



Lloyd Green District 3.2.09

Bert Gregory FAIA



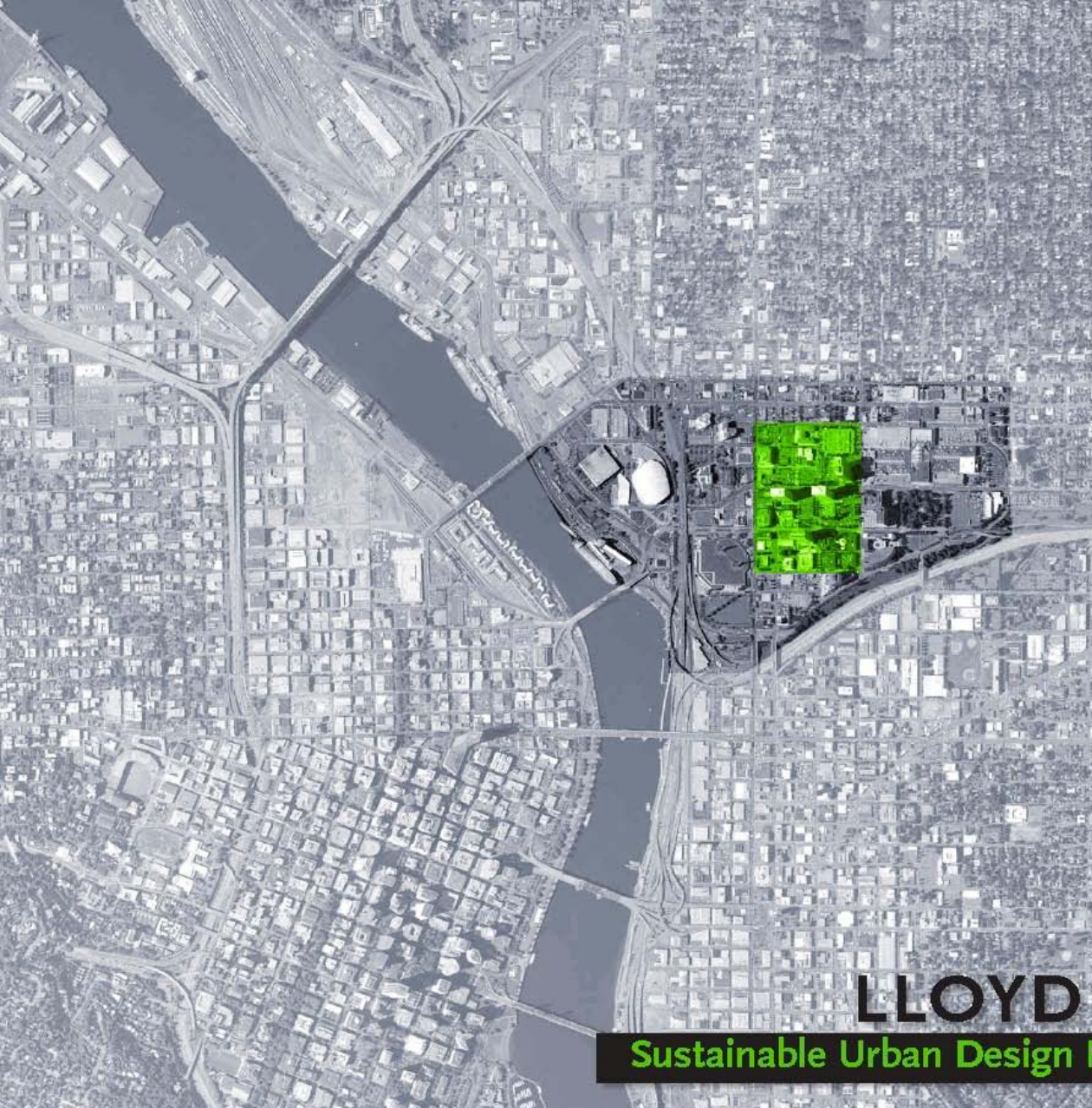
# Carbon Emissions



Carbon Neutral

Carbon Offsets





**LLOYD CROSSING**  
**Sustainable Urban Design Plan & Catalyst Project**

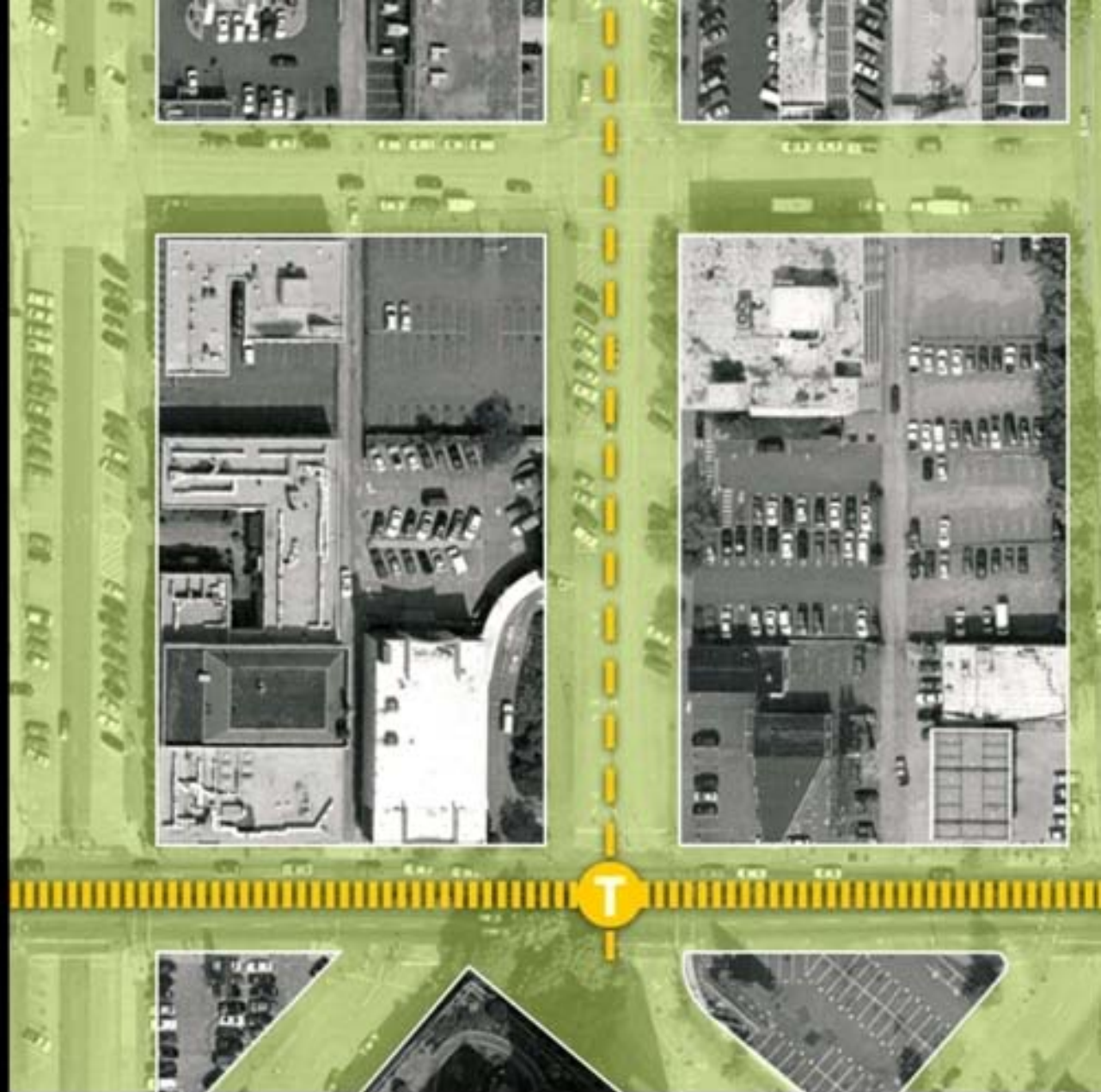


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Private



Public





Private  
+  
Public





Private





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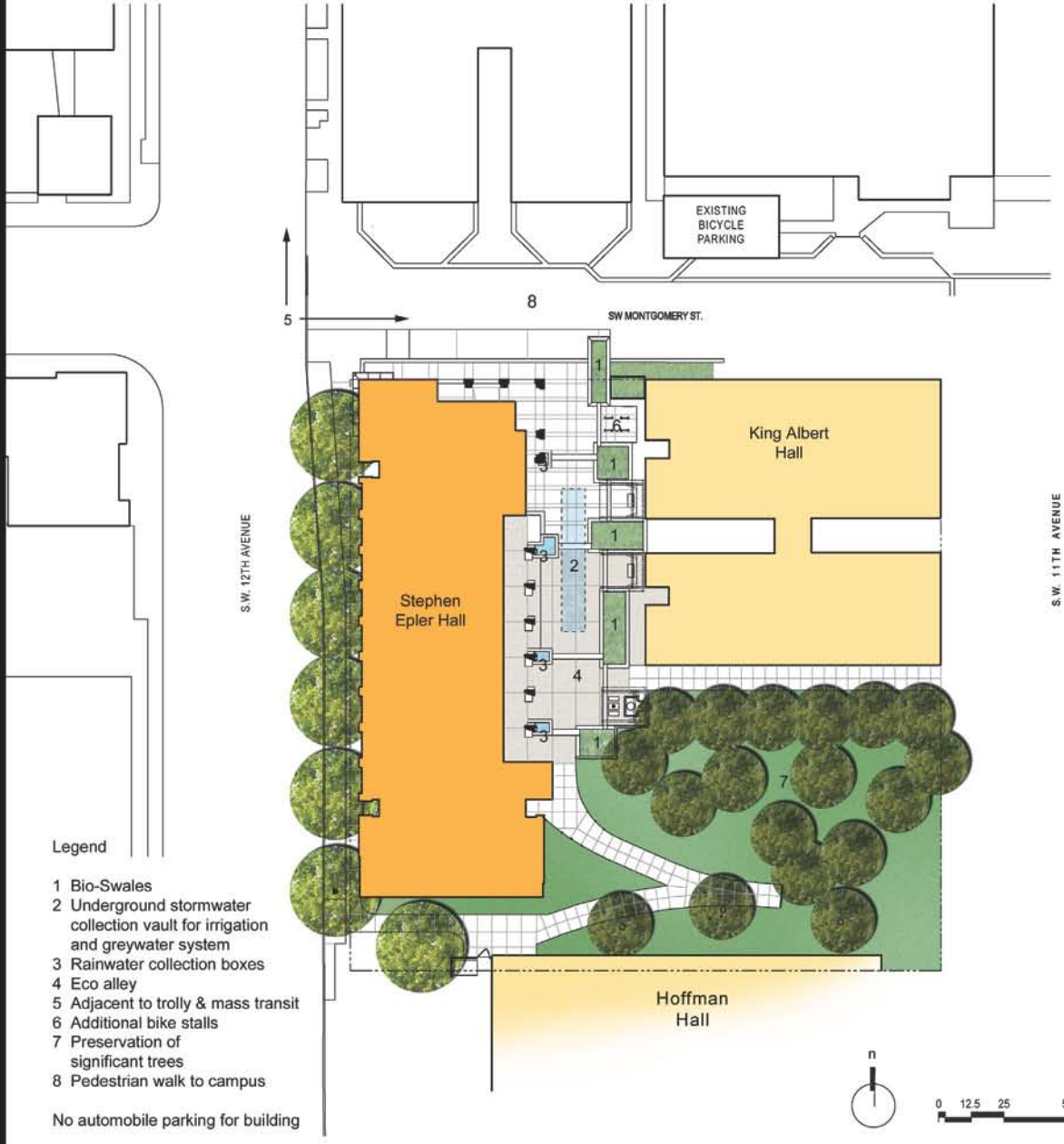
Portland State University  
Stephen Epler Hall



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# The Big Pipe

National  
Portland Stormwater



EXISTING BICYCLE PARKING

8

SW MONTGOMERY ST.

King Albert Hall

Stephen Epler Hall

S.W. 11TH AVENUE

S.W. 12TH AVENUE

Hoffman Hall

Legend

- 1 Bio-Swales
- 2 Underground stormwater collection vault for irrigation and greywater system
- 3 Rainwater collection boxes
- 4 Eco alley
- 5 Adjacent to trolley & mass transit
- 6 Additional bike stalls
- 7 Preservation of significant trees
- 8 Pedestrian walk to campus

No automobile parking for building





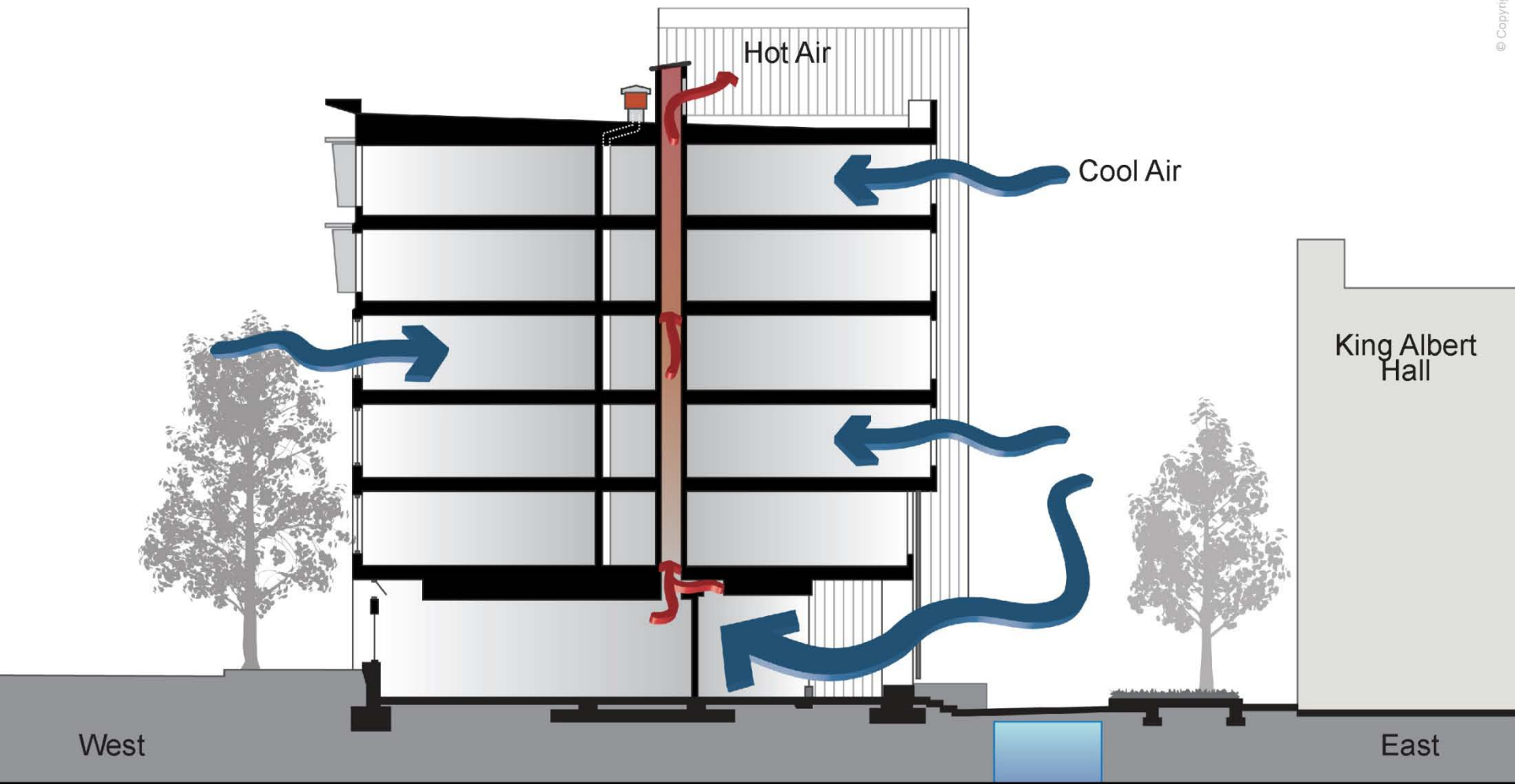
Summer Sun

Winter Sun

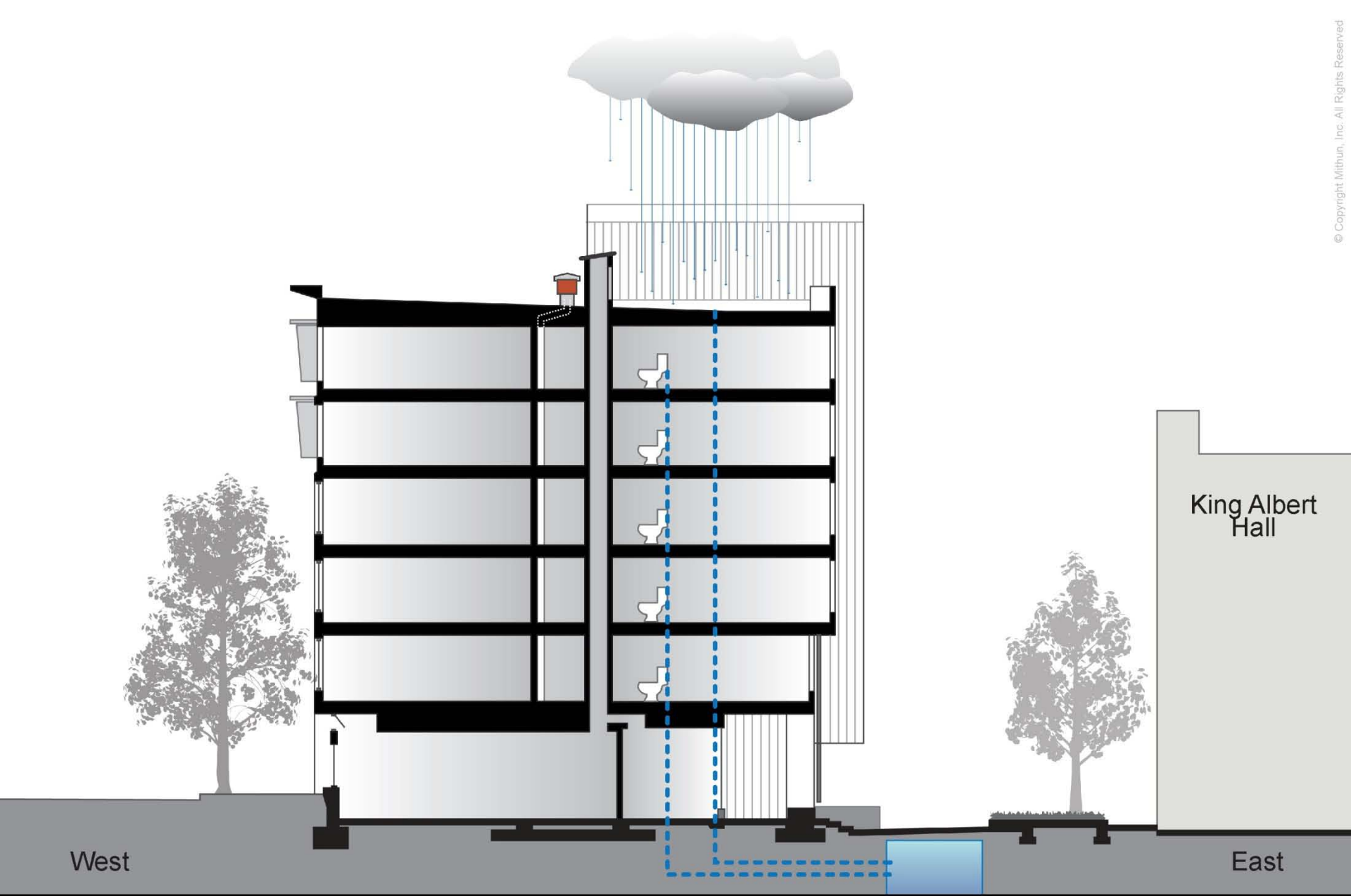
King Albert Hall

West

East



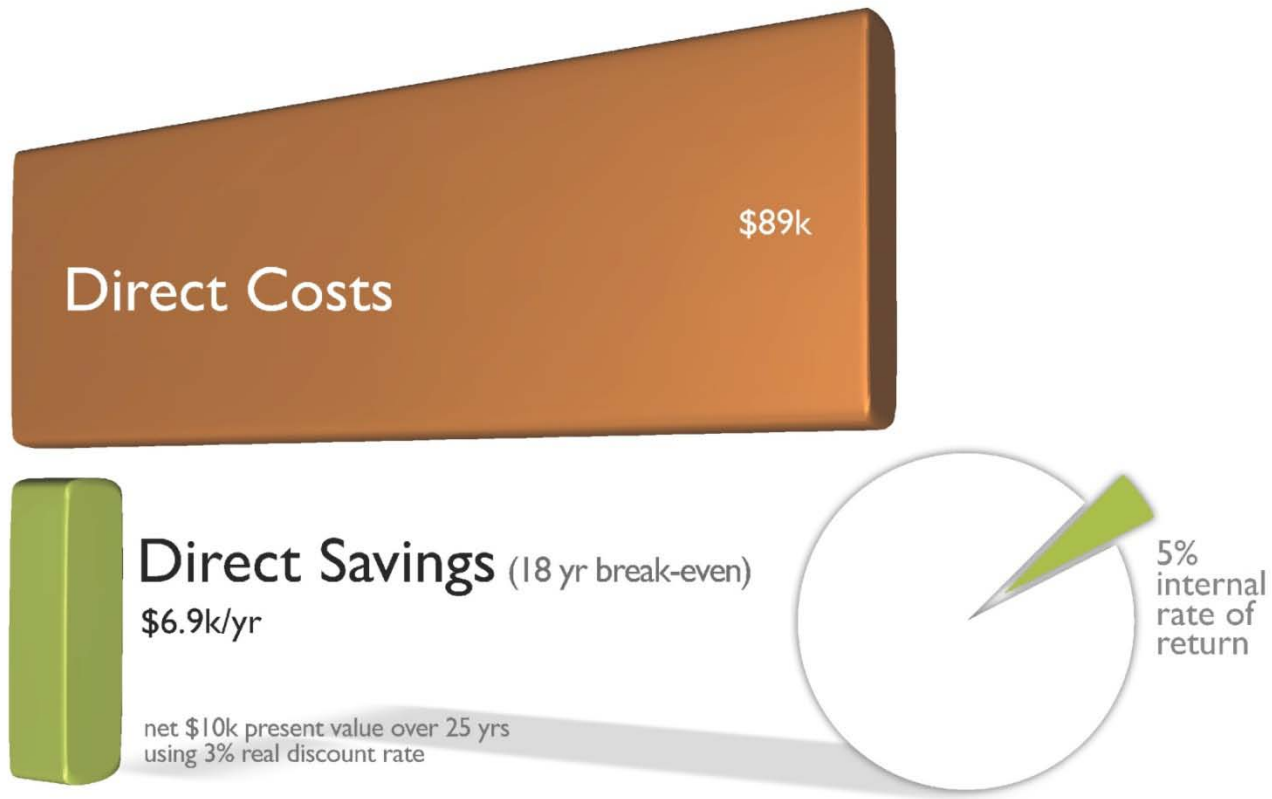








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2004 Data



**Direct Savings** (2 yr break-even)  
\$6.9k/yr

net \$10k present value over 25 yrs  
using 3% real discount rate

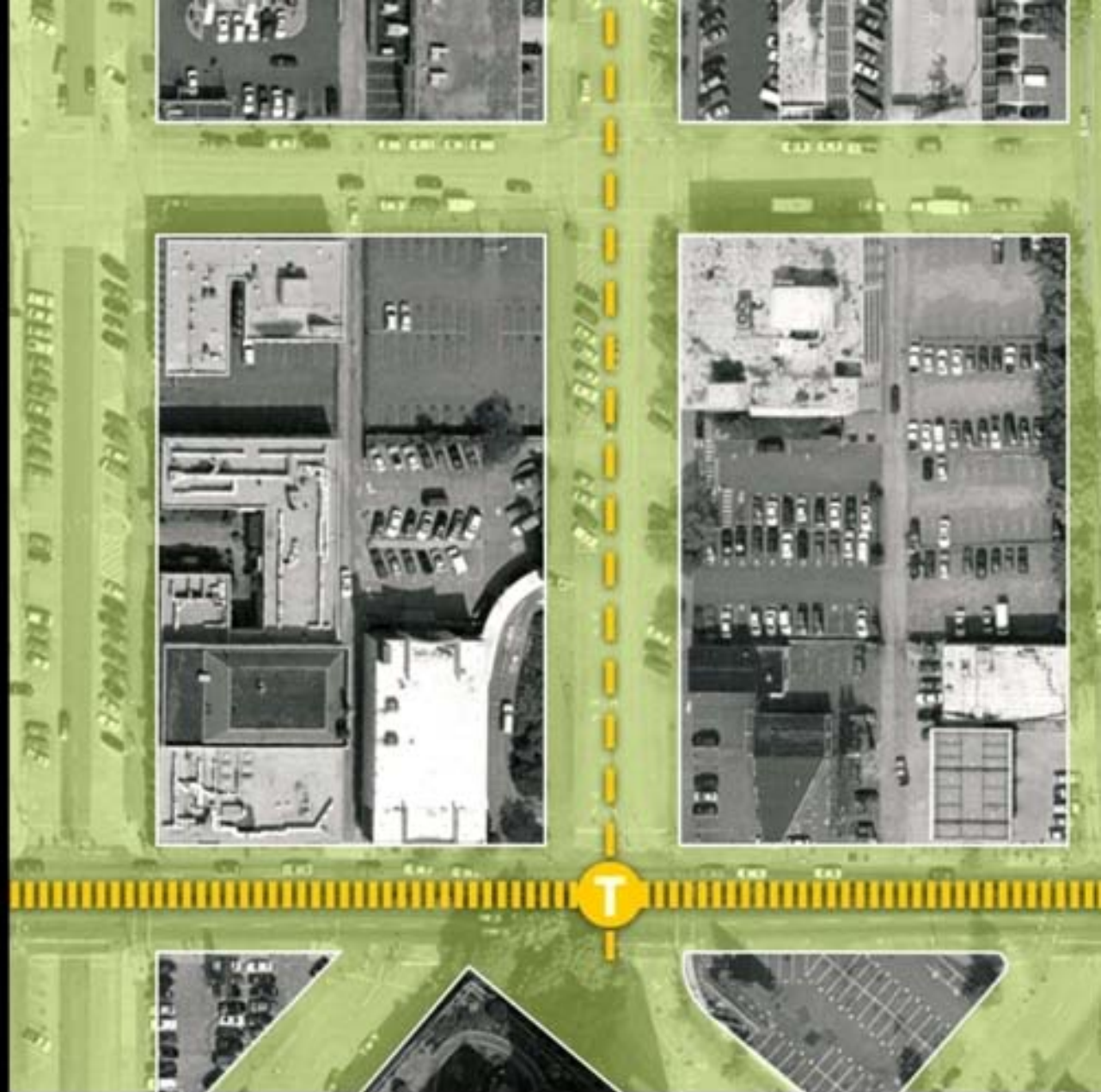


2004 Data





Public





The logo features a large, thin blue circle on the left and a thin, curved yellow line on the right. The text 'The Blue Ring' is centered between them, with 'The Blue' inside the blue circle and 'Ring' to its right. Below this, the words 'connecting places' are written in a smaller font, with 'connecting' in blue and 'places' in yellow.

# The Blue Ring

connecting places

Seattle's Open Space Strategy  
For the Center City





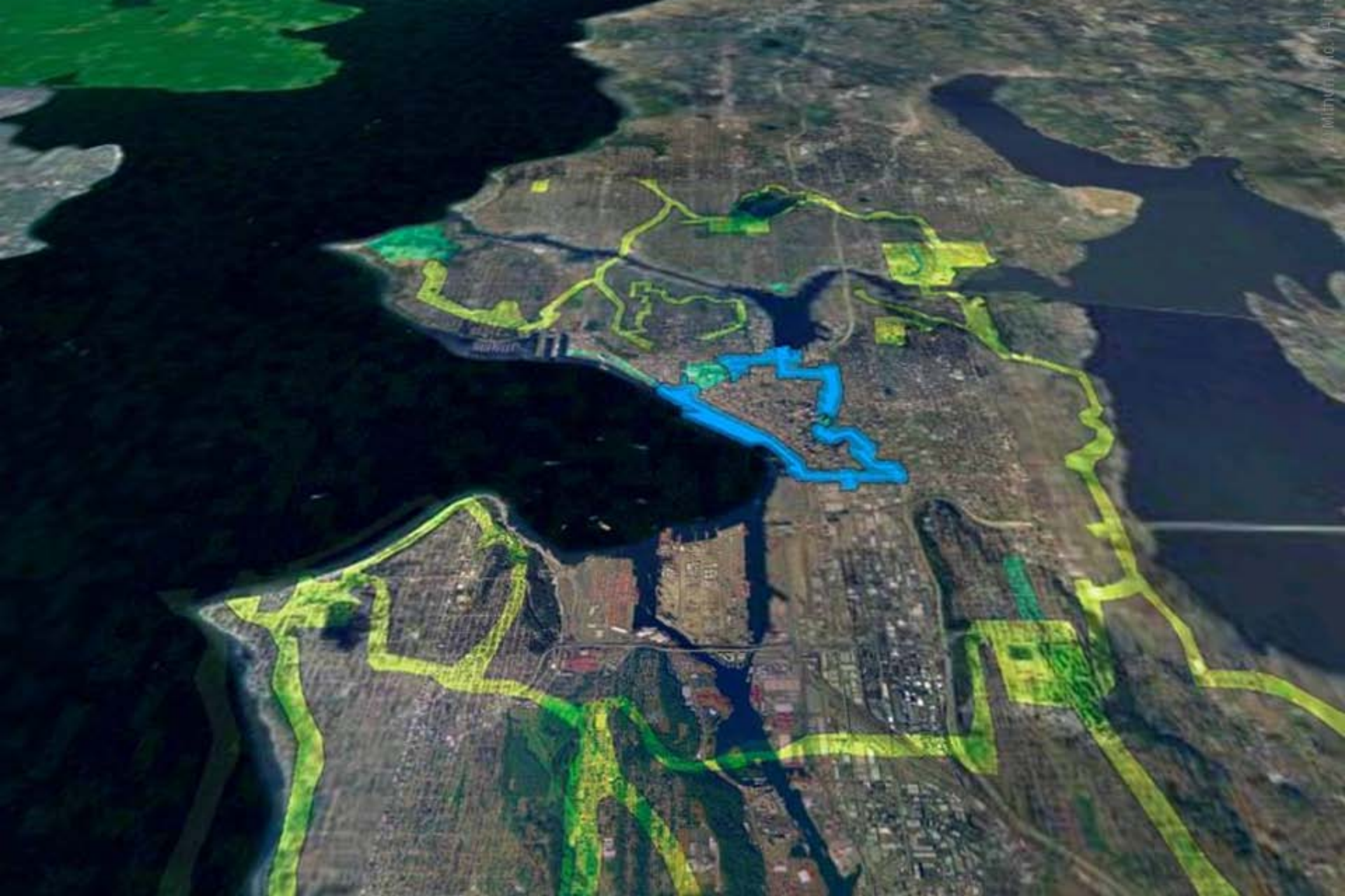
The Olmsted Plan  
Seattle



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The Blue Ring  
Seattle

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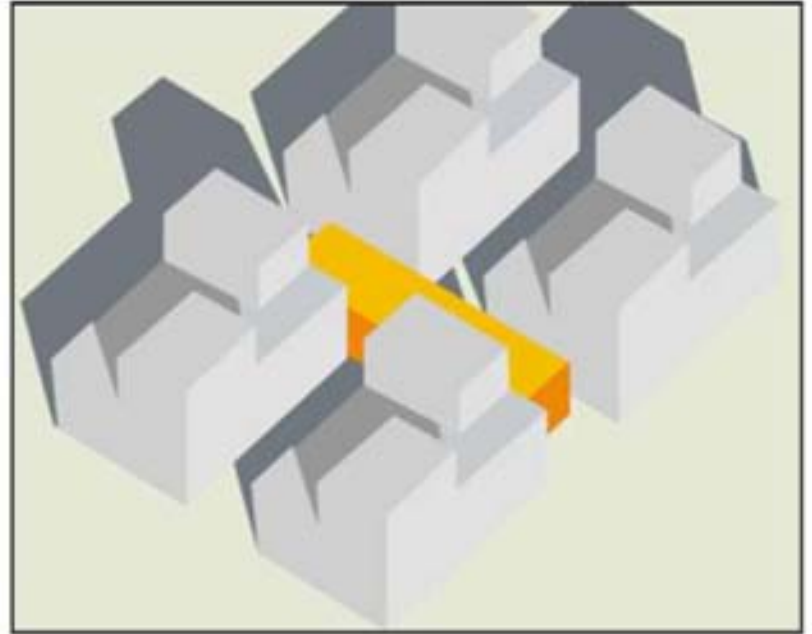
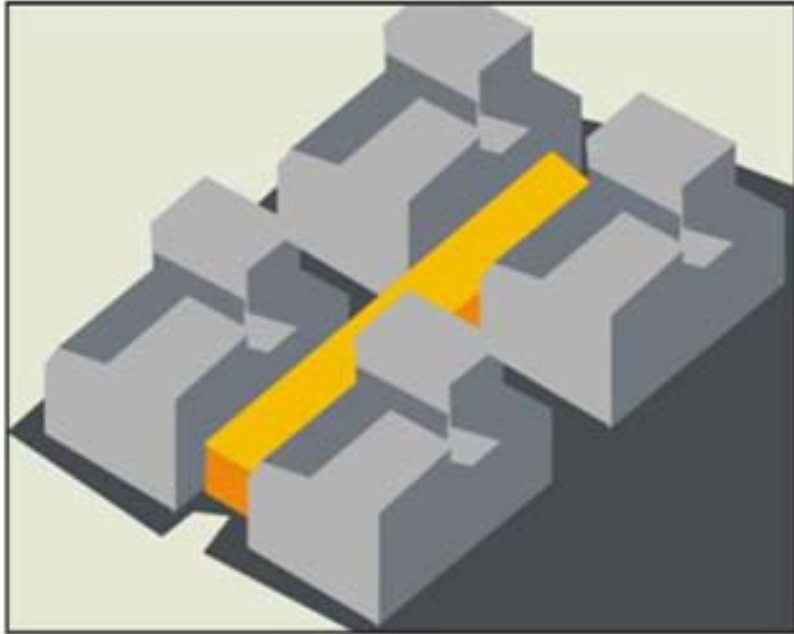
MITHUN INC. 01

The Blue Ring  
Seattle

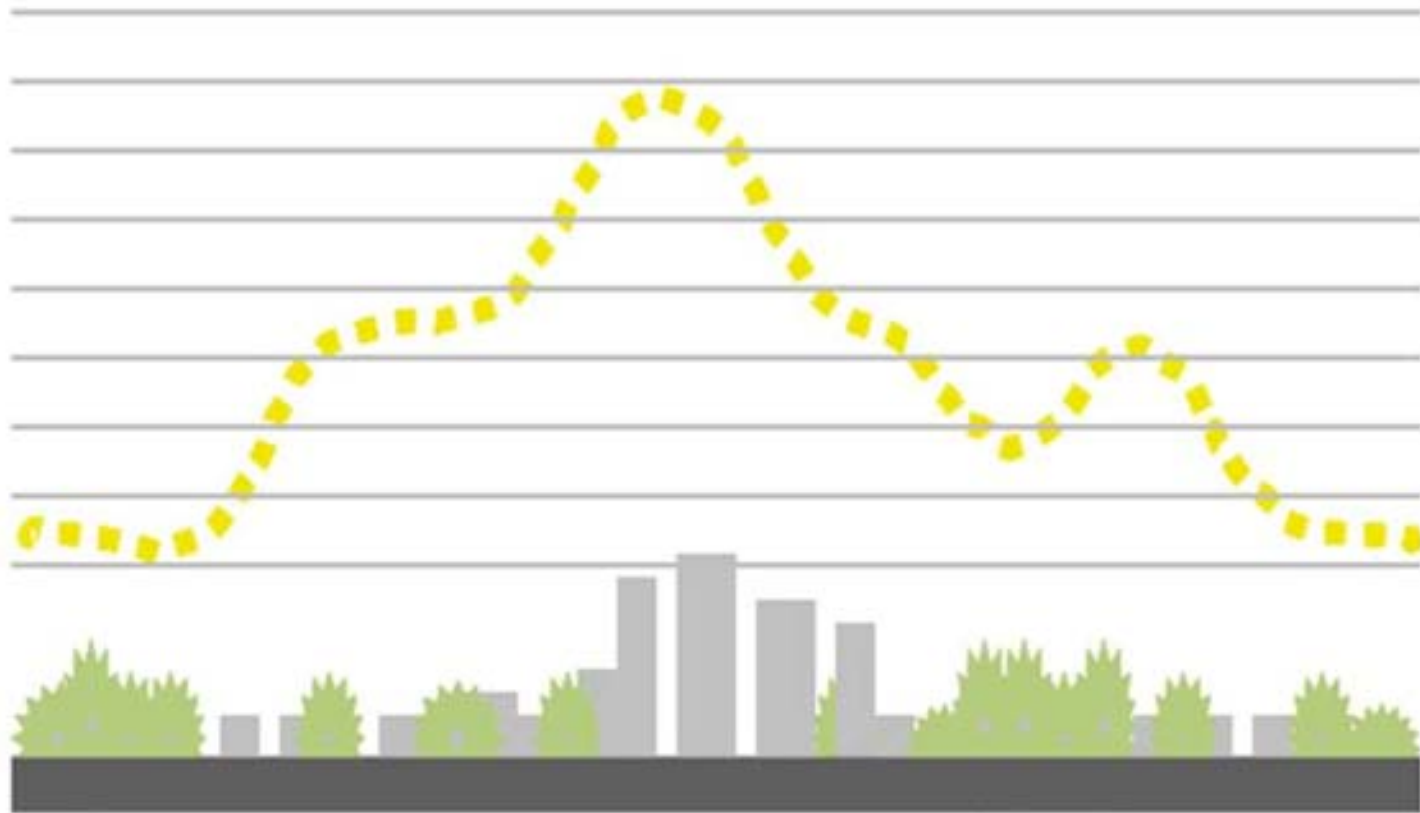




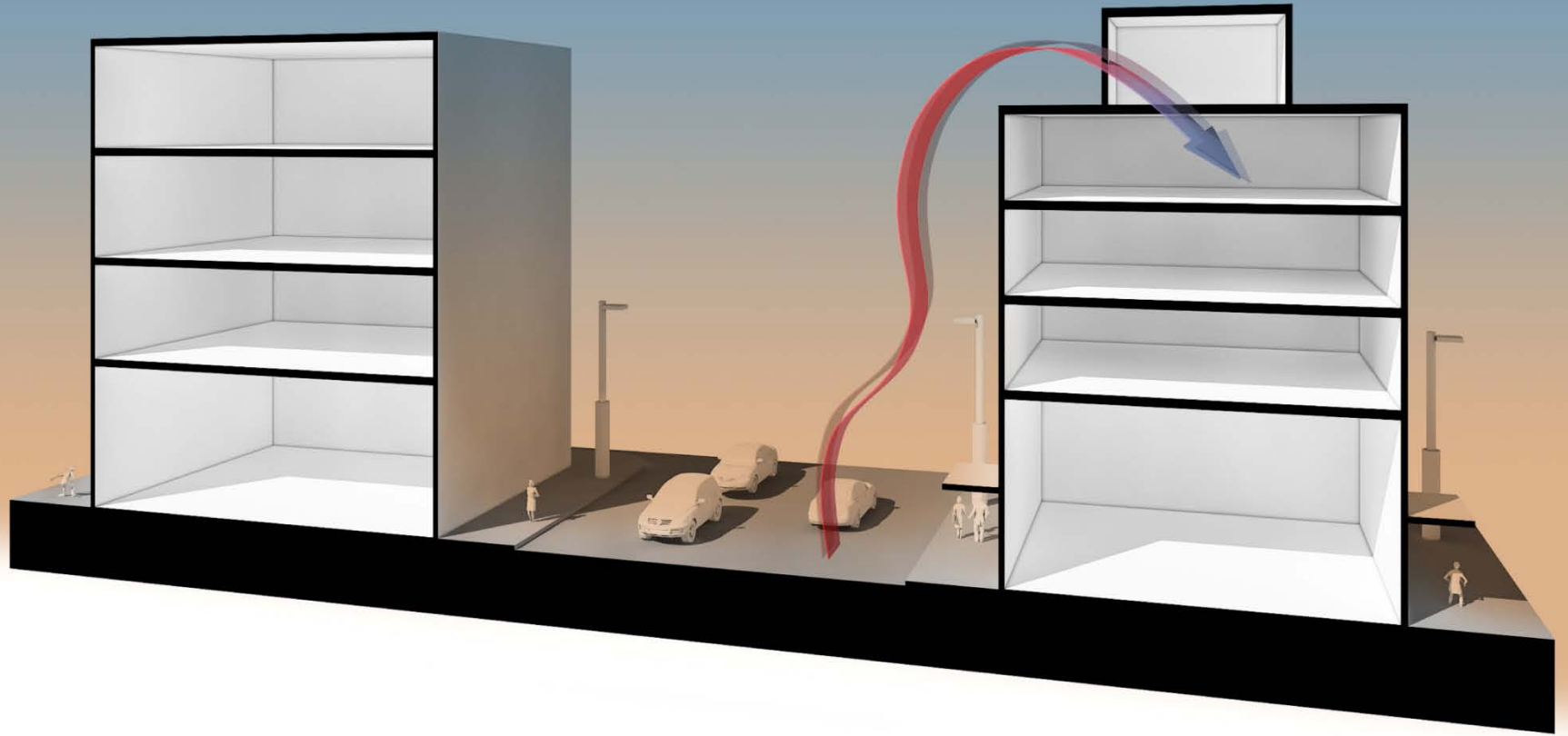
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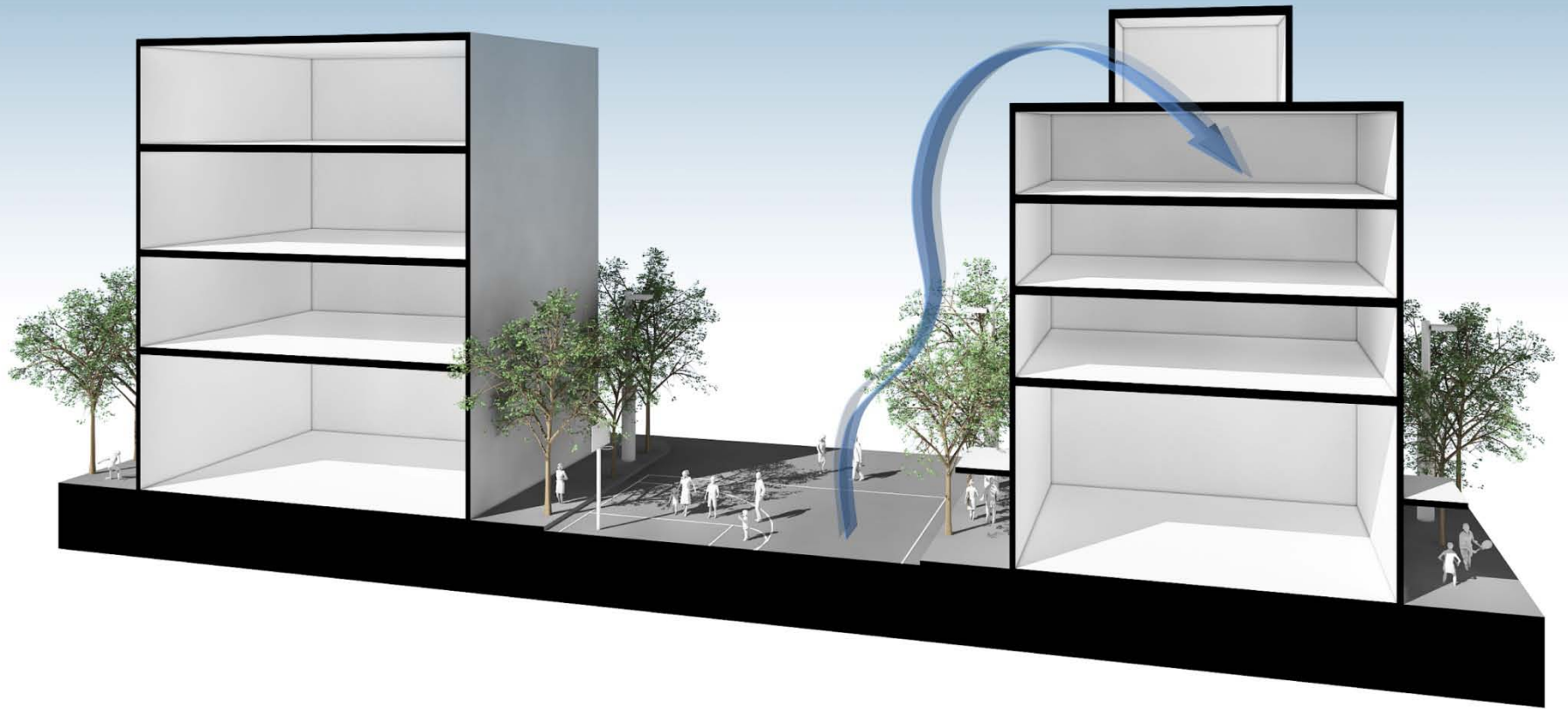


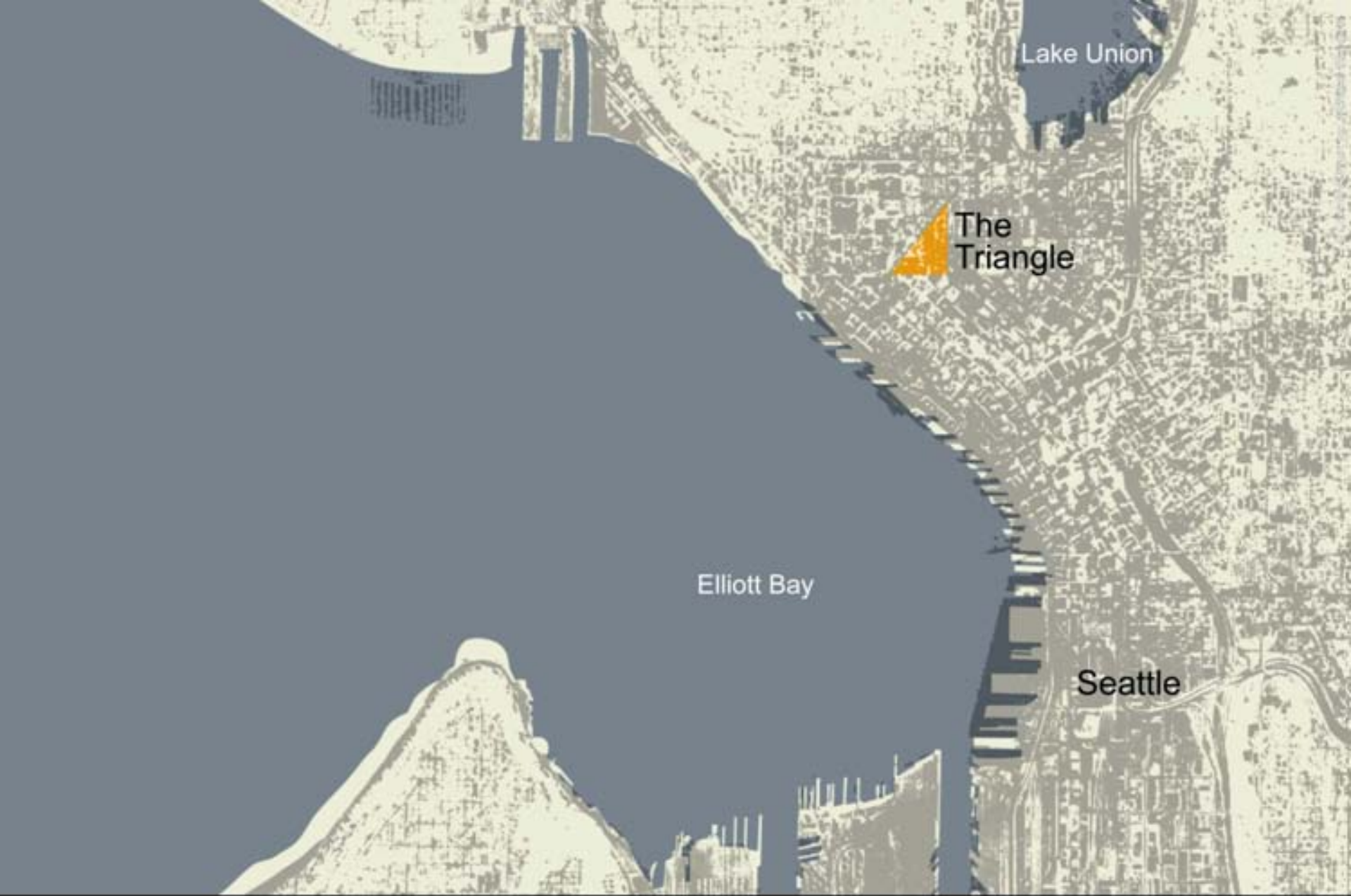


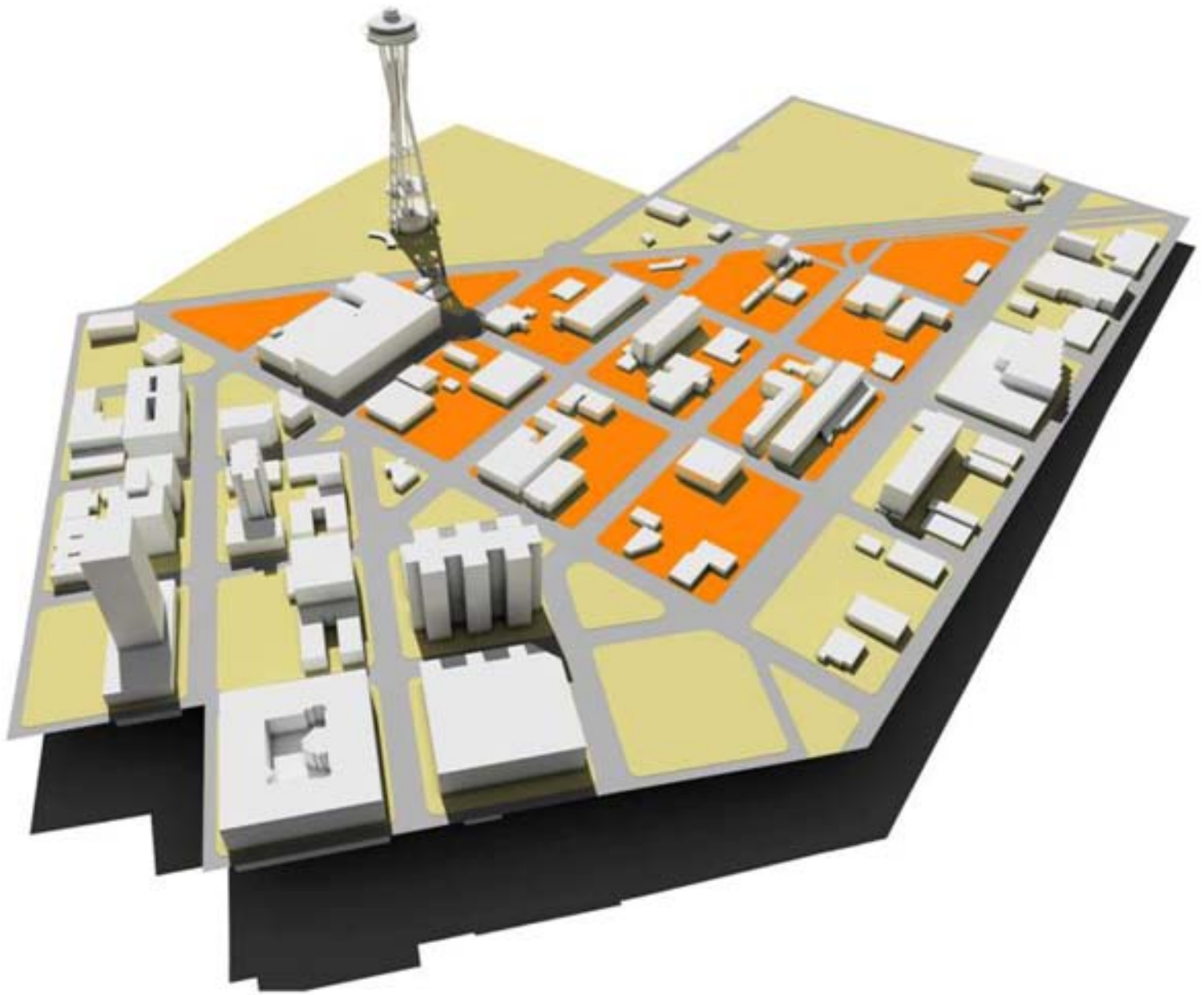


Urban Heat Island









The Blue Ring  
Taylor 28 Project



The Blue Ring  
Taylor 28 Project



The Blue Ring  
Taylor 28 Project

Traffic Focused

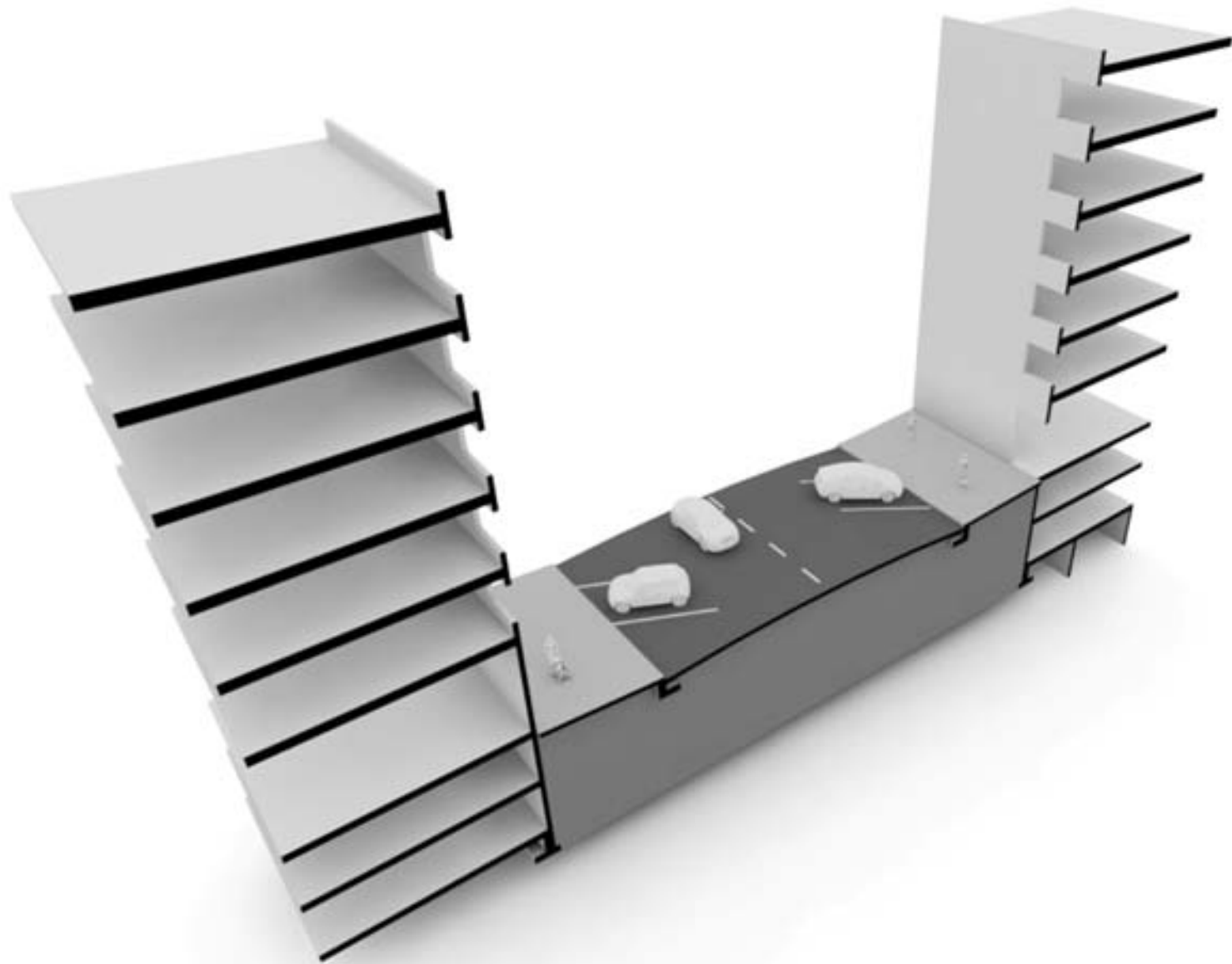


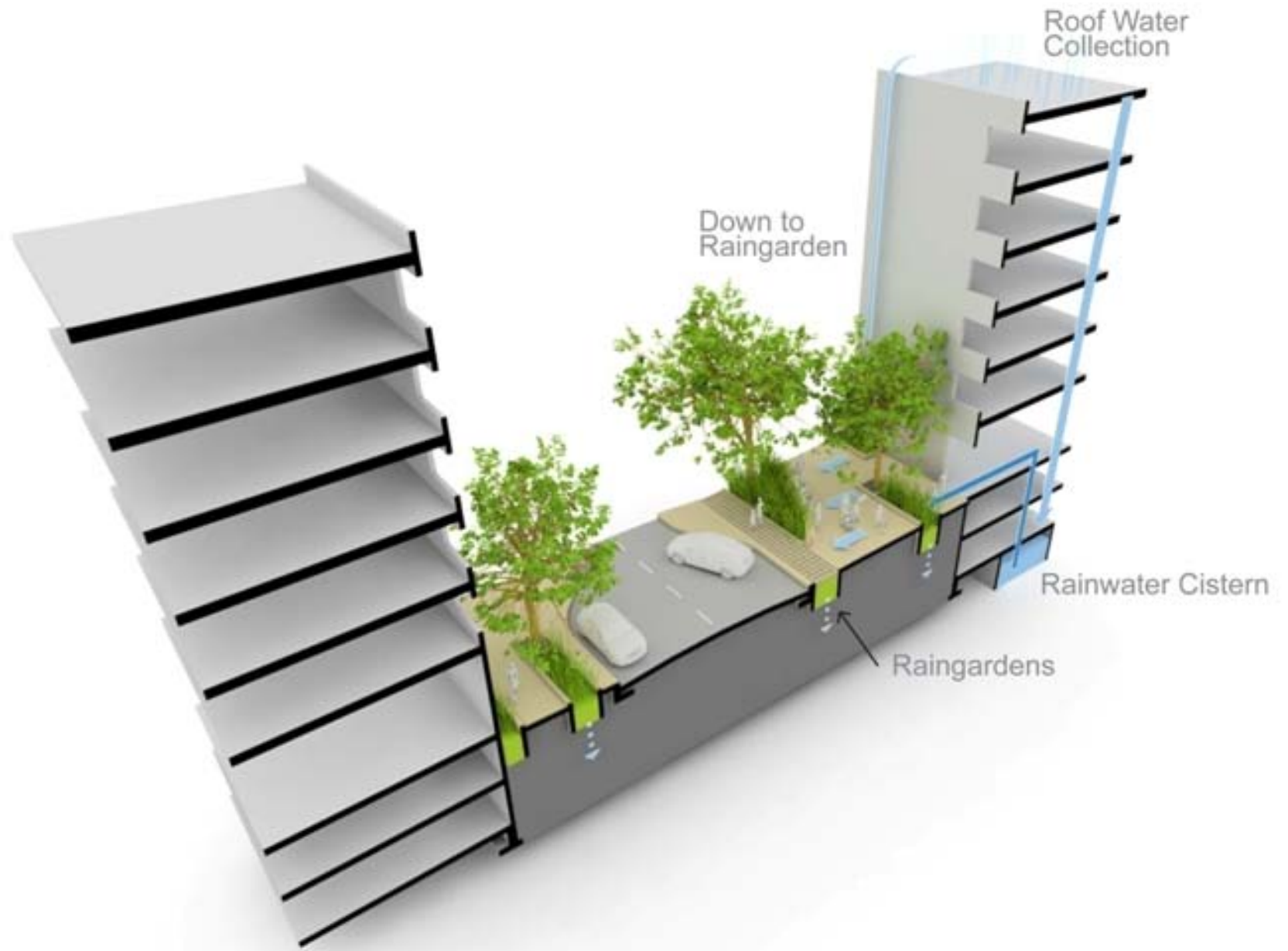
The Blue Ring  
Taylor 28 Project





The Blue Ring  
Taylor 28 Project







Private  
+  
Public





Lloyd Crossing Urban Design Plan  
Portland, Oregon



Lloyd Crossing Urban Design Plan  
Portland, Oregon

## Sustainable Urban Design Plan:

*Identify “green” infrastructure opportunities and synergies that can be realized at the neighborhood scale*

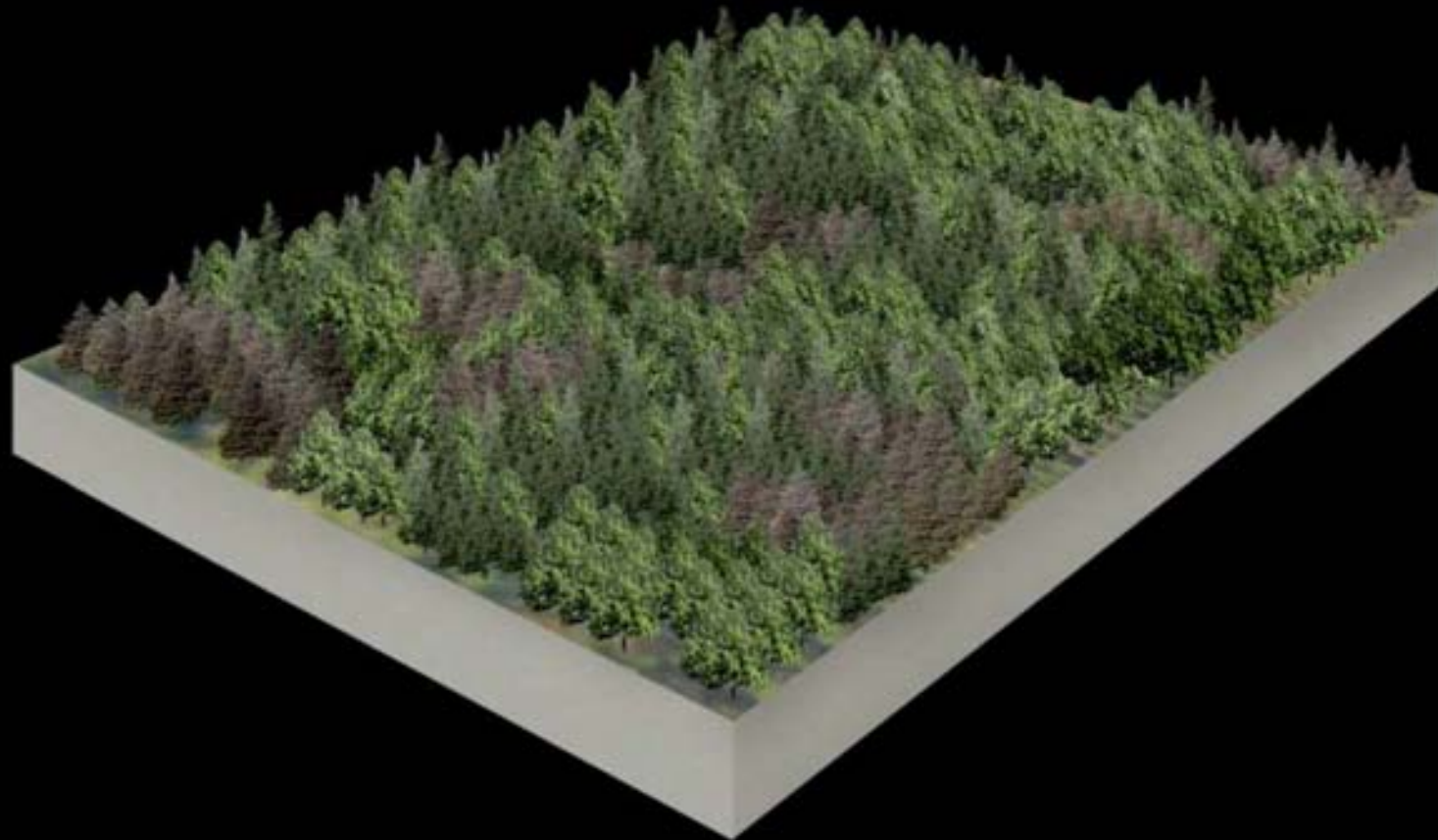
## Lloyd Crossing Signature Project:

*Develop a conceptual design for a sustainable, financially feasible, mixed-use development project that will catalyze future private development in the district*

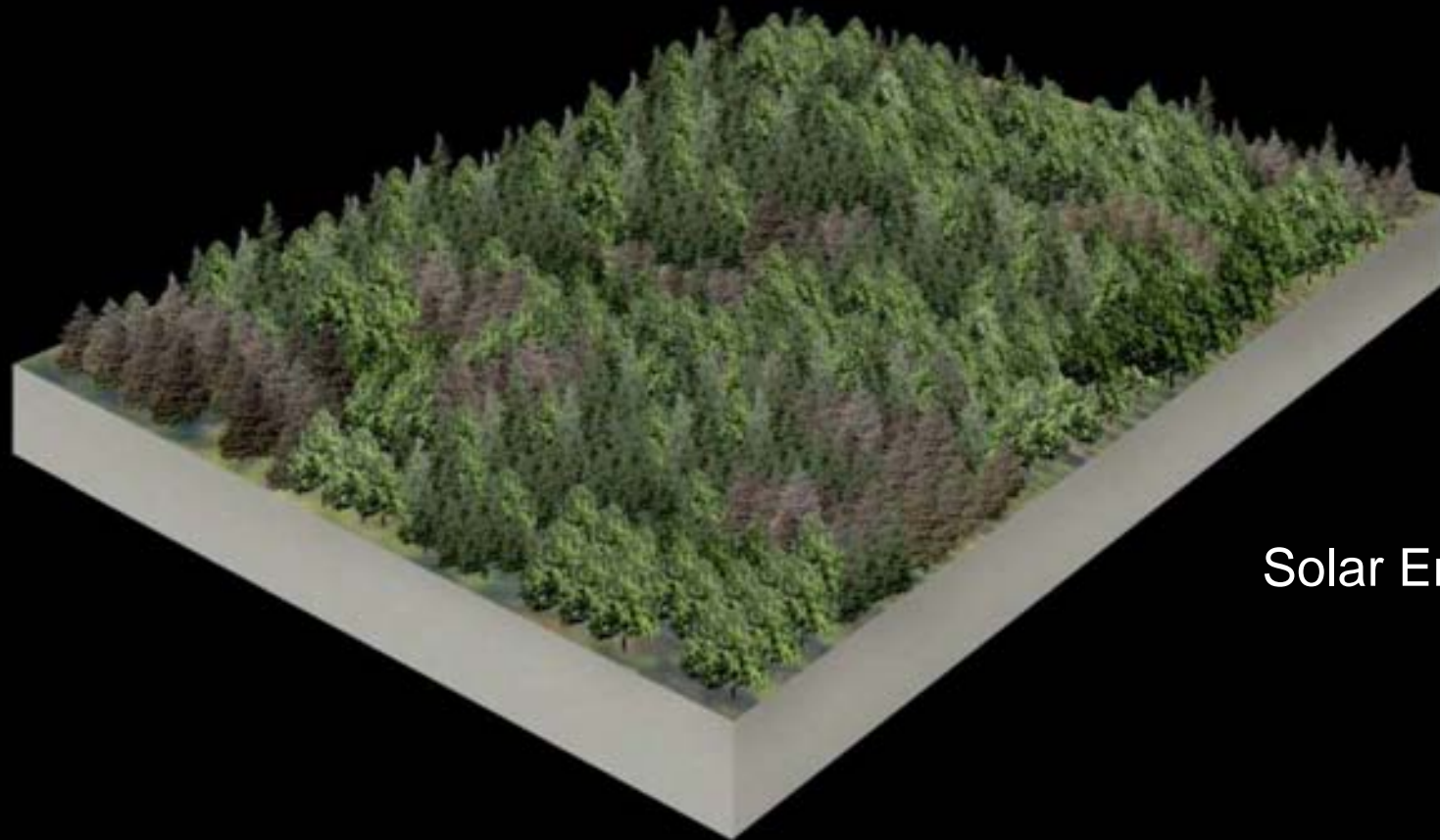




Coal Based Electrical Energy  
Portland Lloyd District



# Predevelopment Metrics



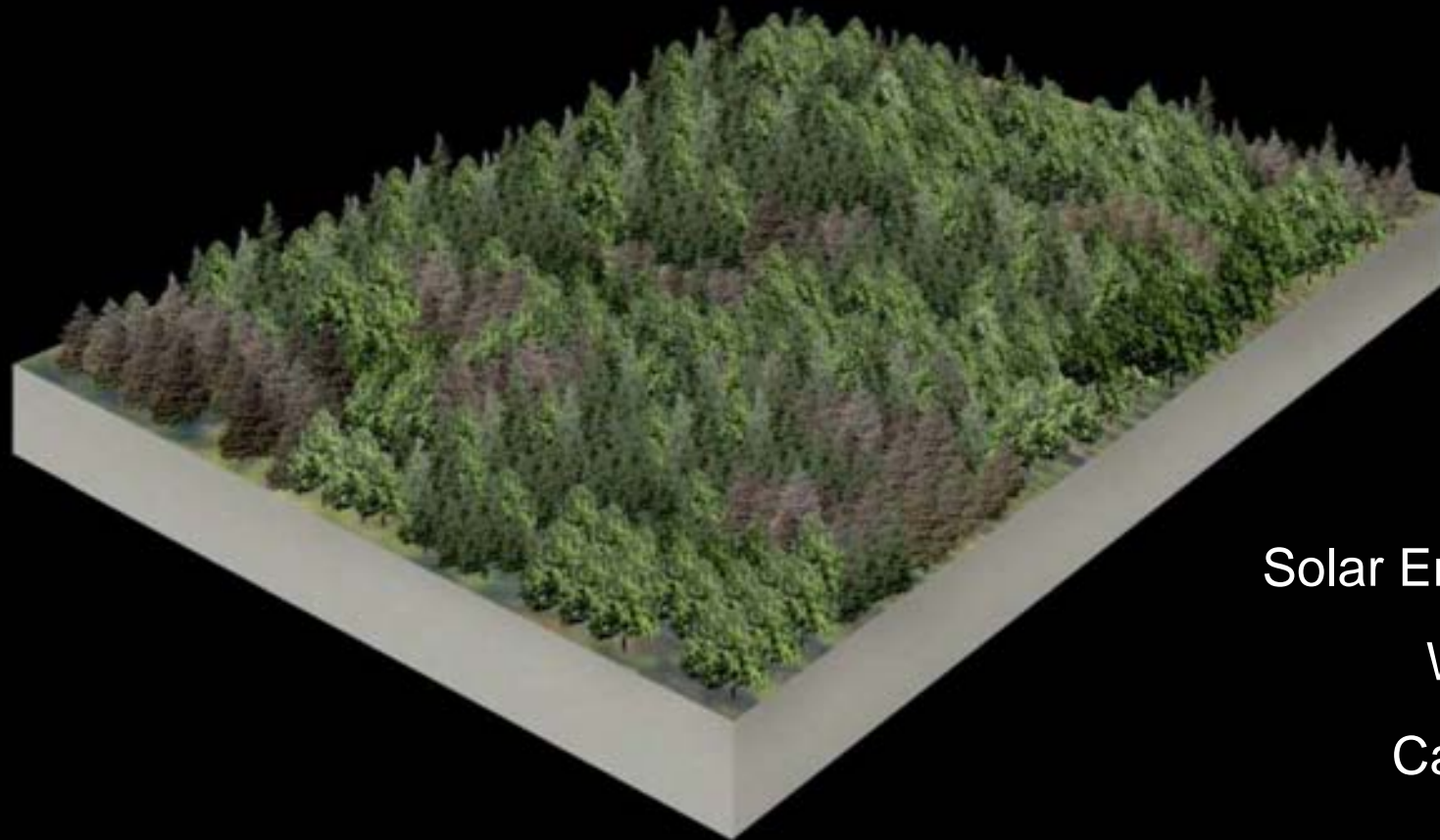
Solar Energy

Predevelopment Metrics



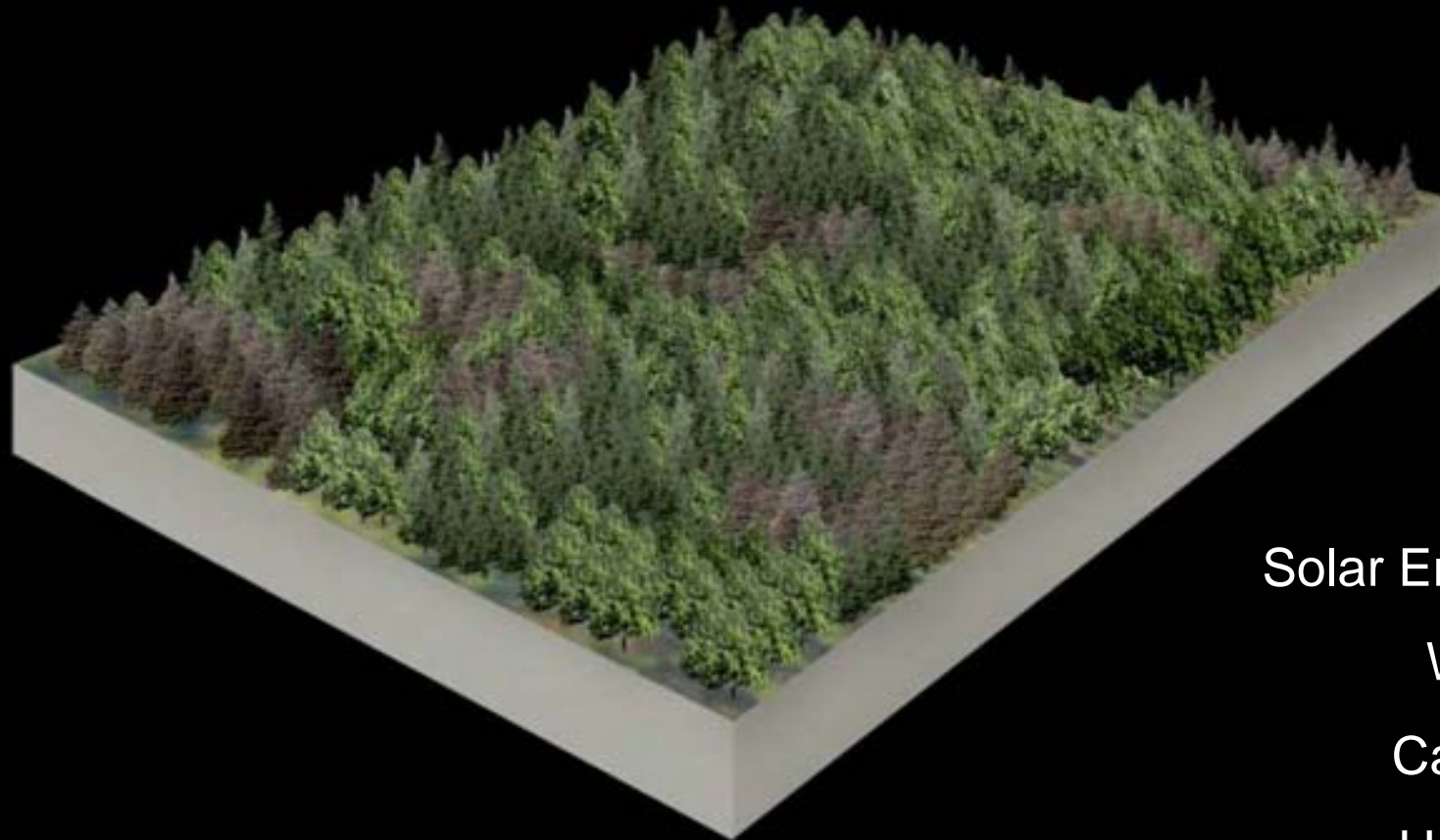
Solar Energy  
Water

Predevelopment Metrics



Solar Energy  
Water  
Carbon

Predevelopment Metrics



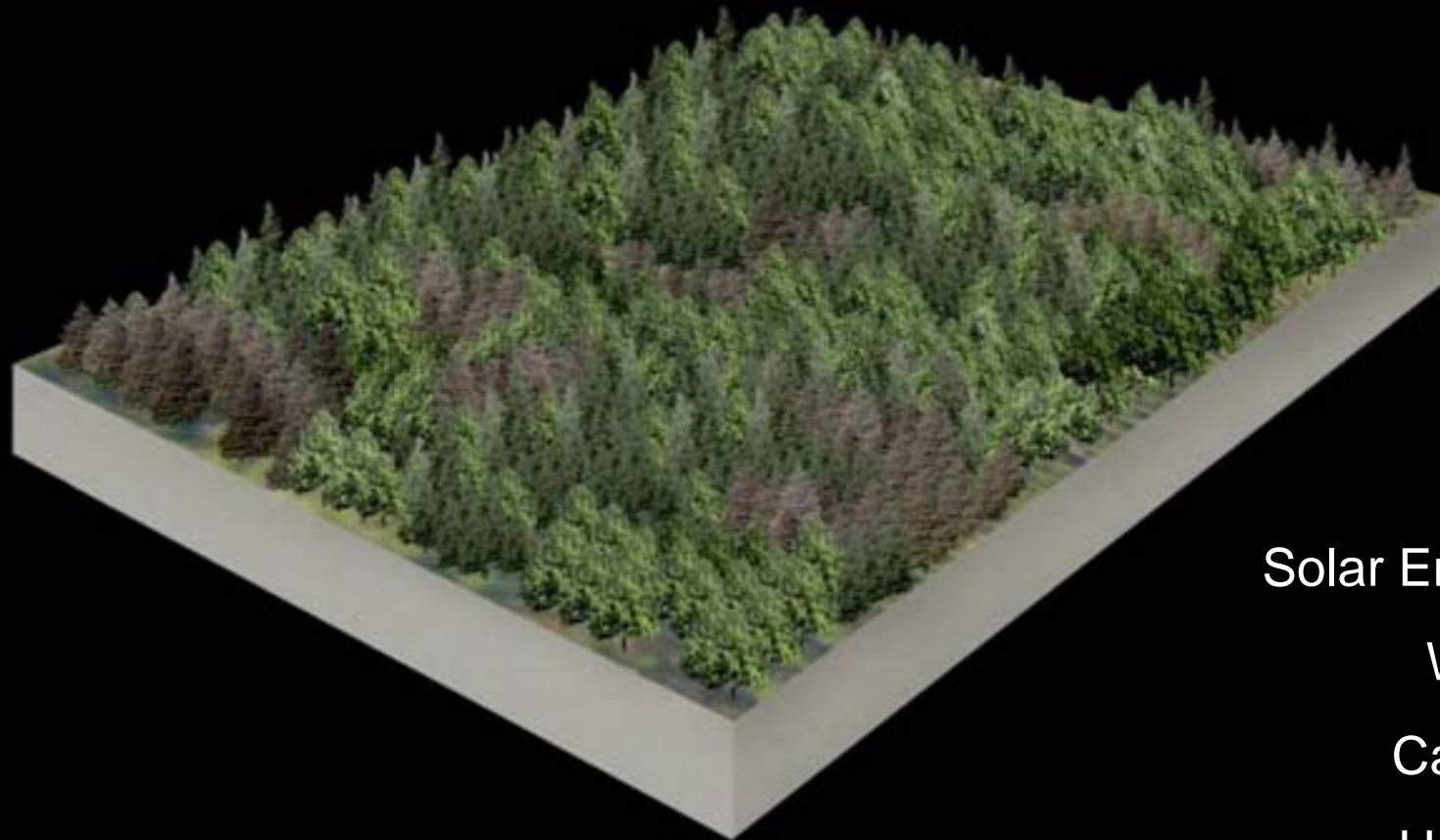
Solar Energy

Water

Carbon

Habitat

Predevelopment Metrics



Solar Energy

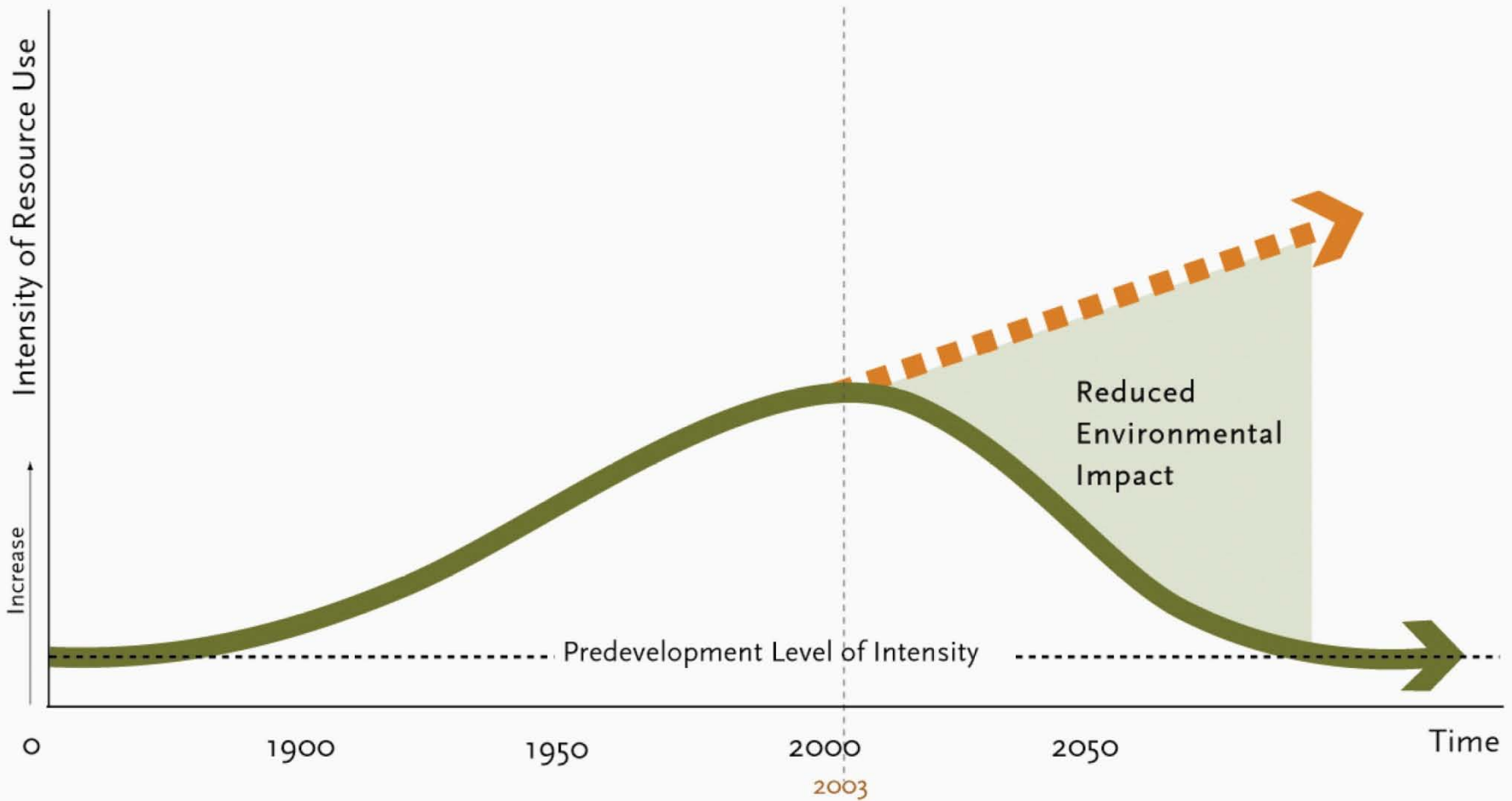
Water

Carbon

Habitat

Materials

Predevelopment Metrics

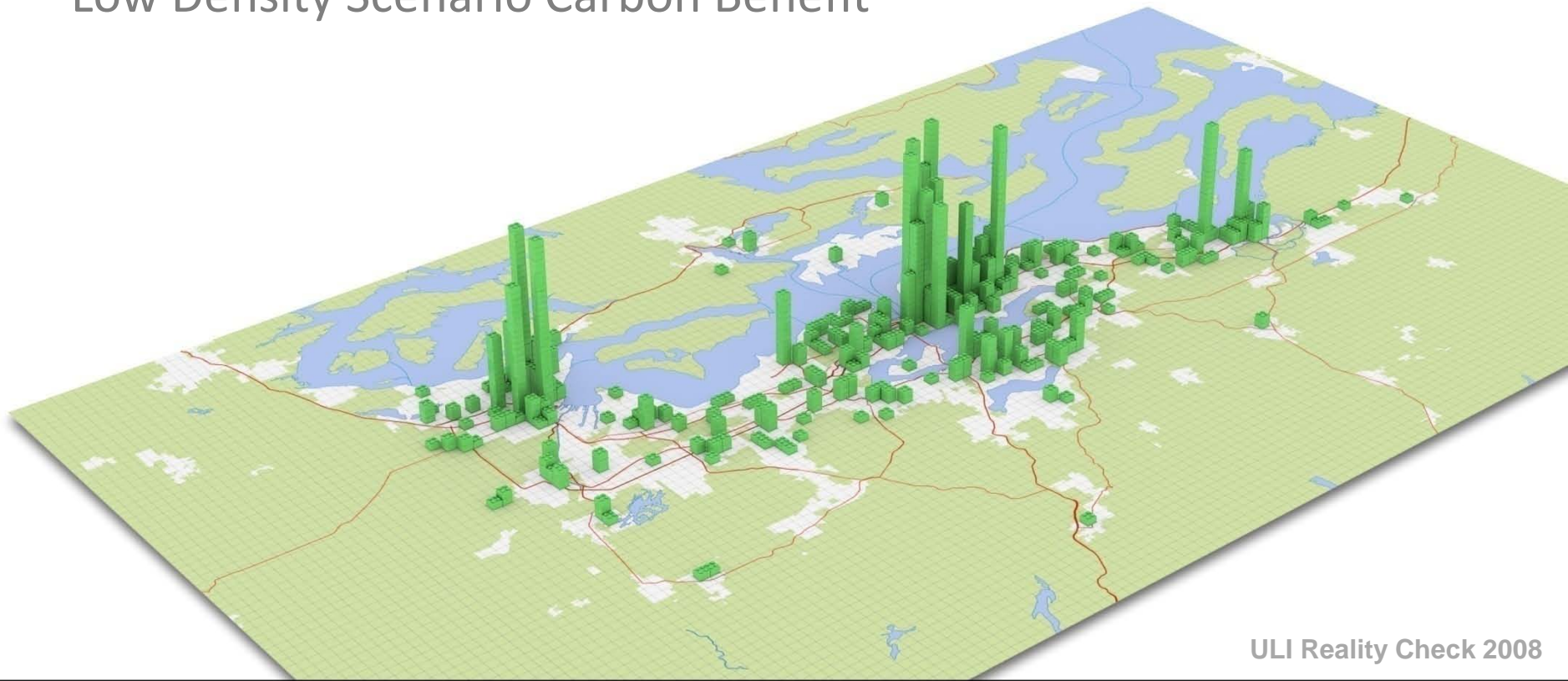


- A  Sustainable Strategy "Predevelopment" Goal
- B  No Strategy "Status Quo"
- C  Reduction in Environmental Impact



# Maximize Density

## Low Density Scenario Carbon Benefit

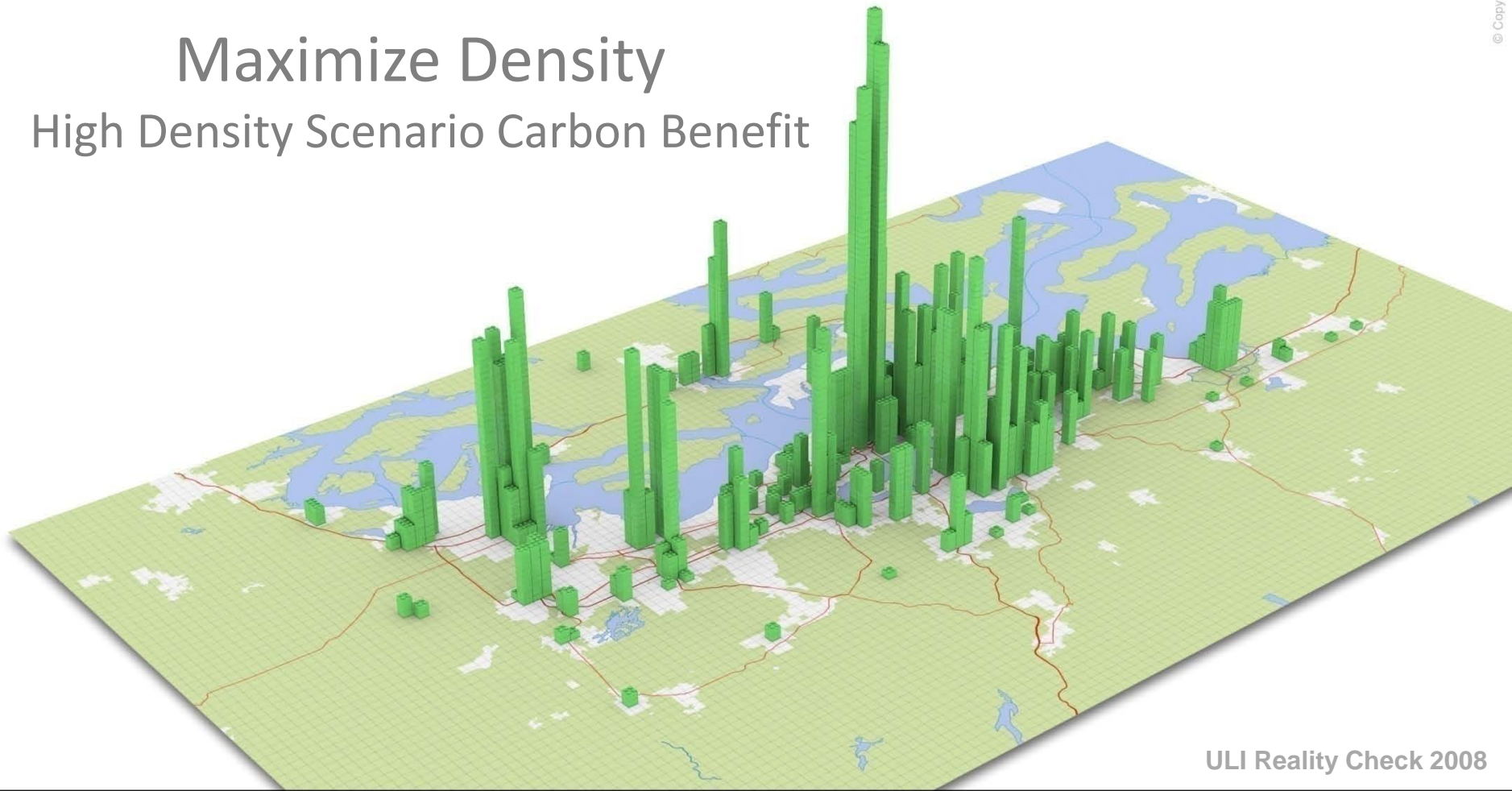


ULI Reality Check 2008

Puget Sound Region in 2040  
Greenhouse Gas Reductions from Land Use Actions

# Maximize Density

## High Density Scenario Carbon Benefit



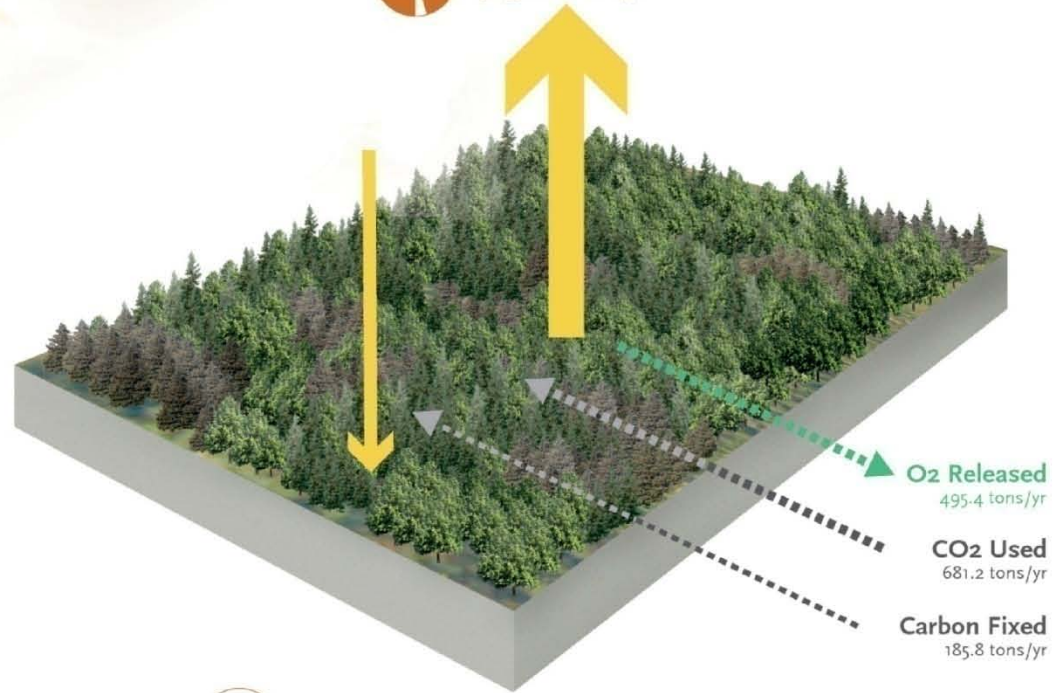
ULI Reality Check 2008

Puget Sound Region in 2040  
Greenhouse Gas Reductions from Land Use Actions

# Pre-development Energy Use Conditions

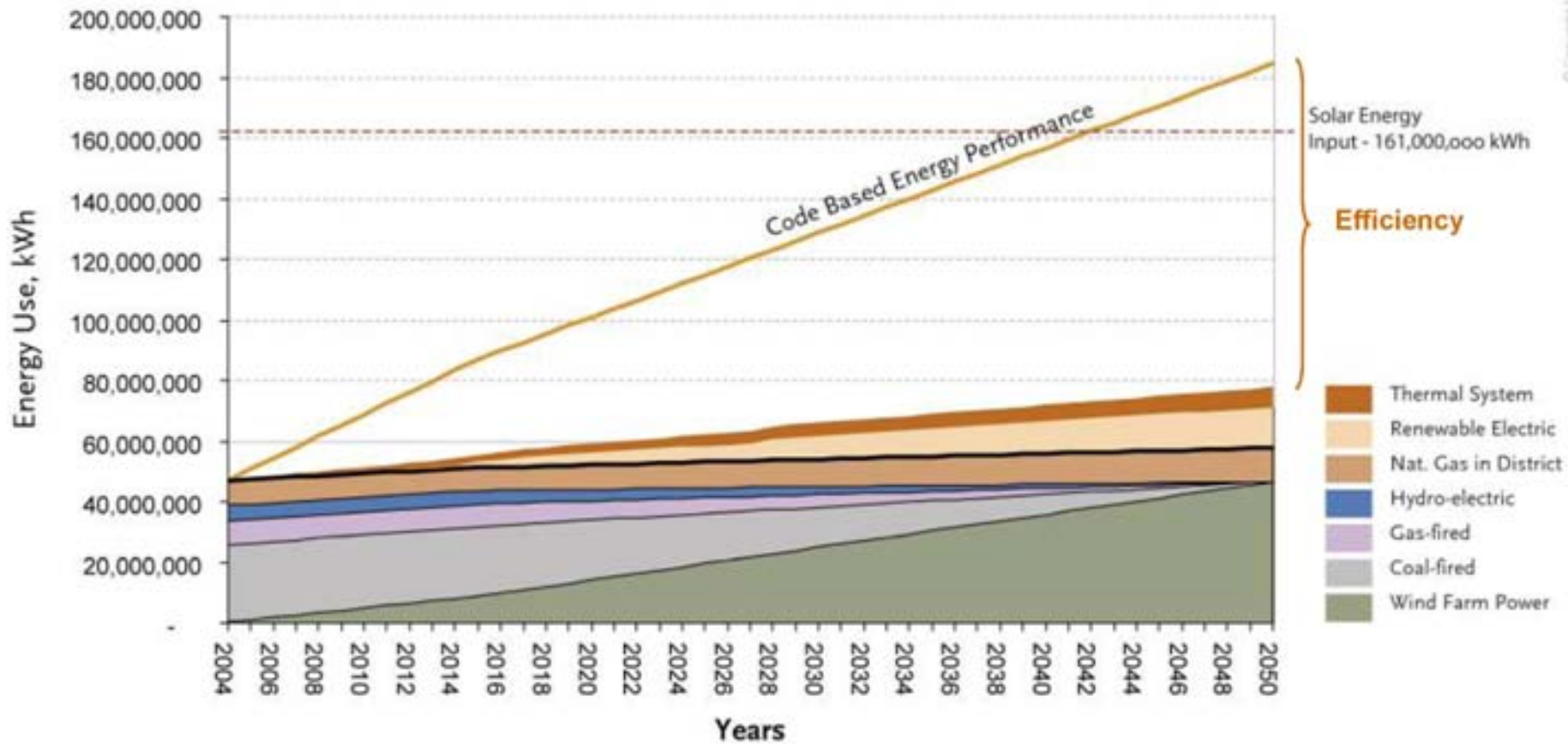
100% **Solar Energy Input**  
161,006,000 kWh/yr

95% **Solar Energy Reflected, Absorbed & Released**  
152,956,000 kWh/yr



4.5% **Solar Energy Used by Photosynthesis**  
8,050,000 kWh/yr

**Carbon Balance**  
Net removal from atmosphere: 681.2 tons/yr



## 2050 Per Plan Energy Use Conditions



Note: This concept plan is not intended to represent specific planned or required development proposals

**Carbon Balance**  
Net add to atmosphere: 2,144 tons/yr

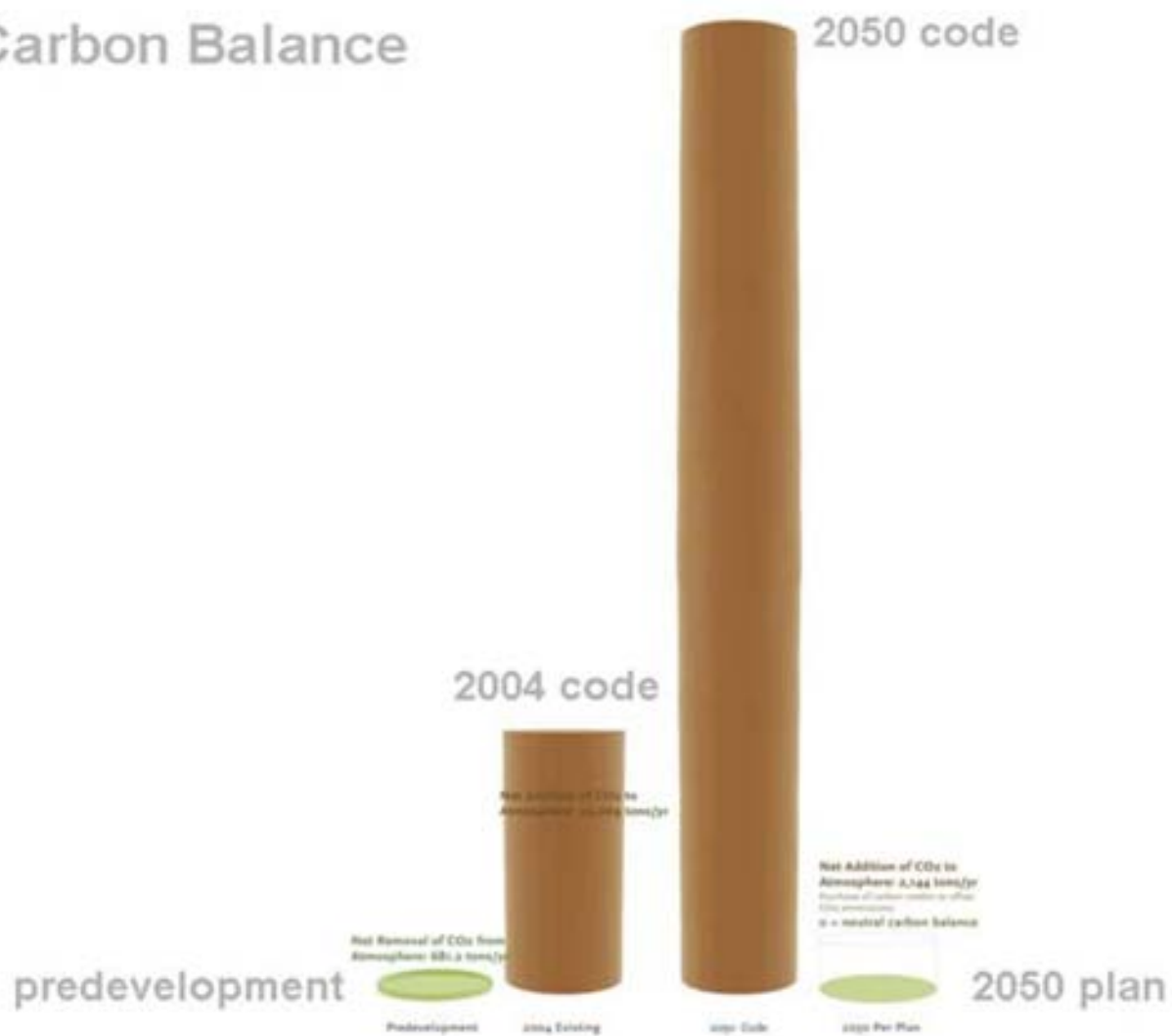
# Solar Energy Input

161,006,000 kWh/yr

Future photovoltaic efficiencies may improve utilization factor.



# Carbon Balance



Predevelopment Water Use Conditions

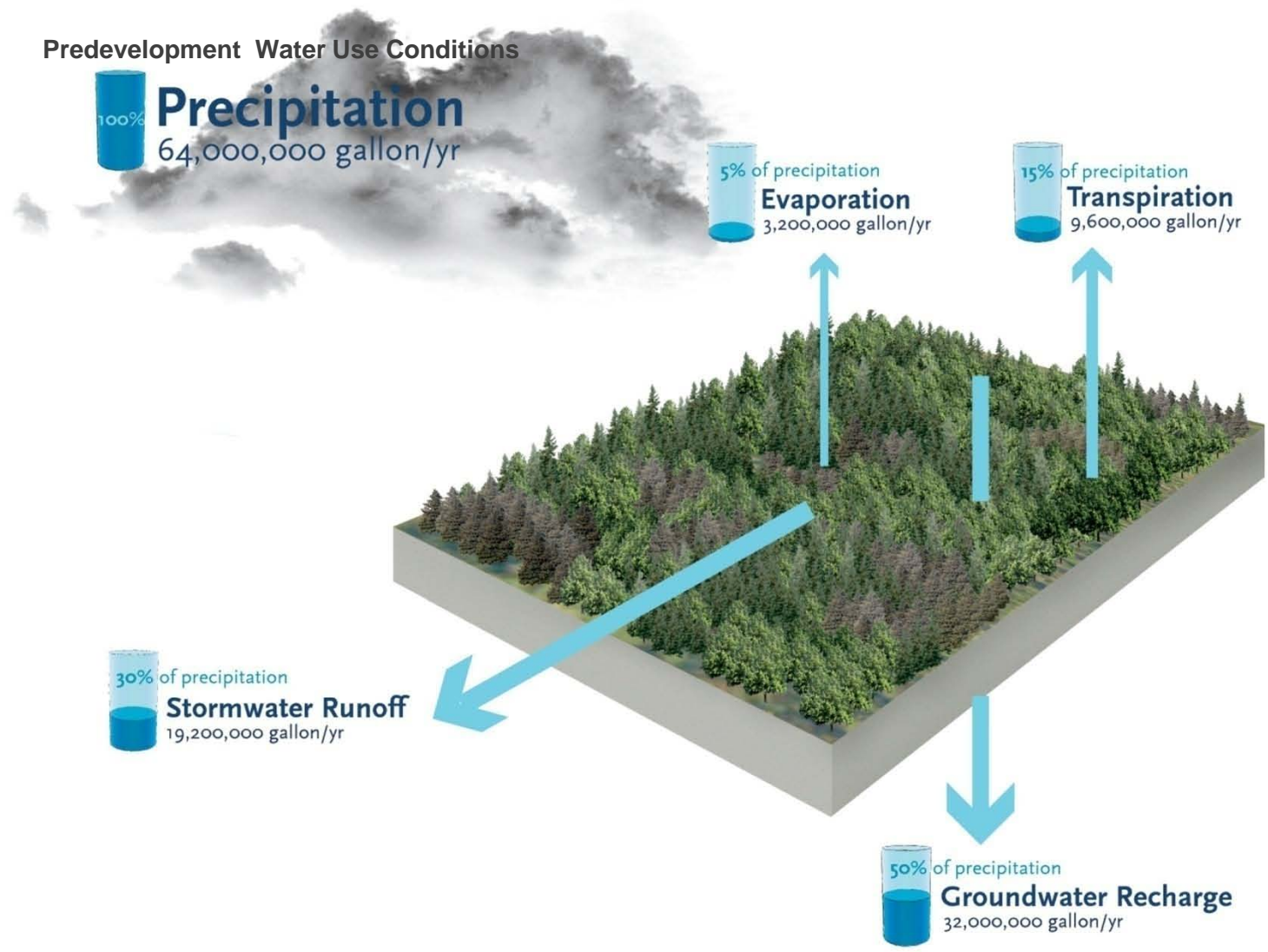
100% **Precipitation**  
64,000,000 gallon/yr

5% of precipitation  
**Evaporation**  
3,200,000 gallon/yr

15% of precipitation  
**Transpiration**  
9,600,000 gallon/yr

30% of precipitation  
**Stormwater Runoff**  
19,200,000 gallon/yr

50% of precipitation  
**Groundwater Recharge**  
32,000,000 gallon/yr





2050 Per Code Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

2% of precipitation  
**Transpiration**  
1,280,000 gallon/yr

100% **Potable Water**  
160,378,998 gallon/yr

88% of precipitation  
**Stormwater Runoff**  
56,320,000 gallon/yr

90% of potable water  
**Waste Water**  
144,341,098 gallon/yr

10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
16,037,900 gallon/yr

**Groundwater Recharge**  
negligible

# 2050 Per Plan Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

10% of precipitation  
**Transpiration**  
6,400,000 gallon/yr

**Potable Water**  
57,736,439 gallon/yr

45% of precipitation  
**Stormwater Runoff**  
28,800,000 gallon/yr

90% of potable water  
**Waste Water**  
51,962,795 gallon/yr

10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
5,773,644 gallon/yr

35% of precipitation  
**Groundwater Recharge**  
22,400,000 gallon/yr

Water metrics summary  
©Mithun / KPFF

Note: This concept plan is not intended to represent specific planned or required development proposals

# 2050 Per Plan Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

10% of precipitation  
**Transpiration**  
6,400,000 gallon/yr

**28,000,000 Gallon Reduction**

100% **Potable Water**

45% of precipitation  
**Stormwater Runoff**  
28,800,000 gallon/yr

90% of potable water  
**Waste Water**  
51,962,795 gallon/yr

10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
5,773,644 gallon/yr

35% of precipitation  
**Groundwater Recharge**  
22,400,000 gallon/yr

Note: This concept plan is not intended to represent specific planned or required development proposals

Water metrics summary  
©Mithun / KPFF

2050 Per Plan Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

10% of precipitation  
**Transpiration**  
6,400,000 gallon/yr

**Potable Water**  
**28,000,000 Gallon Reduction**

45% of precipitation  
**Stormwater Runoff**  
**37,000,000 Gallon Reduction**

90% of potable water  
**Waste Water**  
51,962,795 gallon/yr

10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
5,773,644 gallon/yr

35% of precipitation  
**Groundwater Recharge**  
22,400,000 gallon/yr

Note: This concept plan is not intended to represent specific planned or required development proposals

Water metrics summary  
©Mithun / KPFF

# 2050 Per Plan Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

10% of precipitation  
**Transpiration**  
6,400,000 gallon/yr

**Potable Water**  
**28,000,000 Gallon Reduction**

45% of precipitation  
**Stormwater Runoff**  
**37,000,000 Gallon Reduction**

90% of potable water  
**Waste Water**  
**92,000,000 Gallon Reduction**

10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
5,773,644 gallon/yr

35% of precipitation  
**Groundwater Recharge**  
22,400,000 gallon/yr

Note: This concept plan is not intended to represent specific planned or required development proposals

Water metrics summary  
©Mithun / KPFF

2050 Per Plan Water Use Conditions

100% **Precipitation**  
64,000,000 gallon/yr

10% of precipitation  
**Evaporation**  
6,400,000 gallon/yr

10% of precipitation  
**Transpiration**  
6,400,000 gallon/yr

Water metrics summary  
©Mithun / KPFF

**28,000,000 Gallon Reduction**

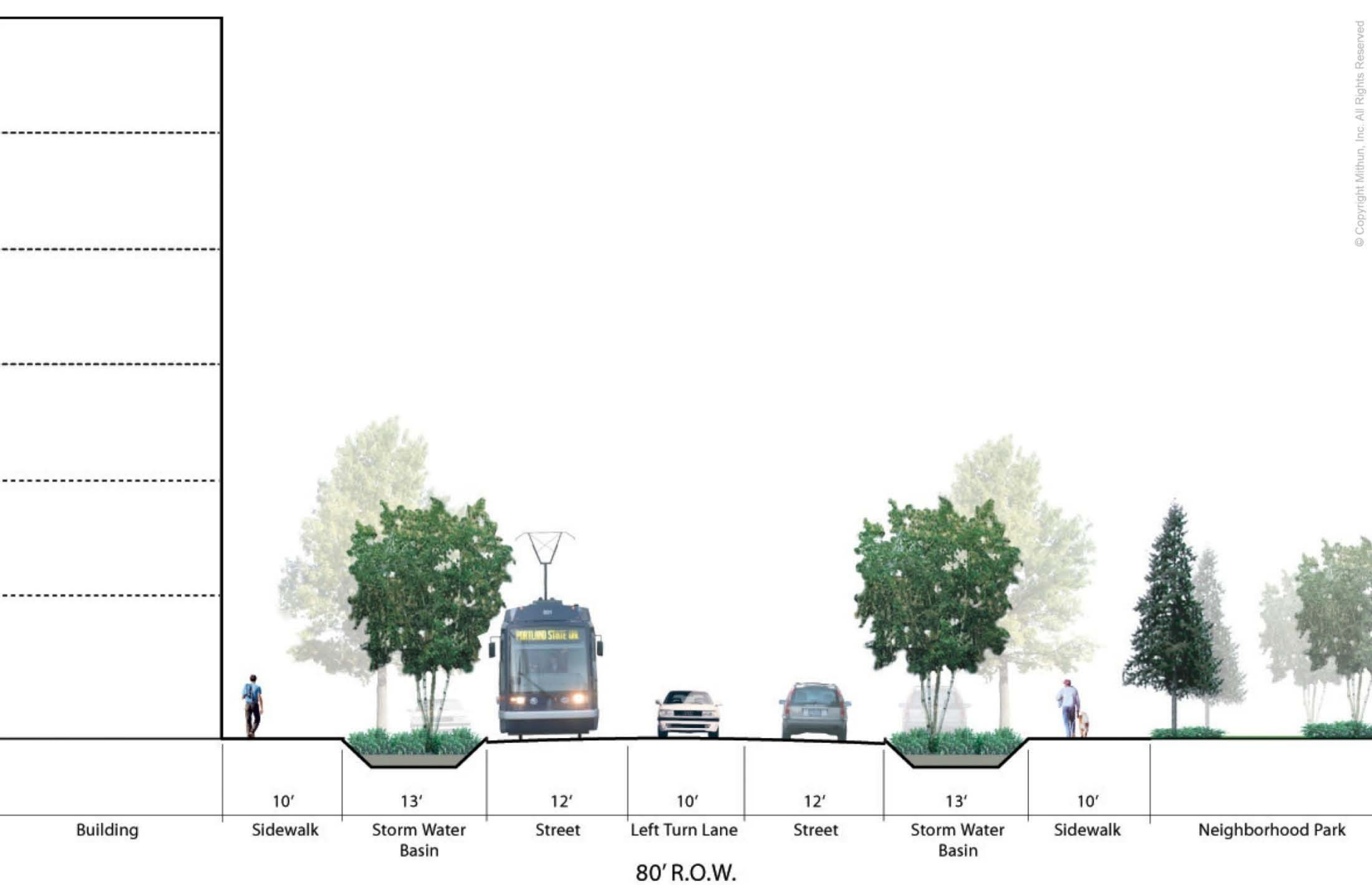
45% of precipitation  
**Stormwater Runoff**  
**37,000,000 Gallon Reduction**

90% of potable water  
**Waste Water**  
**92,000,000 Gallon Reduction**

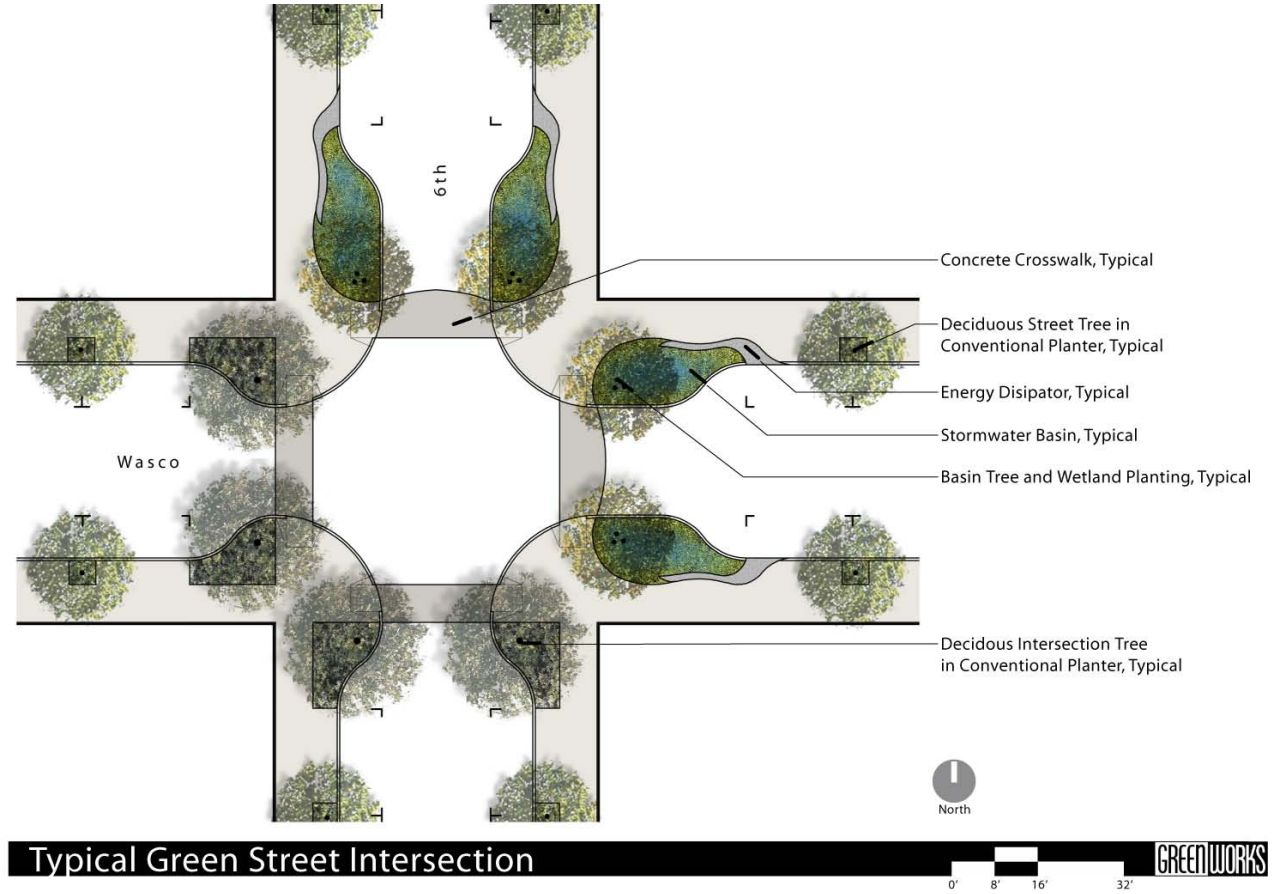
10% of potable water  
**Building System/Occupant  
Consumptions (System Loss)**  
5,773,644 gallon/yr

35% of precipitation  
**Groundwater Recharge**  
**22,000,000 Gallon Addition**

Note: This concept plan is not intended to represent specific planned or required development proposals



Lloyd Crossing Sustainable Urban Design Plan  
Portland, OR

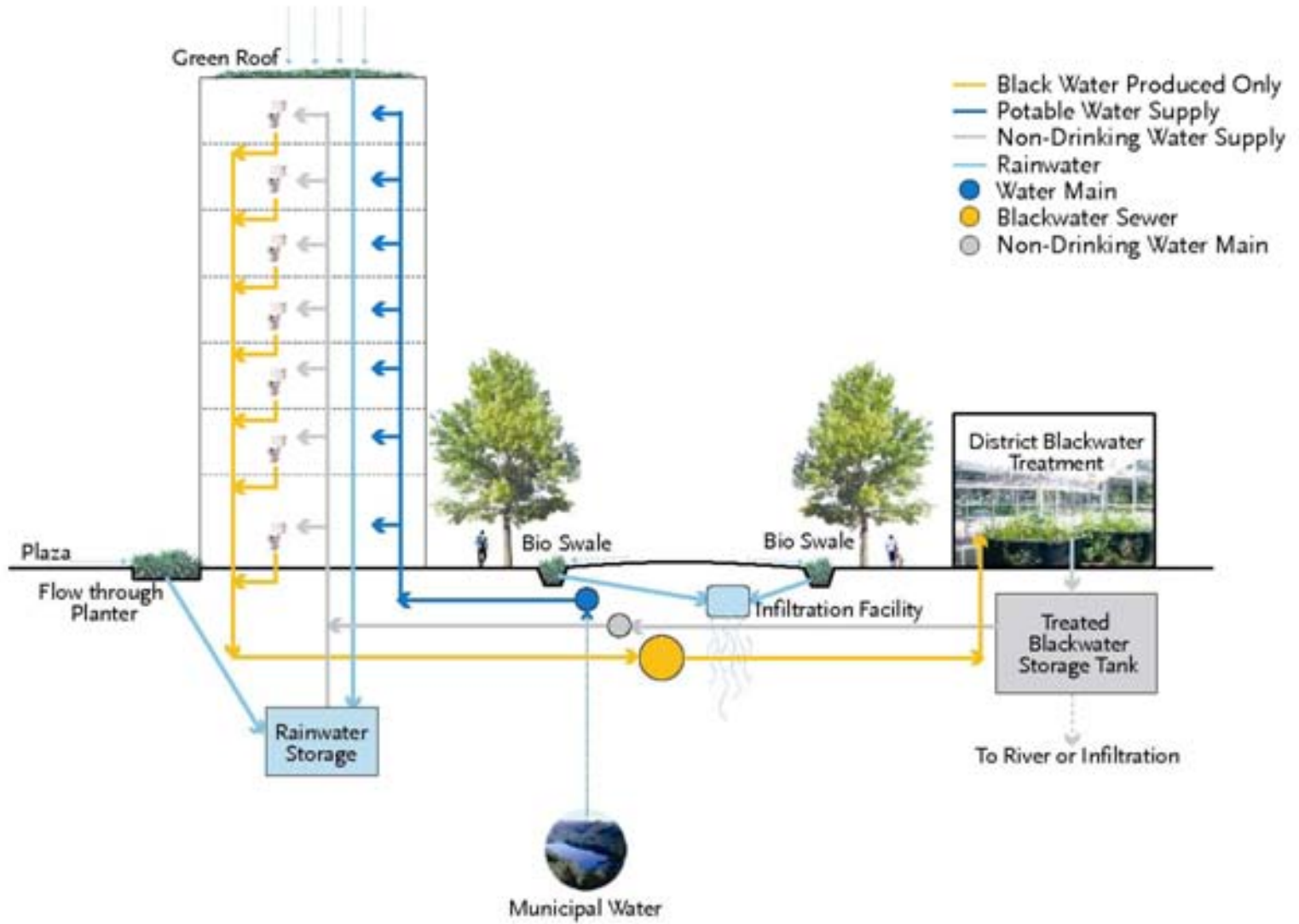


Typical Green Street Intersection

# Lloyd Crossing Raingardens







# Central Water Park Water Treatment



0.6

cents/gallon

To Columbia Boulevard  
Wastewater Treatment  
Plant



From Bull Run Watershed

0.3

cents/gallon

2004 Data



**A**/166,000,000  
(per code buildout)

**B**/116,000,000

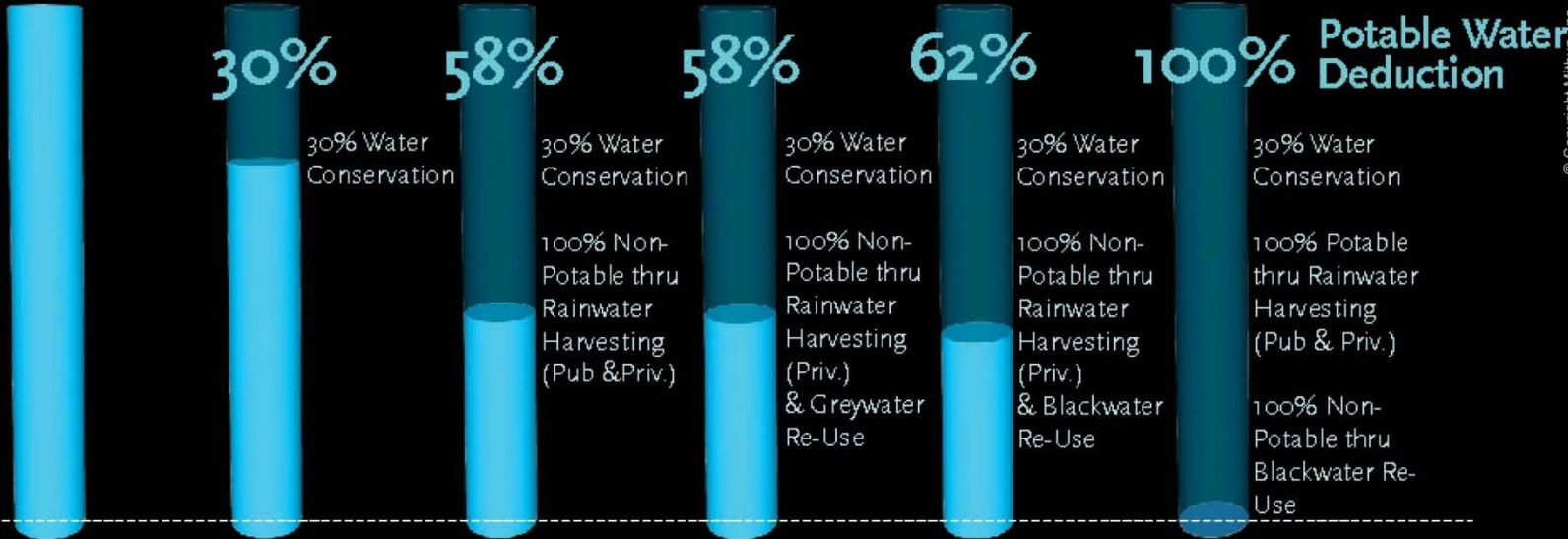
**C**/70,000,000

**D**/70,000,000

**E**/64,000,000

**F**/0

**Precipitation**  
64,000,000



Annual Water Related Utility Cost

**Total**  
\$1,573,244

**Total**  
\$1,135,757

**Total**  
\$657,320

**Total**  
\$359,121

**Total**  
\$170,749

**Total**  
\$0

**28%**

**58%**

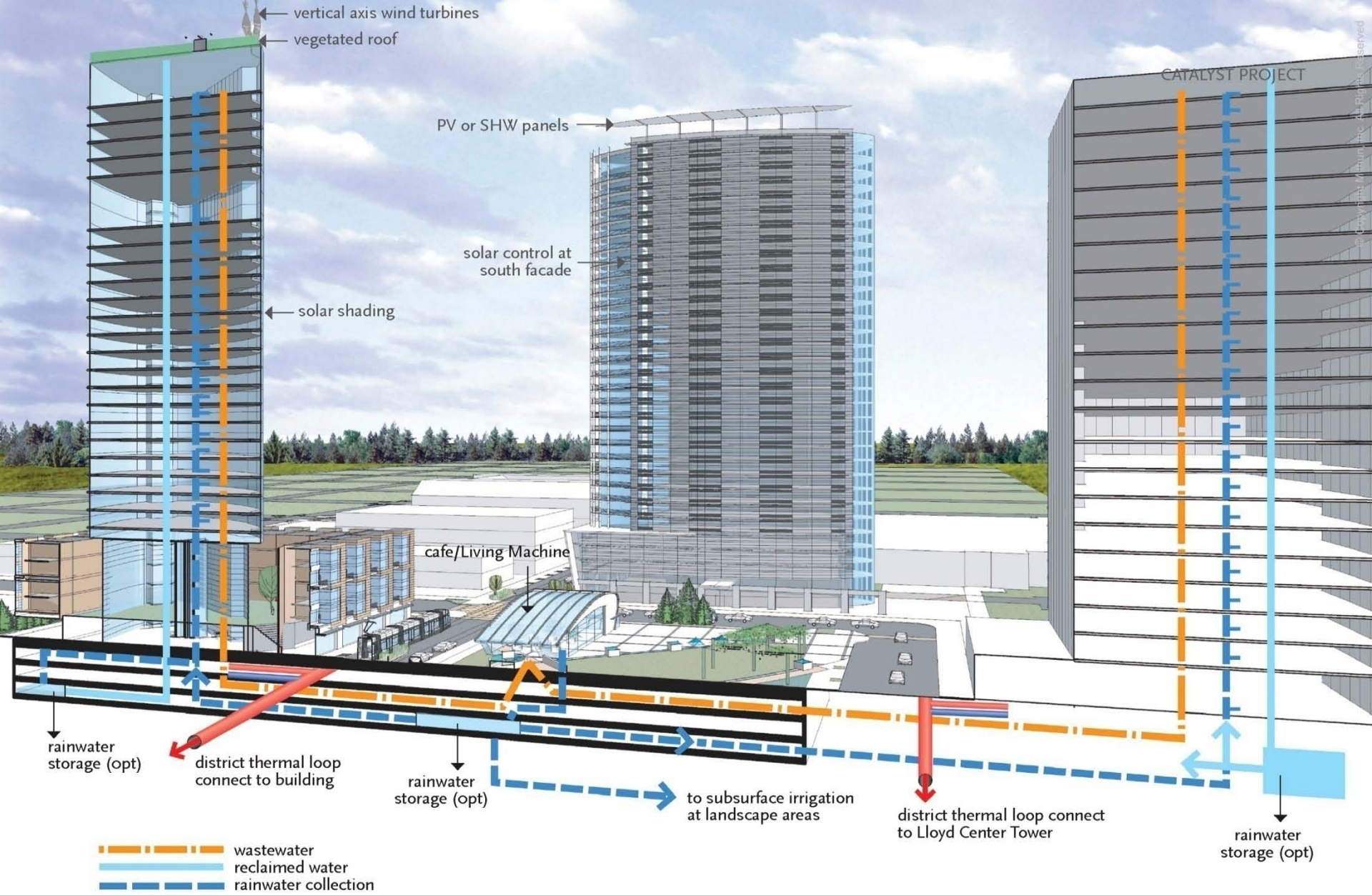
**77%**

**89%**

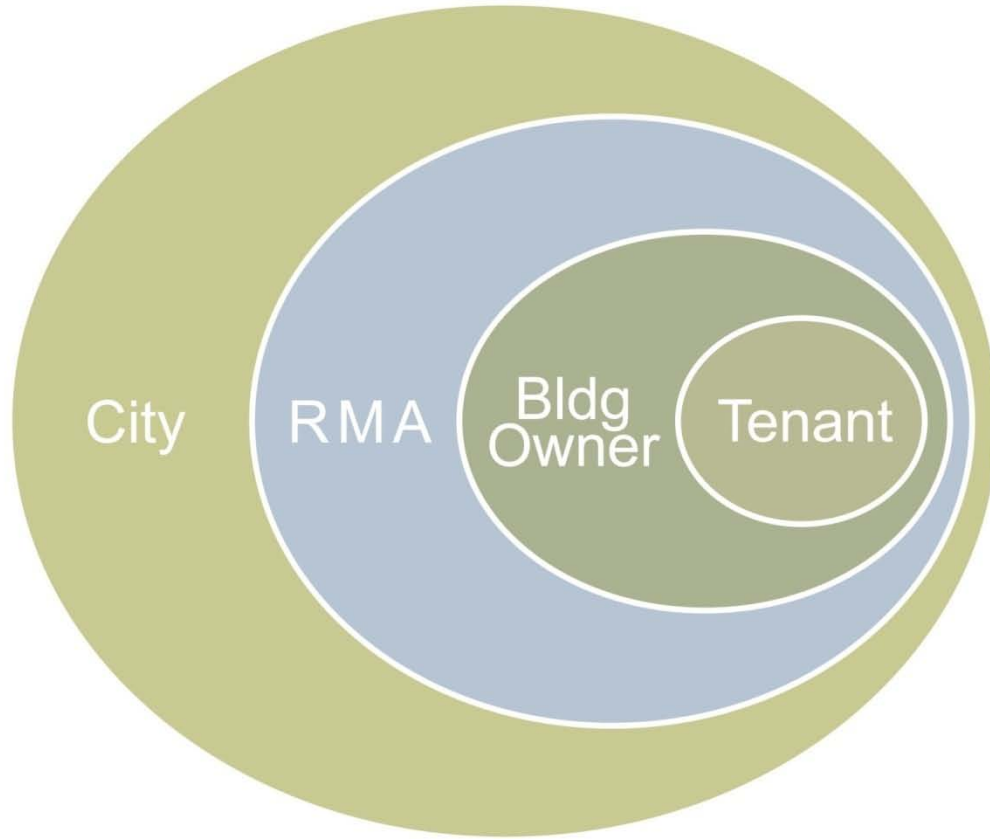
**100% Savings**

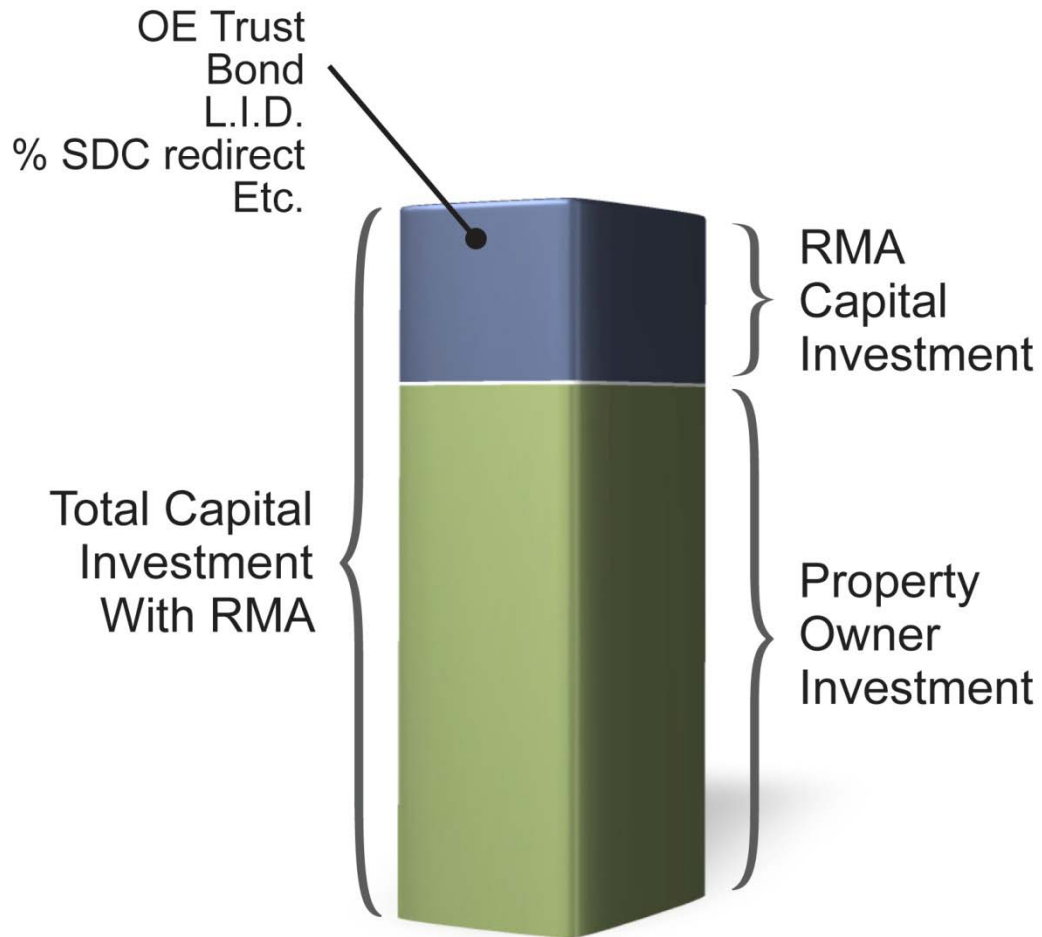
2004 Data

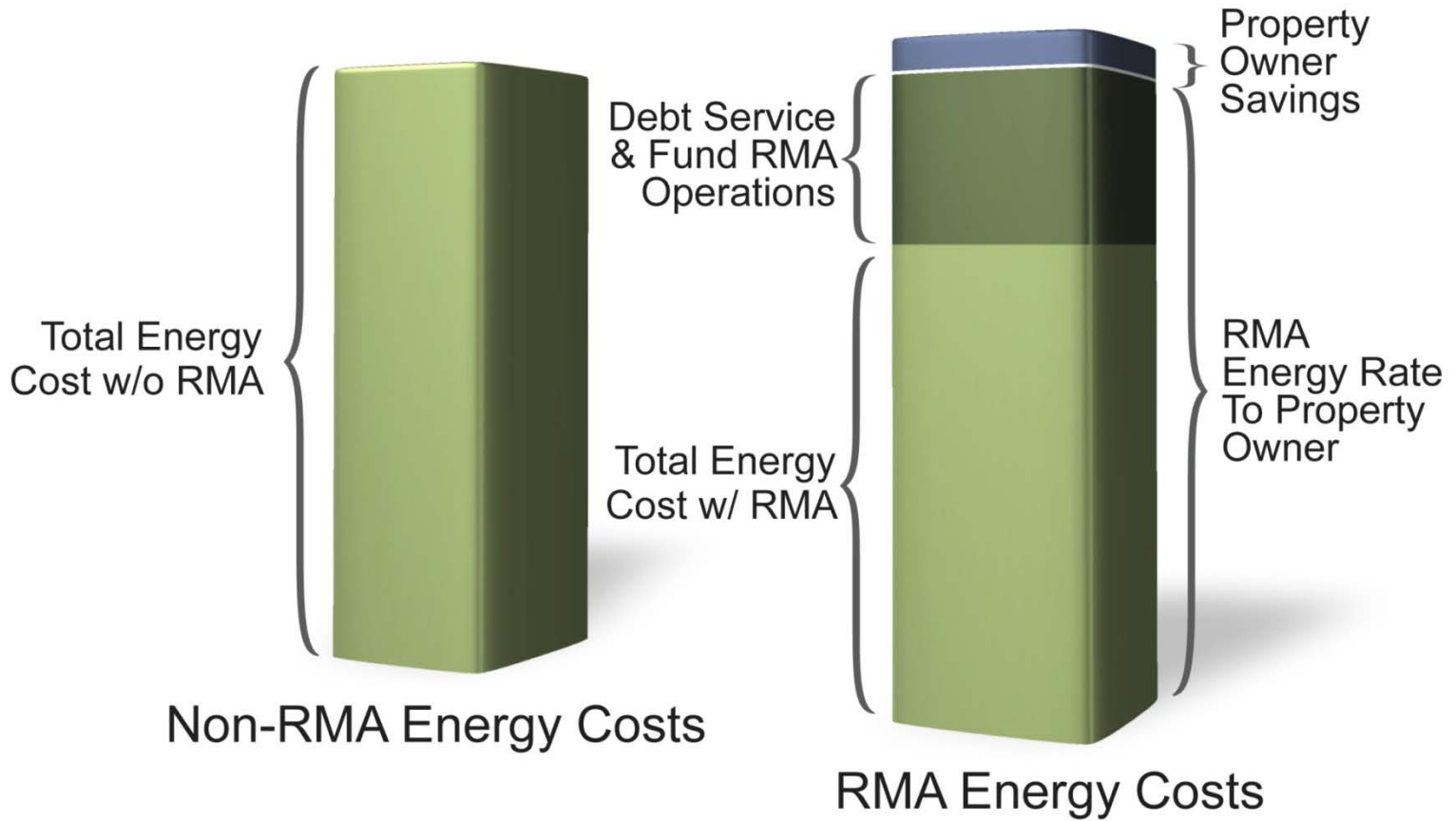
Municipal Water Use  
Strategy / Potable Water Demand



Lloyd Crossing Sustainable Urban Design Plan  
Portland, OR



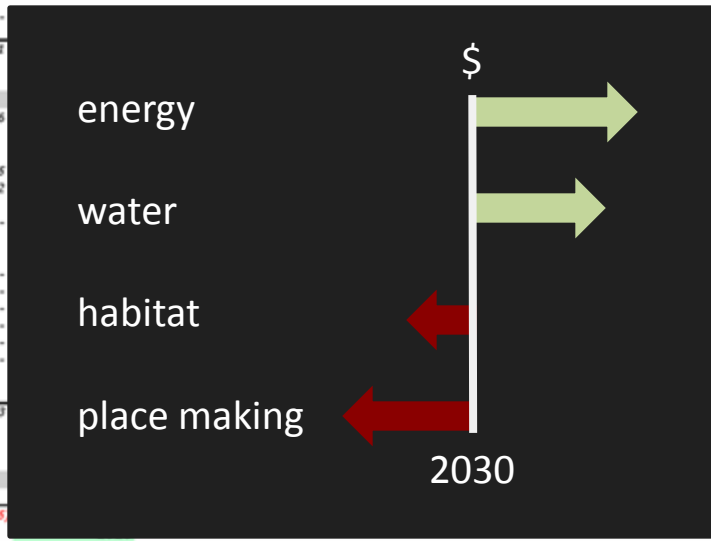






**OVERALL SUMMARY**

Uses:	Total	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
<b>WATER</b>											
Building Improvements	\$ 9,460,491	\$ 2,100,499	\$ 1,572,498	\$ 829,374	\$ 832,534	\$ 835,693	\$ 838,853	\$ 842,012	\$ 845,172	\$ 848,331	\$ 36,314
District Improvements	\$ 8,336,249	\$ 1,717,635	\$ 37,635	\$ 4,851,647	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047	\$ 247,047
	<b>\$ 17,816,741</b>										
<b>ENERGY (inflated @ 2%)</b>											
	\$ 316,047,076	\$ 4,071,532	\$ 19,047,715	\$ 24,240,090	\$ 24,032,884	\$ 28,045,143	\$ 33,542,736	\$ 38,171,772	\$ 43,235,087	\$ 48,298,402	\$ 53,361,716
<b>HABITAT / OPEN SPACE</b>											
	\$ 32,125,750	\$ 5,880,600	\$ 5,472,225	\$ 12,419,450	\$ 1,406,250	\$ 6,947,225	\$ -	\$ -	\$ -	\$ -	\$ -
<b>PLACEMAKING</b>											
	\$ 14,653,750	\$ 14,653,750	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Total Uses:</b>	<b>\$ 380,643,317</b>	<b>\$ 28,424,016</b>	<b>\$ 26,130,073</b>	<b>\$ 42,340,561</b>							
<b>Sources:</b>											
<b>WATER</b>											
Savings Reinvested @ 80%	\$ 40,212,445	\$ 1,202,221	\$ 1,709,206	\$ 3,497,996							
<b>ENERGY</b>											
Offsets	\$ 84,739,389	\$ 1,339,105	\$ 7,115,812	\$ 8,030,715							
Savings Reinvested @ 80%	\$ 260,698,421	\$ 634,557	\$ 4,129,814	\$ 7,729,092							
<b>HABITAT / OPEN SPACE</b>											
	\$ -	\$ -	\$ -	\$ -							
<b>OTHER POTENTIAL FUNDING SOURCES</b>											
Urban Renewal Funds	\$ -	\$ -	\$ -	\$ -							
Tax Increment Financing	\$ -	\$ -	\$ -	\$ -							
Local Improvement District	\$ -	\$ -	\$ -	\$ -							
New Market Tax Credits	\$ -	\$ -	\$ -	\$ -							
EPA Sustainability Pilot Grant	\$ -	\$ -	\$ -	\$ -							
Subtotal - Other	\$ -	\$ -	\$ -	\$ -							
<b>Total Sources:</b>	<b>\$ 385,650,255</b>	<b>\$ 3,175,883</b>	<b>\$ 12,954,832</b>	<b>\$ 19,257,803</b>							
<b>Net Cash Flow:</b>											
<b>WATER</b>											
5-Year Cash Flow:	\$ 22,395,705	\$ (2,615,913)	\$ 99,072	\$ (2,183,025)							
Payback Year:			2010								
<b>ENERGY</b>											
5-Year Cash Flow:	\$ 29,390,733	\$ (2,097,870)	\$ (7,802,088)	\$ (8,480,283)	\$ (2,529,578)	\$ 1,317,927	\$ 3,763,210	\$ 7,122,731	\$ 9,890,000	\$ 12,683,885	\$ 15,522,806
Payback Year:						2025					
<b>HABITAT / OPEN SPACE</b>											
5-Year Cash Flow:	\$ (32,125,750)	\$ (5,880,600)	\$ (5,472,225)	\$ (12,419,450)	\$ (1,406,250)	\$ (6,947,225)	\$ -	\$ -	\$ -	\$ -	\$ -
Payback Year:											
<b>PLACEMAKING</b>											
5-Year Cash Flow:	\$ (14,653,750)	\$ (14,653,750)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Payback Year:											
<b>GRAND TOTAL DISTRICT CASH FLOW:</b>	<b>\$ 5,006,938</b>	<b>\$ (25,248,134)</b>	<b>\$ (13,175,241)</b>	<b>\$ (23,082,758)</b>	<b>\$ (1,177,484)</b>	<b>\$ (2,533,190)</b>	<b>\$ 7,198,078</b>	<b>\$ 10,897,353</b>	<b>\$ 14,005,370</b>	<b>\$ 17,140,999</b>	<b>\$ 20,881,152</b>
Payback Year:							2030				



2004 Data



Lloyd Crossing Sustainable Urban Design Plan  
Portland, Oregon

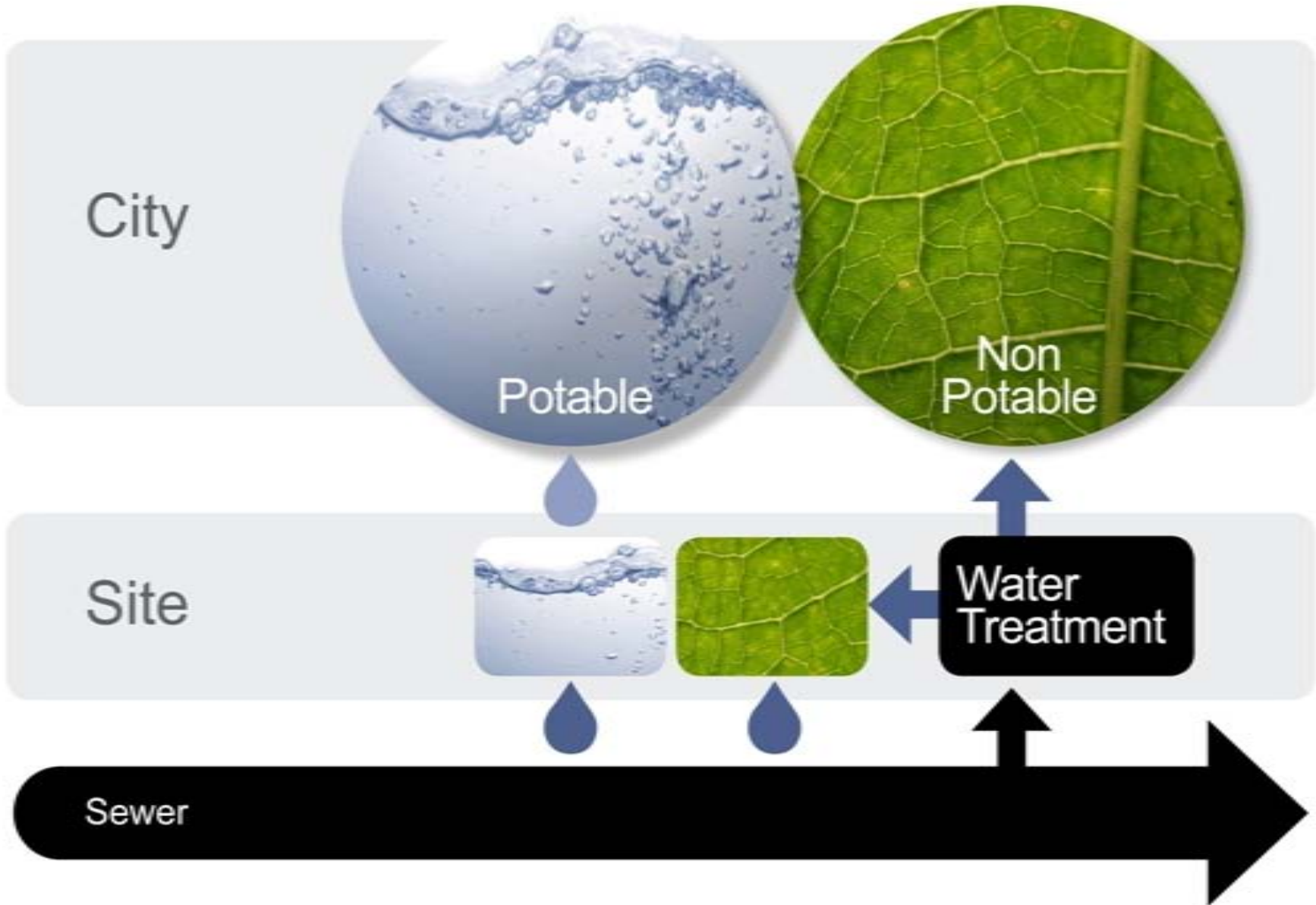


PROJECT  
GREEN

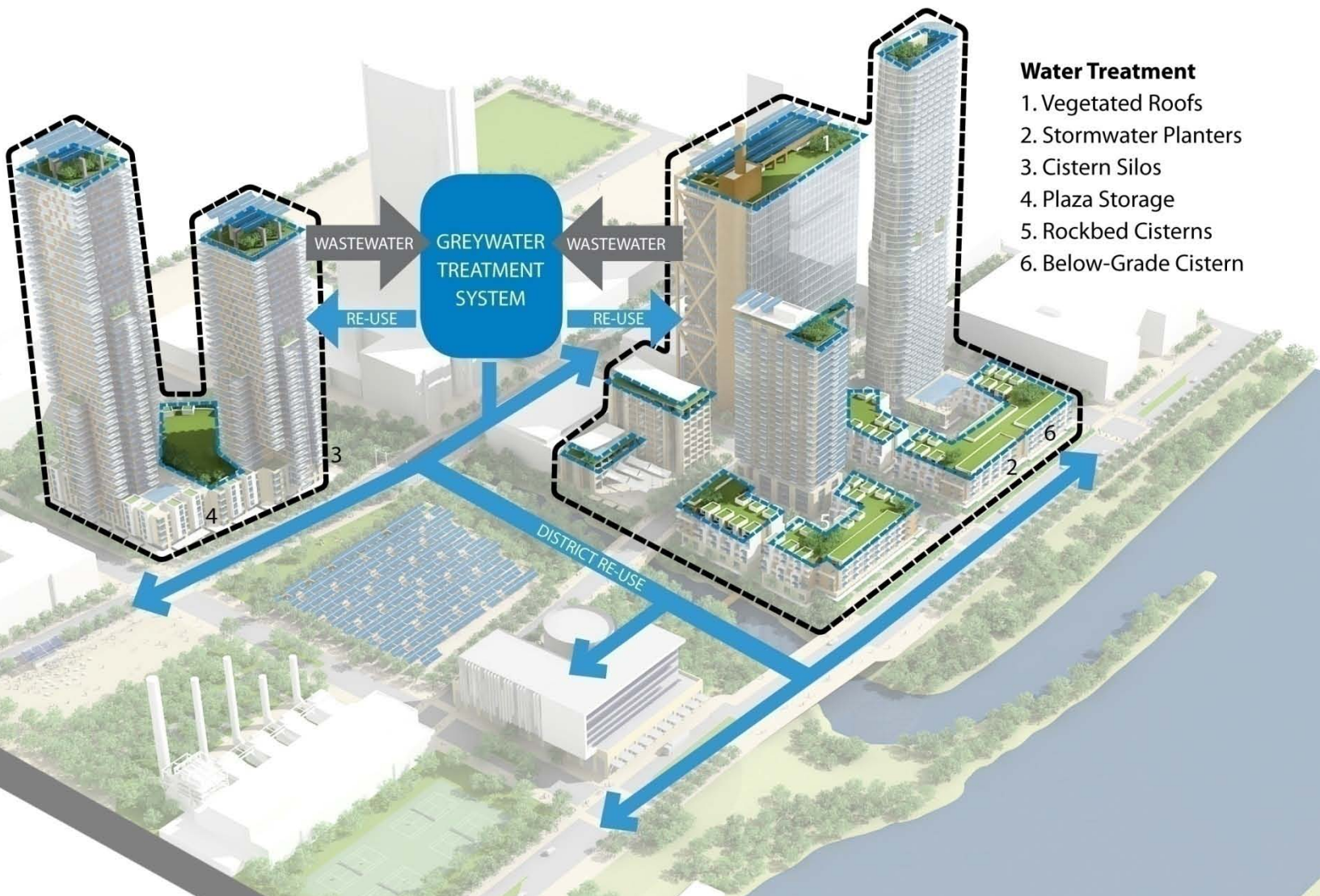
GREEN WATER TREATMENT  
PLANT DEVELOPMENT PROJECT



Project Green  
Austin, Texas



Water Neutral Development Concept



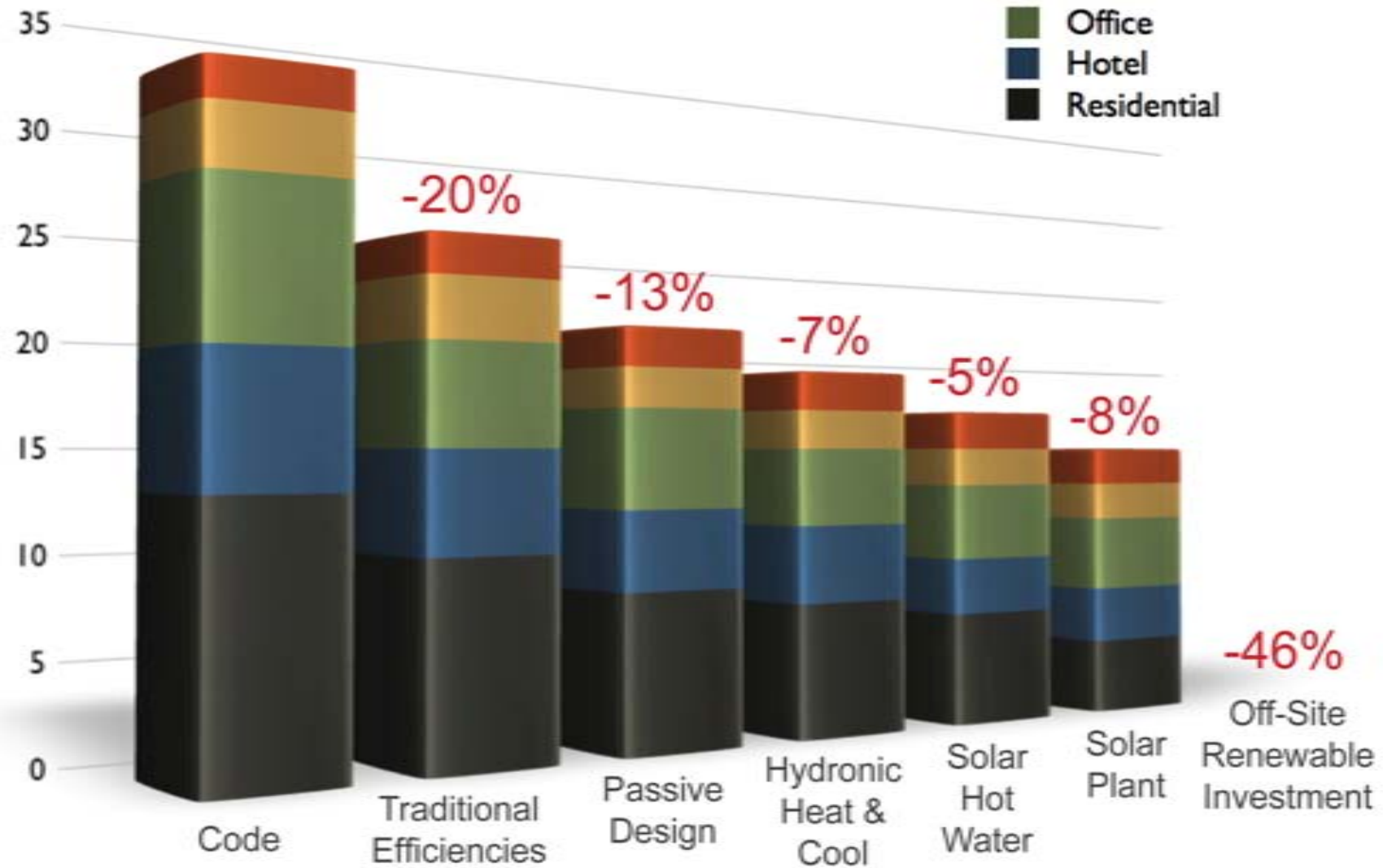
### Water Treatment

- 1. Vegetated Roofs
- 2. Stormwater Planters
- 3. Cistern Silos
- 4. Plaza Storage
- 5. Rockbed Cisterns
- 6. Below-Grade Cistern

Project Green - Water Treatment

Annual Greenhouse Gas Emissions

- Car Parking
- Retail
- Office
- Hotel
- Residential



Carbon Neutral Development Concept

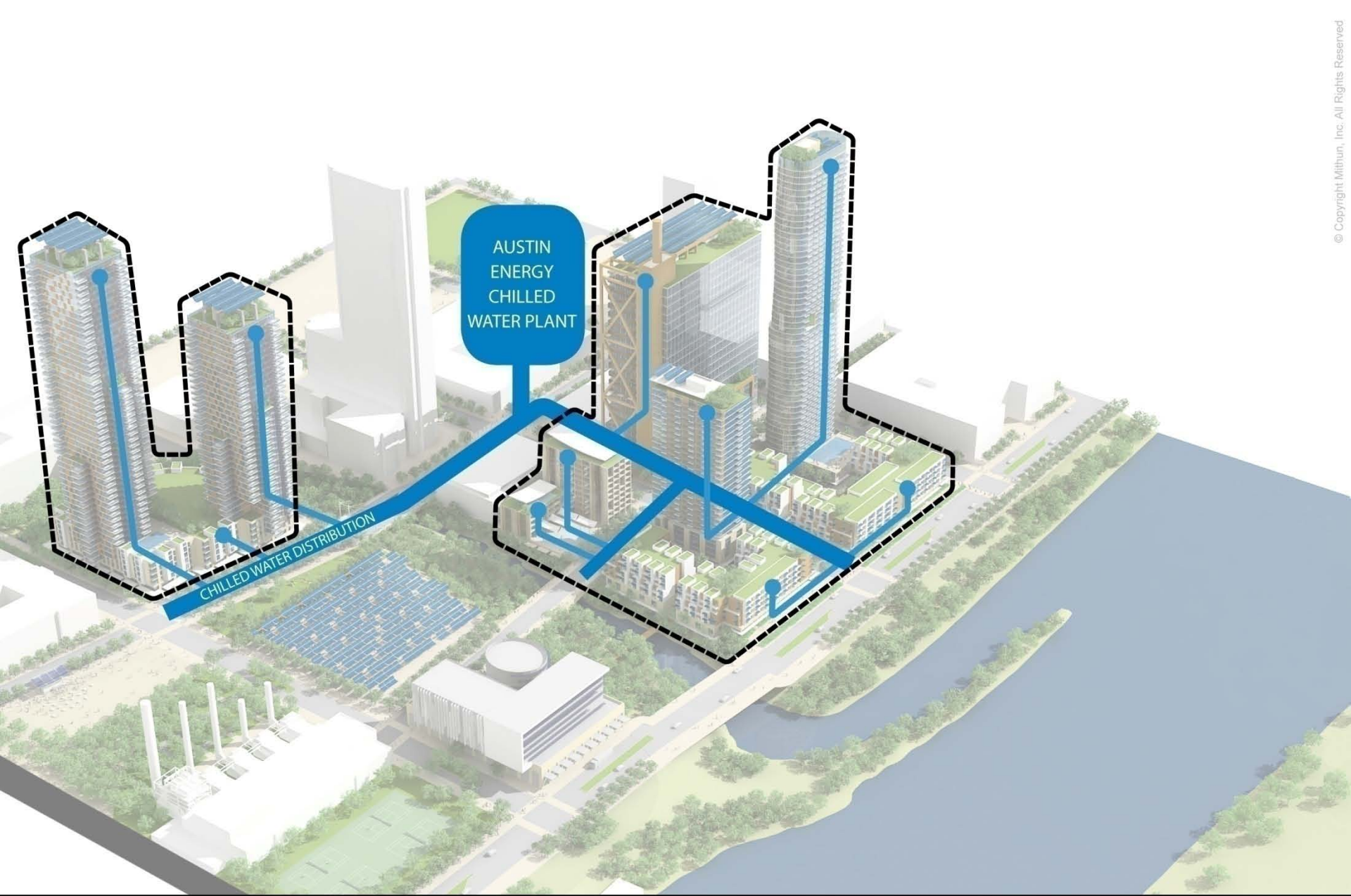




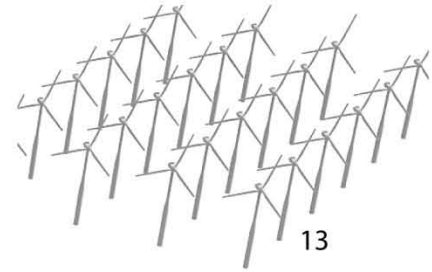
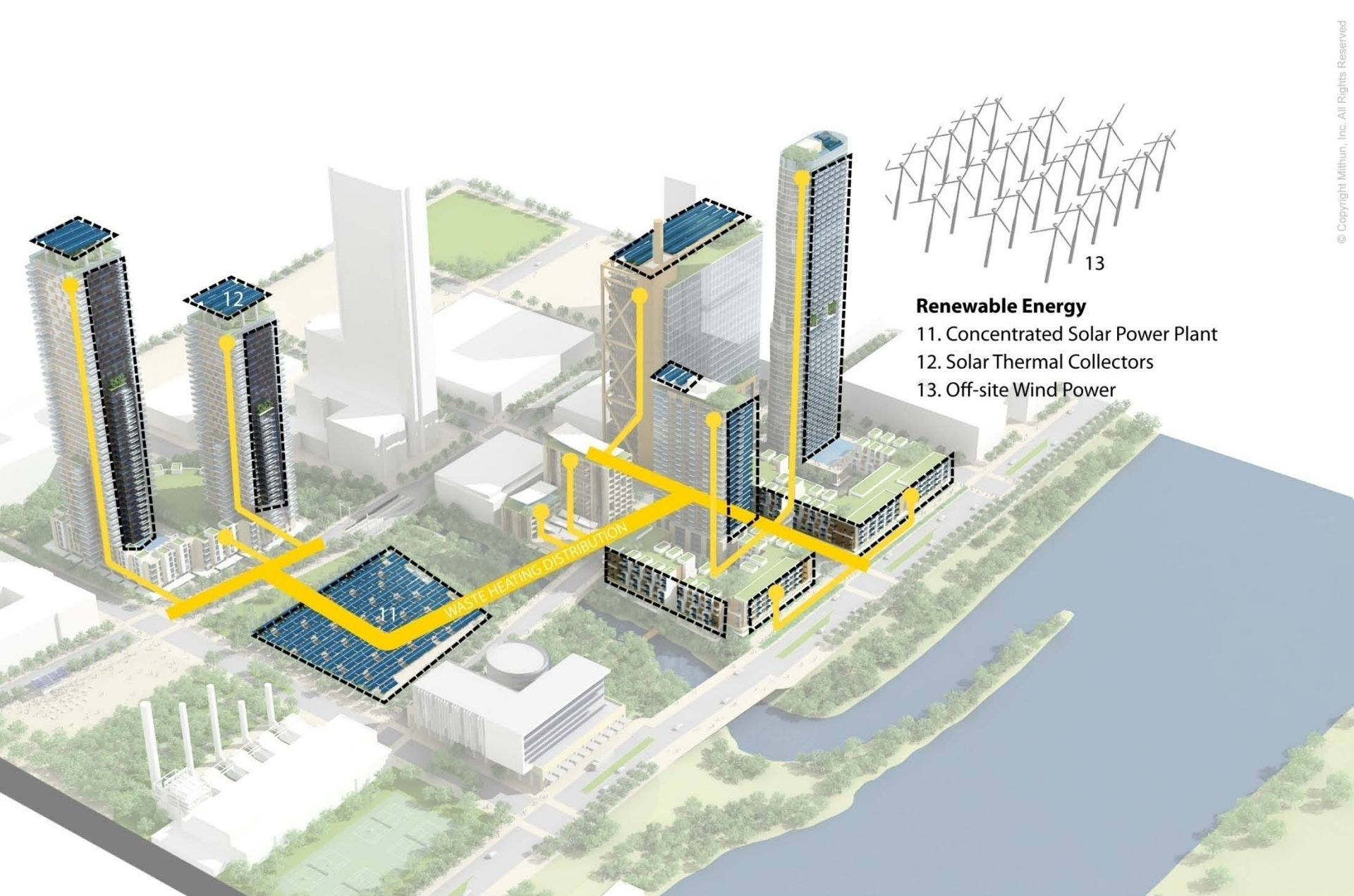
**Passive Building Design**

- 7. Solar screens on South and West Facades
- 8. PV Panels on Canopies
- 9. Double Skin Membrane
- 10. Shaded Balconies

Project Green - Passive Building Design



Project Green - Chilled Water Distribution



**Renewable Energy**

- 11. Concentrated Solar Power Plant
- 12. Solar Thermal Collectors
- 13. Off-site Wind Power



Project Green  
Austin, TX



# Climate Benefit District



Climate Benefit District  
GHG Reduction Strategies



Green Power  
Production On Site



District-Wide  
Green Infrastructure

Green Power  
Production On Site

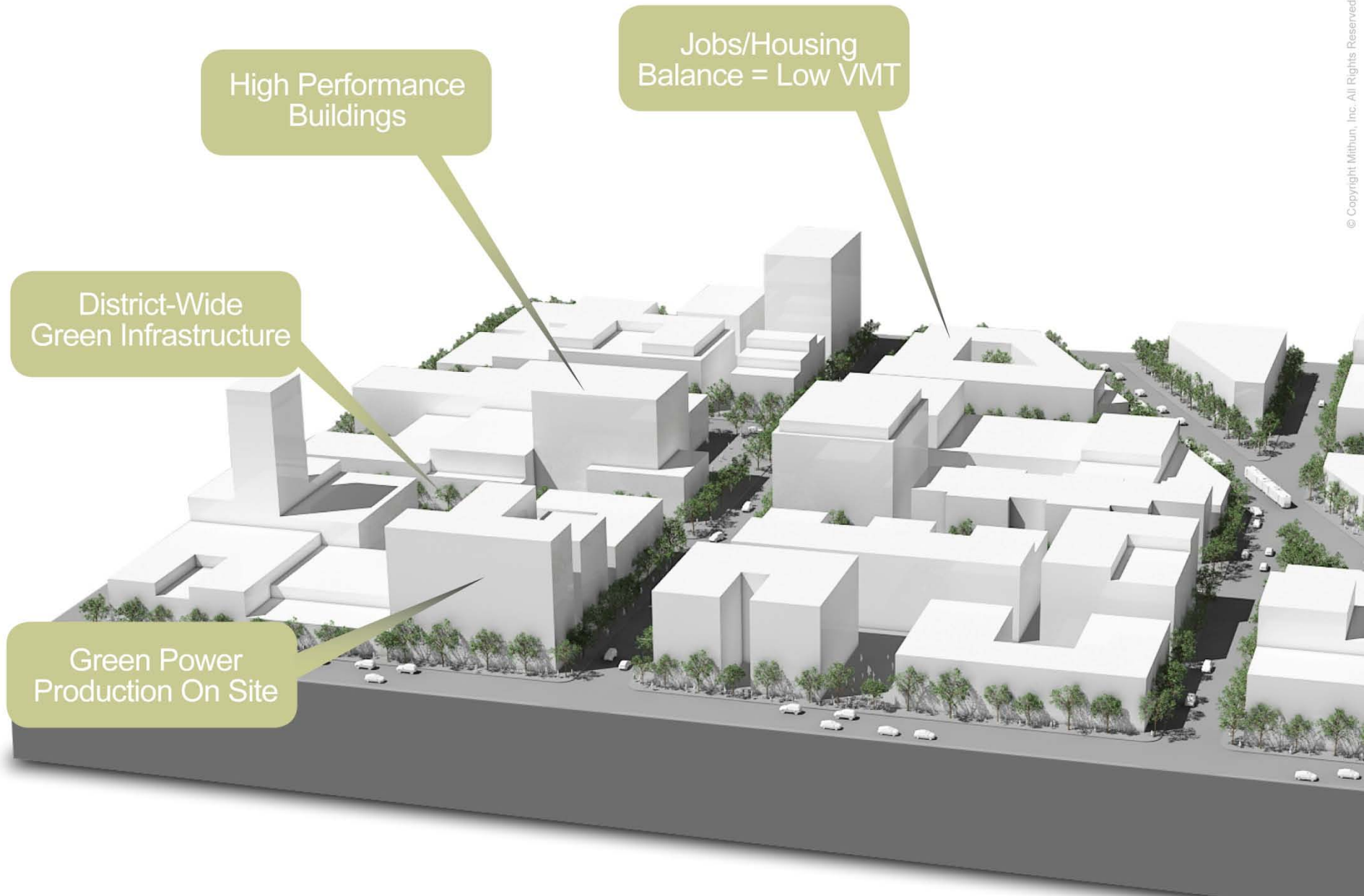


High Performance Buildings

District-Wide Green Infrastructure

Green Power Production On Site



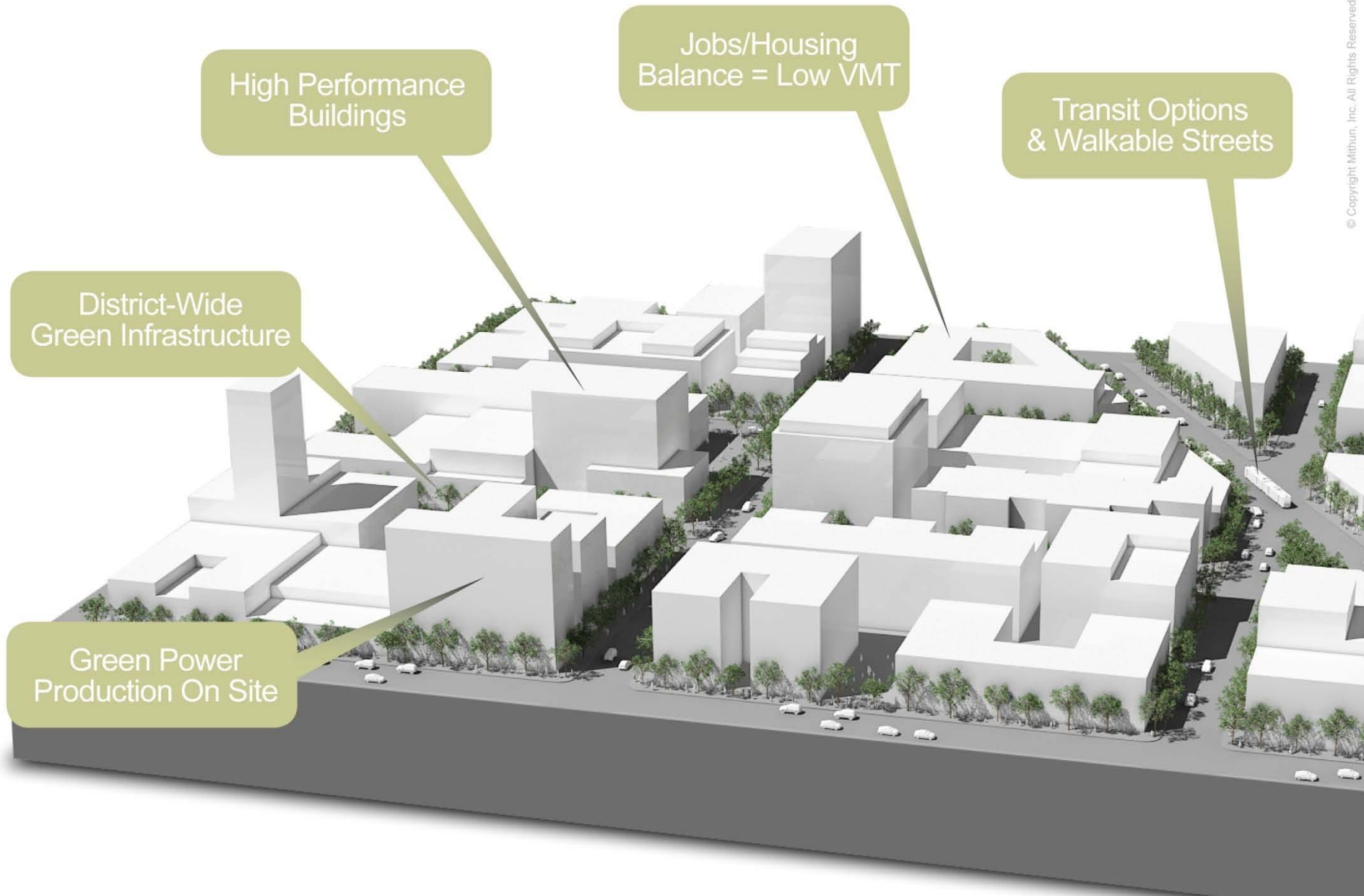


High Performance Buildings

Jobs/Housing Balance = Low VMT

District-Wide Green Infrastructure

Green Power Production On Site





Step 4: CBD Created



Neighborhood  
Sustainability Plan

- Integrated infrastructure & utilities
- VMT reduction strategies
- Green building & land use initiatives
- Social sustainability plan
- Finance & governance

Step 3: Recommend to City Council



Community  
Sustainability  
Agency

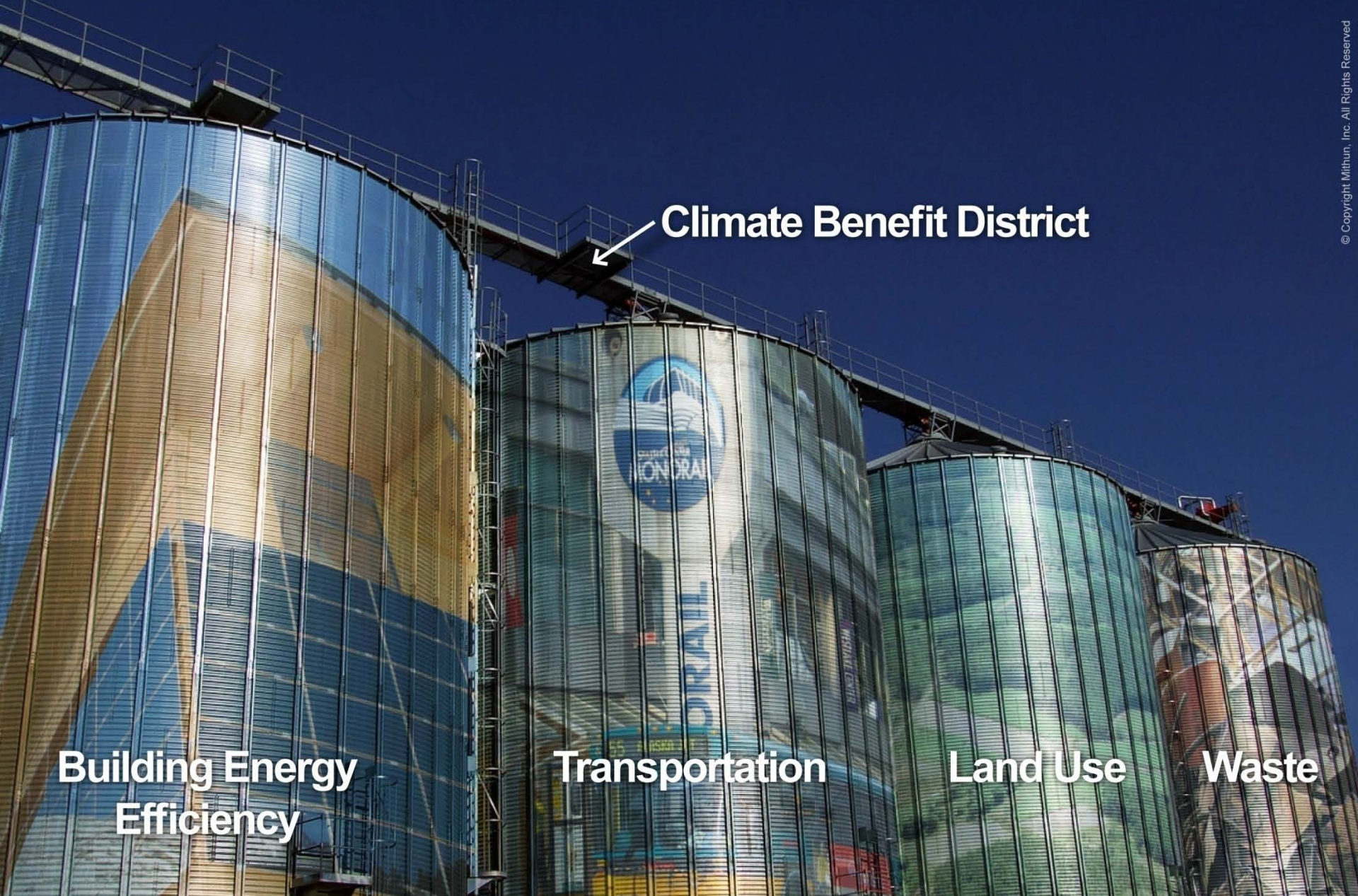
Citywide  
Sustainability  
Plan

Step 2: Develop NSPs



City Council

Step 1: Designate CSA



# Climate Benefit District



**Building Energy  
Efficiency**

**Transportation**

**Land Use**

**Waste**

Climate Benefit District  
GHG Reduction Strategies

Base photo by Hamuchen via Flickr









# MITHŪN

ARCHITECTS + DESIGNERS + PLANNERS

Bert Gregory FAIA Lloyd Green District March 3, 2009

