

Designing for co-benefits at the neighbourhood scale

An aerial photograph of a residential neighborhood. The image shows a central green space with many trees and a paved road that runs through the middle. On either side of the road are rows of houses with grey roofs. The overall scene is a mix of urban development and greenery.

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Case study: East clayton, Surrey, BC

Master-planned sustainable community



CANOPY ~

45%



10%

IMPERMEABLE

Development started 2004



CANOPY 1

8%



65%

IMPERMEABLE

Future scenarios to improve the suburban forest

No Policy change



Climate Retrofit



Re-Wild



Suburban Savannah



No Policy change



Climate Retrofit



Re-Wild



Suburban Savannah



No policy change

Trees: 14,890

Canopy Cover: 16%

Diversity: High species

Stormwater: 5,860 m³/year

Habitat: low

Air Quality: 0.9 t/year

GHG sequestration: 60 t/year

GHG storage: 4000



Image credit: Sara Barron

Climate retrofit

Trees: 30,650

Canopy Cover: 44%

Diversity: High species & size

Stormwater: 14,070 m³/year

Habitat: medium

Air Quality: 2.4 t/year

GHG sequestration: 135 t/year

GHG storage: 9660



MADE WITH
LUMION TRIAL VERSION

Image credit: Sara Barron

Re-wild

Trees: 27,190

Canopy Cover: 28%

Diversity: High age & structural

Stormwater: 9,830 m³/year

Habitat: high

Air Quality: 1.6 t/year

GHG sequestration: 107 t/year

GHG storage: 5340



MADE WITH
LUMIONI TRIAL VERSION

Image credit: Sara Barron

Suburban savannah

Trees: 29,000

Canopy Cover: 29%

Diversity: High size

Stormwater: 10,060 m³/year

Habitat: medium









Air Quality: 1.7 t/year

GHG sequestration: 99 t/year

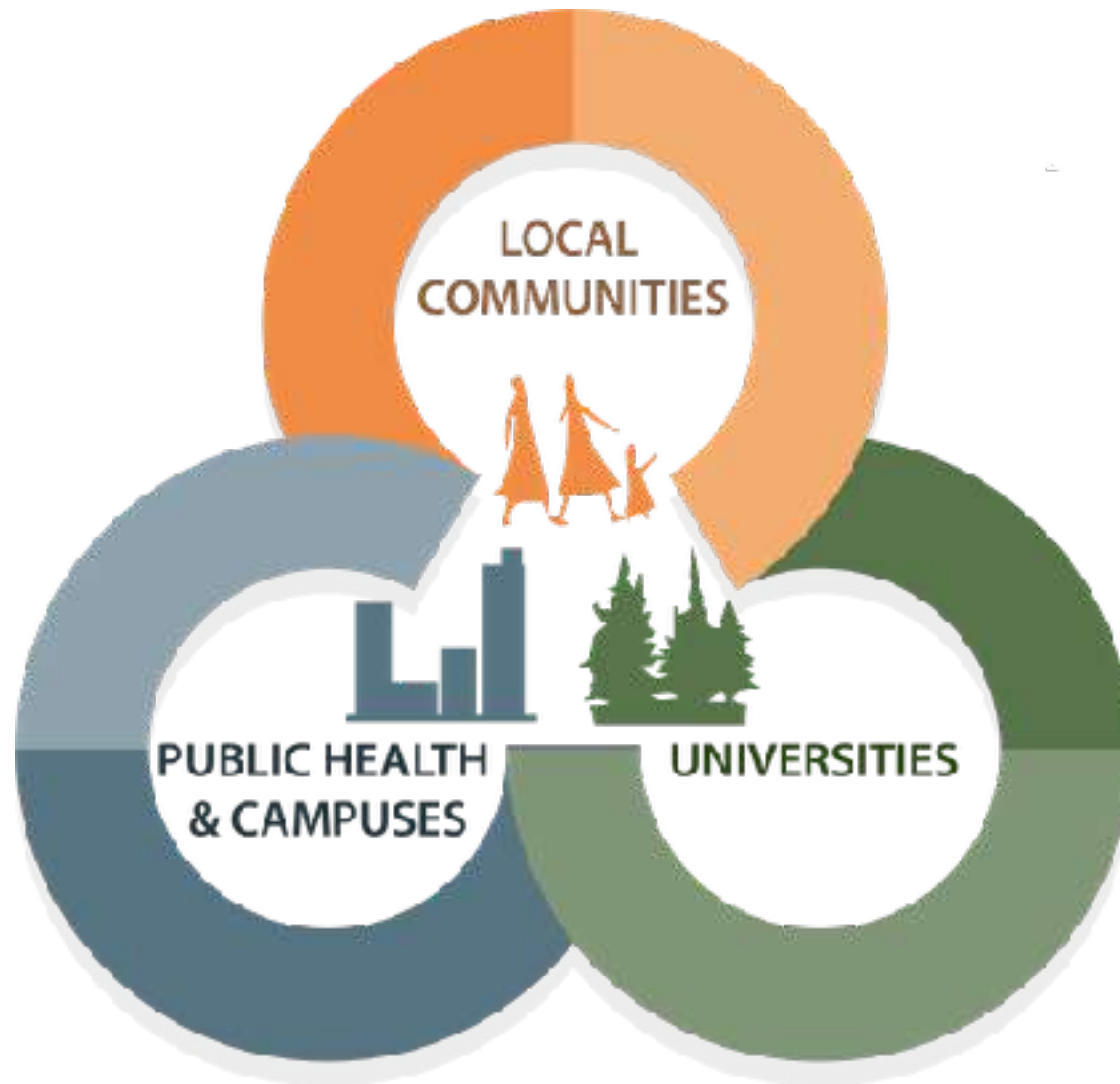
GHG storage: 5310



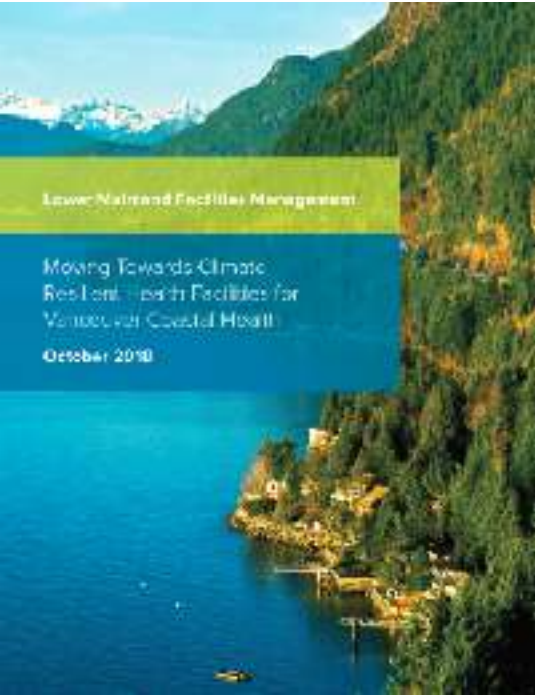
Image credit: Sara Barron

	No Policy Change	Climate Change Retrofit	Re-Wild	Suburban Savannah
				
Physical Access to Nature	78%	78%	87%	94%
Visual Access to Nature	28%	28%	43%	89%
Habitat Potential	15%	15%	26%	21%
Building for Birds Breeding & Winter Score	78	78	183	79
Building for Birds Migrant Stopover	93	93	212	174
Air Quality (tons per year)	.89	8	1.63	1.65
Canopy Cover 2016	16	44	28	29
Canopy Cover in 2050	29	82	35	34
Air Quality 2016	.89	2.4	1.63	1.65
Carbon sequestration 2016	60	135	107	99
Carbon storage	4,022	9,659	5,335	5,314
Stormwater	5,862	14,073	9,826	10,064
Street-level visualization				

Climate Resilience and Well-Being through Neighbourhood-Scale Green Design



How can health campuses help with climate adaptation and improve health outcomes?

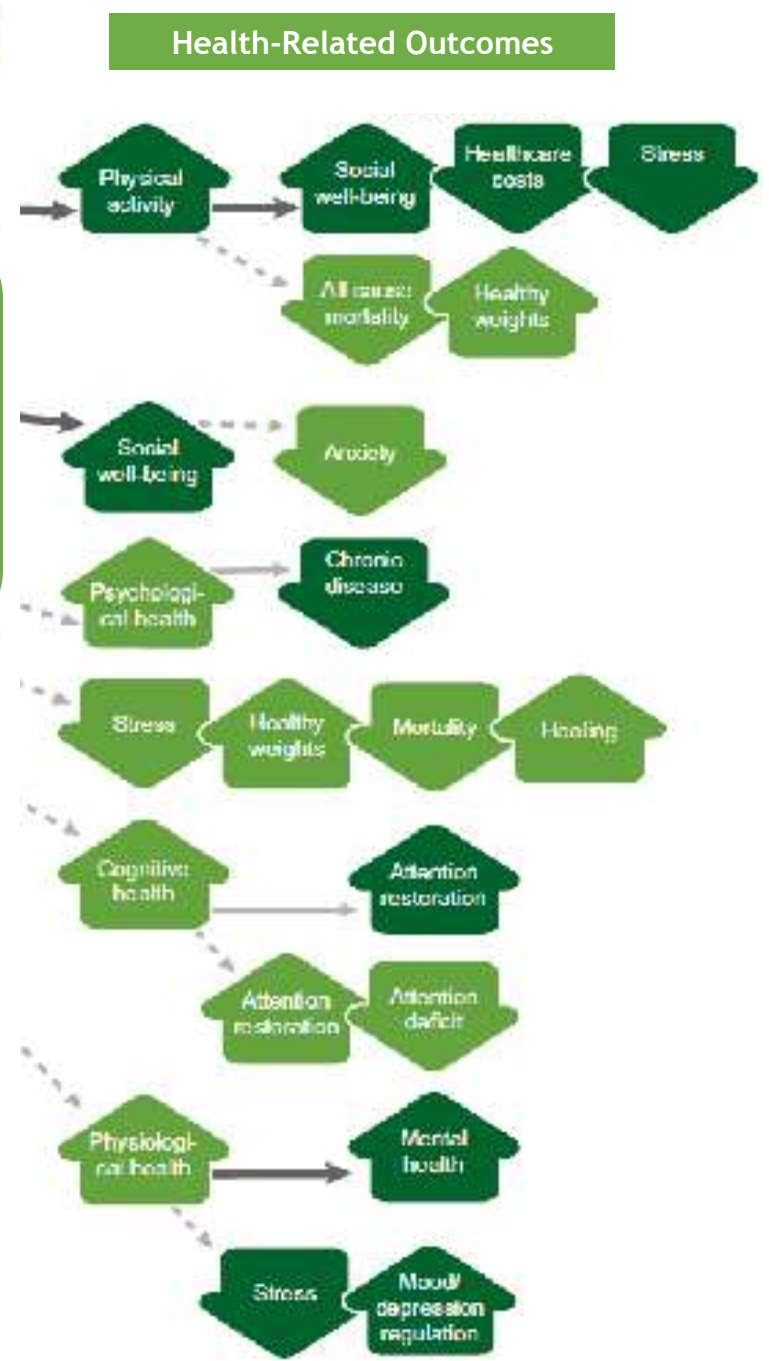
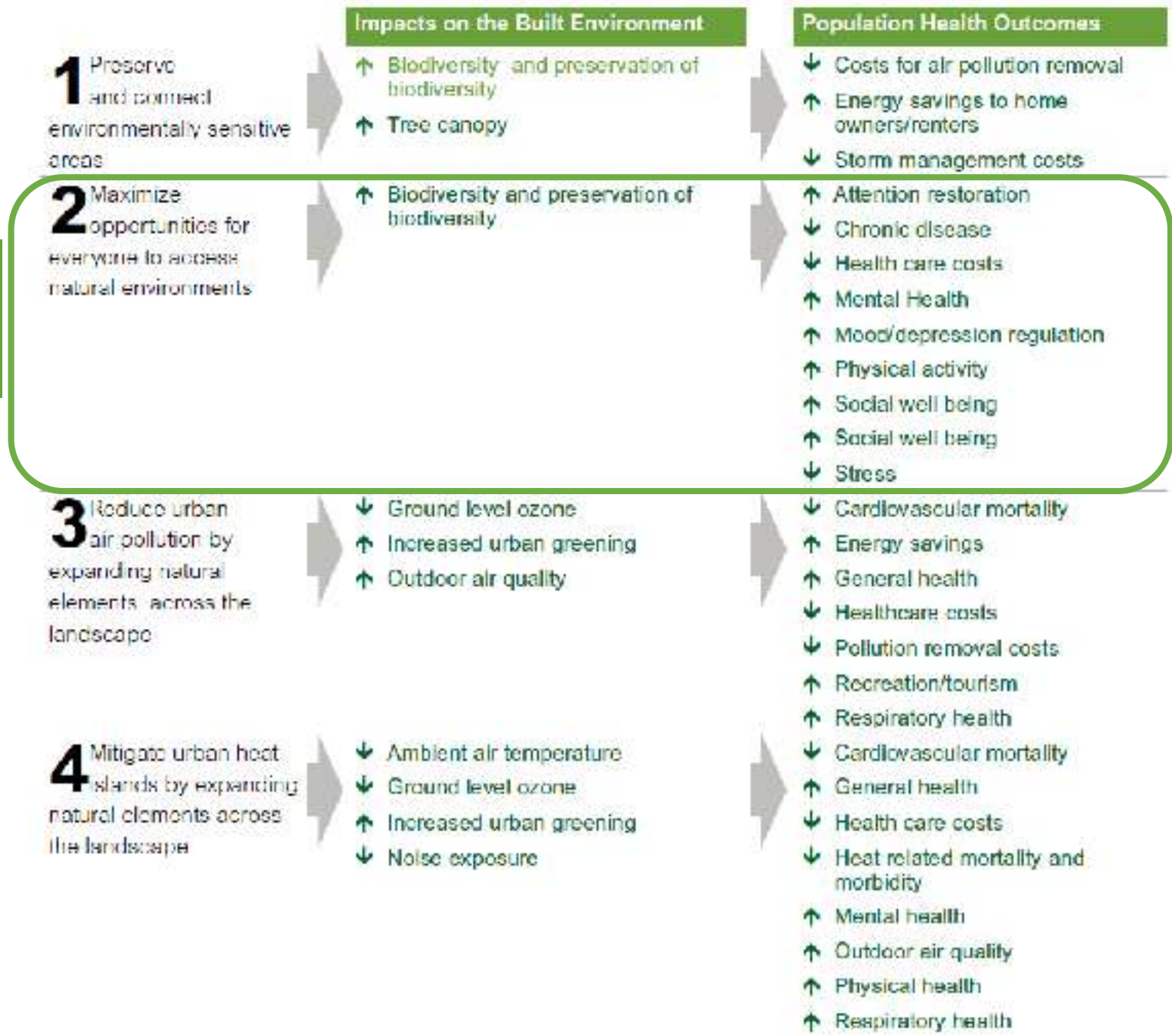


How can urban forests help with climate adaptation and improve health outcomes?



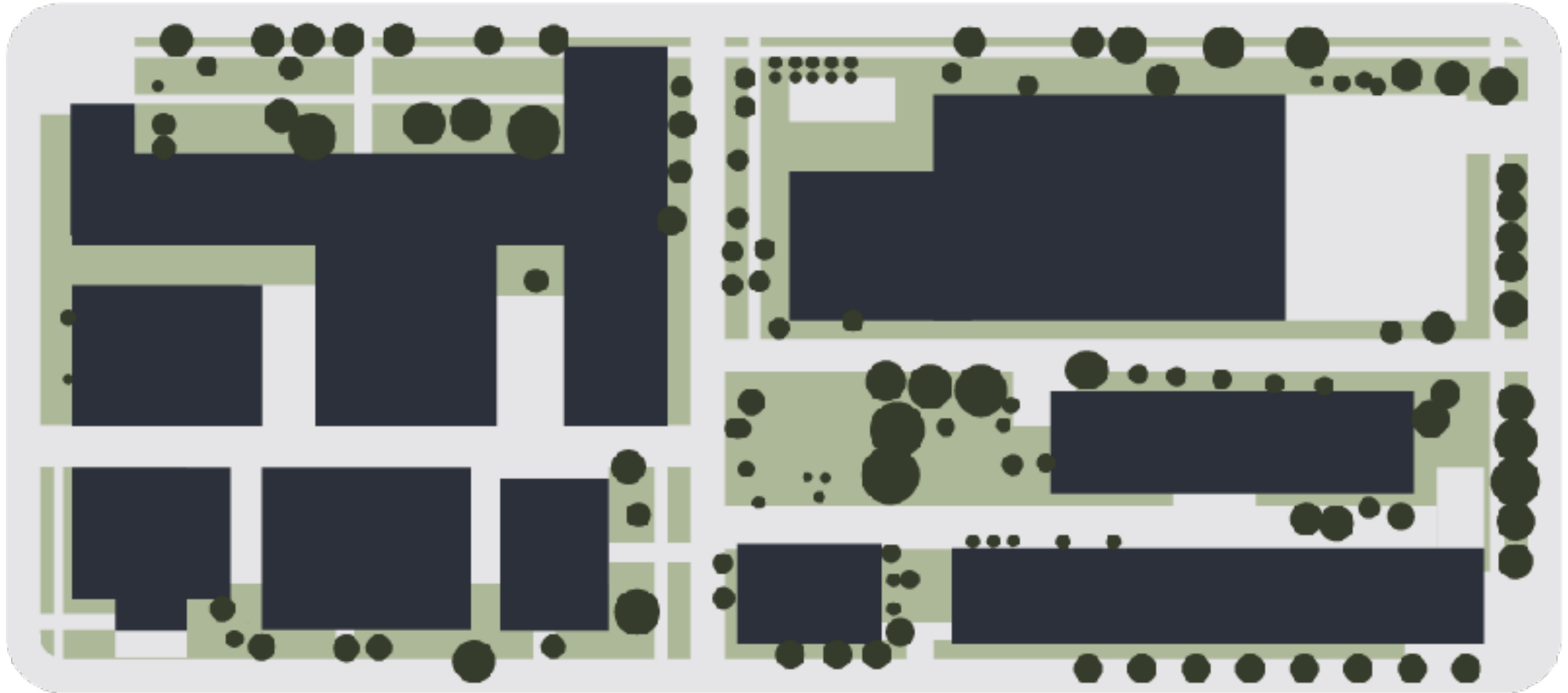
Climate Impacts and Responses				
	Past	Projected Impact (2080)	Urban Forest Response	Projected Outcome (<i>draft</i>)
Days above 25°C	18 days	73 days (44 to 105)	Increase canopy Increase large trees to maximize air filtration	30% canopy = 2-3°C reduced temperature Increased ozone = higher need for air filtration
Cooling Degree Days	80 days	520 (270 - 800) days	Shade S/W building faces	Passive cooling
Heating Degree Days	2750 days	-45% (-57 to -33) days	Shade S/W building faces	Passive cooling
Tropical Nights	0.7	29 (5-63)	Increase canopy	30% canopy = 2-3°C reduced temperature
Precipitation	(mm)	(mm)		Increased resilience
Spring	305	9%		
Summer	146	-22%	Select drought tolerant species	
Autumn	429	17%		
Winter	499	11%		

Health Impacts and Responses				
	Existing	Goal	Urban Forest Response	Projected Outcome (<i>draft</i>)
Improved Air Quality	TBD	Decrease ozone Decrease particulates	Maximize canopy Maximize leaf area index	Fewer days above 25°C Increased filtration
Physical Access to Greenspace	TBD	Increase access for all patients	Nearby greenspaces (within 50-100 m of doors)	Increased use of spaces, reduced patient recovery
Visual Access to Greenspace	TBD	Increase access for all patients		Reduced recovery times, reduced pain medication
Social Opportunities	TBD	Provide outdoor spaces for gathering	Variety of greenspaces for groups of 3 or more people People-watching spaces	Improved mental health
Walkability	TBD	Increase connectivity/routes	Tree-lined walks, walking loops	Increased physical activity
Biodiversity	TBD	Increase species/age/size diversity	Increased tree diversity	Increased mental health Increased resilience



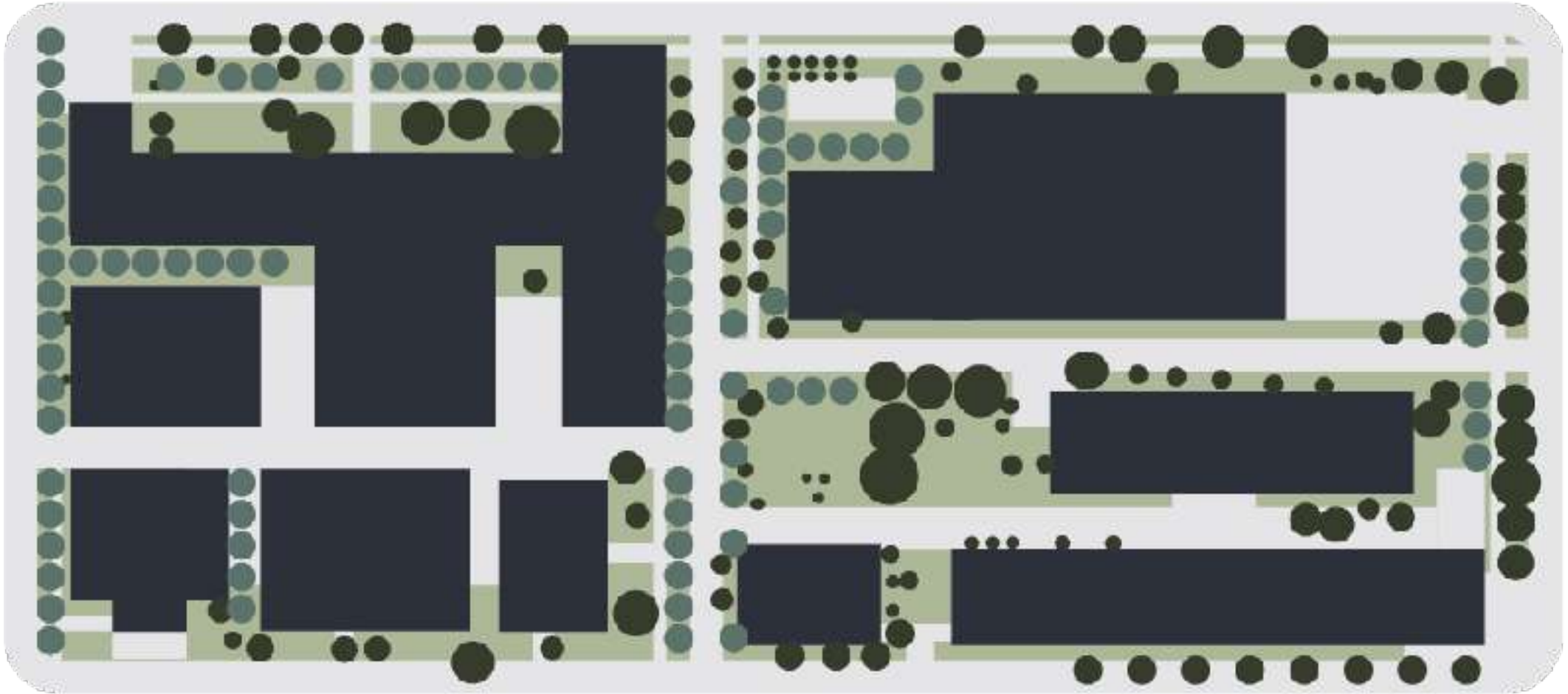
Source: Healthy Built Environment Toolkit v2 (PHSA, 2018)

Test site



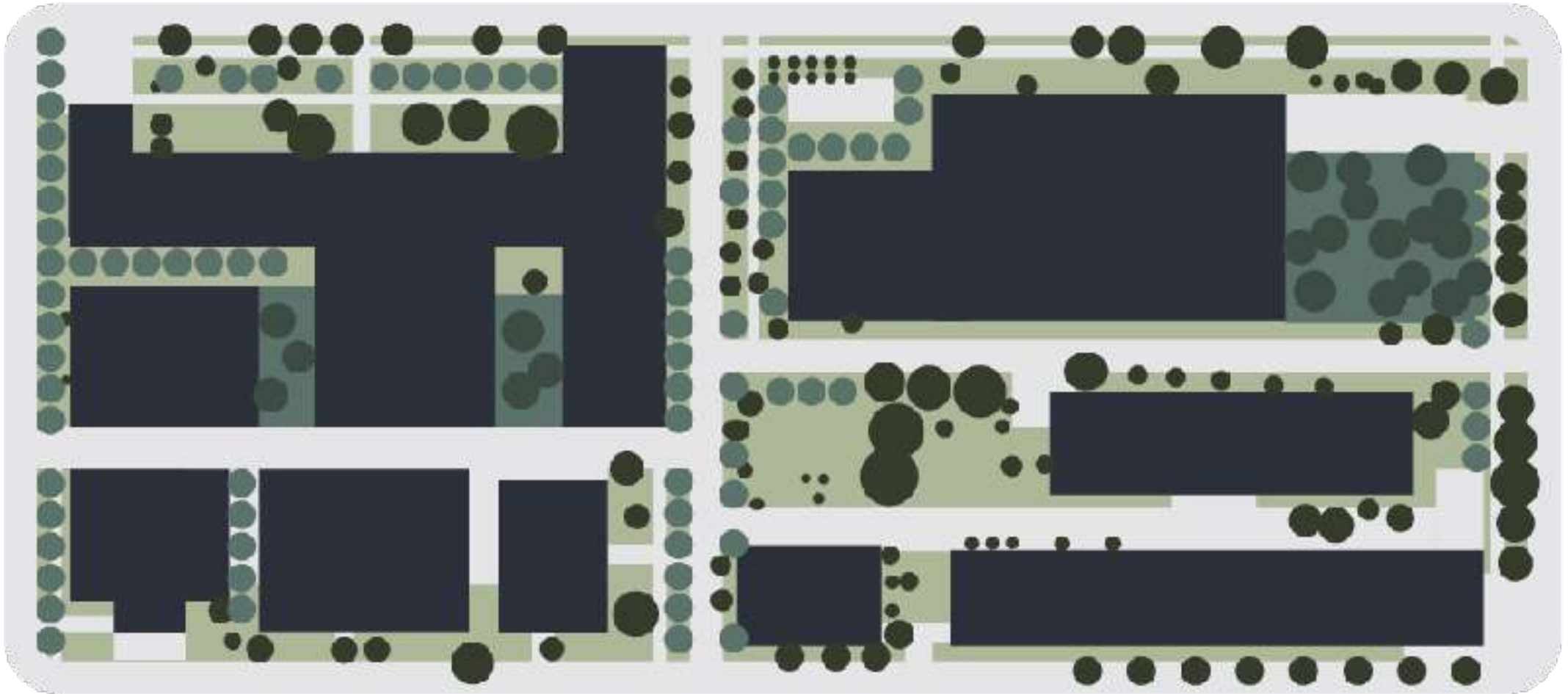
Existing conditions
Canopy cover = ~11%

Test site



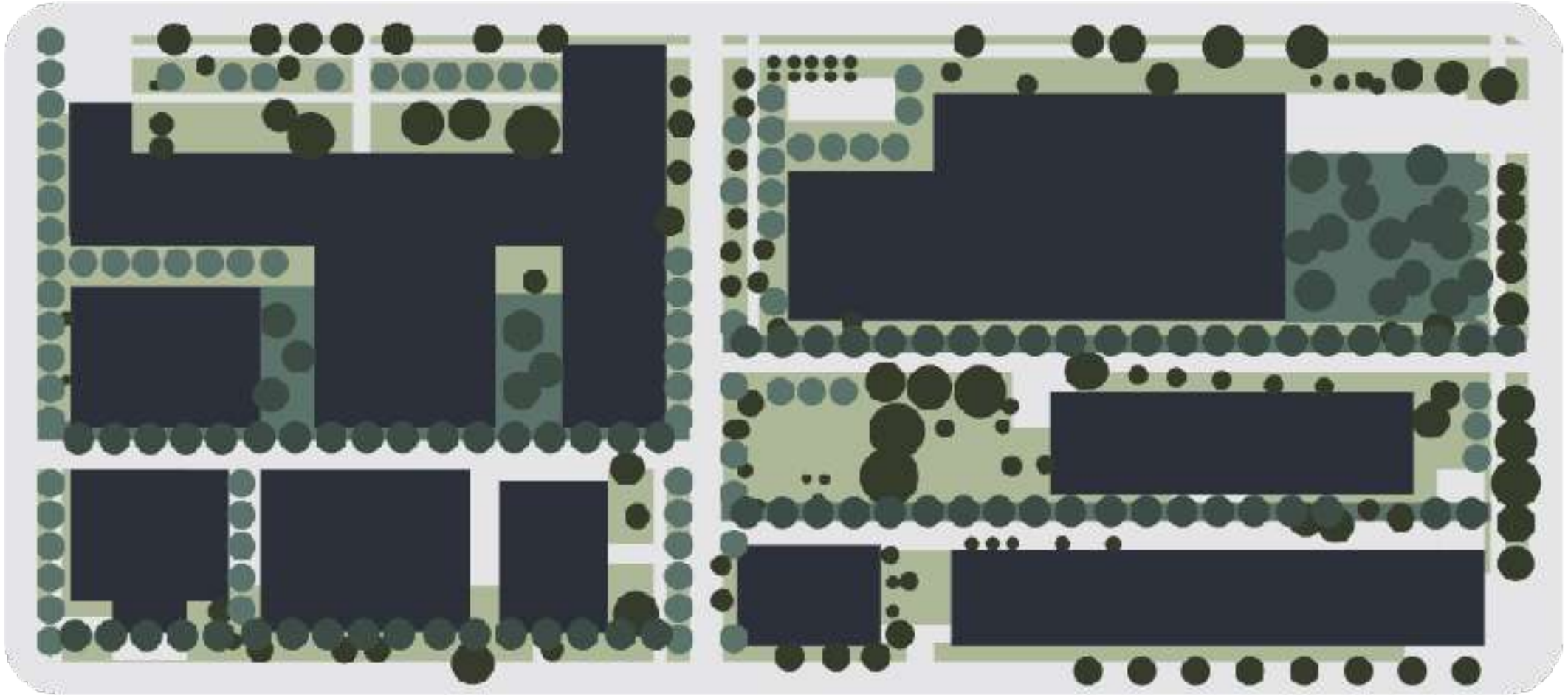
Increase building shading &
canopy
Canopy cover = ~17%

Test site



Increase accessible
greenspace
Canopy cover = ~19%

Test site



Increase views of trees
Canopy cover = ~22%