties. Multiple gas stations were destroyed, creating **new brownfields** that now need to be cleaned up and redeveloped.

Moving Toward Resilience

Helping communities build resilience to changing climate conditions is a priority for EPA and the nation. There are many ways a community can increase its resilience when assessing, cleaning up and reusing brownfield sites. See EPA's Climate Smart Brownfields Manual for guidance on best practices for climate change adaptation and resilience at all stages of brownfields work. Additionally, see EPA's Consider Climate to Protect Public Health in Brownfield Redevelopment webpage for visuals of how brownfield redevelopment planning can add to climate safety.

Brownfield Site Case Studies

Completed stormwater park in Minneapolis, Minnesota.

Taking action by adding resilient features, as shown in these two case studies, can help a community reduce risks and negative economic impacts of climate change and avoid future costs.

Protecting a Watershed With Green Infrastructure[4]

Stormwater Park and Learning Center, Minneapolis, Minnesota

Threat: Brownfield site near the Mississippi River extremely vulnerable to **flooding**

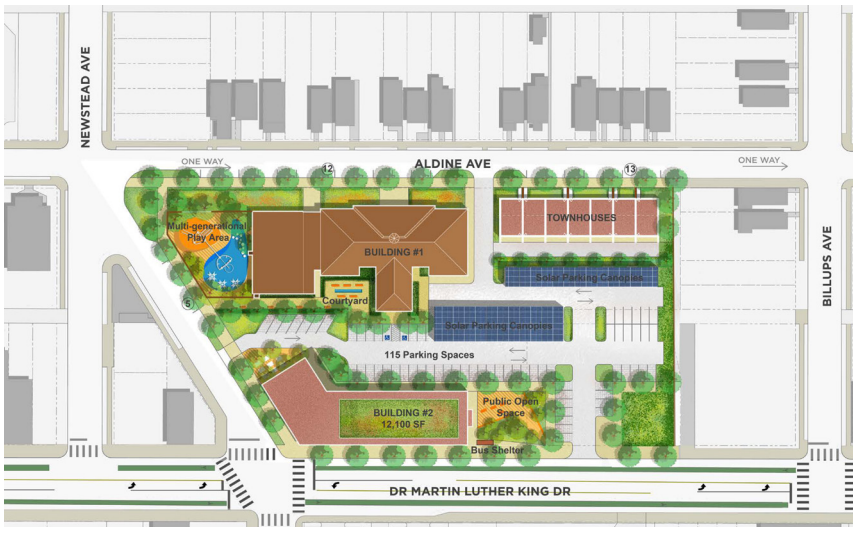
Solution: The Mississippi Watershed Management Organization transformed the site into a stormwater park and restored a piece of riverbank to a natural and sustainable state. The park has 11 visible stormwater management features, including a green roof and large rain gardens with native prairie vegetation. The park can absorb and clean up to 7 inches of stormwater runoff in a single day, ultimately preventing stormwater from entering the river. This project also provides a public access point to the river and a learning center for community education.

From School to Cool: Combating Urban Heat

Former Marshall School Reuse Plan, St. Louis, Missouri

Threat: Brownfield site in northern St. Louis impacted by the **urban heat island effect**

Solution: St. Louis is severely impacted by increasing temperature due to climate change, and coupled with the amount of paved surfaces, the Marshall School brownfield site contributes to the urban heat island effect in the community. The St. Louis Development Corporation is interested in utilizing the shuttered school as a future affordable housing complex and incorporated robust green infrastructure techniques into the plan to reduce the experience of heat on the site. The plan calls for a green roof on the proposed new construction, a significant increase of vegetation and tree canopy, especially around the bus stop where residents may be waiting, and solar parking canopies.



Proposed site reuse plan for the Marshall School in St. Louis, Missouri.

[4] Stormwater Report, "Stormwater Park Demonstrates Green Infrastructure"; October 30, 2015.