

# URBAN REWILDING

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FIGURE

STREET-SCAPE - ROOF-SCAPE - FACADE-SCAPE

If someone were to replicate my thesis either in an academic or a professional forum I would hope that they would be able to first recognize that urban sprawl and an increasing population density in cities is leading to a disconnect between city dwellers and ecosystems. We desperately need legislators, politicians and young people to reinvest in the species and ecosystems that are quickly disappearing from the urban fabric?

Where are the architectural in between spaces that can be filled with built habitat. How can proximity, immersion and representation be used to foster this reinvigorated interest in rewilding our built landscape.

How can we as architects facilitate a better understanding of and relationship to the natural world for city dwellers specifically.

As urban sprawl worsens and cities expand more and more people reside in cities rather than in rural areas. This causes human to ecosystem relationships to further fracture.

Worsening urban sprawl is destroying valuable habitat for endangered species in addition to further separating city dwellers from fostering relationships with valuable species and ecosystems.

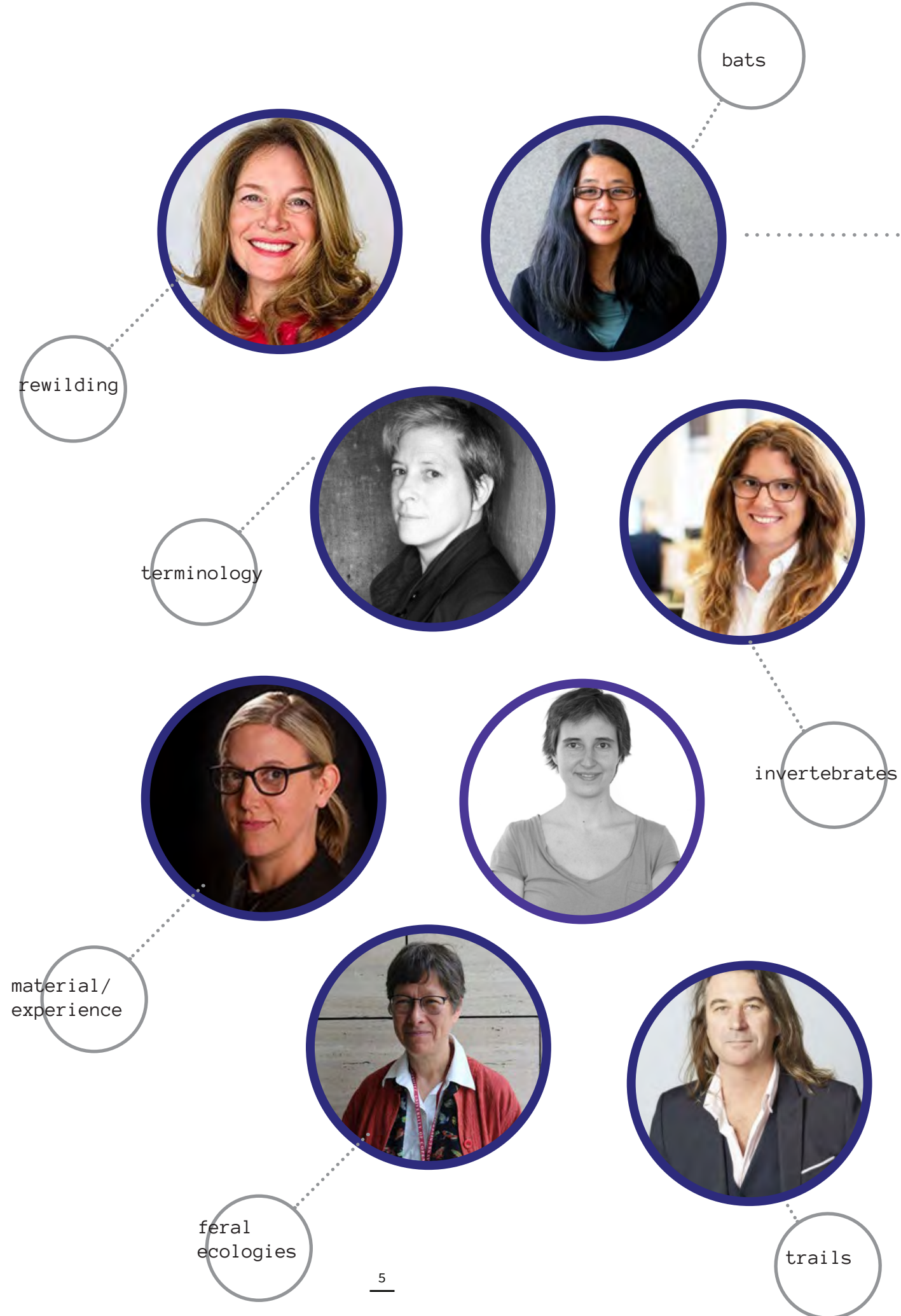
Where can species and micro ecosystems be worked back into the fabric of large sprawling cities like New York City?

The projected lower reliance on cars as the primary means of transportation in densely populated cities like New York City opens up large swathes of land for ecosystem redevelopment. Imagine walking out of your apartment on your way to the train or bus into a system of boardwalks and micro wetlands and being able to hear birds chirping and see small mammals running beneath your path.

In addition to the street-scape architectural elements like a facade or roof could be re-appropriated as habitat. How can a facade panel shed water as well as house a bat or a beetle.

Although re-wilding can be thought of as a movement to recreate the past it can also be seen as a reintegration of valuable species in a controlled way. How do we determine which species to bring back. There are many species known for their ability to provide ecosystem services. Bats, bees, beetles and butterflies are pollinators and small felines and birds of prey provide pest control.

We can not completely rewild Manhattan to the forests of 1609 but we can locate and redesign architectural components to work dually as habitat while still providing their human functions.



“As architects, we are operating in a landscape of shifting ecological and cultural values. We must not only develop strategies for incorporating diverse habitats into the spatial and built environment, but we must also take on the challenge to radically rethink the spatial and visible dimensions of animals and urban organisms. In the process of doing so, we will not only enable urban citizens to envision the possibilities of living among ‘pests,’ we’ll also unshackle architecture from some of its time-loaded assumptions and cultural biases. It is only then that architecture can become a vehicle for provoking new priorities, rather than simply responding to them. Here are some issues for architects to consider as we proceed into an emerging biosynthetic world.”

This is from Joyce Hwang of Ants of the Prairie,

13. Living Among Pests  
Originally published in Volume #35: Everything Under Control

# — RESEARCH METHODOLOGY —

MEAGHAN KELLY

CONTEXT — CASE STUDIES

PRIMARY ADVISOR:  
JOEL KERNER



where do we start?

One of the most dense and richly populated cities in the world, that also once contained 55 rich ecosystems  
NEW YORK CITY — ISLAND OF MANHATTEN

who do we look to?

Singapore has been incredibly successful in passing and enforcing legislature and creating a youth movement in order to create a garden city.

Where do we find the available space and break down our scope?

In many large cities and in Manhattan particularly there is a movement away from personal car use. This will open up acres of land for redevelopment as habitat and human open used space.

Scope?

We can break up the urban fabric into the re designable urban surfaces of the roof, facade and street.

## WHAT IS REWILDING?

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“Rewilding, or re-wilding, activities are conservation efforts aimed at restoring and protecting natural processes and wilderness areas. This may include providing connectivity between such areas, and protecting or reintroducing apex predators and keystone species.”

– True Nature Foundation

## WHAT IS URBAN REWILDING?

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“Urban rewilding is a way to bring nature back to people’s daily lives, as it is an inseparable part of our origins. However, this idea carries more benefits than just our reconnection with natural elements, it helps with the conservation of the area specific habitat as well.”– GreenTumble



# MANHATTEN HABITAT

Habitat is defined as the place where an plant or an animal can be meet its basic ecological needs, that is, needs for food, water, shelter, and reproductive resources (e.g. materials for building nests, or a den where an animal can give birth).

INTACT HABITAT CORES -  
USA

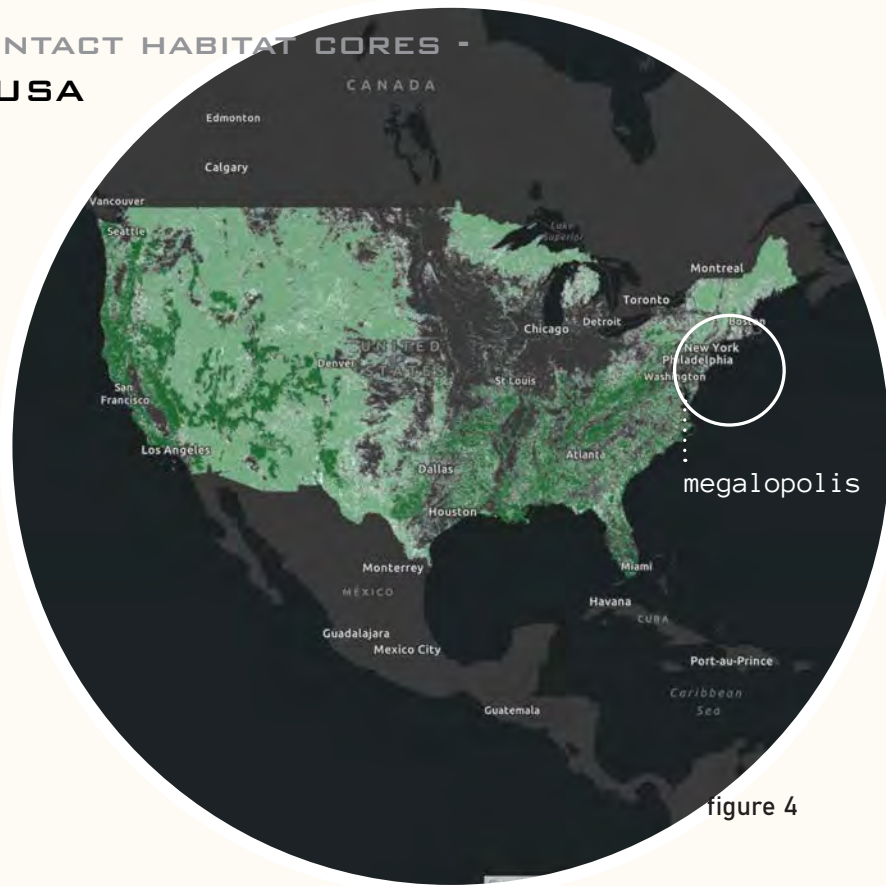


figure 4

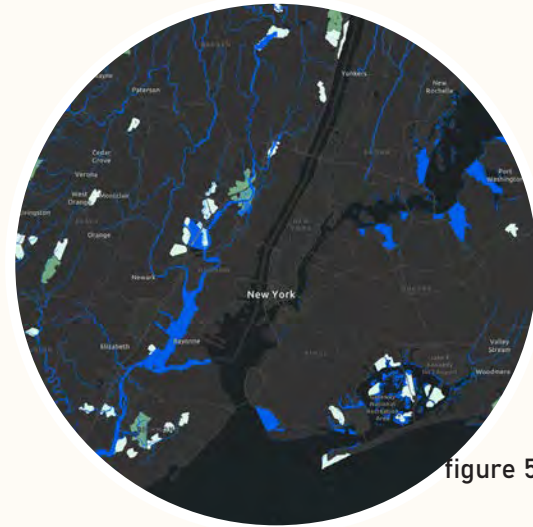


figure 5

## What was the ecosystem?

Ecosystems, actually. Manhattan is something like one percent the size of Yellowstone. Yellowstone is 2.2 million acres and it has 66 ecosystems. Mannahatta had 55.

VALUABLE INTACT HABITAT SURROUNDING MANHATTEN



figure 6

It's an interesting thought exercise to imagine what might have happened had the United States been colonized from the West, instead of from the East. We might have decided to make Manhattan a national park. We would be coming to New York for an entirely different sort of wildlife.



“...a megalopolis is a continuously built-up region,” that is, “...tightly interwoven suburban and urban areas encroached on rural landscapes.” (Getis, Bjelland, Pg. 321)

Although there is little left to remember its past the biodiversity of Manhattan once rivaled that of Yellowstone National park, Yosemite and the great Smoky mountains with 55 distinct ecological communities.

Prior to 1609

Present



“coastal oak-pine forest” and “red maple swamps.”



figure 2

figure 7

**MANHATTEN HAS NO REMAINING ORIGINAL HABITAT**

# SPECIES RICHNESS

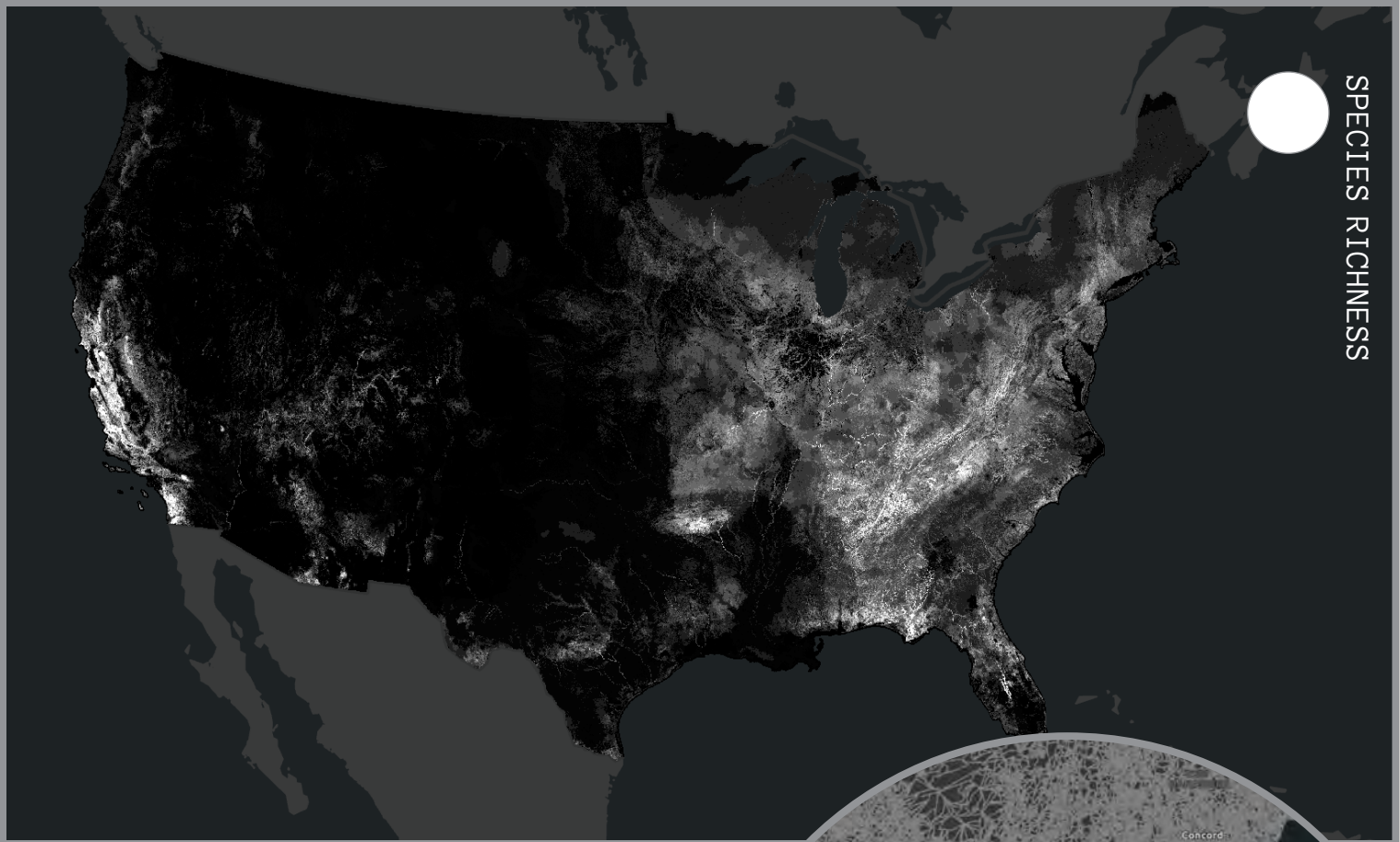


figure 8

## SPECIES RICHNESS



figure 9



figure 10

After five years of research The Welika Project determines it is likely that “1000 species of plants and vertebrate animals (24 species of mammals, 233 birds, 32 reptiles and amphibians, 85 fish, and 627 species of plants, and unknown numbers of fungi, lichens, mosses, insects, shellfish and other invertebrates) once occurred on Mannahatta. These likely wildlife included wolves, black bears, mountain lions, beavers, passenger pigeons, heath hens, timber rattlesnakes, tree frogs, bog turtles and over 30 species of orchids and 70 species of trees.”

# CONNECTING HABITAT

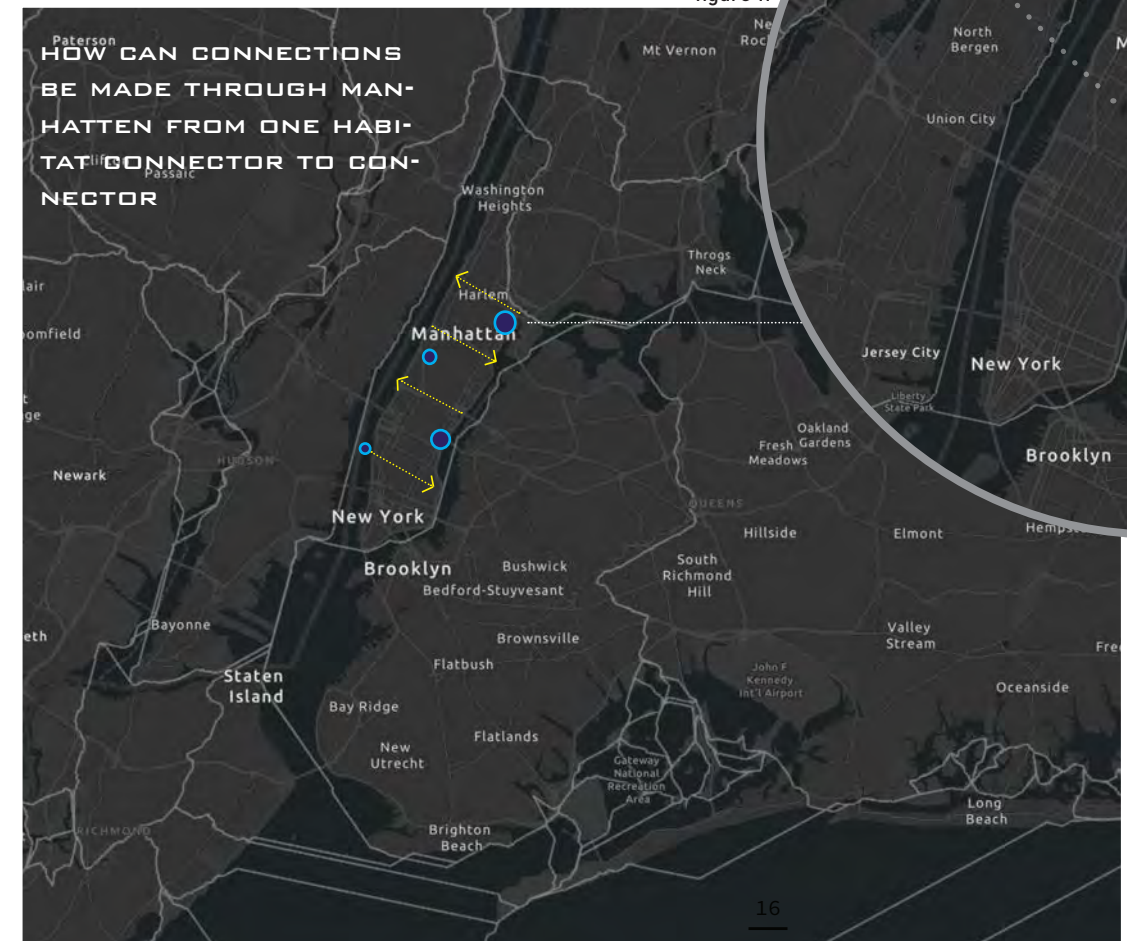
## LEAST COST PATHS CONNECTING HABITAT CORES



“THIS LAYER REPRESENTS MODELED LEAST COST PATHS (LCPs) AMONG NEIGHBORING INTACT HABITAT CORES. IT WAS CREATED AS PART OF ESRI’S GREEN INFRASTRUCTURE INITIATIVE AND IS ONE OF FIVE COMPANION LAYERS THAT CAN BE USED FOR GREEN INFRASTRUCTURE PLANNING.”

<https://www.arcgis.com/home/item.html?id=F8352A73777B4F23800C6D4CF838CC72>

figure 11



**THERE ARE NO CONNECTIONS MOVING THROUGH MANHATTAN PREVENTING SPECIES TRAVEL FROM HABITAT TO HABITAT**

figure 12



figure 13





# SPECIES MAP

## THE WELIKA PROJECT

### WEST FORTEENTH STREET ORIGINAL SPECIES

Common Name	Scientific Name
Meadow Vole	<i>Microtus pennsylvanicus</i>
White-footed Mouse	<i>Peromyscus leucopus</i>
Deer Mouse	<i>Peromyscus maniculatus</i>
Beaver	<i>Castor canadensis</i>
Southern Flying Squirrel	<i>Glaucomys volans</i>
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>
Masked Shrew	<i>Sorex cinereus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Eastern Chipmunk	<i>Tamias striatus</i>
Raccoon	<i>Procyon lotor</i>
Muskrat	<i>Ondatra zibethicus</i>
Eastern Mole	<i>Scalopus aquaticus</i>
Dog	<i>Canis lupus familiaris</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasiurus noctivagans</i>
Red Bat	<i>Lasiurus borealis</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Striped Skunk	<i>Mephitis mephitis</i>
Gray Wolf	<i>Canis lupus</i>
North American River Otter	<i>Lontra canadensis</i>
Bobcat	<i>Lynx rufus</i>
Mink	<i>Neovison vison</i>
Mountain Lion	<i>Puma concolor</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
American Black Bear	<i>Ursus americanus</i>
White-tailed Deer	<i>Odocoileus virginianus</i>

### Landscape Feature

### Lenape Land Use

Quantity/  
Percent Coverage

Human habitat suitability

#### Topography

Minimum elevation (feet)

-2

Average elevation (feet)

4

Maximum elevation (feet)

15

Hilltops

Hillsides

Valleys

Distance to nearest Lenape en-  
campment

(meters): 1,869

Distance to nearest Lenape trail  
(meters): 587

#### Hunting

Selected species

#### Hydrology

Midreach stream (length in meter)

71

Diamondback Terrapin

American Black Duck

Spotted Turtle

Common Musk Turtle

Raccoon

#### Shore

Length of shoreline (meters)

173

#### Fishing

Selected species

#### Soils

Rocky marine bottom

Deerfield

Windsor

Ipswich

Pawcatuck

American eel

Hickory shad

Atlantic rainbow smelt

Alewife

White perch

Gathering

Selected species

#### Bedrock Geology

Manhattan schist

#### Gathering

gray dogwood

common hackberry

mapleleaf viburnum

American wintergreen

riverbank grape

#### Surface Geology

Made land

Stratified drift

Modern Block Area (square meters)

19,564

# 1609

..... Site Concept, Design, and Flash Development – Pond Media and Design: Phillip Pond.

– Site Architecture and Content (text, historical imagery, curriculum) – The Mannahatta Project staff at the Wildlife Conservation Society: Eric Sanderson, Kim Fisher, Markley Boyer, Amanda Huron and Danielle LaBruna.

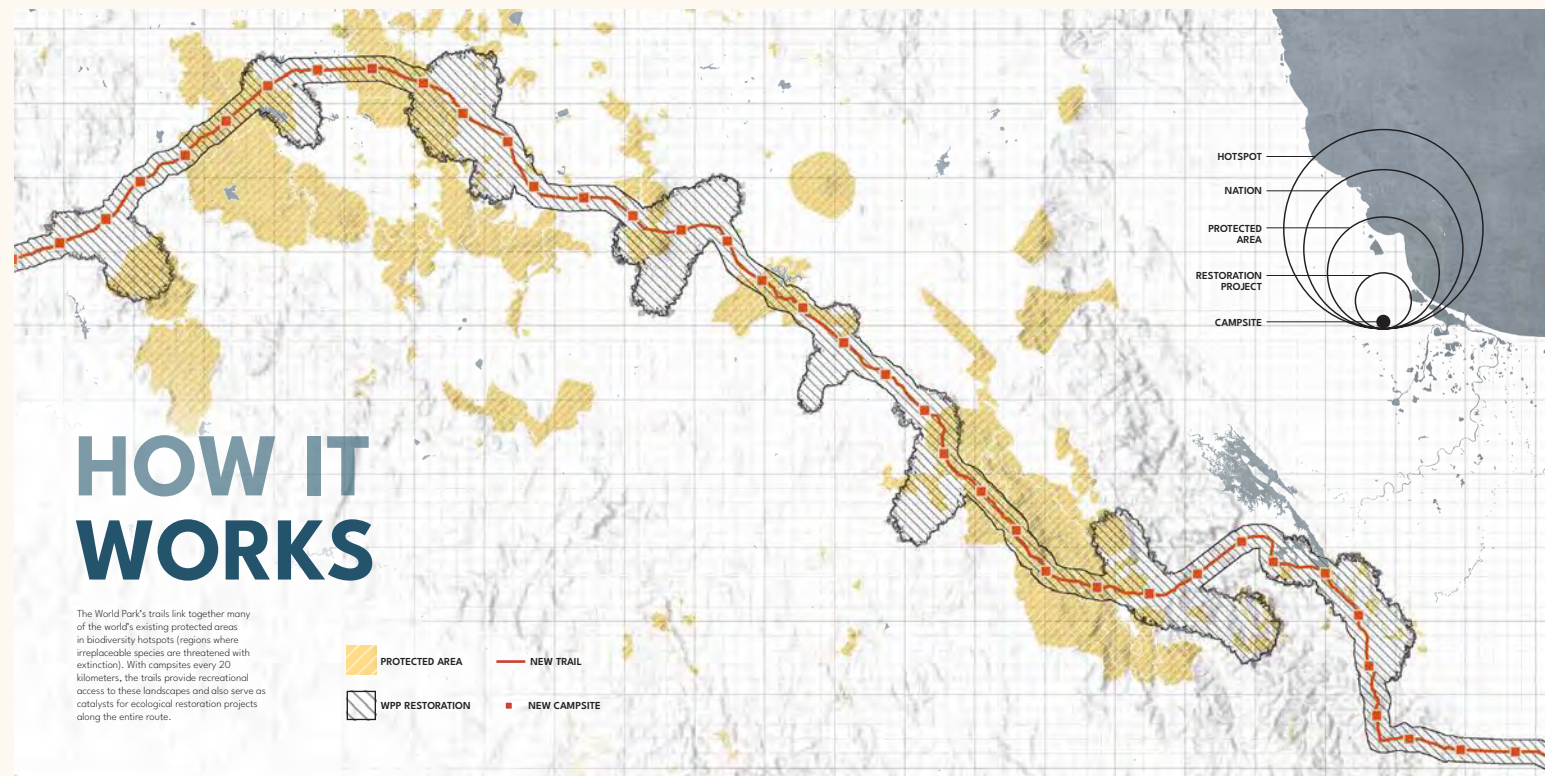
– Muir web interactive prepared by Kim Fisher and Meredith Adams based on pre-fuse, original code by Jeffrey Heer.



# CASE STUDY THE WORLD PARK

“In the 19th century, we had national parks.  
The 21st century needs a new model for a global culture: a world park.”

The World Park is a continuous landscape of restored habitat with three major walking trails reaching from Patagonia to Alaska, Namibia to Turkey, and Australia to Morocco. The World Park connects 19 biodiversity hotspots, 155 nations and secures 163,000 km<sup>2</sup> of habitat for all species to share.



## THE WORLD PARK REPORT CASE STUDY Richard Weller

“If cities keep growing as they do now, nearly 400 of them will sprawl into the habitats of endangered species by 2030.”



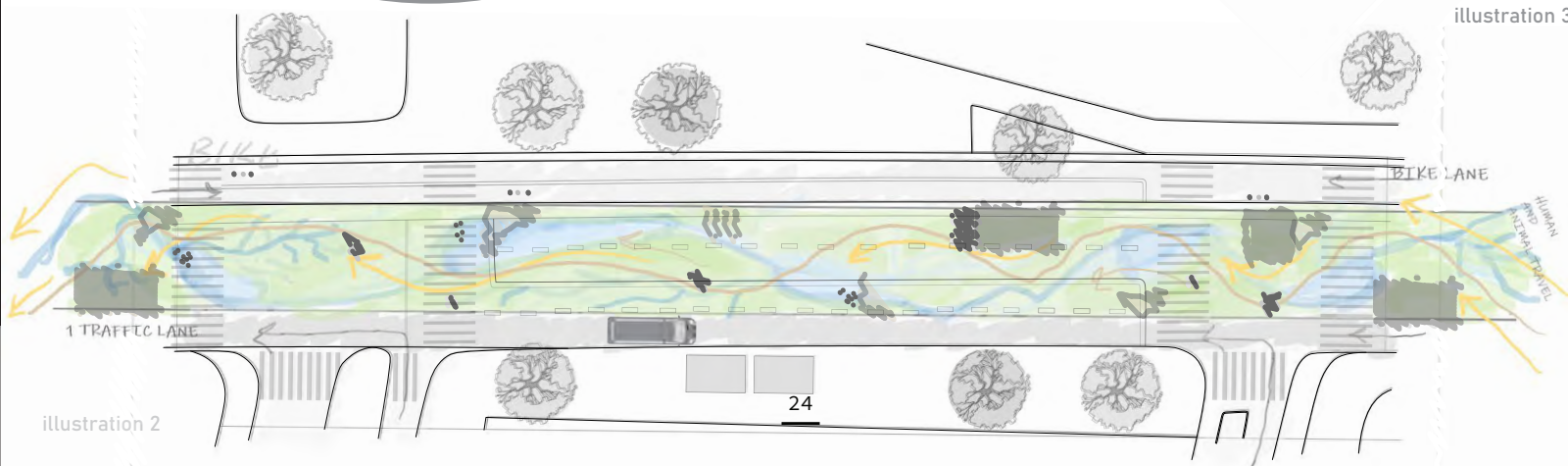
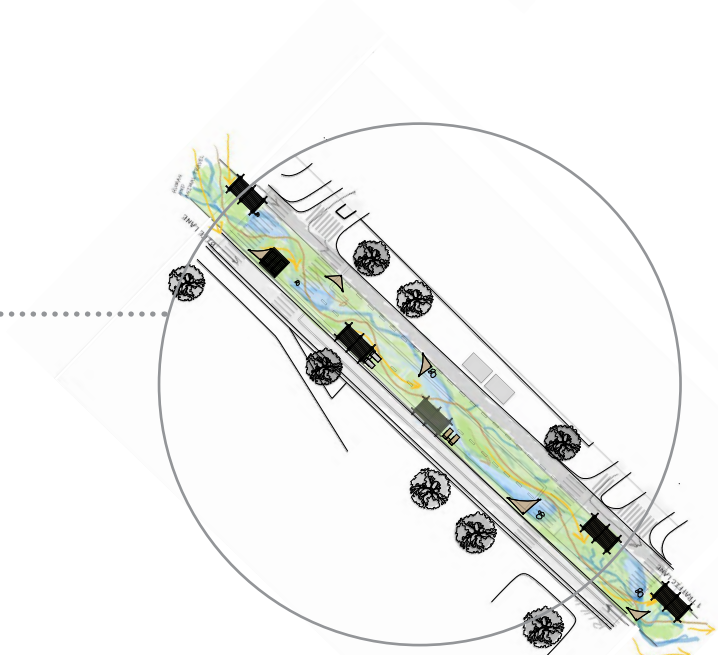
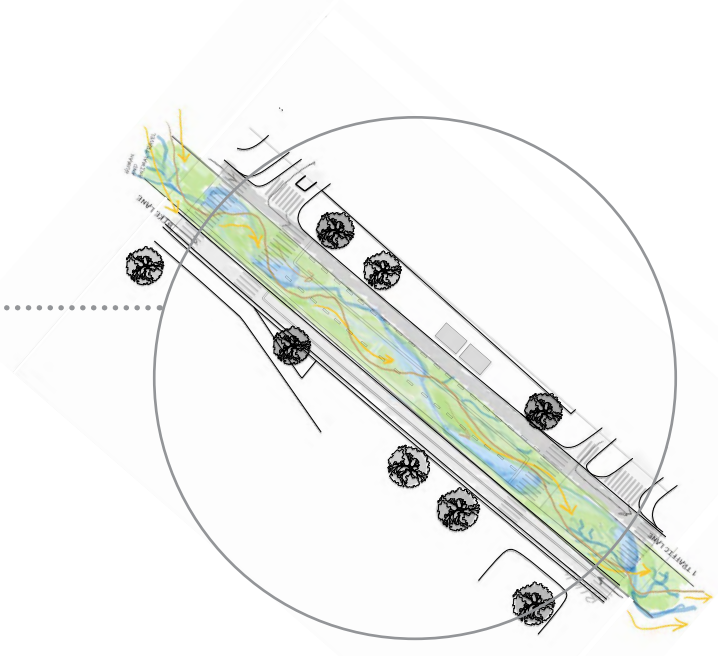


In order to figure out what streetscapes should be altered the habitat connector map and the habitat core maps have been overlaid. Where can specific streets be selected in order to provide optimal human and species travel?

1.6 miles of New York City's 6,000 miles of roads have already been repurposed as pedestrian only streets during either certain times of day or they have been permanently closed.

CAN THESE ALREADY PEDESTRIANIZED STREETS BE OVERLAYED WITH HABITAT CORE AND HABITAT CONNECTOR DATA TO DETERMINE IF THESE EXISTING REPURPOSED STREETS ALIGN AS NEW THROUGHWAY HABITAT CONNECTORS?

**CONNECTING HABITAT**



# URBAN SPRAWL

“The future health of ecosystems is arguably as dependent on urban sprawl as it is on human-caused climatic warming. Urban sprawl strongly impacts the urban ecosystems it creates and the natural and agro-ecosystems that it displaces and fragments.” (McKerrow).

# POPULATION

New York City alone contains more people than Wyoming, Montana, Idaho, both Dakotas, Nebraska, and New Mexico combined.

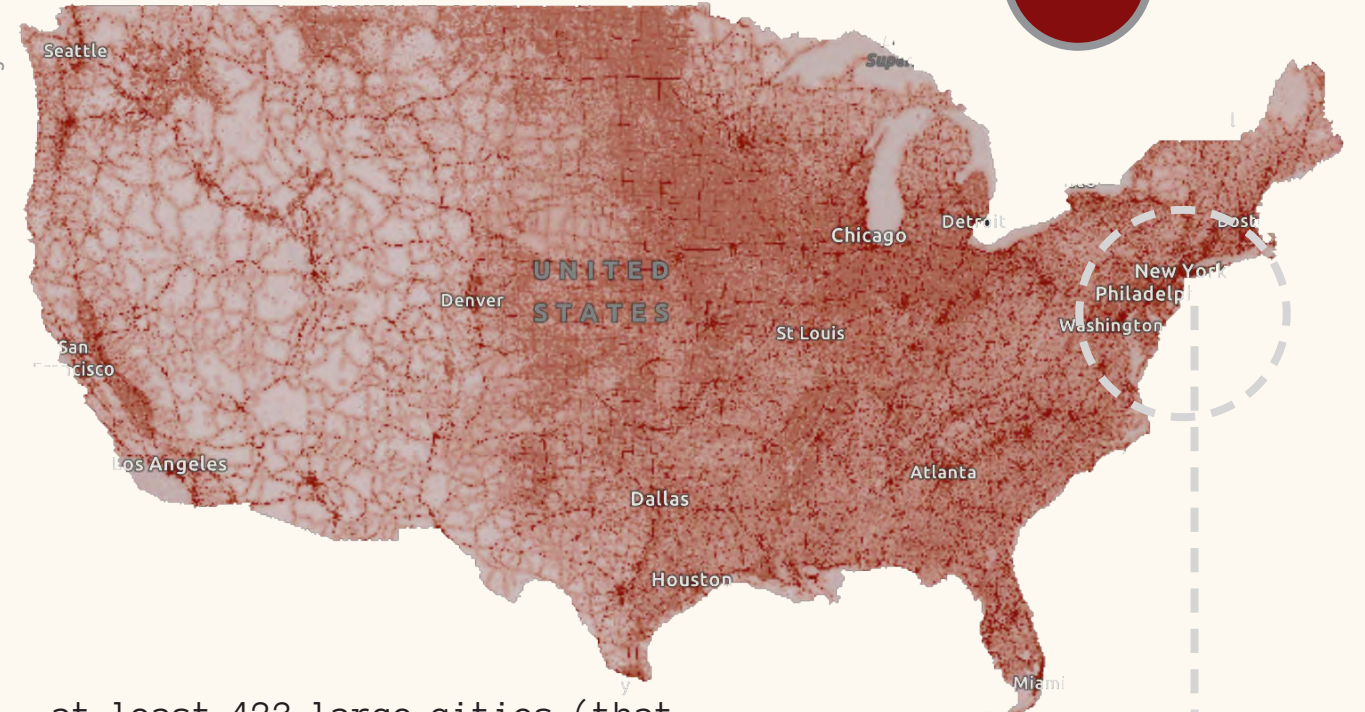
New York City’s population density is three times that of Los Angeles.

New York City is more populated than Mongolia, Greenland, and Norway combined.

“New York City is predicted to more than double in size by 2035, up to 20.8 million residents in the New York City urban area. New York has the highest population density of any American city, with over 10,194 people packed into every square kilometer. This is about 3,000 more people per square kilometre than San Francisco”

# HUMAN MODIFIED SURFACES

figure 2



“.. at least 423 large cities (that is, with more than 300,000 people) across the globe are nestled inside 36 biodiversity hotspots: regions that harbor a high diversity of animal and plant species found virtually nowhere else in the world. And considering the growth trajectory of these cities—as modeled by the Seto Lab at Yale University—a staggering 90 percent of them could end up destroying the natural habitats of endangered species over the next decade or so.”

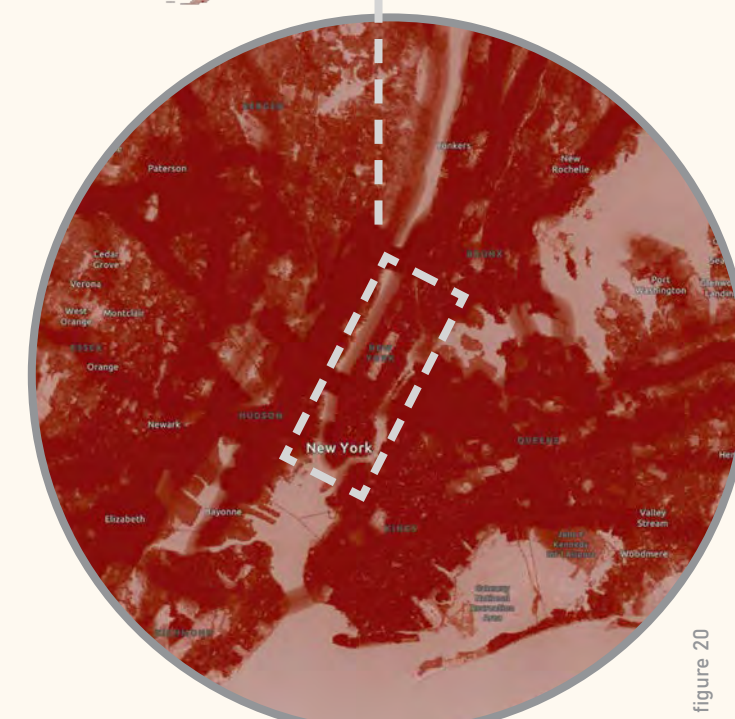


figure 20

# HOTSPOT CITIES CASE STUDY

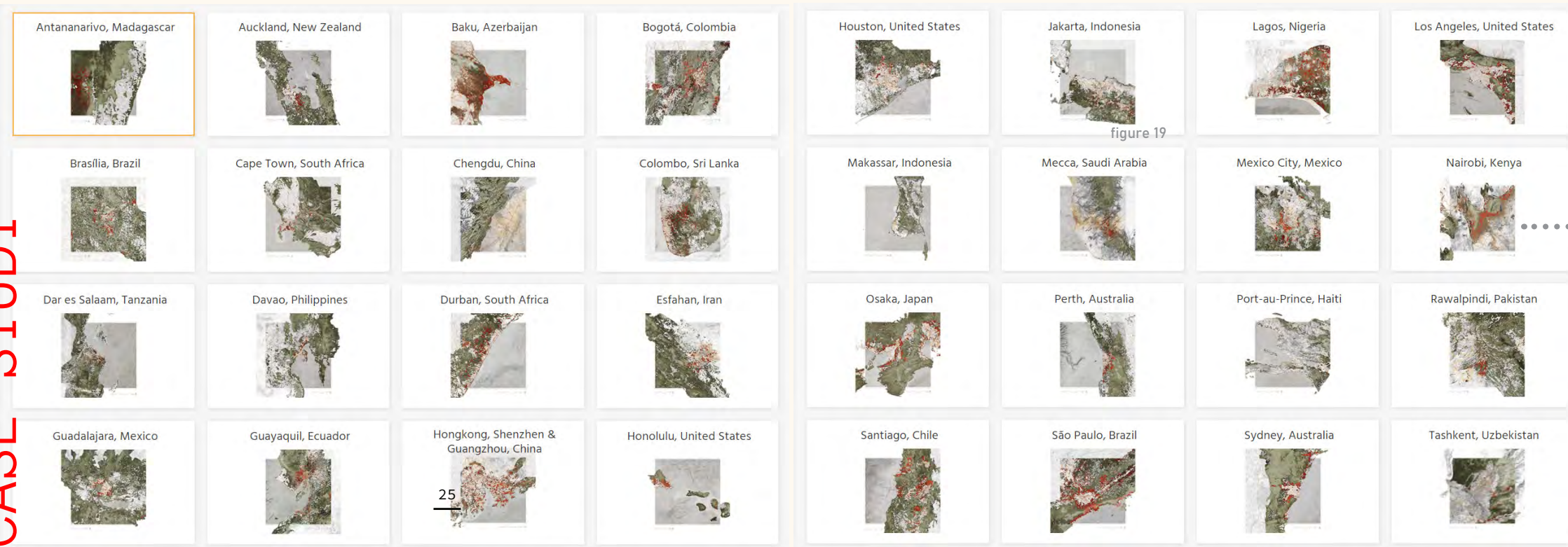


figure 19

## CASE STUDY: ATLAS for the END of the WORLD

1 The mapping and research pertaining to the Hotspot Cities has been conducted by Nanxi Dong, Zuzanna Drozd with assistance from Rong Cong and Joshua Ketchum.

2 Karen C. Seto, Burak Güneralp, & Lucy R. Hutyra, “Global Forecasts of Urban Expansion to 2030 and Direct Impacts on Biodiversity and Carbon Pools,” Proceedings of the National Academy of Science of the United States 109, no. 40 (2012): 16083-16088.

3 These are based on the IUCN’s data for Terrestrial Mammals, Amphibians, Birds, Reptiles and Freshwater Groups. See: The IUCN Red List of Threatened Species, <http://www.iucnredlist.org> (accessed June 1, 2016) and the Global Land Cover Facility, “MODIS Land Cover,” <http://glcf.umd.edu/data/1c/> (accessed August 4, 2017)

# AUDIENCE

City legislators:  
(success in other parts of the world in rewilding cities is rooted in a change in legislature)

## Urban Planners

Youth: Inheritors of the planet  
(it is important to encourage investment in landscape in the generation who will ultimately be required to deal with the damage our ancestors have done)

WHY DO WE NEED HABITAT AND A MEANS FOR INTERSPECIES TRAVEL DIRECTLY IN THE CITY?

MORE PEOPLE LIVE IN CITIES – HOW DO YOU GET PEOPLE TO CARE ABOUT SOMETHING THEY HAVE NEVER ACTUALLY SEEN WITH THEIR OWN EYES, SOMETHING THAT DOES NOT DIRECTLY AFFECT THEM.



SINGAPORE HABITAT CORES

figure 23



NYC HABITAT CORES

figure 24

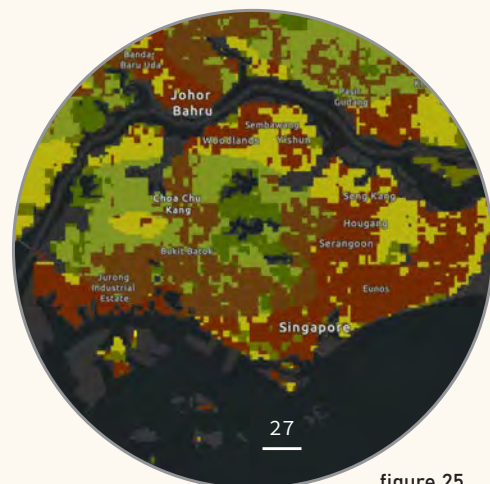


figure 25

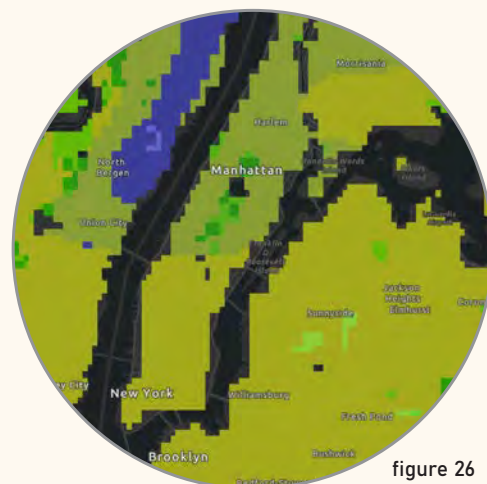


figure 26

MANHATTEN

POPULATION  
1.69 MILLION



SINGAPORE

POPULATION  
5.7 MILLION



Similar issues of density per square foot

## SINGAPORE 2030 GREEN PLAN

some key targets

### Greener Infrastructure and Buildings

2025 targets:

Reduce energy consumption of desalination process from current 3.5kWh/m<sup>3</sup> to 2kWh/m<sup>3</sup>  
Singapore's first integrated waste and used water treatment facility to be 100% energy self-sufficient (Tuas Nexus)  
2030 targets:

Green 80% of Singapore's buildings (by Gross Floor Area) by 2030

80% of new buildings (by Gross Floor Area) to be SLE buildings from 2030

Best-in-class green buildings to see an 80% improvement in energy efficiency (over 2005 levels) by 2030

Long-term target: Reduce desalination energy further to 1kWh/m<sup>3</sup>

Sustainable Towns and Districts

2030 target:

Reduce energy consumption in existing HDB towns by 15%

Cleaner-energy Vehicles

2025 targets:

New registrations of diesel cars and taxis to cease from 2025

7 EV-Ready Towns with chargers at all HDB carparks by 2025

2030 targets:

All new car and taxi registrations to be of cleaner-energy models from 2030

Target 60,000 charging points nationwide by 2030, including 40,000 in public carparks and 20,000 in private premises

# SINGAPORE CHANNELING THE GARDEN CITY

## PARKS

2026 target:

Develop over 130 ha of new parks, and enhance around 170 ha of existing parks with more lush vegetation and natural landscapes.

2030 targets:

Double our annual tree planting rate between 2020 and 2030, to plant 1 million more trees across Singapore

Increase nature parks' land area by over 50% from 2020 baseline

Every household will be within a 10-minute walk from a park

2035 target:

Add 1000 ha of green spaces

## Green Commutes

2030 targets:

Achieve 75% mass public transport (i.e. rail and bus) peak-period modal share

Expand rail network from around 230km today to 360km by early 2030s

Triple cycling paths to 1,320km from 460km in 2020

Strengthen Green Efforts in Schools  
2030 targets:

Achieve a two-thirds reduction of net carbon emissions from the schools sector

At least 20% of schools to be carbon neutral

# A CITY WITHOUT CARS

## NEW YORK CITIES OPEN STREETS PROGRAM

New York City's Open Streets program transforms streets into public space open to all. These transformations allow for a range of activities that promote economic development, support schools, and provide new ways for New Yorkers to enjoy cultural programming and build community.

"The program was created last year in response to the COVID-19 pandemic as a way to provide more open space for New Yorkers to go outside during the pandemic. Streets would be restricted for a few hours a week or during weekend days and would be managed by various community organizations or the NYPD. The program provided public space around the city, during a time when many businesses were closed and access to playgrounds was restricted to prevent the spread of COVID-19. Due to the popularity of the program, many community advocates have been calling to make the program permanent. For CityLand's prior coverage of the Open Streets program, [click here.](#)"



parking

2450 acres of pavement dedicated to motor vehicles and another 970 acres designated for offstreet parking lots and garages



almost 5 central parks worth of parking

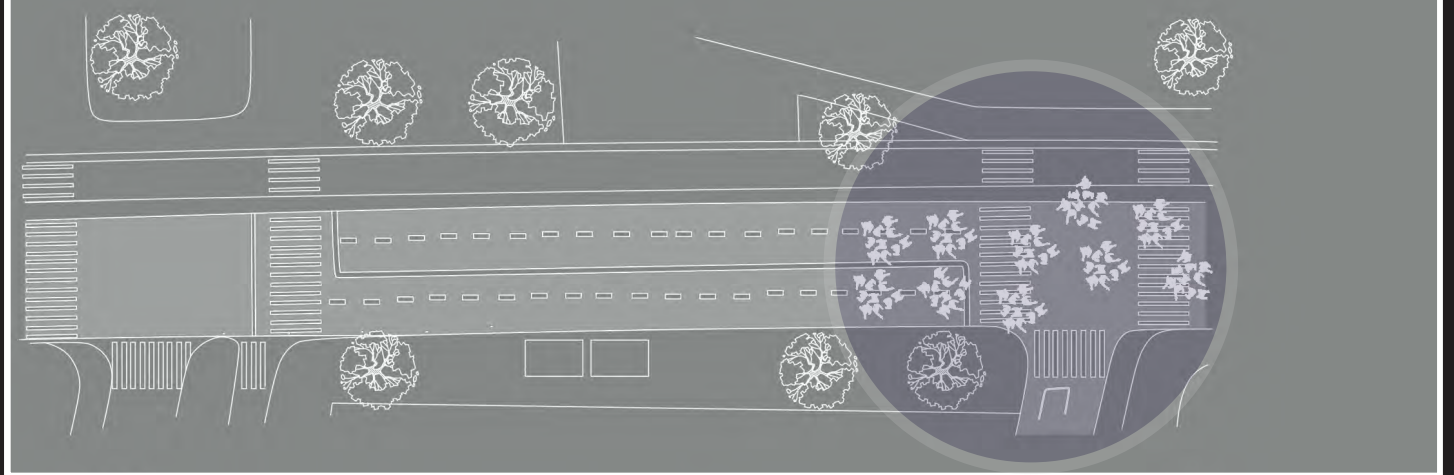
parking

combined it covers lower Manhattan up to 23rd street

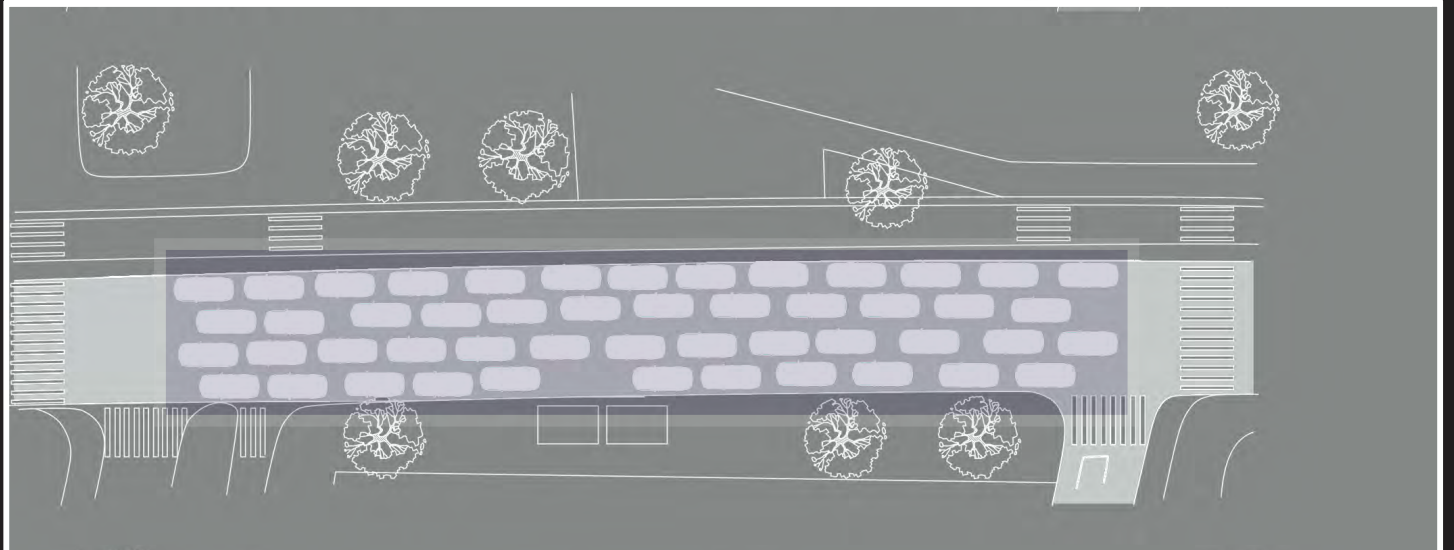
Close to 4X the size of central park

29 illustration 4

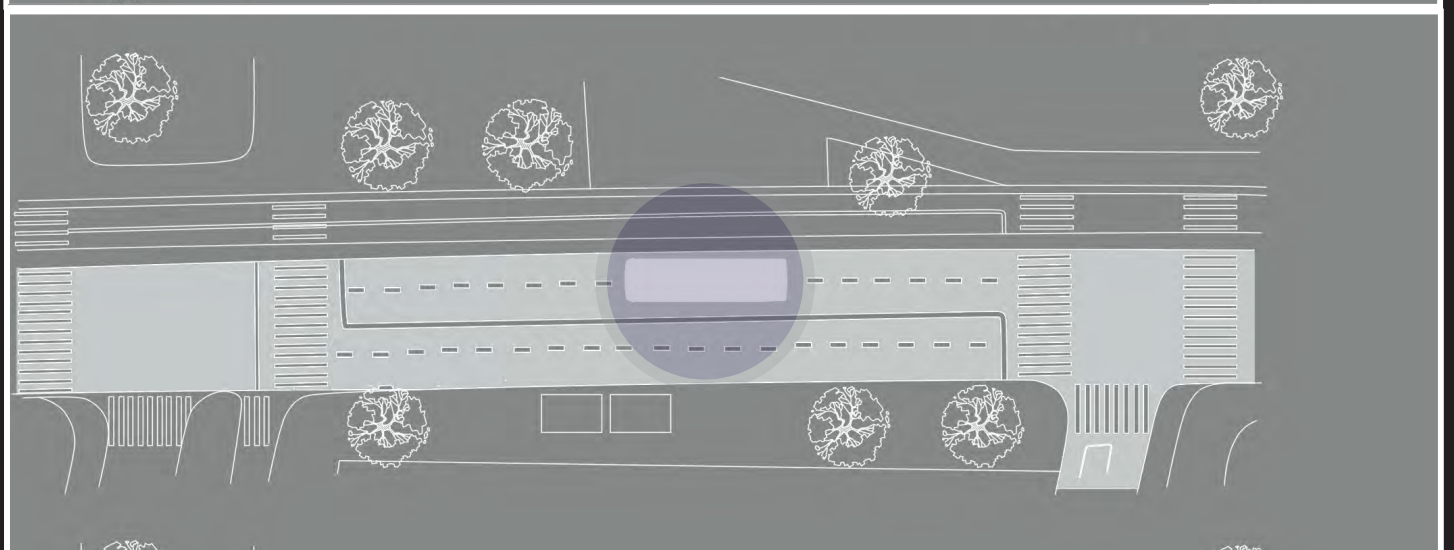
50 PEOPLE



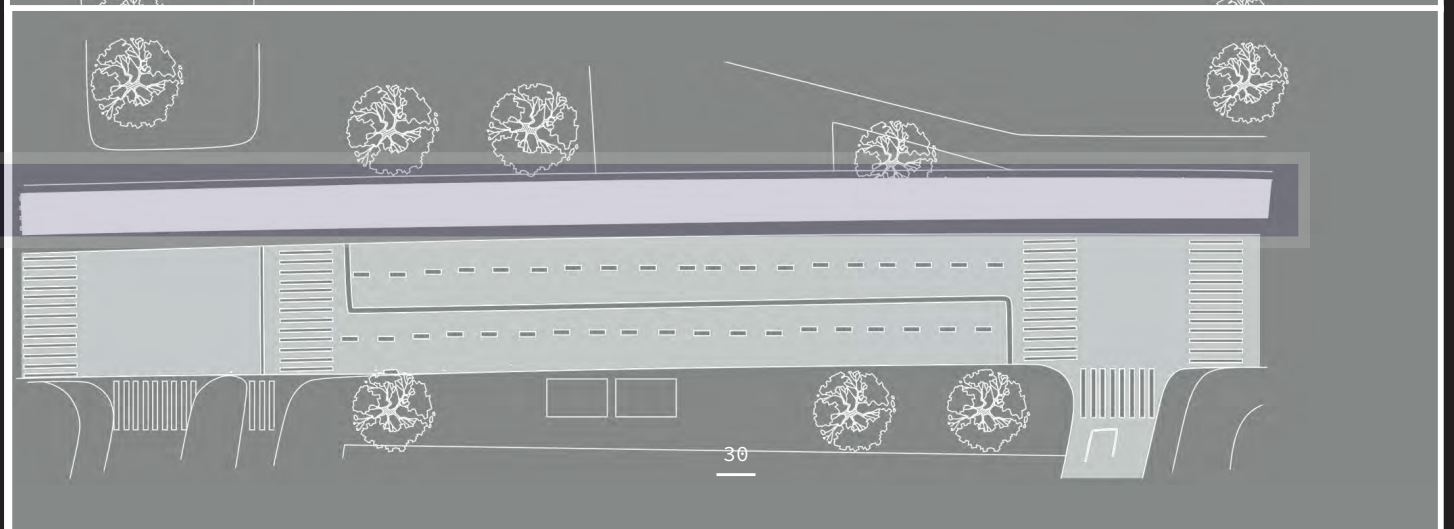
50 CARS



50 PEOPLE IN 1 BUS

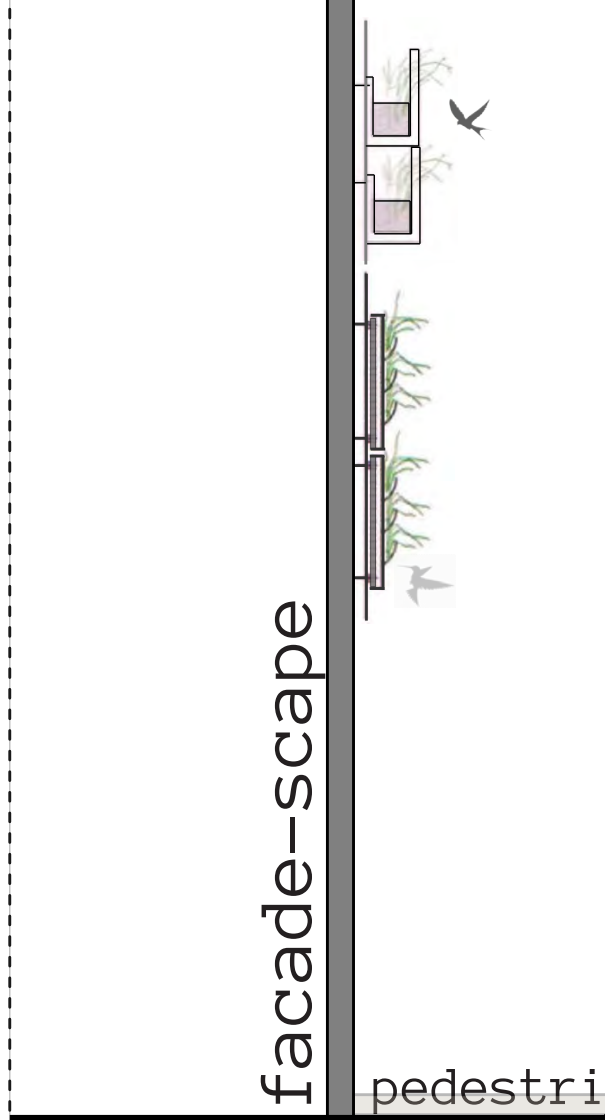
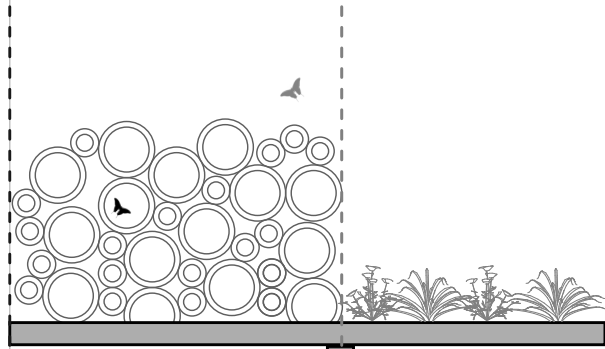


50 BICYCLES



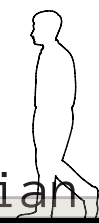
HOW CARS / PEOPLE / BIKES USE THE STREETSCAPE

roof scape



facade-scape

pedestrian

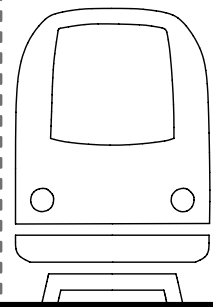


bike lanes



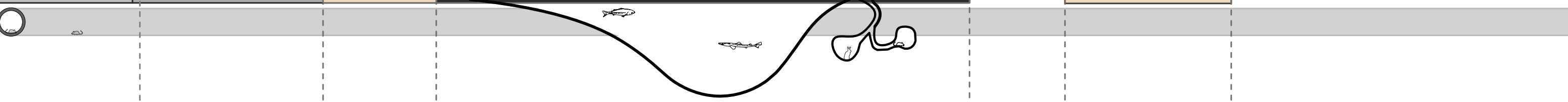
habitat

barrier



public transportation

underground scape

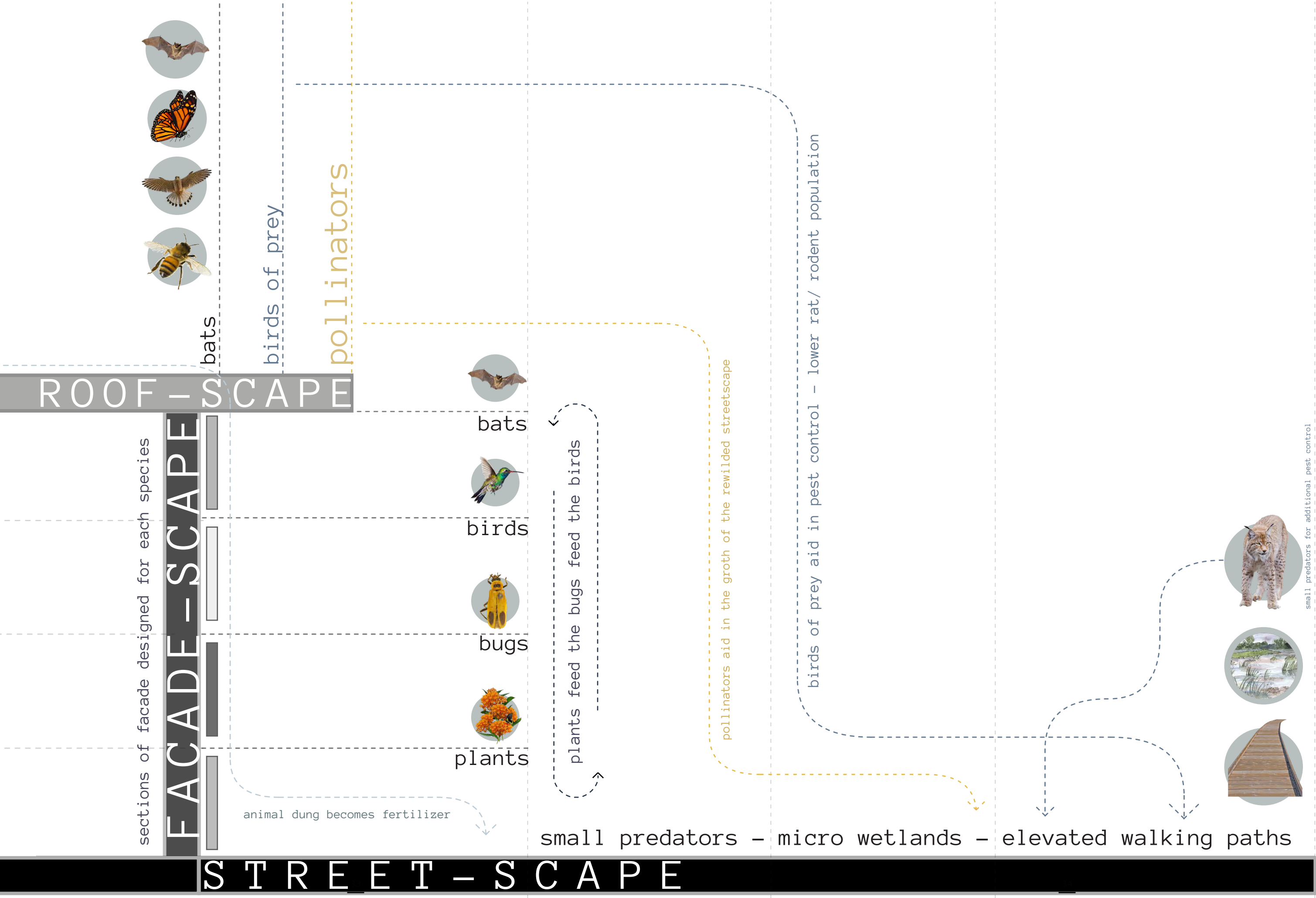


street scape

INITIAL DESIGN SKETCH

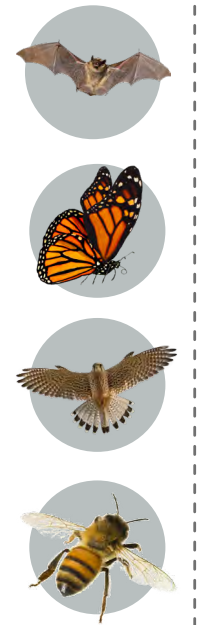


# DESIGN SCOPE



sections of facade designed for each species

## FACADE - SCAPE



bats

birds of prey

pollinators



bats



birds



bugs



plants

animal dung becomes fertilizer



plants feed the bugs feed the birds

pollinators aid in the growth of the rewilded streetscape

birds of prey aid in pest control - lower rat/ rodent population

small predators - micro wetlands - elevated walking paths



small predators for additional pest control

# FOCUS SPECIES

WHAT SPECIES PROVIDE BENEFICIAL ECOSYSTEM SERVICES?

— POLLINATORS AND PEST PREDATORS

— CAN WE BEGIN WITH THE INTRODUCTION AND UTILIZATION OF THESE SPECIES AND THEN SLOWLY REINTRODUCE SPECIES THE GENERAL PUBLIC WOULD BE LESS LIKELY TO IMMEDIATELY WARM TO.

## WHY WE NEED POLLINATORS?

Worldwide, pollinators are necessary for the reproduction of over **85%** of the earth's flowering plants, including more than **2/3** of the world's food crop species.

Pollinators are also **keystone** species, meaning a species on which other species in an ecosystem largely depend. Fruits and seeds derived from insect pollination are a major part of the diet of approximately **25%** of all birds and of many mammals worldwide.

Although birds, bats, and some reptiles can provide pollination services, the vast majority of plants are pollinated by insects. And, while bees are the most important pollinators from this group, flies, wasps, beetles, moths, and butterflies are also important for the pollination of many species of plants.

## CHALLENGES FACED BY NYC POLLINATORS

Unfortunately, in many places, the essential service of pollination is at risk from habitat loss and the loss of native host plants, pesticide use, and introduced insect species and diseases.

## POLLINATORS



ruby-throated hummingbird  
(Archilochus colubris)



big brown bats  
tri-colored bats



Canadian Tiger Swallowtail  
Aphrodite Fritillary  
American Lady  
Pipevine Swallowtail  
Monarch  
Mourning Cloak  
White M Hairstreak  
Tawny Emperor  
Falcate Orangetip  
Common Wood Nymph  
Common Buckeye



Goldenrod Soldier Beetle



Brown Belted Bumble Bee  
Ligated Furrow Bees aka Mining or Sweat Bees  
Leaf Cutter Bees

## PEST PREDATORS



bald eagle



great horned owl



red-tailed Hawk



American Robin



red fox

# ROOF LIFE CYCLE ANALYSIS

waste collection

# ROOF-SCAPE

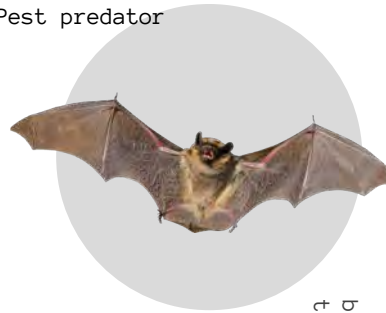


bats

birds of prey

pollinators

Pollinator/  
Pest predator



big brown bats  
tri-colored bats

Pollinator



- Canadian Tiger Swallowtail
- Aphrodite Fritillary
- American Lady
- Pipevine Swallowtail
- Monarch
- Mourning Cloak
- White M Hairstreak
- Tawny Emperor
- Falcate Orange-tip
- Common Wood Nymph
- Common Buckeye

Pest predator



- red-tailed Hawk
- bald eagle
- great horned owl
- American Robin

Pollinator



- Brown Belted Bumble Bee
- Ligated Furrow Bees
- aka Mining or Sweat Bees

## DESIGN NEEDS

### HABITAT NEEDS

Nocturnal  
Winter hibernation - insulated  
Roost in slat like cavities  
Maternity colonies

### DIET

Herbivore and insectivore

### ECOLOGICAL NICHE

Big brown bats play a very important role in their ecosystem. They are significant predators of agricultural pests which makes them quite beneficial to farmers. A 1995 study found that, per year, a colony of 150 Big brown bats in IndianWa or Illinois consumes 600,000 cucumber beetles, 194,000 scarab beetles, 158,000 leafhoppers, and 335,000 shield bugs - all of which cause serious agricultural damage

- animalia



### HABITAT NEEDS

warm summer breeding grounds in north America  
milkweed plants

### DIET

Herbivore

### ECOLOGICAL NICHE

Western monarchs have declined by more than 99 percent since the 1980s. Eastern monarchs have declined by an estimated 80 percent.

The disappearance of milkweed is a major reason for their population decline. Milkweed, which is the only place monarchs will lay their eggs and the only food caterpillars will eat, used to grow in and around agricultural crops. The systematic removal of milkweed from fields in recent years, as well as increased use of herbicides and mowing alongside roads and ditches, has significantly reduced the amount of milkweed available. They are also very sensitive to temperature changes which makes climate change a pressing issue for monarchs.

- animalia



### HABITAT NEEDS

nest in high elevation  
must have high spacious perches for large nests

### DIET

opportunistic generalists, but in North America, they are most often predators of small mammals such as rodents

### ECOLOGICAL NICHE

Redtailed Hawks are no longer on the endangered list, but they are still protected by the Migratory Bird Act. They've made quite a comeback over the past few years and you can see them sitting on top of telephone poles, billboards, fence posts, and in trees while driving in rural areas. In fact, there are quite a large number of urban hawks now, which is good for bird lovers, but sad because it comes from us developing their natural habitat.



### HABITAT NEEDS

warm housing  
small tubular crevices  
south facing/ unshaded  
attracted to blue flowers

### DIET

Cirsium (Thistle)  
Asclepias (Milkweed)  
Helianthus (Sunflowers)

### ECOLOGICAL NICHE

Bumble bee populations are doing poorly worldwide, with declines reported in North and South America, Asia, and Europe. A combination of climate change, pesticides, monoculture planting, habitat loss and fragmentation, competition, and disease transmission are responsible.

- animalia

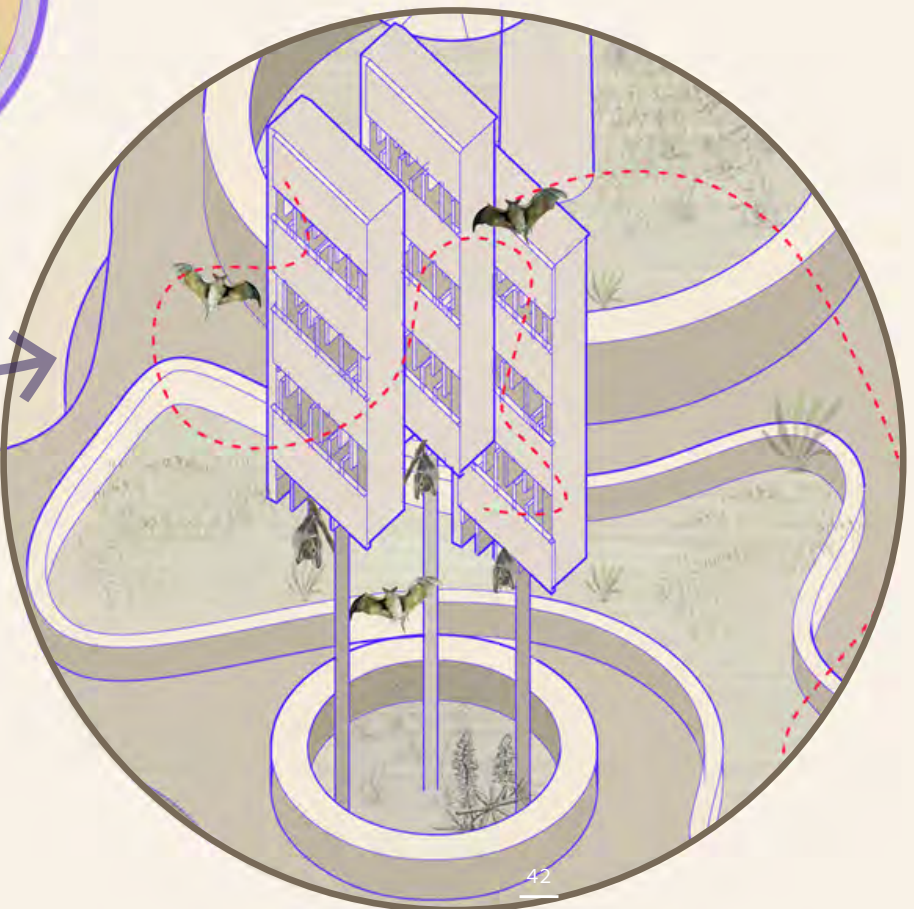
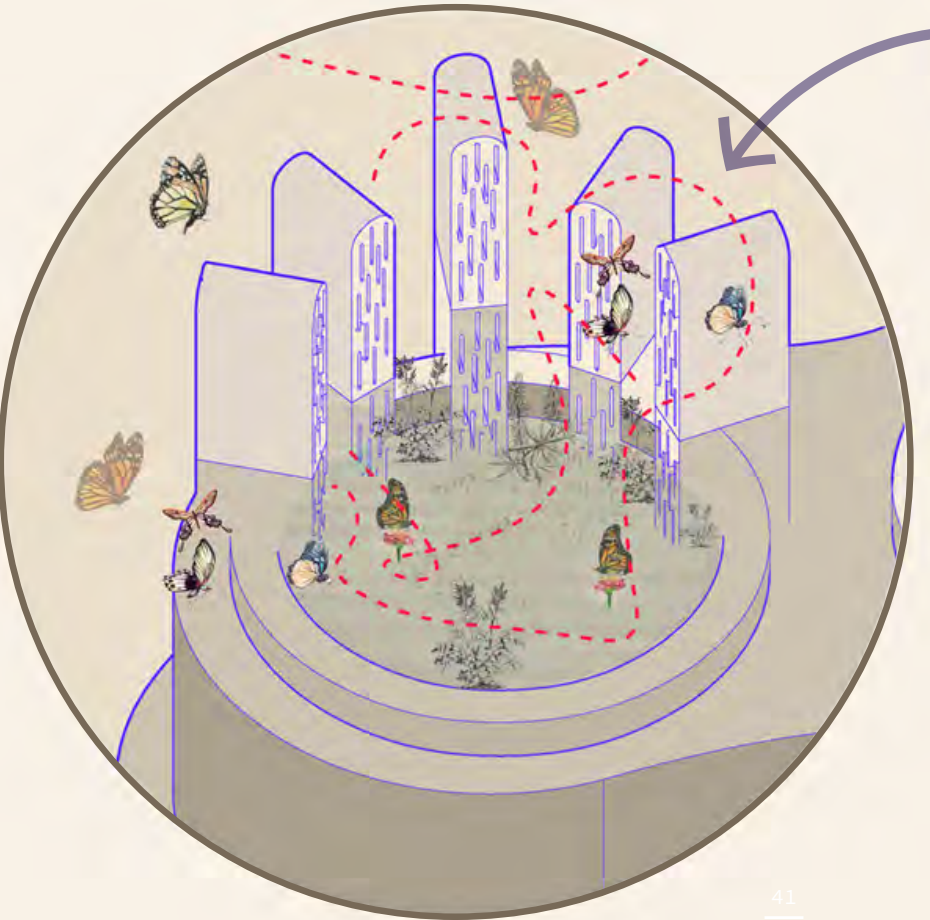
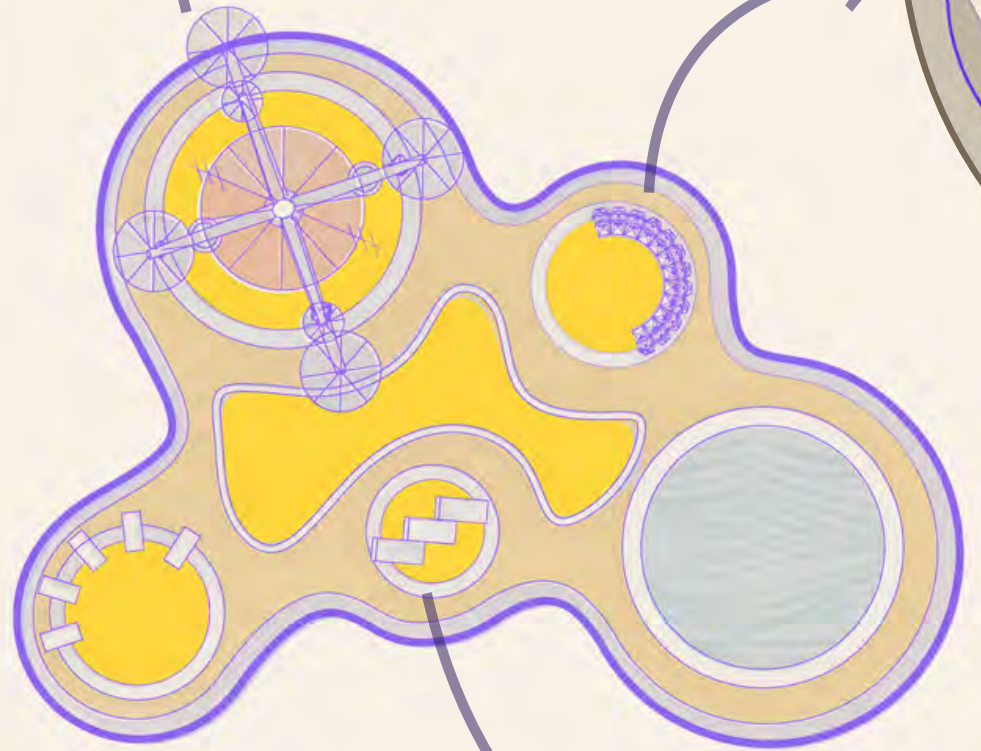
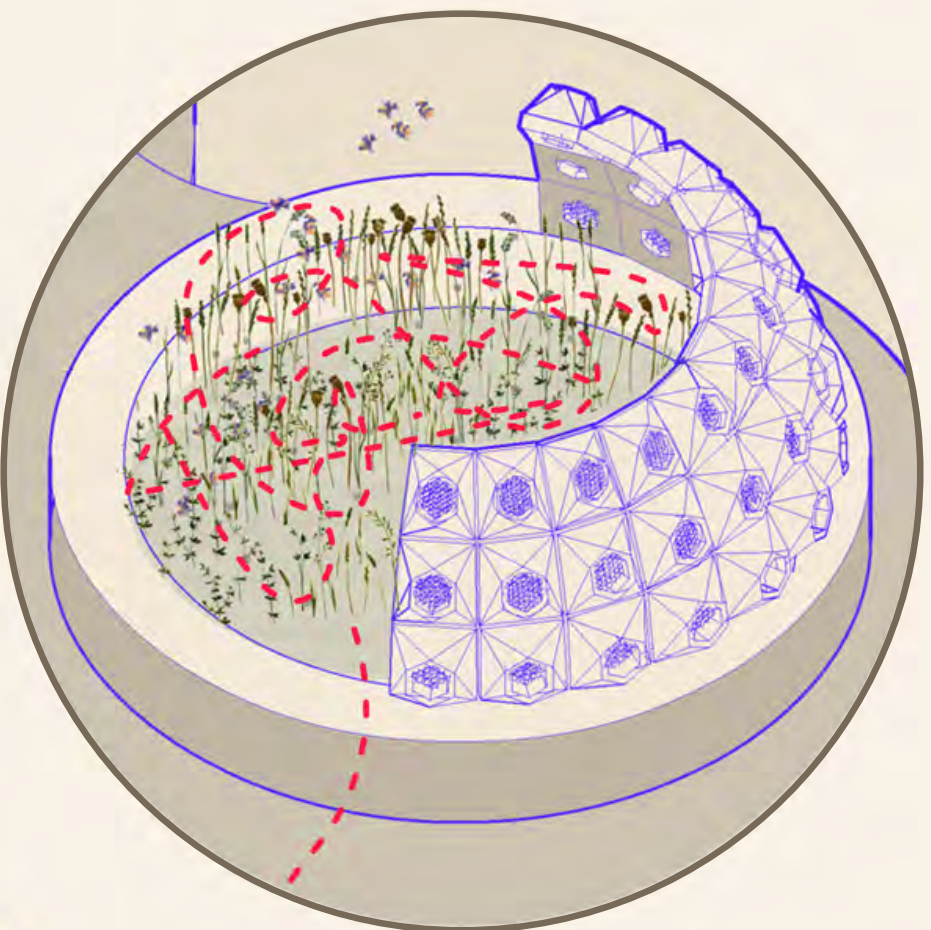
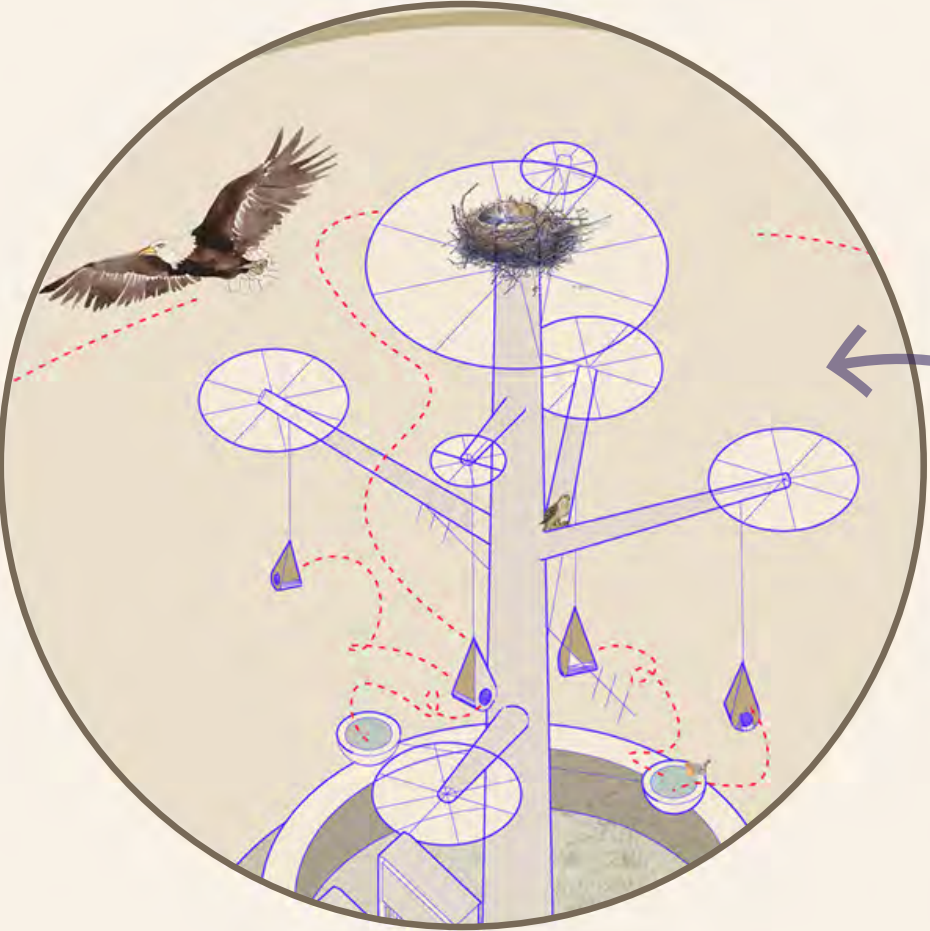


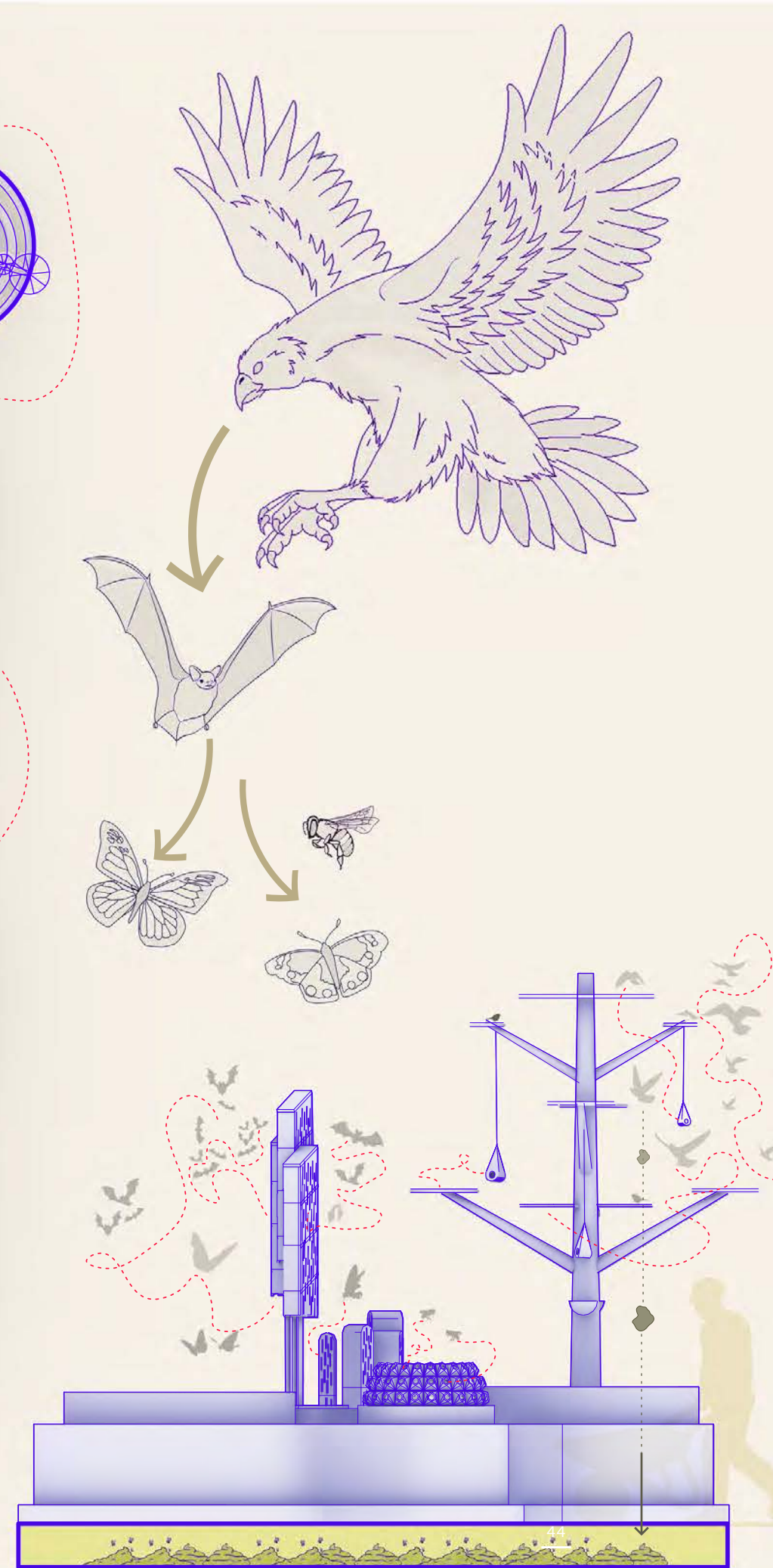


Components to be placed on roof tops

Each component consists of a series of habitats for specific species that operate together in a closed loop life cycle

each specific habitat is designed per the needs of the species as well as their size





The units can be placed in order to foster interspecies travel from habitat unit to unit

How do humans occupy the space?



sited on lower  
fourteenth  
street

-  
this area had  
been select-  
ed as a part of  
the nyc open  
streets program

# I FACADE

sections of facade designed for each species

# FACADE - SCAPPE



bats



birds



bugs



plants

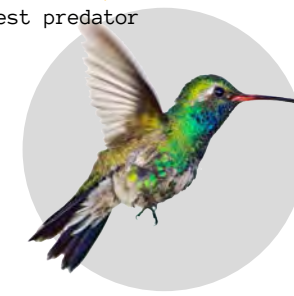
animal dung becomes fertilizer

Pollinator/  
Pest predator



big brown bats  
tri-colored bats

Pollinator/  
Pest predator



Ruby-throated Hummingbird  
Rufous Hummingbird

Pollinator



Goldenrod Soldier Beetle

Feed plants



Milkweed  
nectar producing plants  
including yellow composites  
Queen Anne's lace milkweed  
rattlesnake master late-summer

## DESIGN NEEDS

### HABITAT NEEDS

Nocturnal  
Winter hibernation - insulated  
Roost in slat like cavities  
Maternity colonies

### DIET

Herbivore and insectivore

### ECOLOGICAL NICHE

Big brown bats play a very important role in their ecosystem. They are significant predators of agricultural pests which makes them quite beneficial to farmers. A 1995 study found that, per year, a colony of 150 Big brown bats in Indiana or Illinois consumes 600,000 cucumber beetles, 194,000 scarab beetles, 158,000 leaf hoppers, and 335,000 shield bugs - all of which cause serious agricultural damage

- animalia



### HABITAT NEEDS

warm summer breeding grounds in north America  
attracted to red flowers

### DIET

Herbivore

### ECOLOGICAL NICHE

Hummingbirds feed frequently to support their high-energy nutritional needs. Plant flowers that attract hummingbirds with abundant nectar and specialized blooms for these birds to feed, and minimize the use of insecticides so there are plenty of small insects available. Adding colorful hummingbird feeders also gives the birds a rich, reliable source of supplemental food.



### HABITAT NEEDS

nest in high elevation  
must have high spacious perches for large nests

### DIET

The flowers, besides providing nectar, are also a meeting place for finding mates. They do no long-term damage to the plants and do not bite or sting.

### ECOLOGICAL NICHE

Beetles were among the first insects to evolve to visit flowers. They are especially important pollinators for ancient species such as magnolias and spicebush. Beetles will chew through petals and other floral parts to get to the nectar within. They often defecate within flowers, earning them the nickname "mess and soil" pollinators. While pollination by beetle is less common in New York City than by other insects, beetles do pollinate native magnolias, pond lilies, goldenrod, and spirea.



### NECTAR - hummingbirds

lupine  
California fuchsia  
mimulus  
monkey flower  
monard featuring pink, red or purple flowers  
cardinal climber, Ipomoea sloteri

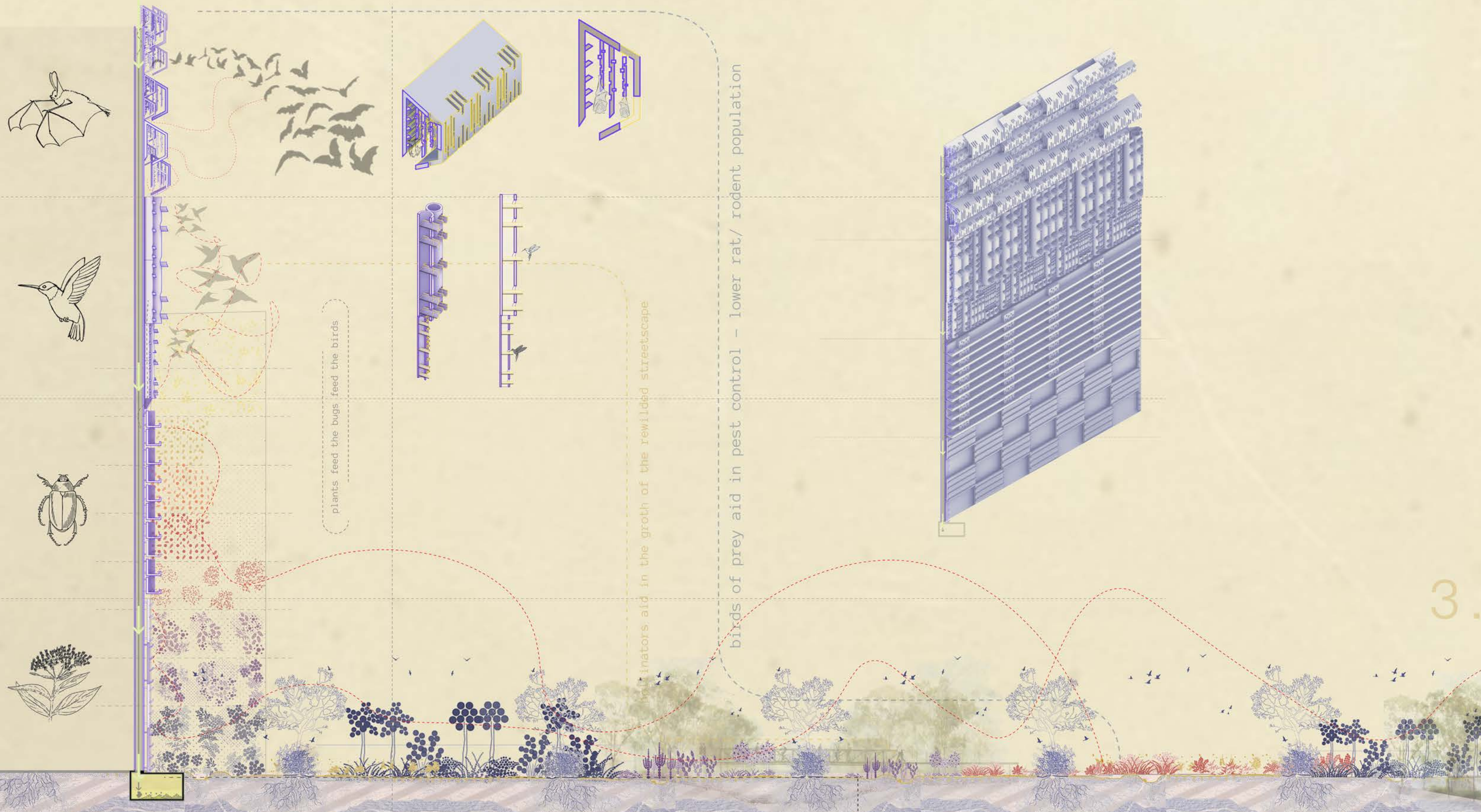
### NECTAR - bees

salvia  
Russian sage  
catnip  
wisteria  
sea holly  
eryngium  
penstemon  
California fuchsia  
verbena and lamb's ear  
stachys  
rosemary  
basil  
calamint  
lavender  
Vitex agnus-castu  
chaste tree

# STREET - SCAPPE

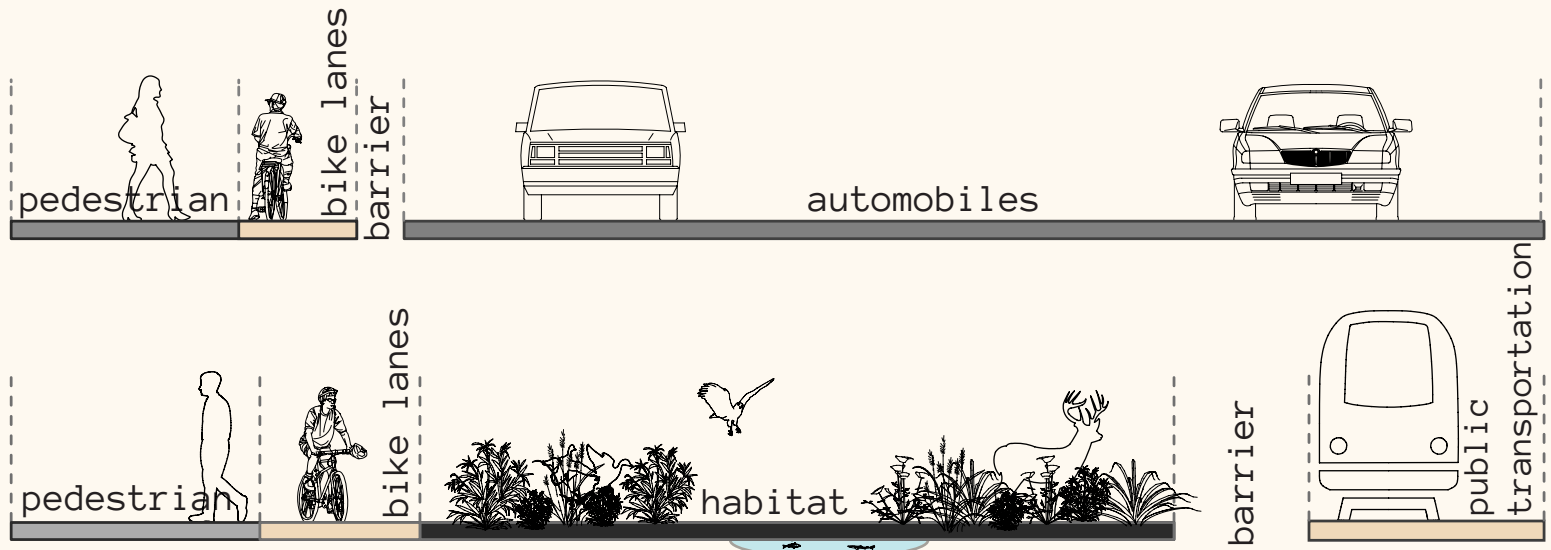


# 2. facade



3.

# CURRENT



# PROPOSED

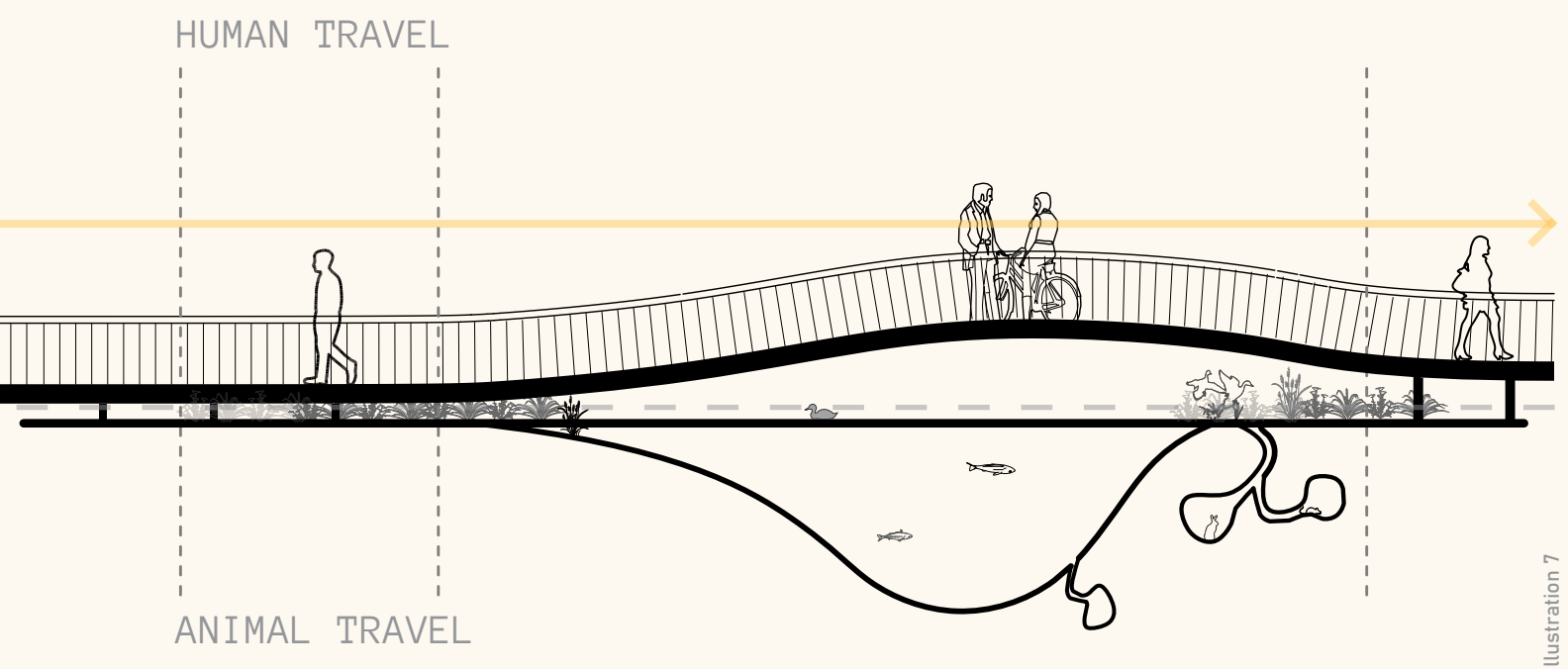
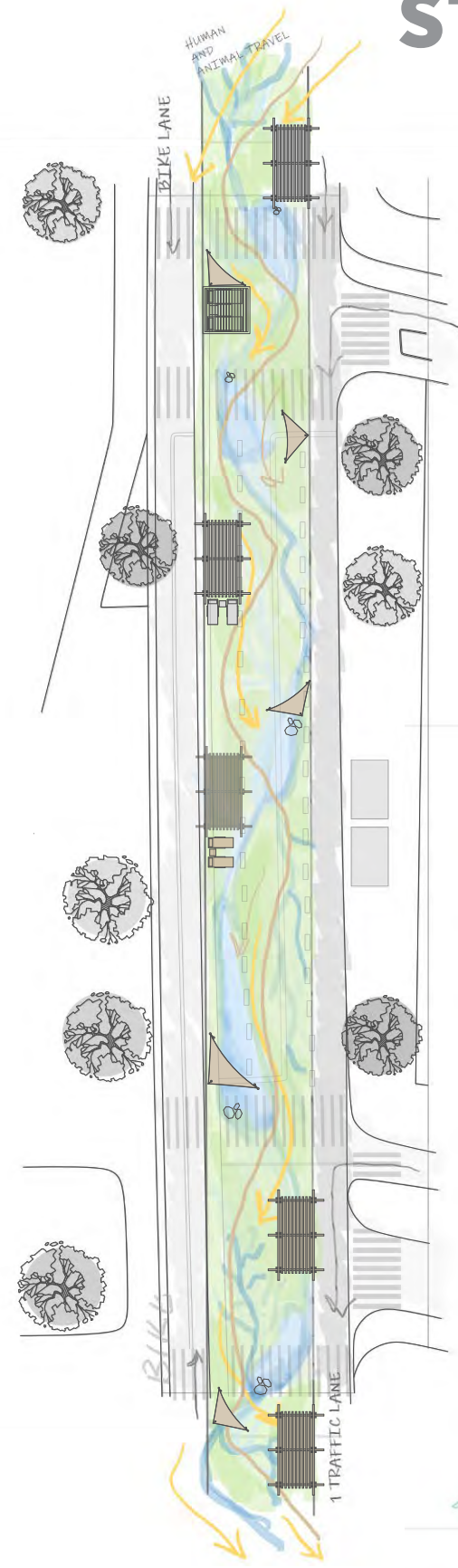
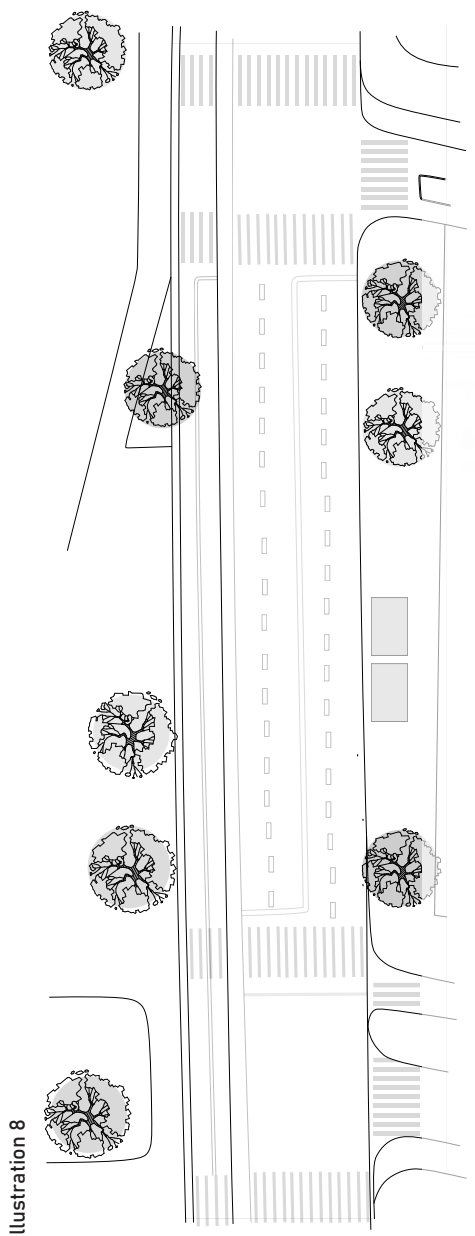


illustration 6

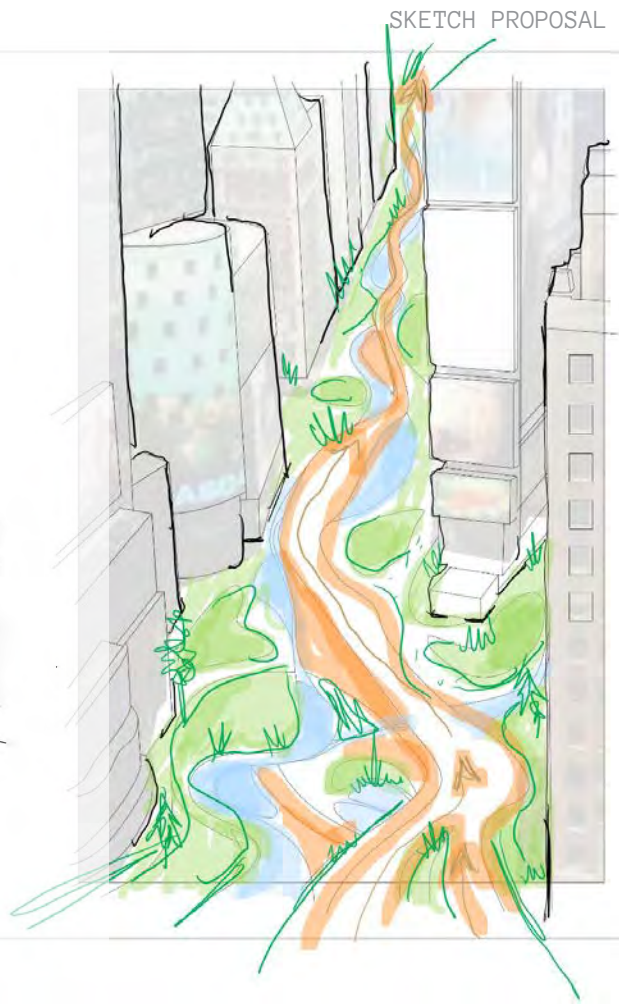
illustration 7

# NORMAL STREETSCAPE



# REWILDED STREETSCAPE

# INITIAL SKETCHES

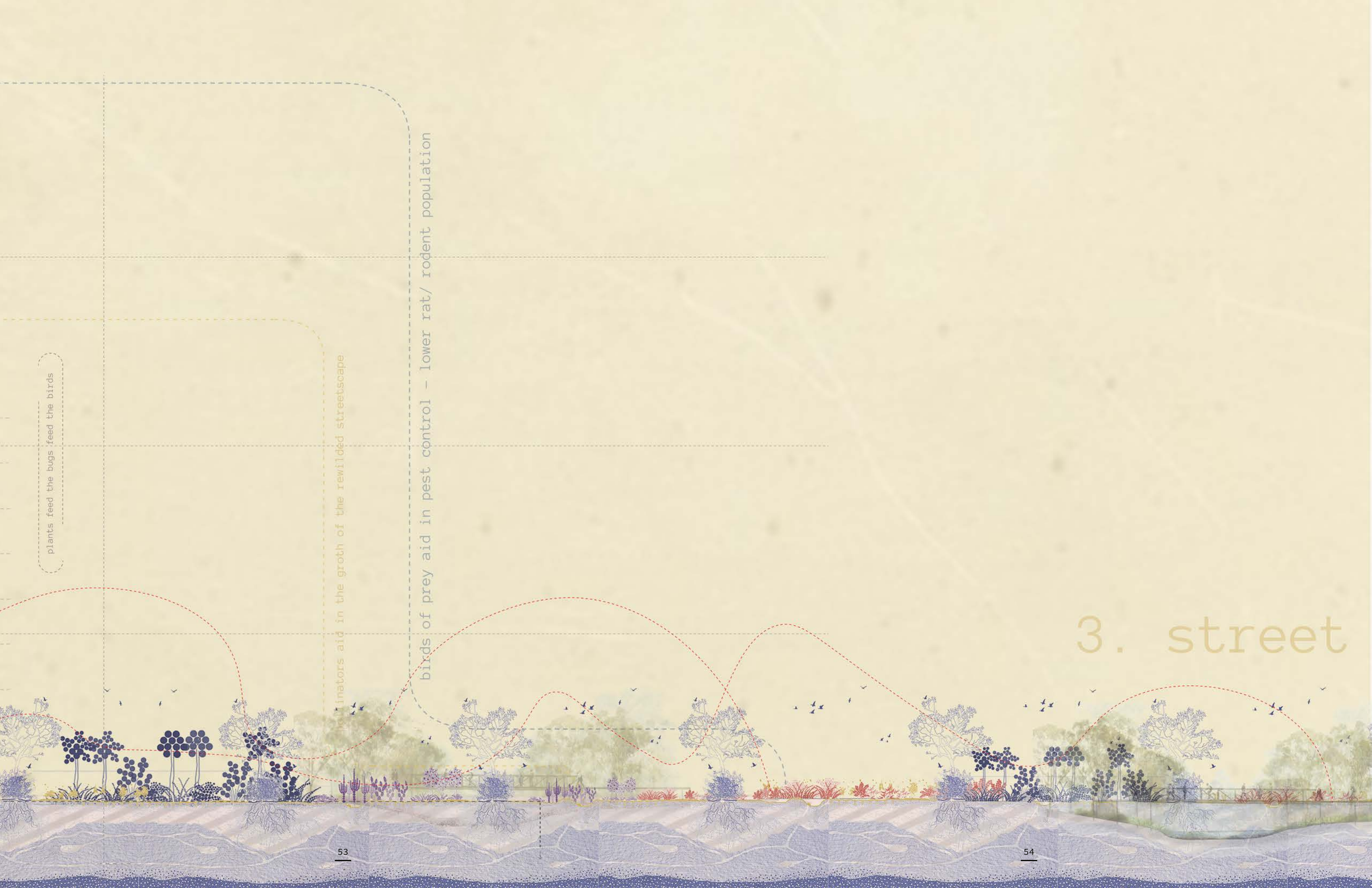


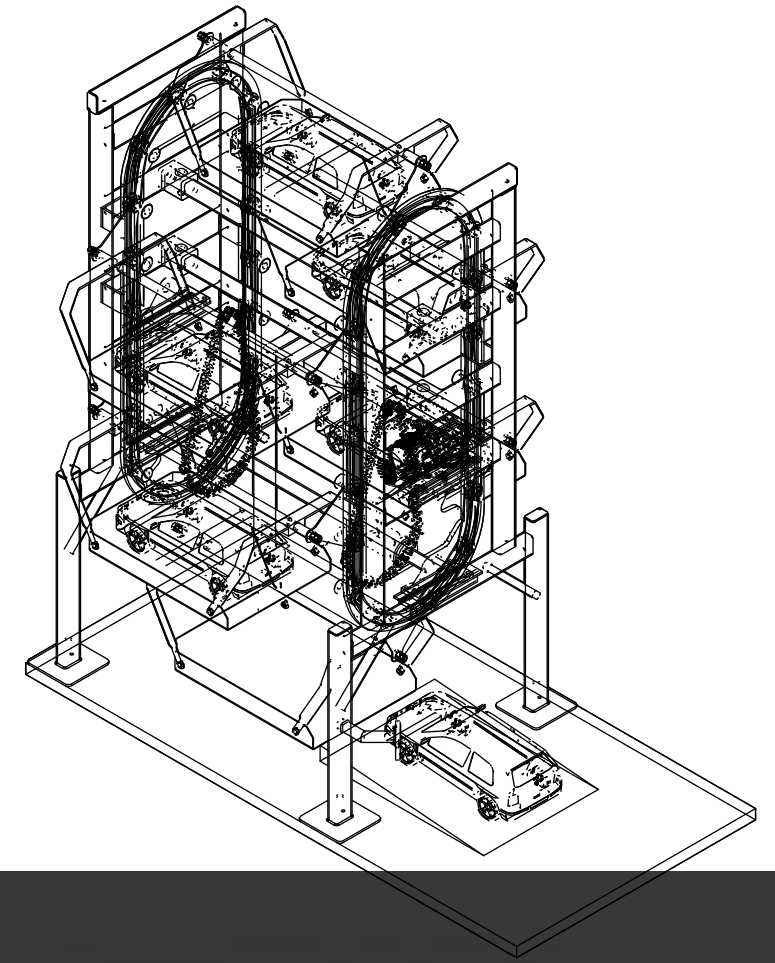
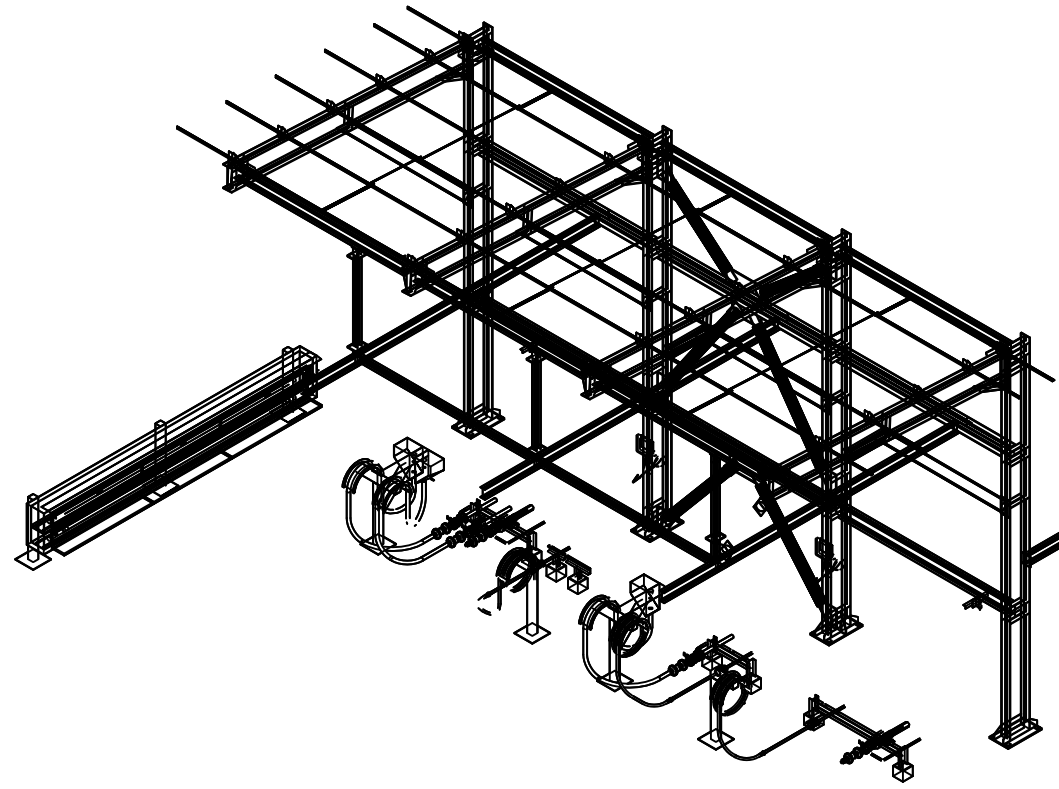
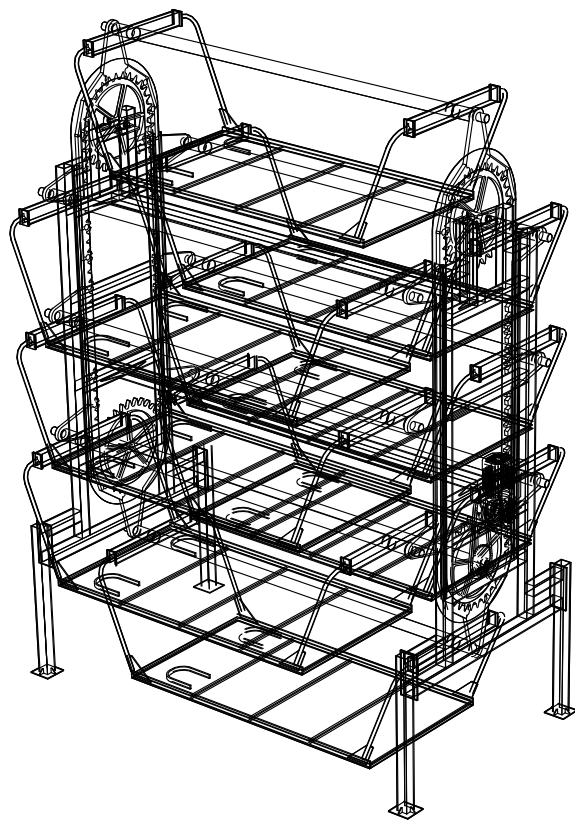
plants feed the bugs feed the birds

pollinators aid in the growth of the rewilded streetscape

birds of prey aid in pest control - lower rat/ rodent population

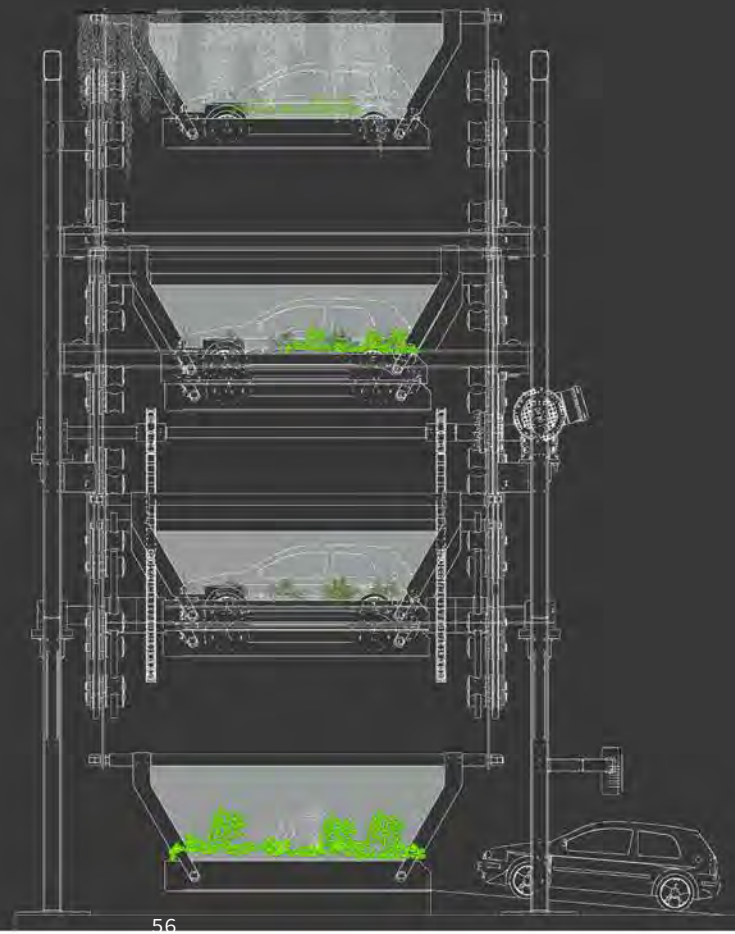
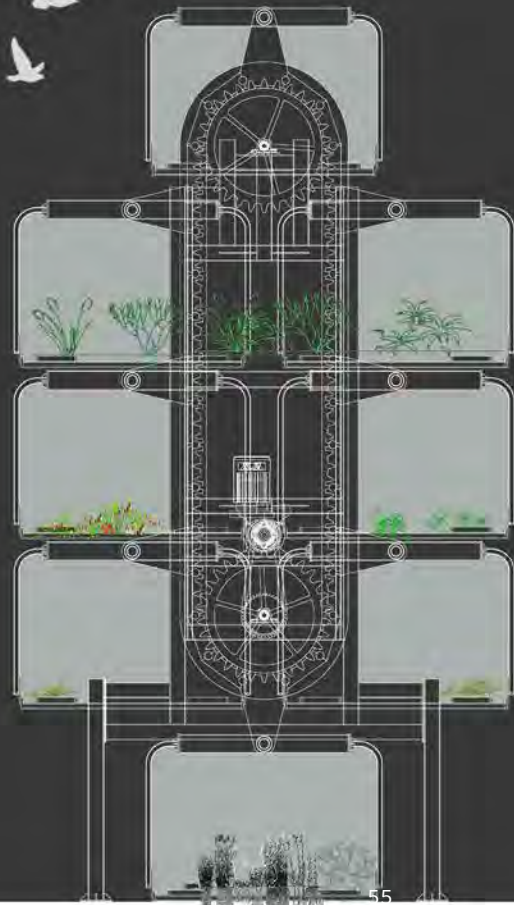
### 3. street



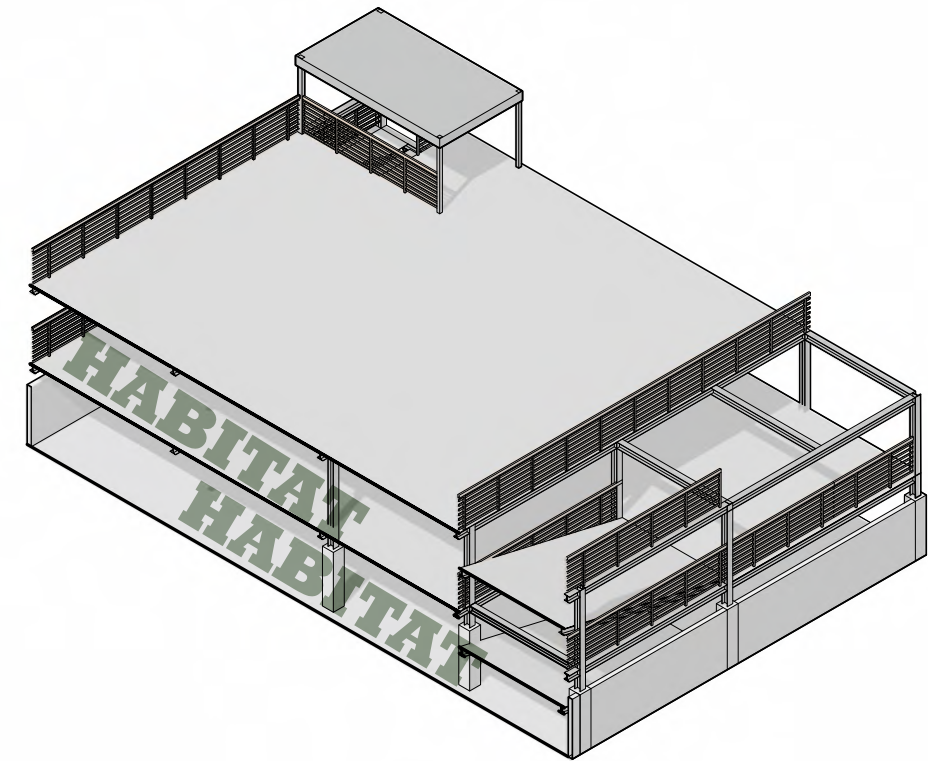
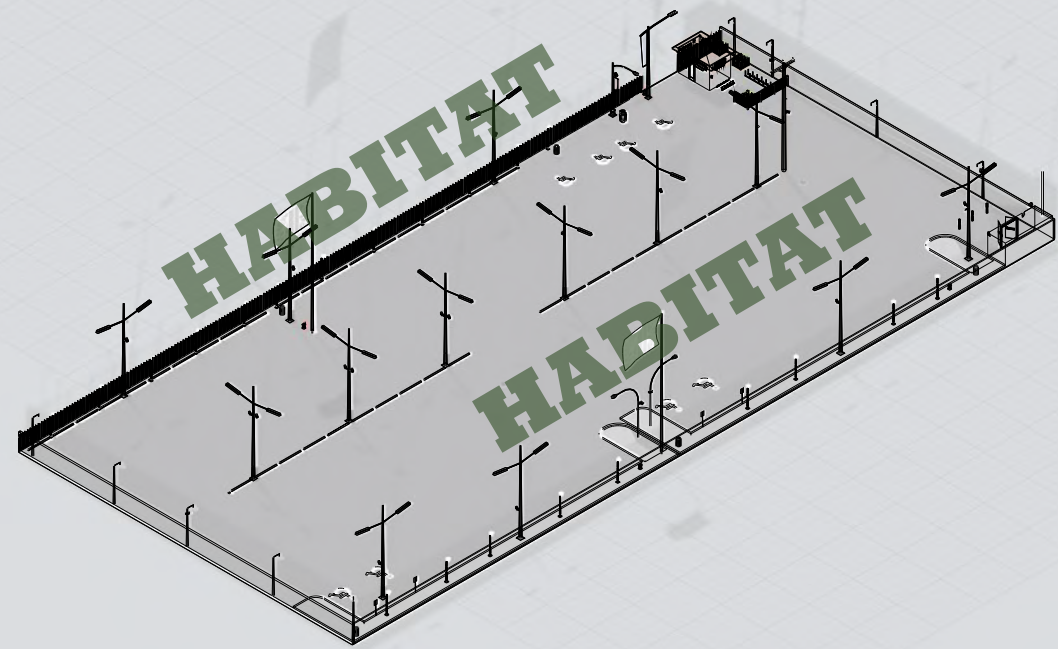


MULTI LEVEL PARKING

HABITAT ZONES



# GARAGES AND LOTS AS OPPORTUNITIES FOR INTERVENTION



IF AND WHEN MANHATTEN PROHIBITS CARS WILL THERE WILL BE A SURPLUS OF EXISTING MULTI-LEVEL PARKING GARAGES HOW CAN THESE BE REPURPOSED AS HABITAT ZONES ?

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