Baltimore’s natural and built systems are colliding.

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
The city has over 16,000 vacant buildings and properties.
And is at increased risk from flooding as storms become more volatile and less predictable.
Higher Ground is a landscape proposal to simultaneously address vacancy and stagnation in blighted communities and to reduce the risk of flooding in low lying areas.

Higher Ground
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
The early city was built around its water system c. 1700. At one time the Jones Falls powered mills that produced over 80% of the world’s sail cloth.
The city expanded as an industrial hub with the advent of the county's first railroad, introduced in the mid 1800's.

The geography of new shipping routes rendered the water-powered mills obsolete.
Neighborhoods grew to house the expanding work force.
And the city extended its boundaries to encompass over 75 square miles.

Highways extended the reach for workers and the primary means of transportation for industries shifted again.
These new exo-centers and their arterial highways like Route 40 sliced through the city neighborhoods in the 1970's, isolating residents from the new job centers, and creating a steady increase in paved surfaces deep into the watershed.
To compete with the allure of the expanding suburbs, the city began several waterfront revitalization projects in the early 1980's.

Rerouting federal funds that had been awarded to west Baltimore to address poor conditions, the Hyatt waterfront hotel at Inner Harbor and the promenade bulkheads in Fell's Point were built with these community-based funds.
Sparked by the new waterfront activity, many of the abandoned mill buildings were renovated in the late 1980’s, creating charming pockets of retail, residential and restaurant activities. These upscale communities thrived in geographical separated areas of the city.
While some areas of city began to thrive in the 1980’s and 1990’s and continue to prosper, the effects of isolation and work displacement in east and west Baltimore have been staggering, especially for African-American communities.

Maryland is the richest state in the United States of America, with a median household income of $69,272 according to the 2010 census.

Median Household Incomes:

- United States: $50,500
- State of Maryland: $69,272
- Baltimore City: $41,800
- West Baltimore: $24,300

**INCOME:**

**RACE**

- Percent population Black:

http://www.nhgis.org
RACE BY DECADE: 1940

MINNESOTA POPULATION CENTER. NATIONAL HISTORICAL GEOGRAPHIC INFORMATION SYSTEM: VERSION 2.0. MINNEAPOLIS, MN: UNIVERSITY OF MINNESOTA 2011. HTTP://WWW.NHGIS.ORG

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
RACE BY DECADE: 1950

Percent population Black:

- 0.0300000 - 0.020732418
- 0.020732417 - 0.0385022042
- 0.089022043 - 0.232573727
- 0.232573728 - 0.387494496
- 0.387494497 - 0.573546958
- 0.573546959 - 0.784285714
- 0.784285715 - 0.996195723


HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
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MINNESOTA POPULATION CENTER. NATIONAL HISTORICAL GEOGRAPHIC INFORMATION SYSTEM: VERSION 2.0. MINNEAPOLIS, MN: UNIVERSITY OF MINNESOTA 2011. HTTP://WWW.NHGIS.ORG
RACE BY DECADE: 1970

MINNESOTA POPULATION CENTER. NATIONAL HISTORICAL GEOGRAPHIC INFORMATION SYSTEM: VERSION 2.0. MINNEAPOLIS, MN: UNIVERSITY OF MINNESOTA 2011. HTTP://WWW.NHGIS.ORG

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
RACE BY DECADE: 1980

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RACE BY DECADE: 1990

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HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
CENSUS TRACT 2000 BALTIMORE BLACK RACE BY DECADE: 2000

Maryland Institute College of Art

Percent population Black:
- 0.006095 - 0.1455
- 0.1456 - 0.3110
- 0.3111 - 0.4701
- 0.4702 - 0.6528
- 0.6529 - 0.8015
- 0.8016 - 0.9198
- 0.9199 - 0.9880

RACE BY DECADE: 2000

Maryland Total
Baltimore Black
Baltimore White

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape

RACE BY DECADE: 2010

Map and bar chart showing racial distribution in Baltimore, Maryland. The map highlights the percentage of population Black in different census tracts, with data from the Minnesota Population Center and the National Historical Geographic Information System. The chart compares Maryland Total, Baltimore Black, and Baltimore White populations over decades from 1940 to 2010.

The city became increasingly divided as the population shrank. Baltimore's numbers plummeted as the state population soared, creating a significant gap in the political will of the state and the needs of the city.
Vacant Housing Units in Baltimore City

MARYLAND INSTITUTE COLLEGE OF ART

Minnesota Population Center. National Historical Geographic Information System:
Vacant Housing Units in Baltimore City

Vacant Housing Units in Baltimore City

Vacant Housing Units in Baltimore City

HIGH GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape

http://www.nhgis.org
There are currently 33,500 vacant lots and buildings in Baltimore City. This amounts to 15% vacancy city-wide, with some neighborhoods exceeding 70% vacancy.

According to recent research, a stable community can tolerate up to 4% vacancy.

Built in the 1800’s, most of these vacant buildings are well above the risk of flooding.

These neglected communities offer great potential to be reimagined in the face of climate change.
The Inner Harbor was under construction as the emerging FEMA flood guidelines were being debated. Seen in 2011, the Inner Harbor promenade is under water.
Wedding ceremony is disrupted, July 2016.
HIGHER GROUND
Leveraging Baltimore's Topography to Increase Social and Climate Resiliency through Landscape
Inundation Sequence shows flooding scenarios along the Gwynn’s Falls. Stream gage values are based on the historical record of Hurricane Agnes (1972).

### Different stage of the sequence reflects the percentage of Agnes rainfall.

<table>
<thead>
<tr>
<th>stage #</th>
<th>Agnes Reasoning</th>
<th>discharge at Nova (starting point Washington Blvd)</th>
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<tbody>
<tr>
<td>1</td>
<td>100 Full Agnes(1972)</td>
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<td>1611 2932</td>
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**Stage 8**

**Higher Ground**

Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
### Stage 7

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Stage 5

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
# Higher Ground
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape

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*HIGHER GROUND*

Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape

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**Normal Stream Level (2014-15):** 20

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**Higher Ground**
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
Stage 2 with vacants in project area well above the flooding

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
Storm surge affects industrial and the most desirable waterfront sites

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
Buffer along the Gwynns Falls for ecosystem support and community edge:

4,080 vacant properties, 20.84 million ft² land

water volumes: TBD

**Phase 1 Green along major stream**
Neighborhood parks to engage each community in the solution for flooding and vacancy:

1,960 vacant properties, 3.14 million ft² land

water volumes: TBD

Phase 2 Green Neighborhood Parks
Phase 3 Green Intertidal Wetlands

Wetlands along the Gwynns Falls in the intertidal zone and the floodplain:

142 vacant properties, 14.80 million ft² land

water volumes: TBD

Tanner Park, Peter Walker & Assoc.
Mid-neighborhood greenway for connectivity

3,250 vacant properties, 11.4 million ft² land

water volumes: TBD

Phase 4 Green along buried stream
Eastern-most neighborhood boundary and major connector.

2,520 vacant properties, 6.80 million ft² land

water volumes: TBD

Phase 5 Green along MLK blvd

HIGHER GROUND
Leveraging Baltimore’s Topography to Increase Social and Climate Resiliency through Landscape
Phase 1 Build new commerce sites

Develop light industrial and manufacturing sites along the Route 1 truck route.

1,720 vacant sites
Phase 2 Build new mixed-use

Provide a variety of use redevelopment within communities.

1,030 vacant sites
Phase 3 Redevelop housing blocks

Provide a variety of community-oriented housing projects

670 vacant sites

Higher Ground
Leveraging Baltimore's Topography to Increase Social and Climate Resiliency through Landscape
Phase 4 Fill out the district

Complete re-use of vacant sites within the district

6,000 vacant sites

The project total addresses 21,600 vacant sites, or 2/3 of the total in the city, reducing total vacancy from 15% to 5%
Next steps:

Run the hydrology model for the selected sites to determine amount of flood reduction with coauthor and collaborator Celso Ferreira and his team at George Mason University
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Continue work with the Community Embedded Manufacturing Group in collaboration with Center for Urban Families to bring jobs to west Baltimore and replace vacants with new fabrication centers.
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Continue work with collaborator Seth Guikema and his team at University of Michigan on the application of BIG DATA to the analysis of critical factors in community risk and well-being. Develop “butterfly models” of parameters for site typologies.
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Enter plan in the Baltimore City Office of Sustainability DP3 plan for hazards, allowing FEMA funding to implement plan in case of disaster. Roll out maximum number of sites in the flood plain to improve the Community Rating System Score, challenging projects like Under armour’s new plan for Locust Point in the 500 year flood, and pressuring the city to consider Higher Ground for a combined improvement of Social and Environmental Resiliency.
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