

Redeveloping Brownfields to Create Resilient Communities

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What Does Climate Change Have To Do with Brownfields?

“Any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant.”

- N.J.S.A. 58:10B-23.d



Vacant Land



Dry Cleaner



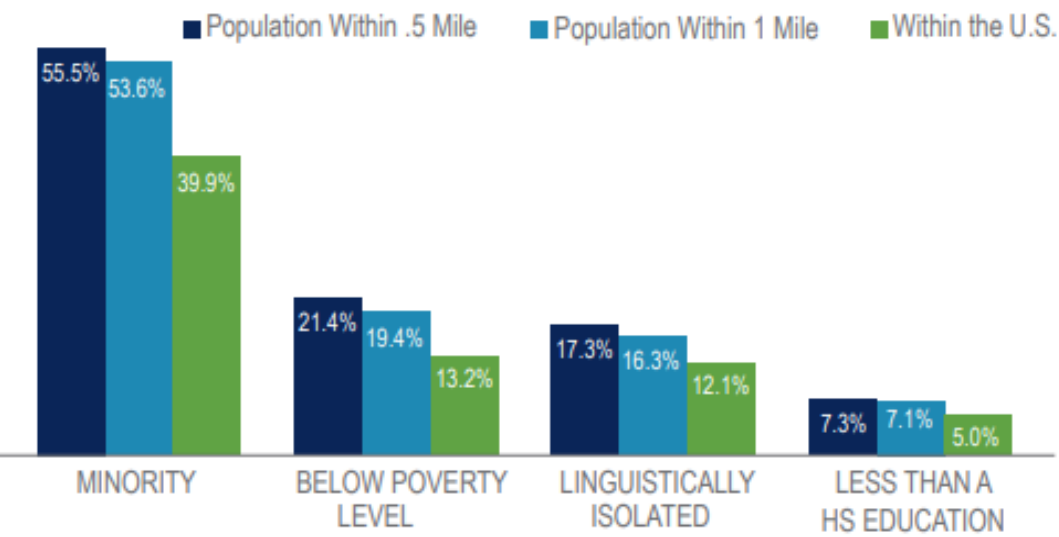
Factory

COMMUNITY CHARACTERISTICS NEAR BROWNFIELD SITES

Brownfield sites from Assessment, Cleanup and Redevelopment Exchange System (ACRES) as of FY20
Population Data from 2016-2019 American Community Survey

The population living within .5- and 1-mile of a Brownfield site is:

- ▶ more minority,
- ▶ more low income,
- ▶ more linguistically isolated, and
- ▶ less likely to have a high school education than the U.S. population as a whole.



Climate Impacts on Brownfields



Underground Storage Tank



Hurricane Harvey in Houston, TX

Unaddressed brownfield sites are susceptible to increased and repeated damage from extreme events that can mobilize contaminants and compromise structures on brownfield sites.

Climate Resilience

“A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment” – EPA



Structures damaged by flooding



Elevated structure

Climate Adaptation

“Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.” – EPA



Green roof on top of the Jacob Javits Convention Center in New York City

HOW CAN BROWNFIELD REDEVELOPMENT PLANNING ADD TO CLIMATE SAFETY? FLOODING PROBLEM



Potentially contaminated brownfield site

1

Paved, impervious site and road areas

2

Poor drainage for stormwater management

3

HOW CAN BROWNFIELD REDEVELOPMENT PLANNING ADD TO CLIMATE SAFETY? FLOODING SOLUTION

1 Remove and reduce
contaminants to
clean the site

2 Add safe, permeable
surfaces for walking or
biking

3 Improve drainage
and stormwater
management

Flooding Solutions: Permeable Surfaces & Stormwater Management

- **Permeable pavement** has openings in it to allow water to soak into the soil
- **Bioswales** are channels that are either vegetated, mulched, or xeriscaped, and used for stormwater retention and treatment.
- Combine for green streets & parking lots



Green Street in Seattle, WA (Image Credit: Abby Hall, US EPA)

Green Parking Lots (Image Credit : Naturally Resilient Communities)

HOW CAN BROWNFIELD REDEVELOPMENT PLANNING ADD TO CLIMATE SAFETY?

URBAN HEAT PROBLEM

1

Pavement and dark, heat-absorbing materials

2

Lack of plants and green space

HOW CAN BROWNFIELD REDEVELOPMENT PLANNING ADD TO CLIMATE SAFETY? URBAN HEAT SOLUTION



1

Use lighter color and reflective pavement and materials

2

Plant trees, add water features and expand green space

Urban Heat Solutions: Reflective Materials, Green Space, Water Features

- **Lighter color and reflective materials** absorb less heat than blacktop.
- **Green roofs** are created by building layers of drainage, engineered soil, and vegetation on a building's roof. They capture and store stormwater to reduce flood impacts, and cool buildings during extreme heat events.
- **Trees** provide aesthetic benefits and shade, improve air quality, and capture and store greenhouse gases from the atmosphere.

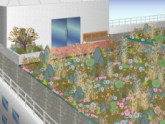


Considerations for Green Infrastructure

Note that your LSRP will help you determine what's appropriate for your site.

Resources to Guide Implementation

9.4 GREEN ROOFS



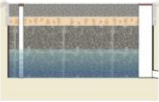
A green roof, also known as a vegetated roof, is a roof that has been covered with a growing medium and vegetation. Green roofs are effective for reducing the amount of stormwater runoff leaving a site. A green roof consists of vegetation planted in growing media on top of a drainage layer that intercepts stormwater runoff and reduces the total volume of runoff through evapotranspiration.

N.J.A.C. 7-8 Stormwater Management Rules – Applicable Design and Performance Standards	
Green Infrastructure	Yes
Stormwater Runoff Quantity	Yes
Groundwater Recharge	Not Allowed
Stormwater Runoff Quality	Not Allowed

Stormwater Runoff Quantity Control Mechanisms and Corresponding Criteria	
Volume Reduction*	
Reduced Curve Number	Based on the available water capacity of the growing medium
Growing Medium	Must meet the design criteria specifications. See Pages 6 and 7, plus either Page 9 for Extensive Green Roofs or Page 10 for Intensive Green roofs, as appropriate
Maximum Roof Slope	20%
Evapo-transpiration	
Appropriate Species Selection	See Page 6
Minimum Density of Vegetation	85%

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Green Infrastructure BMPs, Chapter 9.4: Green Roofs
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9.6 PERVIOUS PAVING SYSTEMS

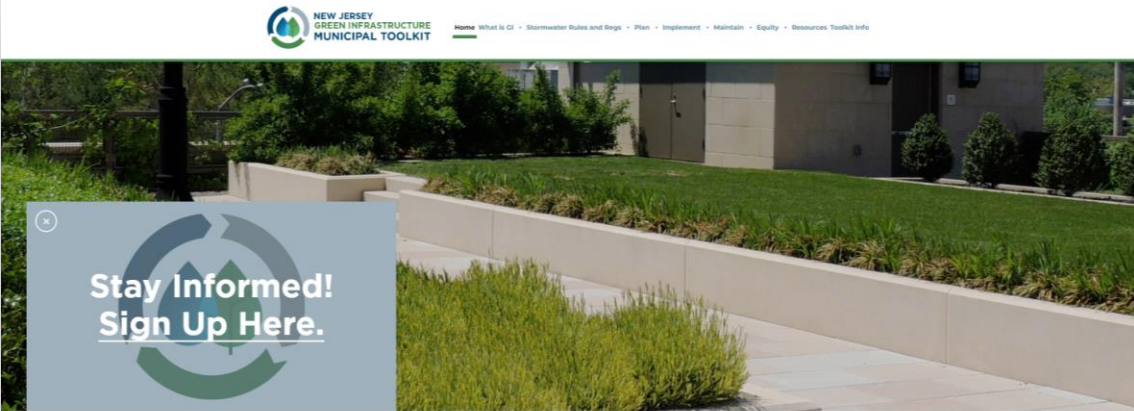


A pervious paving system is a stormwater management facility used to address the impacts of land development. The system consists of a durable, permeable surface course, which allows stormwater runoff to move through it; this surface course is placed over a transition layer and a storage bed of open-graded, i.e., devoid of fine particles, aggregate. There are two types: underdrained systems and systems designed to infiltrate into the subsoil. When designed in accordance with this chapter, the total suspended solid (TSS) removal rate is 80%.


N.J.A.C. 7-8 Stormwater Management Rules – Applicable Design and Performance Standards	
Green Infrastructure	Yes
Stormwater Runoff Quantity	Yes
Groundwater Recharge	Yes, for systems designed to infiltrate into the subsoil
Stormwater Runoff Quality	80% TSS Removal

Stormwater Runoff Quality Mechanisms and Corresponding Criteria	
Filtering	
Maximum Area of Additional Inflow	≤ 3 x the Area of Pervious Paving System
Maximum Drain Time	72 hours, Using Slowest Design Permeability Rate
Porous Asphalt, Pervious Concrete and Permeable Interlocking Paver Units	6.4 inches/hour Minimum Infiltration Rate

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What is GI? **Stormwater Control Ordinances: What You Need to Know** **Plan** **Implement** **Maintain**

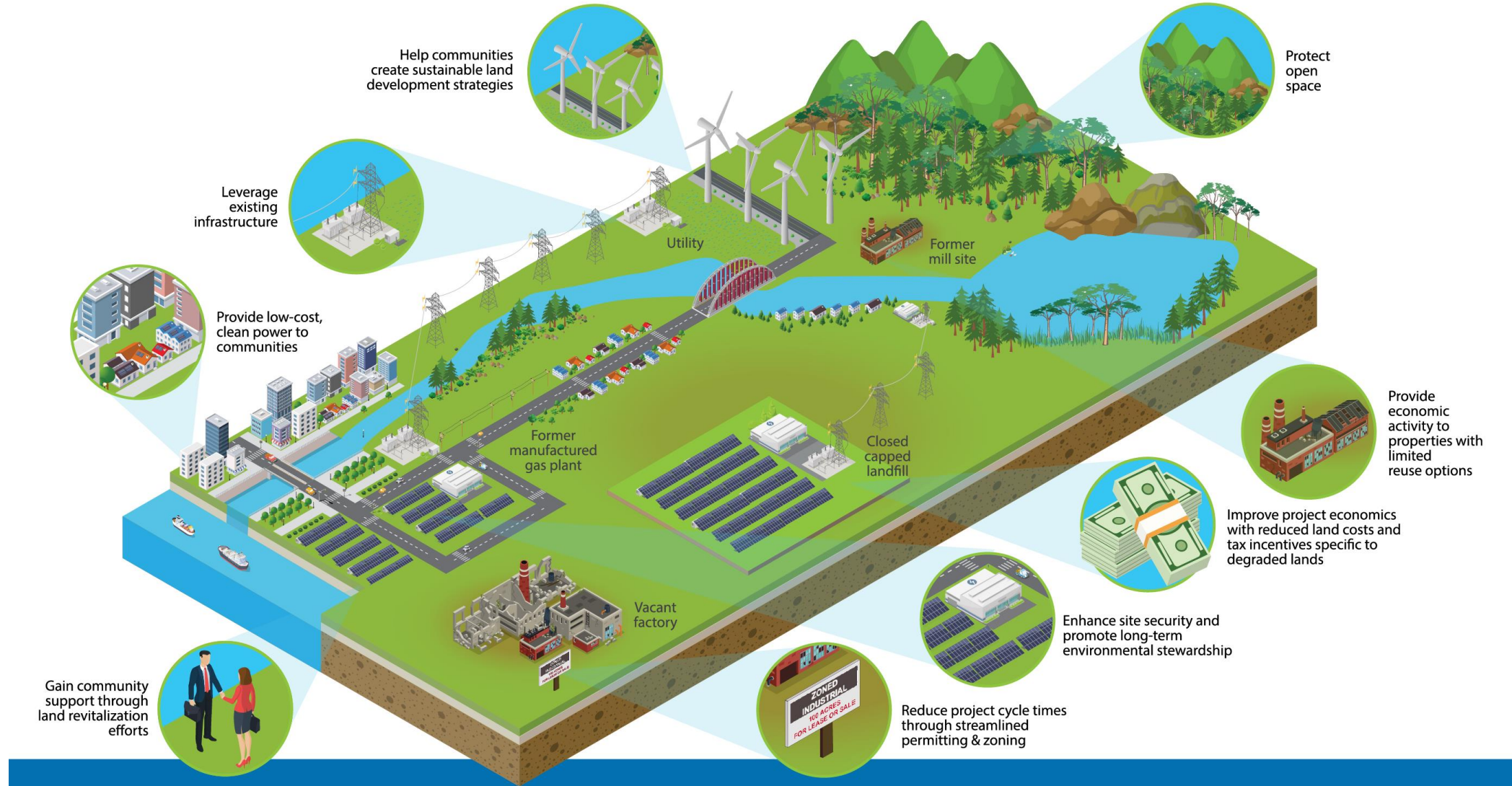
Climate Mitigation

“Measures to reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere” – EPA



RE-Powering America's Land

Potential Advantages of Reusing Potentially Contaminated Land for Renewable Energy



Energy Efficiency

- Energy efficient technology can be integrated into new, renovated, and retrofitted buildings on site.
- Benefits of integrating energy efficient technology:
 - Lower energy costs for owners and tenants
 - Reduced energy consumption
 - Reduced operating expenses

Solutions

- Replace and upgrade lighting and HVAC systems
- Install new energy-efficient appliances and windows
- Incorporate building systems that automatically control heating, ventilation, air conditioning and lighting

QUESTIONS?