climate changed urban agriculture:

advancing edible landscape systems + resilience

University of Washington Landscape Architecture studio

Autumn 2019

cover image: Billie Guilliatt

CLIMATE CHANGED URBAN AGRICULTURE:

advancing edible landscape systems + resilience

AUTUMN QUARTER 2019

University of Washington
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Julie Johnson, Associate Professor

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Zachary Schneeweis

INTRODUCTION

As evidence of accelerated climate change and continued increases in greenhouse gas emissions mount, so does concern for food security. Patterns of drought, extreme heat and flood events, coupled with an increasing population impact regions across the globe, and portend challenges for Puget Sound. Regenerative agricultural practices and other emerging approaches hold promise for large scale farming, and local urban food production may contribute to diverse aspects of community resilience. As such, the studio was framed by this inquiry:

How may we shift the paradigm of what, where and how food is grown in our cities such that urban agriculture permeates our landscapes as a critical infrastructure advancing resilience through food security, biodiversity, environmental justice, and community connections?

This graduate landscape architecture studio explored the challenge in the context of metropolitan Seattle. Pedagogical goals of the studio included:

- fostering a collaborative and supportive studio community, to share expertise and support collective endeavors.
- experiential learning about diverse urban agriculture systems and practices.
- focused consideration of the projected impacts of climate change on our region.
- creative design explorations that challenge current assumptions, use systems thinking, and cross spatial and temporal scales to advance climate resilience.
- framing and development of meaningful design proposals in response to local urban agriculture site needs and climate impacts, in partnership with site leader(s).

This Autumn Quarter 2019 studio document was created to share the speculative and site-based projects developed, as described on the next page. Care has been taken to correct errors in the work, but some errors or omissions may exist. Thanks to all the students for formatting their projects for this document, and special thanks to those who created the document template, coordinated sections of the document and completed the final document assembly.

-- Julie Johnson, Associate Professor

STUDIO STRUCTURE

To gain understandings of current urban agriculture, and explore potentials for a more resilient future, the studio was organized as three phases of research and design:

What about…

The first two weeks involved researching **climate change projections and urban agriculture systems and practices**. Each student's poster is found in the What About section of this booklet. We also gained firsthand understandings by touring, often guided by a site leader(s):

- Magnuson Community Gardens, Orchard, Children's Garden, Native Plant Garden
- Meadowbrook Community Gardens and Orchards
- Nathan Hale High School Urban Farm
- Danny Woo Community Garden
- Yes Farm
- Beacon Food Forest
- UW Farm @ Center for Urban Horticulture and @ Mercer Court
- UW's Project IF (Indoor Farm)
- 21 Acres Center for Local Food & Sustainable Living
- Viva Farms, Woodinville

What if…

The next two weeks, students identified **latent opportunities for urban agriculture and proposed speculative visions** for sites without current regulatory constraints. These proposals comprise the What If section of the booklet.

What now…

Over the remaining seven weeks, students revisited **design opportunities identified during our initial tours**, and selected a site to develop proposals addressing organization goals and climate resilience strategies. Working individually and as a pair, students collaborated with leaders from these sites:

- Viva Farms, Woodinville
- 21 Acres Center for Local Food & Sustainable Living
- Nathan Hale High School Urban Farm
- UW Farm @ Mercer Court
- Danny Woo Community Garden
- Yes Farm

CLIMATE CHANGED URBAN AGRICULTURE: ADVANCING EDIBLE LANDSCAPE SYSTEMS + RESILIENCE

CONTENTS

WHAT ABOUT?

What can we discover, critique, and apply in our design work addressing local climate change projections
and potential impacts for food production, by examining local urban agriculture as :

- SYSTEMS [physical, ecological, socio-cultural, political, organizational, land tenure...]
- TYPOLOGIES [roof, vertical, garden, orchard, forest, farm...]
- PRACTICES [foraging, gleaning, permaculture, perennials, planting/harvesting, food forest, regenerative agriculture, aquaculture...]
- ENVIRONMENTAL JUSTIC APPROACH [access to growing/harvesting/eating healthy, culturally-valued food]
- COMMUNITY RESILIENCY STRATEGIES [building social relationships and networks through food systems]

These research projects present findings to collectively inform subsequent design proposals.

WHAT ABOUT THE SYSTEMS, TYPOLOGIES, AND PRACTICES OF URBAN AGRICULTURE?

Brian Deck	Climate Projections for Seattle region and impacts on food production
Shanshan Shang	Healthy Soil and Microbes
Dorothy Mulkern	Water Use Recycling and Irrigation Approaches
Emma Petersen	Green Infrastructure, Pollinators and Season Extenders
Yingjie Luo	Plant Varieties Past and Future
Claudia Sackett Hennum	Management, Stewardship + Distribution Models
Billie Guilliatt	Growing Beds and Containers
Michelle Woo	Wall Climbers and Canopy
Xinyu Xu	Animals on Urban Farms
Yuqing Zhang	Permaculture Principles and Practices
Stuart Johnson	Foraging native ecology
Niccolo Piacentini	Aquaculture Principles and Practices

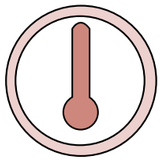
CLIMATE CHANGE PROJECTIONS

BRIAN DECK

Climate change projections will have an impact on plant growing environments. Climate patterns in the Pacific Northwest have historically been mild and temperate with drier sunny summers and wetter cloudy winters. With increased global temperatures, climate will be shifting what agriculture in the bioregion might look like. Climate will shift towards a warmer environment that will impact water availability, plant life, and ecological factors. Several research sources from the UW Climate Impacts Group summarize the potential impact on the area.:

Sources:
1 https://toolkit.climate.gov/topics/food-resilience
2 https://cig.uw.edu/resources/special-reports/

CLIMATE CHANGE PROJECTIONS - IMPACTS FOR FOOD PRODUCTION



TEMPERATURE

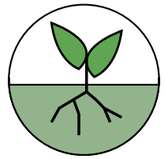
- Longer growing season
- 6deg increase in temperature [1]
- Increasing risk of new pest from changing climate zones [2]

EXTREME WEATHER

- Hotter and drier during summer months with heat waves [1]
- 6deg increase in temperature [1]

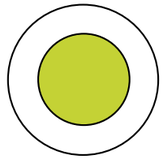
PRECIPITATION

- Increasing the frequency and intensity of heavy rain events [2]
- Increasing risk of saltwater intrusion [2]
- Increasing winter flooding [2]
- Less snowpack and irrigation supply with decreased summer precipation [1]



PLANTS

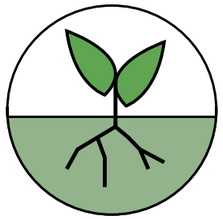
- Cold hardiness zone projected to change from 8B to 10A [1]
- Stress-tolerent plants of year-round lowest and highest temperatures and the amount of rainfall [1]
- Increasing levels of atmospheric CO2 may increase some crop productivity with "C02 fertilization" but lower nutritional quality of forage[2]
-



ENERGY COST

- Fossil fuel costs are expected to increase with reduced supply. [1]
- Low carbon energy input systems are essential

DATA SOURCE :
1 https://toolkit.climate.gov/topics/food-resilience
2 Climate Impact Report Section 8

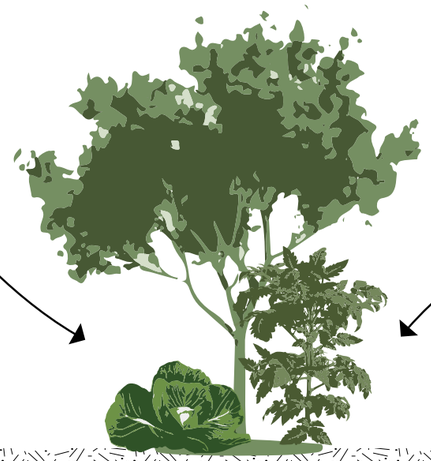


PLANT ENVIRONMENT
2099 - 2010

2010
8B
20 - 25 F

2040
9B
25 - 30F

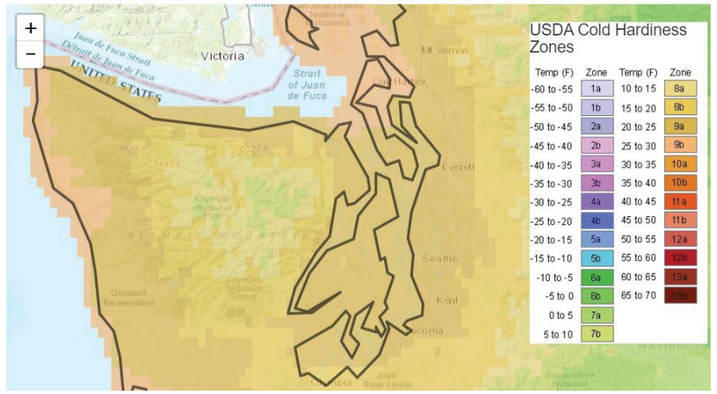
2100
10A
30 - 35F



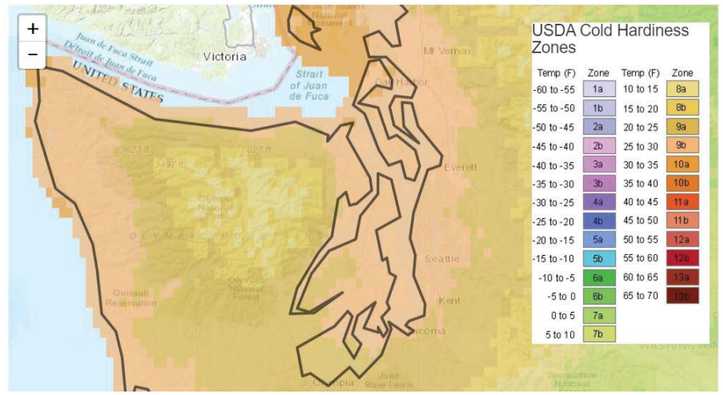
“CO^2 Fertilization”

PEST + PREDATOR

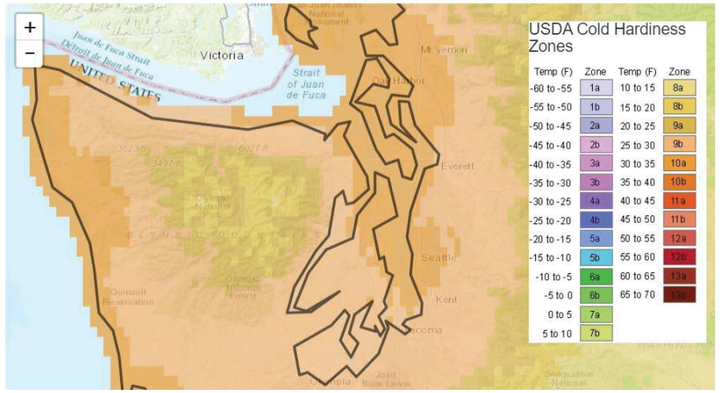
2010-2039, Higher Emissions (RCP 8.5)



2040-2069, Higher Emissions (RCP 8.5)

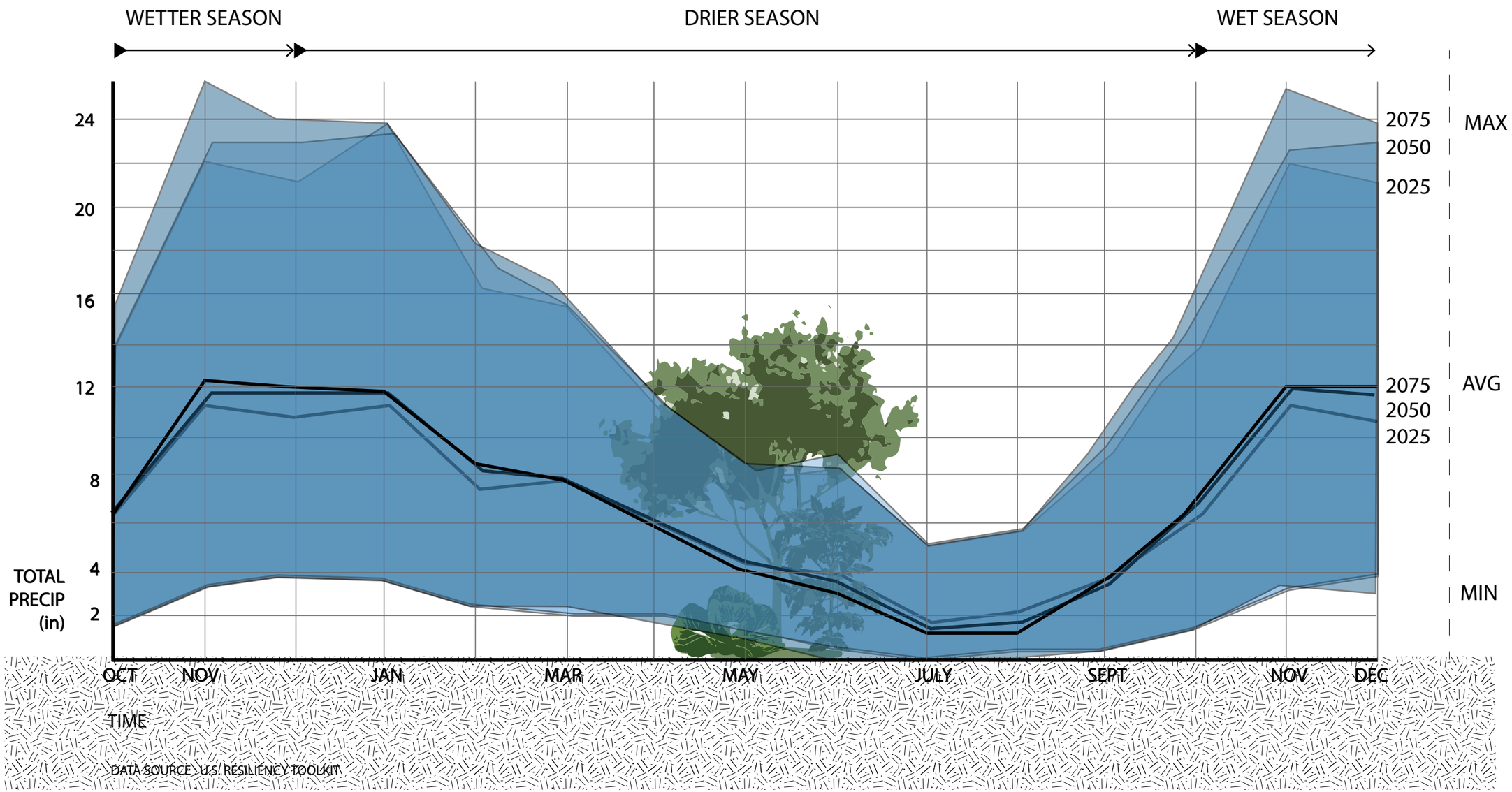


2070-2099, Higher Emissions (RCP 8.5)



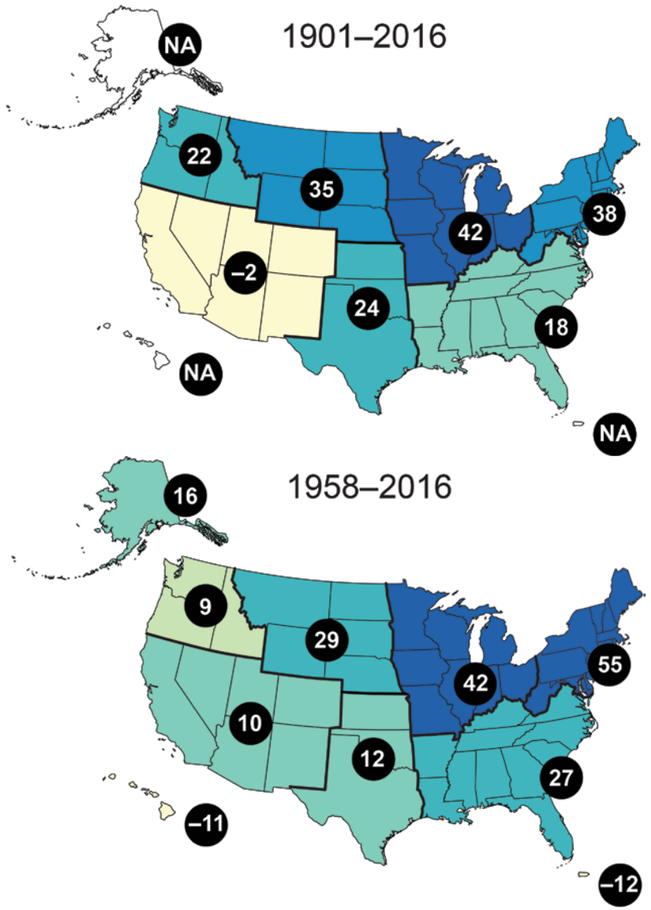
PRECIPITATION
2075 - 2025

- Less winter snowpack = less spring fresh water
- More short-burst downpours during wet season = more flooding, more infrequent



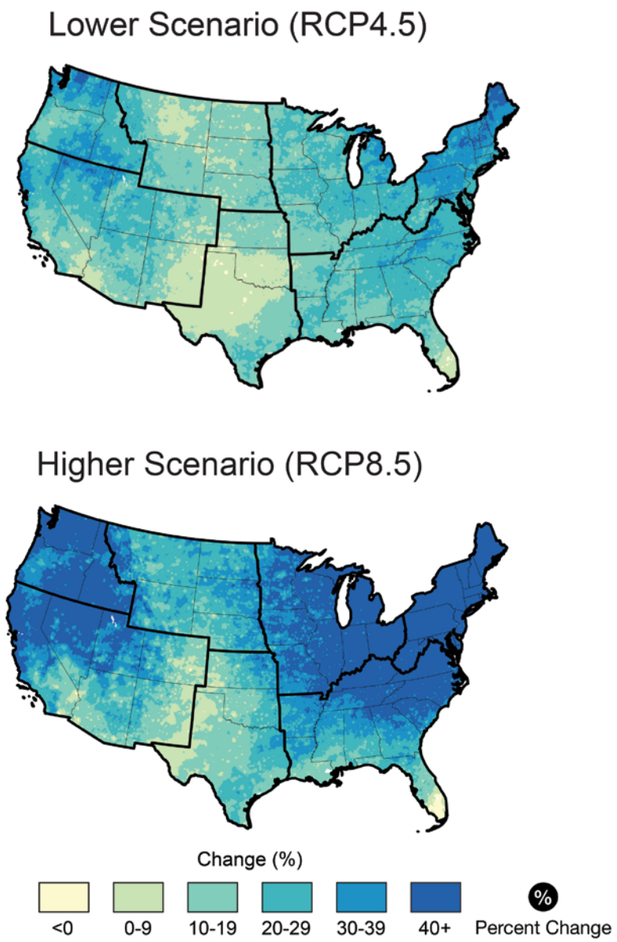
PRECIPITATION
2075 - 2025

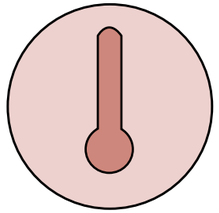
OBSERVED CHANGE IN TOTAL ANNUAL PRECIPITATION
FALLING IN HEAVIEST 1% OF EVENTS



DATA SOURCE : Fourth National Climate Assessment - Figure 2.6

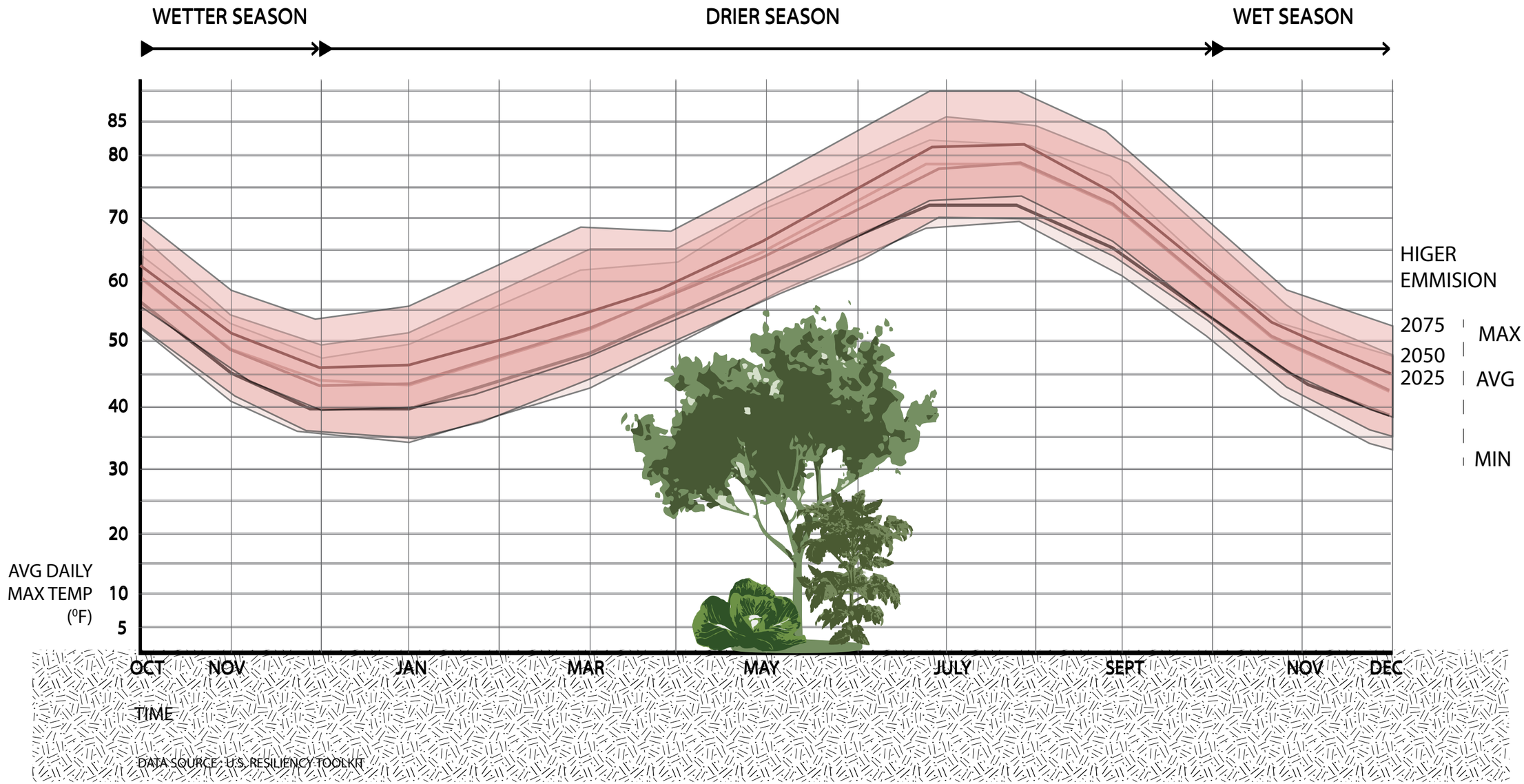
PROJECTED CHANGE IN TOTAL ANNUAL PRECIPITATION
FALLING IN HEAVIEST 1% OF EVENTS

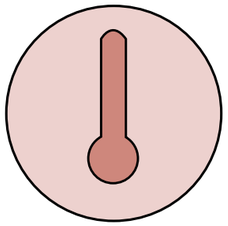




TEMPERATURE

- *+6 ^{0}F degree warming average*
- *Less winter frost and warmer hardiness zones.*
- *Hotter climate crops*
- *Earlier melting of snowpack in spring*

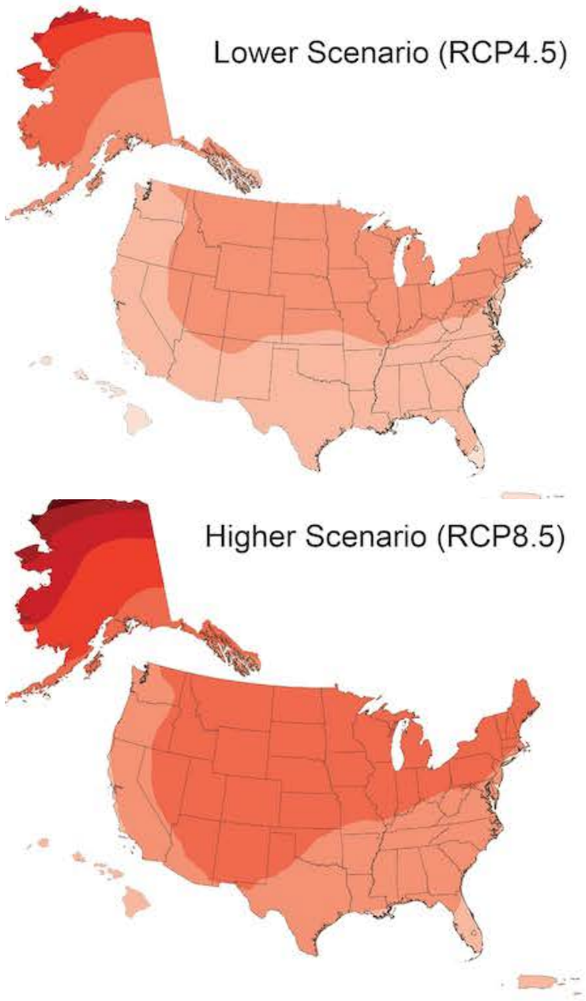




TEMPERATURE

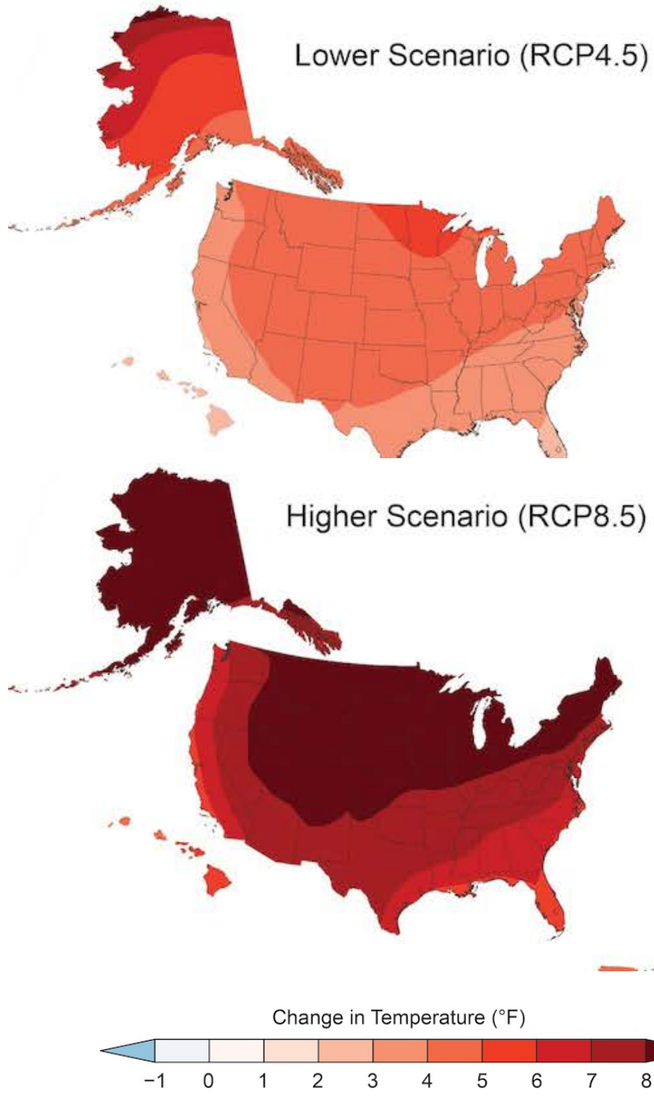
- *+6 ºF degree warming average*
- *Less winter frost and warmer hardiness zones.*
- *Hotter climate crops*
- *Earlier melting of snowpack in spring*

ɛTED CHANGES IN AVERAGE ANNUAL TEMPERATURE 2050



: Fourth National Climate Assessment - Figure 2.4

PROJECTED CHANGES IN AVERAGE ANNUAL TEMPERATURE 2100



HEALTHY SOIL

Shanshan Shang

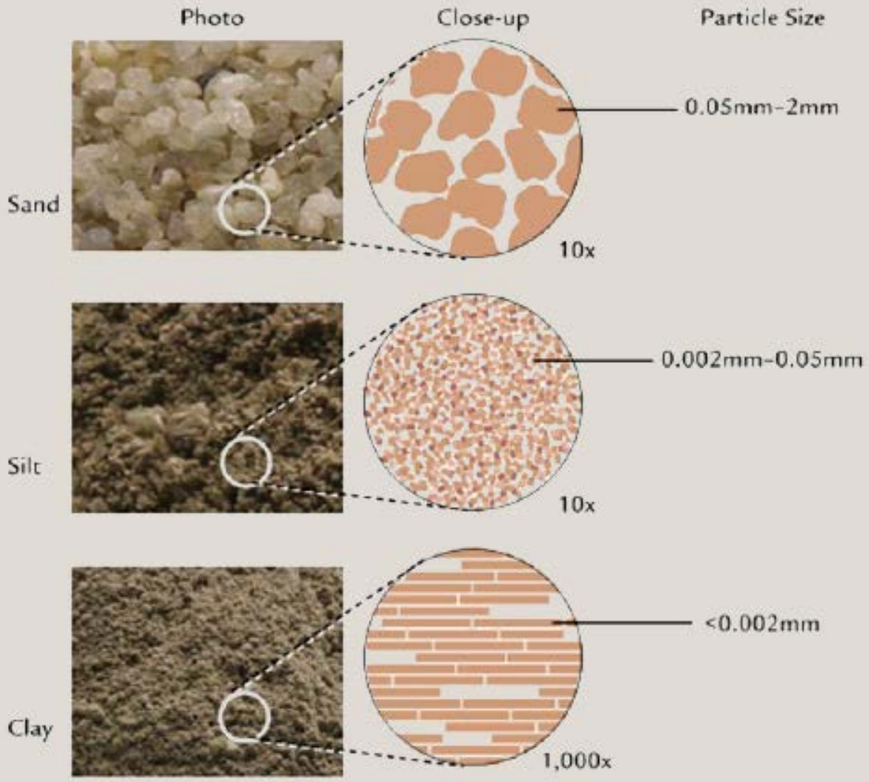
Advances in watershed, natural resource, and environmental sciences have shown that soil is the foundation of basic ecosystem function. They provide the medium for plant growth, habitat for many insects and other organisms. Soil filters our water, provides essential nutrients to our forests and crops.

HEALTHY SOIL

Soil Texture

How coarse or fine it is and feels - is determined by the size of its mineral particles (sands, silts, and clays). Few soils are pure sand, silt, or clay.

Most contain a mixture of all three. Texture has a direct effect on the size and number of the pore spaces and overall surface area in the soil and is an important determinant of soil aeration, drainage, and water- and nutrient-holding capacity. The larger the spacing, or pore size, the greater the infiltration rate. It affects the ease with which a soil can be cultivated.



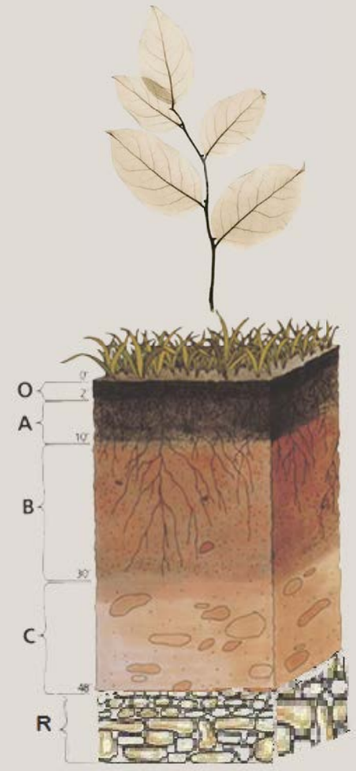
https://support.rainmachine.com/hc/en-us/articles/228001248-Soil-Types

Soil Structure

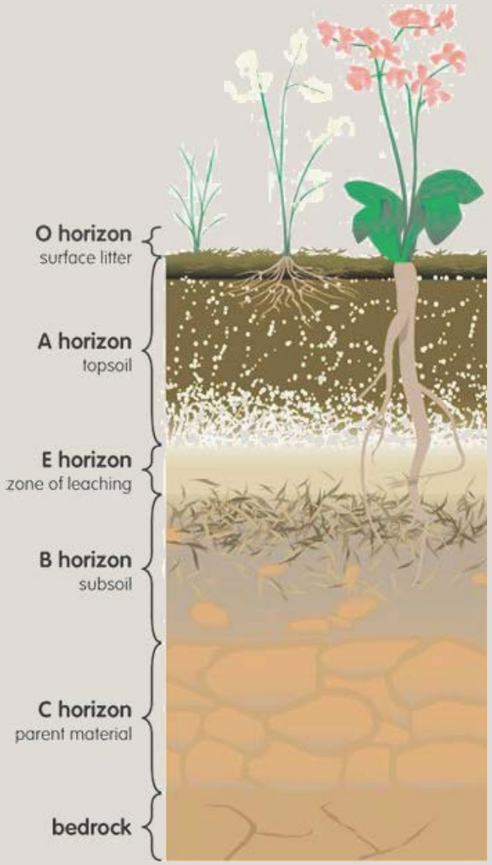
Describes the arrangement of the solid parts of the soil and of the pore space located between them. It is determined by how individual soil granules clump, bind together, and aggregate, resulting in the arrangement of soil pores between them. Soil structure has a major influence on water and air movement, biological activity, root growth and seedling emergence.

Layers in the Soil

Soil scientists commonly recognize six master horizons designated by the letters O, A, E, B, C, and R, in order of depth. For Gardeners, the most important layers are O, A, B. The O horizon refers to the organic layer at the surface - leaf litter and other plant residue in various stages of decompositon. Below that is the A horizon, a predominantly mineral layer enriched with organic matter from the O horizon by the mixing action of soil organisms. It is darker in color that the horizons below due to the organic matter content. Commonly referred to as topsoil, this is the most fertile and biologically active zone of the soil, most plant roots are concentrated here.



https://soilhealthnexus.org/soil-health/



https://www.barnesandnoble.com/b/sparkcharts-series/_/N-2lws

Composting Systems

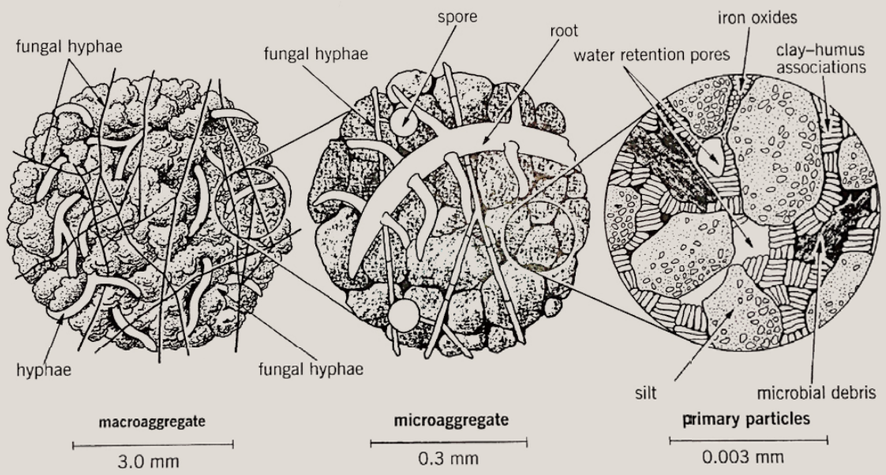
Compost is organic matter that has been decomposed in a process called composting. This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner.

Compost is rich in nutrients. It is used, for example, in gardens, landscaping, horticulture, urban agriculture and organic farming. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil. In ecosystems, compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover.

Worm Bin Composting

Worm composting is using worms to recycle food scraps and other organic material into a valuable soil amendment called vermicompost, or worm compost. Worms eat food scraps, which become compost as they pass through the worm's body.

https://www.instructables.com/id/Drain-Free-Home-Worm-Bin-Composting/bles.com/id/Drain-Free-Home-Worm-Bin-Composting/

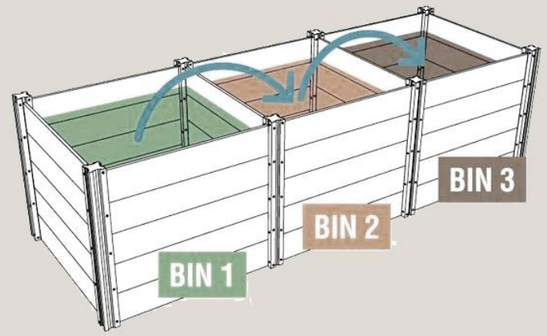


3 Bin Composting Systems

Bin 1: Fill with brown and green waste layers until full. Onceit has gone down by half or more, take the top layer and put it into Bin 2. Continue until Bin 1 is empty and start Bin 1 as new.

Bin 2: When it no longer looks like the waste you put in, move Bin 2 contents into Bin 3.

Bin 3: Holds the finished compost for use around the garden, mulching where the plants are growing the most vigorously.



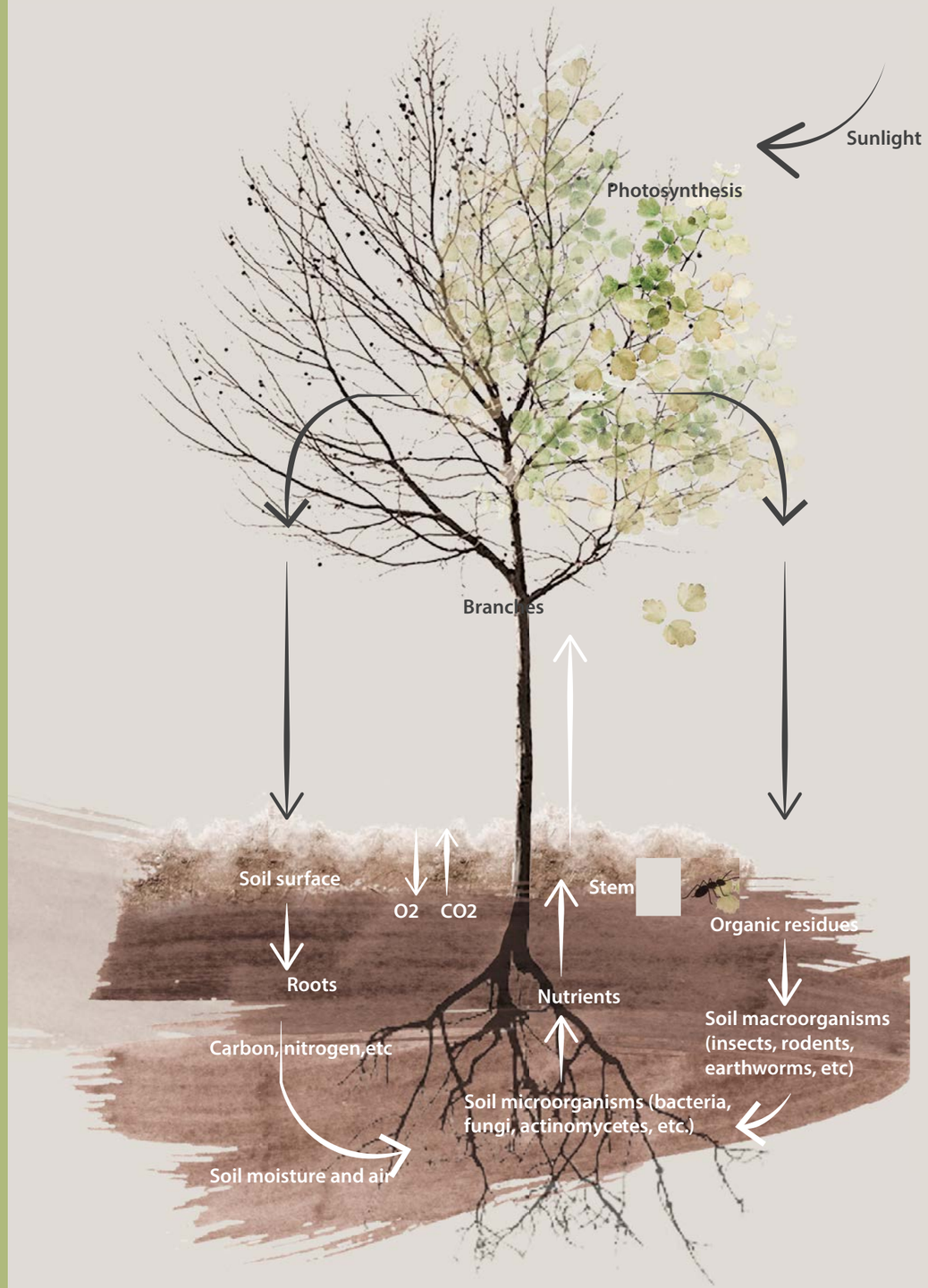
http://hanggiatot.info/3-bin-compost-system/

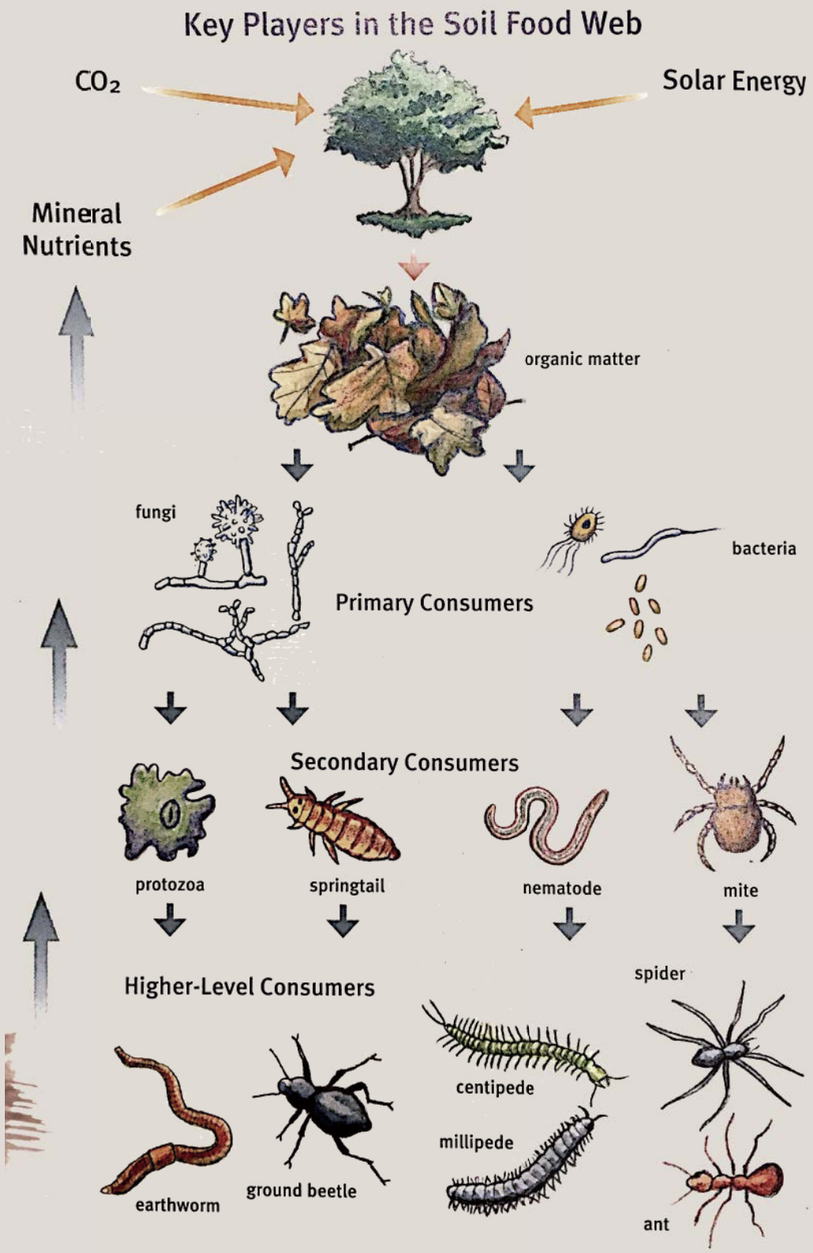
Hügelkultur

Hügelkultur is a horticultural technique where a mound constructed from decaying wood debris and other compostable biomass plant materials is later (or immediately) planted as a raised bed. Adopted by permaculture advocates, it is suggested the technique helps to improve soil fertility, water retention, and soil warming, thus benefiting plants grown on or near such mounds.

https://www.almanac.com/news/gardening/gardening-advice/what-hugelkultur-ultimate-raised-bed

SOIL IN THE ENVIRONMENT Crucible of Terrestrial Life





Healthy Soils for Sustainable Gardens

Ecology of the Soil

Like a rainforest or coral reef, the soil is an astonishingly complex ecosystem comprising a wide variety of interacting organisms-producers and consumers, predators and prey.
These include earthworms, centipedes, and other creatures visible to the naked eye, as well as diverse populations of fungi, bacteria, and other tiny organisms only visible to us through the lens of a microscope.

Components of the Soil Food Web

Primary Consumers :
Fungi and Bacteria
Secondary Consumers :
Unicellular and multicellular microorganisms such as protists (for example, amoebea) and many species of nematodes.
Higher-level Consumers :
There are predatory mites that capture and eat nematodes, other mites, and collembola.
Earthworms and Surface Predators

Data Sources

BROOKLYN BOTANIC GARDEN ALL-REGION GUIDES
Healthy Soils for Sustainable Gardens
Niall Dunne Editor
P9-P19

SOIL IN THE ENVIRONMENT
Crucible of Terrestrial Life
DANIEL HILLEL
P19, P73

https://www.wikipedia.org/

http://hanggiatot.info/3-bin-compost-system/

http://compost.css.cornell.edu/worms/basics.html

WATER USE RECYCLING AND IRRIGATION APPROACHES

Dorothy Mulkern

Irrigation Basics:

All sprinkler systems have the following essential elements.

Water Source. Water will be supplied from a water utility, well or catment system and is supplied to your mainline.

Backflow Preventer. A legally required element that protects from water moving backward in the pipes and contaminating water supplies. Usually where shut off valves are located.

Controller. Also known as an irrigation clock, this mini computer tells sprinkler valves when to turn on and off. Sprinkler systems are split up into zones, usually turning on one at a time, which are controlled by a valve.

Pipes & Tubing. Sprinkler system lines are usually made of PVC pipe at least to the valves. (PVC stands for polyvinyl chloride pipe.) After the valves, some installers switch to poly tubing or funny pipe which is flexible and easier to transport and repair.

Sprinklers. These elements come as popup (pop out of the ground when in use and usually are in high traffic areas like lawns) or shrub stick varieties (do not move up/down and are usually in low traffice areas). These are further broken down by rotor-type (rotating/multiple streams of water) or sprays (fixed water pattern).

Pop-Up Sprinkler:

The above image shows one of the most commonly used sprinkler types, a pop-up.

Sprinkler System Design:

To the right is a generic diagram of a residential sprinkler system from Hunter Industries.

Smart Watering Practices:

1) Use compost and mulch to improve soil quality and health so soils absorb water easily and drain well.

2) When designing cluster plants together with similar watering and light needs.

3) Use technology! Irrigation companies are constantly developing technology to save water. For example, moisture sensors turn irrigation systems off when it has rained enough to maintain plant health.

4) Monitor and repair irrigation systems regularly. Prevent wasting water by checking sprinkler systems quarterly and making repairs a top priority.

Image source: https://www.kram.com/1-2-rps-rotor-rps50

RESIDENTIAL SYSTEM OVERVIEW

Smart Control
Wireless Solar Sync ®
Transmitter

Gear Driven Rotors
PGP ® Ultra

¾" Swing Joint
SJ

Remote Control
ROAM Transmitter

PVC Ell (Slip Thread)
or Poly Ell (Insert x Thread)

PVC Tee (Slip x Slip x Slip)
or Poly Tee (Insert x Insert x Insert)

PVC (Polyvinyl Chloride) Pipe
or Poly (Polyethylene) Pipe

Automatic Sprinkler Controller
Pro-C ®

Smart Control
Wireless Solar Sync Receiver

Remote Control
ROAM

Pressure Regulator
Accu Sync ® 50 Automatic

Automatic Control Valve
PGV

Sprinkler Controller Wire
Low Voltage; Direct Burial

Cap for future use

Male Adapters

Valve Box

Waterproof Wire Connectors

Drip Zone Control Kit
PCZ-101 Valve

Nozzles
MP Rotato r®

Spray Sprinklers
Pro–Spray ® PRS-40

½" Swing Joint
SJ

Brass Compression Tee
(Compression x Compression x Thread)

Point of Connection (P.O.C.)

Brass Gate Valve
or Brass Ball Valve

Backflow Preventer
(Check Local Codes)

Isolation
Ball Valve

Valve Box

Professional Landscape Dripline

mage source: https://www.hunterindustries.com/sites/default/files/design_guide_Residential_System_LIT226-US.pdf

Image source:https://www.groworganic.com/organic-gardening/arti

Image source: https://www.flashdeals.co.ke/product/100-x-adjust

Drip Irrigation:

Drip irrigation uses flexible tubing made of plastic to slowly drip water into soil through tiny holes or emitters. There are different types of drip irrigation:

*Drip tubing with emitters
*Drip tape
*Micro-sprays

Soaker hoses seep water out the entire length of hose as they are made of porous materials. This style of irrigation can be used to water dense plantings thoroughly.

Soaker Hose:

The top left image shows a soaker hose in action.

Drip Tubing with Emitters:

The left image shows drip tubing with emitters watering a short groundcover.

Image source: https://eatyouryard.com/rainwise/

Additional Resources:

Rainbird | Sprinkler System Tutorials https://www.rainbird.com/homeowners/all-about-sprinkler-systems

Hunter Industries | Sprinkler Design Guide https://www.hunterindustries.com/sites/default/files/design_guide_Residential_System_LIT-226-US.pdf

Anatomy of a Sprinkler System https://www.sprinklerwarehouse.com/school/design-install/anatomy-of-a-sprinkler-system/

WikiHow | How to Install a Sprinkler System https://www.wikihow.com/Install-a-Sprinkler-System

Saving Water Alliance https://www.savingwater.org/lawn-garden/

RainWise | Cisterns, Raingardens https://www.700milliongallons.org/rainwise/

Laundry-to-Garden: How to Irrigate with Graywater https://modernfarmer.com/2017/03/laundry-garden-irrigate-graywater/

Catchment for Reuse:

Depending on a project's scale, many options are available for catchment and reuse of water on site. For smaller projects, cisterns can be connected to gutters to catch water off of building roofs to be used in irrigation systems or connected to a hose. For projects that span acres, retention ponds could provide a year round source of water for crops or livestock.

Cisterns:

The image to the left shows a variety of cisterns used on residential projects throughout Seattle.

Retention Ponds:

Below, an image of a retention pond on a farm.

Image source:https://www.btlliners.com/build-farm-pond/

POLLINATORS AND SEASON EXTENDING INFRASTRUCTURES

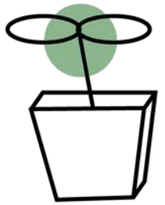
Emma Petersen

https://thehoneybeeconservancy.org/

INFRASTRUCTURE TO EXTEND GROWING SEASON

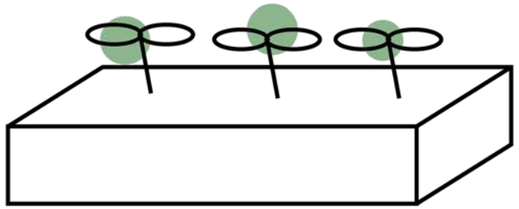
"MODIFY AGRICULTURE MICRO-CLIMATES TO PROVIDE ENHANCED GROWING CONDITIONS BEYOND T

HTTPS://WWW.NATURESPATH.COM/EN-US/BLOG/7-SEASON-EXTENDERS-ENJOY-LONGER-HARVEST/



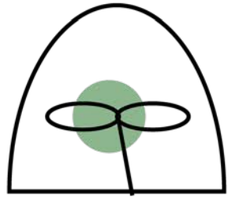
INDOOR SEEDLINGS

START SEEDS INSIDE TO START PLANT GROWTH BEFORE PLANTING



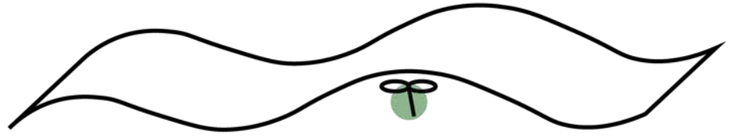
RAISED BEDS

TRAPS HEAT, BUT SOMETIMES REQUIRE MORE WATERING



CLOCHES

COVERS THAT PROTECT INDIVIDUAL PLANTS

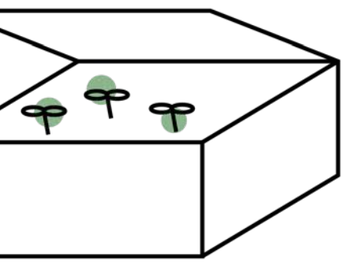


ROW COVERS

SPUN POLYESTHER THAT ALLOWS IN LIGHT AND RAIN, EX. REEMAY, OLD SHEETS

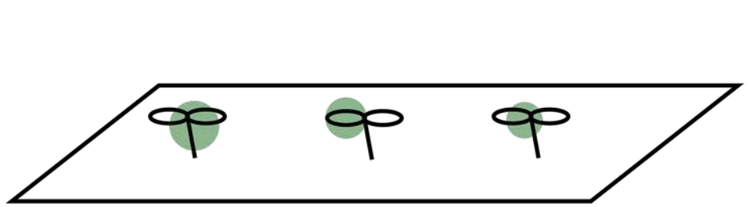
CA

HE TYPICAL GROWING SEASON OF THE REGION”



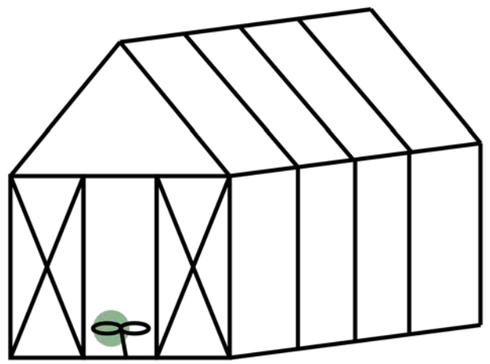
COLD FRAMES

BINETS THAT KEEP A SMALL GARDEN AREA WARM



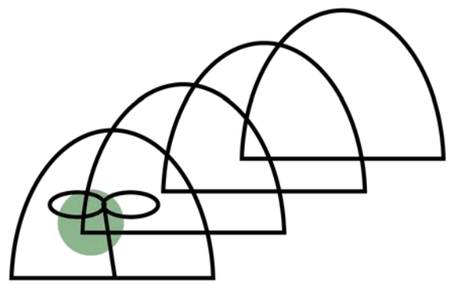
PLASTICULTURE

PLASTIC TARPS HOLDS WARMTH IN THE SOIL TO KEEP PLANTS PRODUCING, ALSO PLASTIC MULCH



GREENHOUSES

BUILDINGS THAT CAN INCLUDE HEATING SYSTEMS TO GROW PLANTS ALL YEAR LONG



HOOP HOUSES

CAN BE LOW OR HIGH TUNNELS, WORK AS MINI/LESS PERMANENT GREENHOUSES

POLLINATORS | PACIFIC LOWLAND ZONE/MIXED FOREST PROVINCE #242

HTTPS://WWW.POLLINATOR.ORG/ > PLANTING GUIDES > PACIFIC LOWLAND/MIXED FOREST PROVINCE

POLLINATORS REQUIRE **IDEAL HABITAT CONDITIONS** TO THRIVE. THESE CONDITIONS ARE CREATED AT SEVERAL **DIFFERENT DEV**

SHELTER

- CANOPY LAYERS FOR HABITATS
- DEAD SNAGS / LEAF LITTER
- BEE BOXES
- UNCOVERED SOIL
- GROUP PLANTINGS TO AVOID PREDETORS
- PLANTS THAT ARE GOOD FOR BUTTERFLY LARVAE

FOOD

- A LOT OF SUGAR
- FERMENTING FRUIT
- PLANT SIMILAR PLANTS INTO GROUPS
- DIFFERENT BLOOM SEASONS
- HIGH BIODIVERSITY
- HERBS & ANNUALS
- SOME WEEDS ARE GOOD!
- INTEGRATED PEST MANAGEMENT

WATER

- CLEAN / RELIABLE
- WATER FEATURES: RUNNING WATER, POOLS, PONDS, SMALL CONTAINERS
- SHALLOW & SLOPING SIDES

-BEESMART-
AN APP THAT SHOWS YOU THE BEST NATIVE POLLINATING PLANTS TO USE IN YOUR AREA

"1 IN 3 BITES OF FOOD IS COURTESY OF INSECT POLLINATION"

"MONARCH BUTTERFLIES HAVE DECLINED BY 90% IN THE LAST 20 YEARS"

"IN THE US, POLLINATION PRODUCES NEARLY $20 BILLION WORTH OF PRODUCTS ANNUALLY."

SPMENTAL SCALES

HOME
- VARIETY
- BARE GROUND IS GOOD

FARMS
- PESTICIDE MANAGEMENT
- MINIMIZE TILLAGE
- SCATTER WATER SOURCES
- BUFFERS FOR WIND
- PLANT UNUSED AREAS
- POLICY INCENTIVES

PUBLIC
- CONNECTIVITY
- MINIMUM LAWN
- NATURAL MEADOWS + HABITAT
- REMOVE INVASIVES
- POLICY INCENTIVES

"25% OF BUMBLE BEES SPECIES ARE THOUGHT TO BE IN SERIOUS DECLINE"

"SAVING THE BEES" (OR THE LACK OF DOING SO) AND OTHER POLLINATORS IS VITAL TO SUSTAIN NOT ONLY OUR ECONOMY BUT OUR ***LIVES***. HOWEVER, A BLANKET APPROACH TO SAVING THE BEES IS NOT NECESSSARILY HELPFUL. WE NEED TO FIRST **SUPPORT OUR NATIVE BEE POPULATION**.

POLLINATOR PROFILES

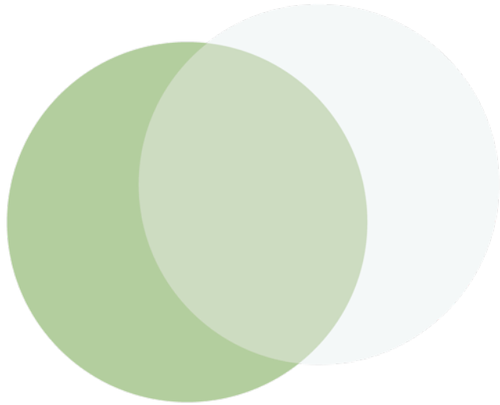
BATS

NECTAR GUIDES: **ABSENT**
ODOR: **STRONG & MUSTY / NIGHT**
NECTAR: **ABUNDANT / HIDDEN**
POLLEN: **AMPLE**
FLOWER SHAPE: **REGULAR / BOWL / CLOSED DURING DAY**

BEES

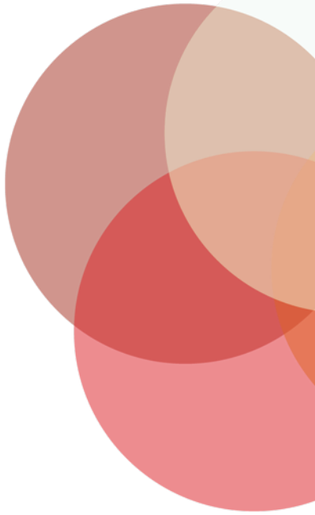
NECTAR GUIDES: **PRESENT**
ODOR: **FRESH, MILD, PLEASANT**
NECTAR: **USUALLY PRESENT**
POLLEN: **LIMITES / STICKY & SCENTED**
FLOWER SHAPE: **SHALLOW / LANDING PLATFORM / TUBULAR**

BEETLES



NECTAR GUIDES: **ABSENT**
ODOR: **NONE - STRONG FRUIT/FETID**
NECTAR: **SOMETIMES PRESENT**
POLLEN: **AMPLE**
FLOWER SHAPE: **LARGE / BOWL-LIKE / MAGNOLIA**

BIRDS



NECTAR GUIDES: **ABSENT**
ODOR: **NONE**
NECTAR: **AMPLE**
POLLEN: **MODES**
FLOWER SHAPE: **LARGE STRON**

BUTTERFLIES

T

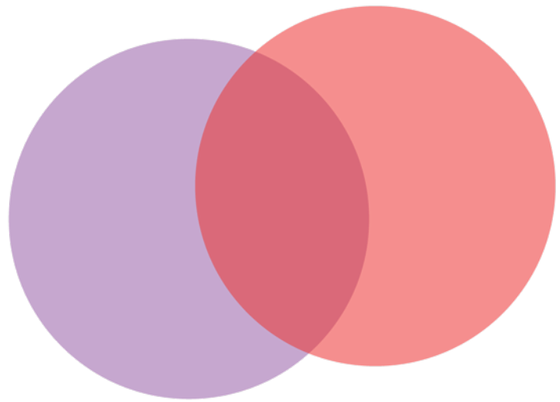
/ DEEPLY HIDDEN

T

FUNNEL-LIKE / CUPS /

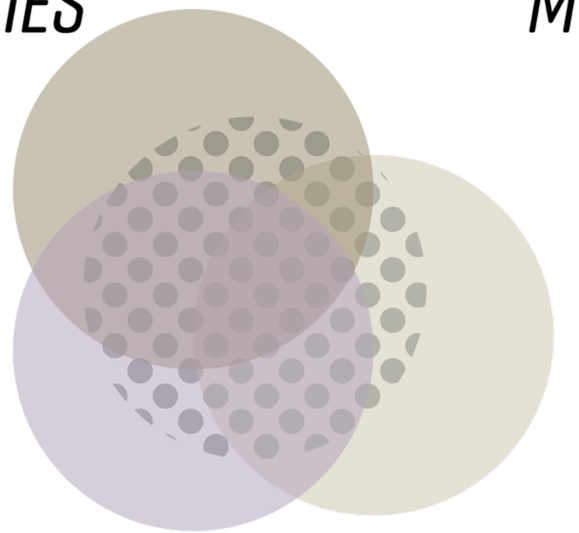
G PERCH

FLIES



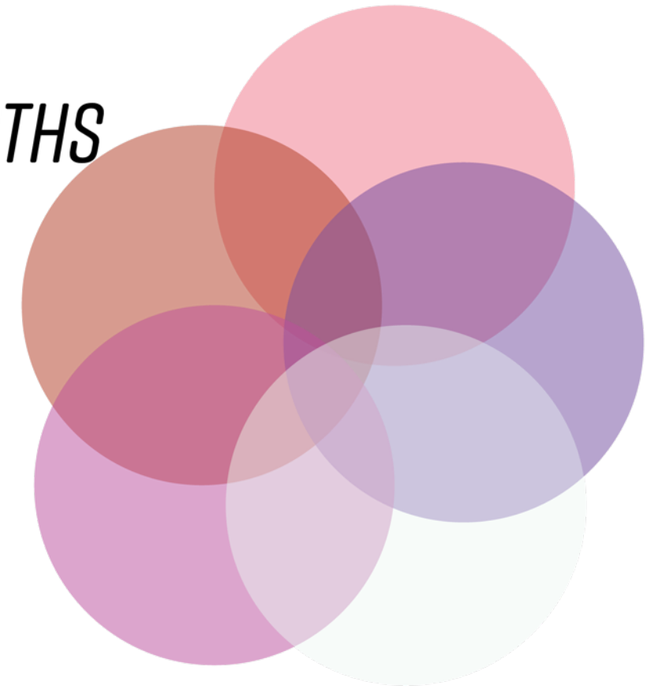
NECTAR GUIDES: **PRESENT**
ODOR: **FAINT BUT FRESH**
NECTAR: **AMPLE / DEEPLY HIDDEN**
POLLEN: **LIMITED**
FLOWER SHAPE: **NARROW TUBE W/ SPUR / WIDE LANDING PAD**

MOTHS



NECTAR GUIDES: **ABSENT**
ODOR: **PUTRID**
NECTAR: **USUALLY ABSENT**
POLLEN: **MODEST IN AMOUNT**
FLOWER SHAPE: **SHALLOW / FUNNEL-LIKE OR COMPLEX & TRAP-LIKE**

MOTHS



NECTAR GUIDES: **ABSENT**
ODOR: **NONE**
NECTAR: **NONE**
POLLEN: **ABUNDANT / SMALL / SMOOTH / STICKY**
FLOWER SHAPE: **REGULAR / SMALL / EXERTED STIGMAS**

Image Citation:https://www.pinterest.com/pin/287104544982104969/

PAST AND FUTURE: SHIFTS IN PLANT

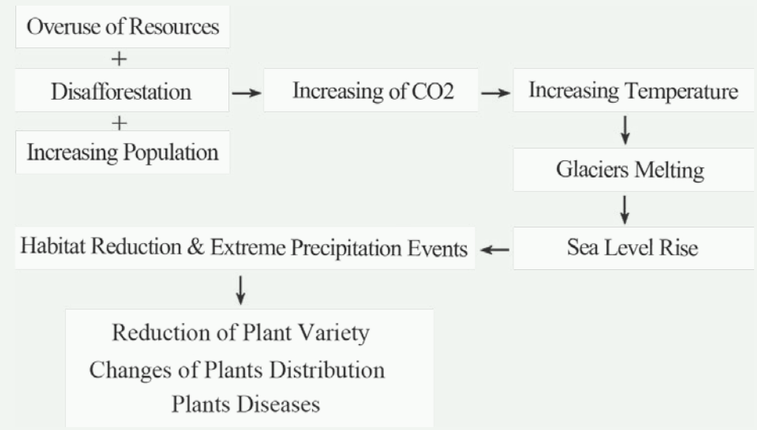
Yingjie Luo

DEFINITION:

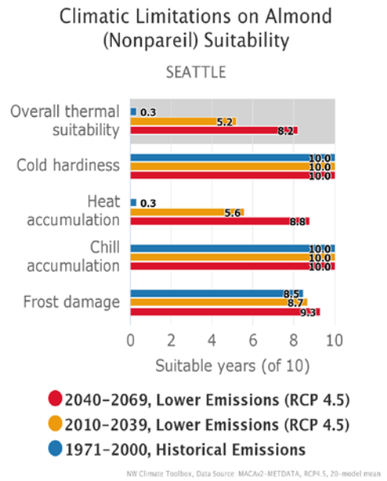
Because of the overdevelopment of fossil fuel, reduction of the forests as well as increasing population, climate change including the increasing amount of greenhouse gas emission and the increase of temperature is becoming fierce which threaten the variety and distribution of plants, especially crops.

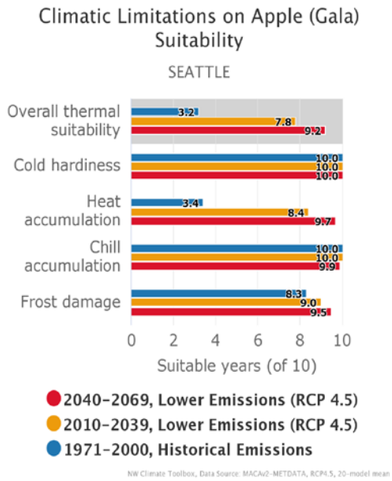
This poster shows what happens to plants (crops) from past to future and analysis why it happened as well as what we can do for the coming challenges.

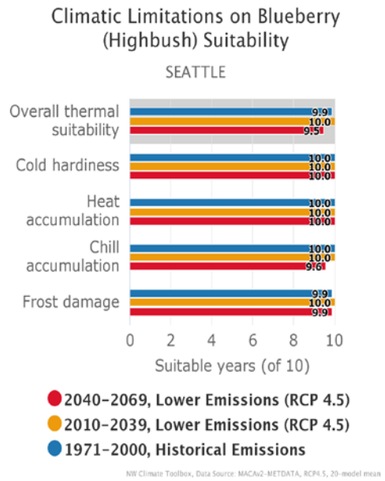
FEATURES:

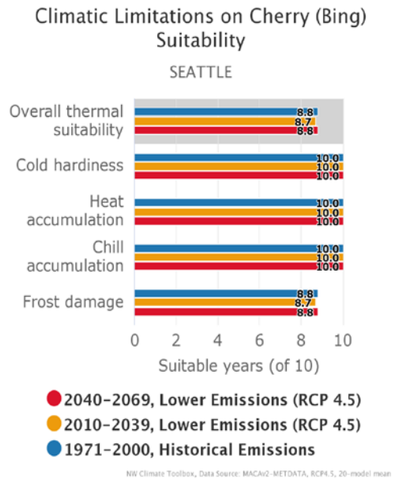


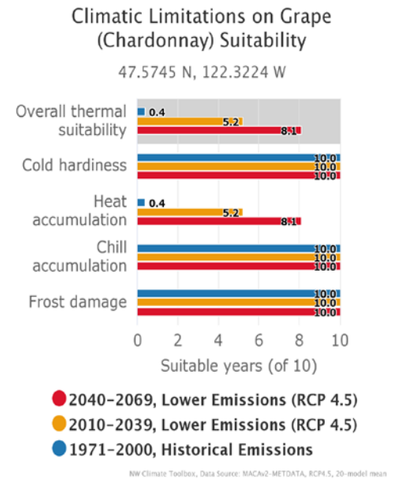
PROCESS AND RELATIONSHIP:

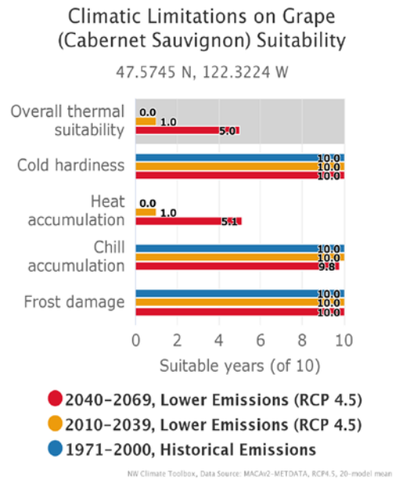












Location-Specific Phenology Timing

Phenology Timing for Almonds (Nonpareil)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	Not Available	Not Available	Jan. 30
Bloom	Not Available	Not Available	Feb. 10
Maturation	Not Available	Not Available	Sept. 12

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Phenology Timing

Phenology Timing for Apples (Gala)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	Not Available	Feb. 28	Feb. 19
Bloom	Not Available	Apr. 8	Mar. 27
Maturation	Not Available	Sept. 12	Aug. 27

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Phenology Timing

Phenology Timing for Blueberries (Highbush)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	Apr. 29	Apr. 12	Mar. 24
Bloom	Jun. 10	May 26	May 15
Maturation	Jul. 25	Jul. 11	Jun. 29

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Phenology Timing

Phenology Timing for Cherries (Bing)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	Mar. 5	Feb. 17	Feb. 8
Bloom	Apr. 3	Mar. 16	Mar. 4
Maturation	Jun. 22	Jun. 7	May 27

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Phenology Timing for Grapes (Cabernet Sauvignon)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	May 2	Apr. 21	Apr. 14
Bloom	Jun. 18	Jun. 5	May 30
Maturation	Not Available	Not Available	Not Available

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Phenology Timing for Grapes (Cabernet Sauvignon)
SEATTLE

	1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Bud Burst	May 2	Apr. 21	Apr. 14
Bloom	Jun. 18	Jun. 5	May 30
Maturation	Not Available	Not Available	Not Available

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Almonds (Nonpareil)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Not Available	30.7 in	32.7 in

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Almonds (Nonpareil)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Not Available	30.7 in	32.7 in

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Blueberries (Highbush)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
15.4 in	16.7 in	18 in

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Cherries (Bing)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
27.1 in	29.1 in	30.7 in

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Cherries (Bing)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
27.1 in	29.1 in	30.7 in

NW Climate Toolbox, MACAv2-METDATA 20-model mean

Location-Specific Irrigation Demand

Irrigation Demand of Grapes (Cabernet Sauvignon)
SEATTLE

1971-2000 (Current Day)	2010-2039, Lower Emissions (RCP 4.5)	2040-2069, Lower Emissions (RCP 4.5)
Not Available	Not Available	Not Available

NW Climate Toolbox, MACAv2-METDATA 20-model mean

IMPLICATION FOR DESIGN:

According to the analysis of some kinds of plants on suitability, phenology timing and irrigation demand in Pacific Northwest, it is easy to draw following conclusion:
a.increasing temperature makes it easier for thermophile plant to grow up while making it harder for tender plant to survive.
b.the increase of temperature will promote seed germination, bloom and mature in advance.
c. drought and water restriction resulting from the climate change will significantly increase the demand of irrigation.

Based on the conclusion and other sources, there are some implications for design:
a. planting dominant germplasm resources.
b.developing and enhancing stormwater-capturing infrastucture.
c. making full use of each piece of land in urban area.

Location: Pacific Northwest
Target Plants: Almond (Nonpareil), Apple (Gala), Blueberry (Highbush), Cherry (Bing), Grapes (Cabernet Sauvignon), Grapes (Chardonnay)
Sources: https://climatetoolbox.org/tool/future-crop-suitability

Name: Soest Herbaceous Display Garden

Location: 3501 NE 41st Street, Seattle, WA 98195

NOTABLE PRECEDENT:

The garden was created to help local gardeners select plants appropriate to a variety of site conditions commonly found in Pacific Northwest urban gardens. This garden features over 280 kinds of herbaceous (non-woody) plants that include perennials, annuals, and bulbs.

The garden demonstrates how soil and light affect plant growth and health. The eight raised beds consist of either a sandy loam or a clay loam soil texture representative of common urban soils. The use of small trees in beds demonstrates how certain plants perform in partial shade versus full sun. Irrigation is applied using “water-wise” techniques to avoid wasteful runoff and evaporation. At the University of Washington Botanic Gardens (UWBG), we consistently evaluate plant performance. Cultivars that are too aggressive here are replaced by others that will grow in the Soest Garden.

Sources: https:// botanicgardens.uw.edu/center-for-urban-horticulture/gardens/soest-herbaceous-display-garden/

Photo: Claudia Sackett Hennum

MANAGEMENT, STEWARDSHIP & DISTRIBUTION

Claudia Sackett Hennum

Urban agriculture exists in a context of community, insurgency and creativity in the margins of the city. Each urban farm is an improvisation, a work of love and discipline by multiple stakeholders and stewards. The products are distributed through a variety of models including free farm stands, food trucks, CSA's and more. In this section I will provide a breif overview of various approaches, however, since each case is unique, I recommend further research and exploration.

Photo: Claudia Sackett Hennum

MANAGEMENT/STEWARDSHIP

Management and stewardship of urban farms is often fairly complicated with multiple organizations involvolved. Design implications include high turnover of stewards and the presence of many stakeholders.

COMMERCIAL
Growing food on private commercial property such as apartment complexes or retail spaces. This might include farm to table locations.

COMMUNITY GARDENS
Either cooperatively managed or broken up into small plots. Community gardens are often on public land and run by volunteers. See the P-Patch program.

COOPERATIVE OWNERSHIP
When people buy land cooperatively, or buy adjacent land and farm it cooperatively.

FOR PROFIT
Operating a farming business in an urban area. This can happen on a rooftop (see Bluma Farm), in grow rooms, on a single property or on multiple properties.

GUERRILLA GARDENING
Growing food on public or private property when it is not sanctioned by the "owner" or legal authority. See The Garden in South Los Angeles.

NON-PROFIT
Urban farms often operate as educational centers and are funded through grants and donations. See Danny Woo Gardens.

PARKS DEPARTMENT
Some urban farms operate on and are managed through local parks departments. See Alemany Farm.

RESIDENTIAL
Produce that is grown in people's homes, either by the homeowners/tenants or through a landscaping service that may also process and/or the food. See Pine House Edible Gardens,

SCHOOLS
Food is grown in many schools from elementary schools to college. School gardens ate managed by teachers, parents, students and other volunteers. See Edible Schoolyards and UC Santa Cruz's Urban Farm.

Image Citation: https://www.berkeleyside.com/2019/06/17/flowers-in-the-sky-these-crops-grow-on-a-berkeley-rooftop

Bluma Farm Growing Flowers on Rooftops in Berkeley, CA

Image Citation: https://www.latimes.com/local/lanow/la-me-ln-south-central-farm-alameda-industrial-businesses-20190702-story.html

The Garden was a Community Garden on Disputed Land in South Los Angeles

Personal Photo @ Pine House Garden

Personal Photo @ Pine House Garden

Pine House Edible Gardens is a California Company which Grows Food for Clients in their own Back-yard

DISTRIBUTION

Distributing food from urban farms requires taking into account local regulatory frameworks and existing opportunities for distribution. Some urban farms are funded through the government or private donors allowing them to make the food produced available for free or at cost to those in need while others need the income from their produce to sustain themselves.

CSA
Community Supported Agriculture: Costumers buy shares which they usually either pick up at the farm or a designated location (like a community center). See Intervale Community Farm.

FARM TO TABLE
Produce is grown specifically for a restaurant, sometimes nearby and sometimes on the same property. In an urban context, this can also happen indoors with grow lights.

FARMER'S MARKET
(Often) pop-up rows of farm stands where farmers sell directly to costumers. See The Free Farm Stand in San Francisco.

FOOD HUB
Intermediary which collects foods from multiple farms and sells to vendors or restaurants.

FOOD TRUCK
Trucks which operate as a mobile co-op/grocery store. Food trucks can address urban "food deserts" where there is no or limited access to fresh produce. See Farm Mobile in Atlanta.

FORAGING/GRAZING/GLEANING
Passersby can harvest produce. Organized gleaning programs pick and consolidate unused produce. See Beacon Hill Food Forest.

GROCERY STORE/CO-OP
Farms selling to a retail market which then sells produce to costumers. This is often less lucrative for farmers than CSAs or farmers markets.

WORK/TRADE
Food is distributed to people who work on the property, often through woofing, internships, employer sponsored volunteer days or drop in volunteering

Image Citation: https://missionlocal.org/2011/10/the-free-farm-stand-will-stay-city-says/

The Free Farm Stand Consolidates and Distributes Food in San Francisco'sMission District

Image Citation: https://www.facebook.com/farmmobile

Image Citation: https://www.facebook.com/farmmobile

The Farm Mobile was a Food Truck Selling Fresh Farm Produce in Atlanta, GA

Personal Photo

Volunteers at San Francisco's Alemany Farm Take Home Produce in Exchange for their Work

RESOURCES: Country Wide database for Urban Tree Harvesting Groups https://www.villageharvest.org/harvestingdirectory | ATTRA- Sustainable ag internships, jobs, events, online resources https://attra.ncat.org/urban-agriculture/ | CIVIL EATS-Digital news source looking at American food system, policy and equity https://civileats.com/

OTHER FARMS OF NOTE: https://commonrootsfarm.org/ (cooperatively owned urban farm catering to people with and without disabilities in Santa Cruz, CA) | https://www.intervalecommunityfarm.com (urban farm cooperatively owned by CSA members with hired employees in Burlington, VT) | https://canticlefarmoakland.org/ (urban farm and intentional community in Oakland, CA) | https://www.patchworkcityfarms.com/ (CSA, farm to table and market farm in Atlanta, GA).

Nathan Hale High School Horticulture Program
Seattle, WA

RAISED BEDS

Billie Guilliatt

BENEFITS

+better drainage in winter

+soil is warmer in spring and fall

+avoids soil compaction

+physically accessible for users in wheelchairs or those who have a hard time bending or kneeling

+easier weed & pest control

+lower perennial weed pressure

+on sites with poor soils, raised beds may require less time, energy, and compost than amending the entire site

+makes it easy to tailor beds to specific plantings such as lower pH for blueberries, lower pH for brassicas, sandy soil for root vegetables, etc.

CHALLENGES

-better drainage in summer, means more watering

-requires regular addition of organic matter

-soil is harder to till or dig

-once established, perennial weeds such as bind weed can be hard to remove completely

CONSIDERATIONS

Location:

Raised beds should be located near an irrigation source for easy access to water for plants, especially during summer months.

While some herbs and leafy greens can be successfully grown in part shade, locating raised beds where they get a decent amount of sun exposure (6+ hrs per day) is idea for growing a variety of crops.

Raised beds cannot be used on a slope without adaptations that make it basically a terrace rather than a raised bed.

Design:

The maximum width of the beds should be 2-4 ft across so you can reach all areas without stepping into the bed.

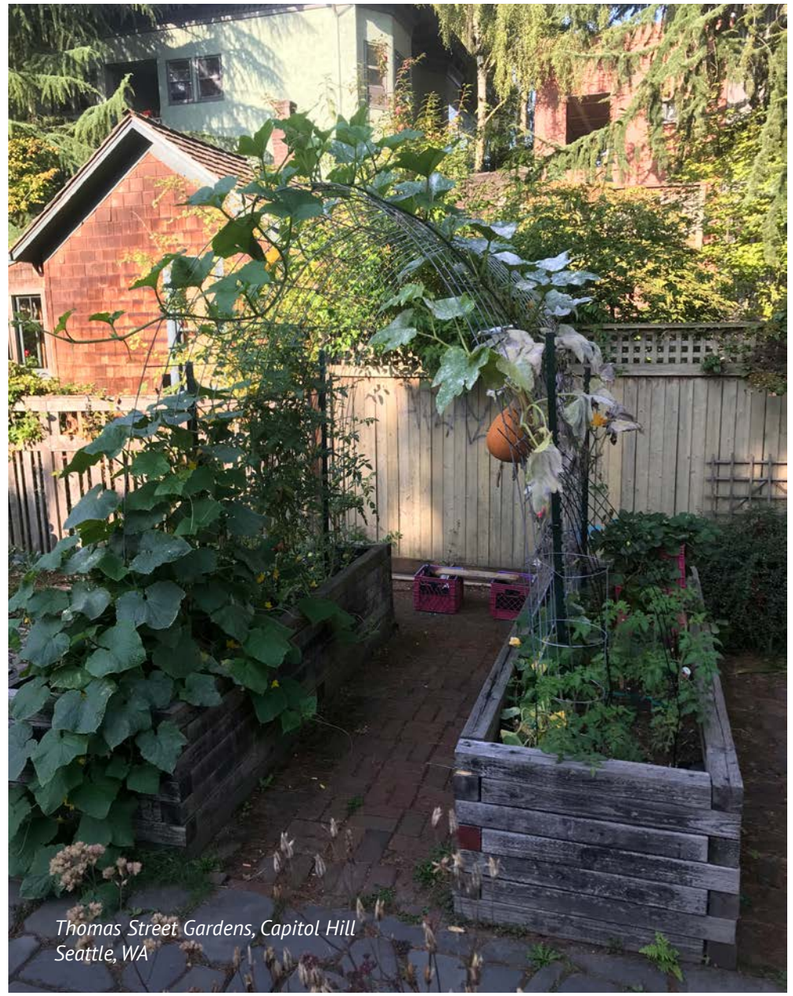
Paths between beds should be designed to allow for easy access, including passage of wheelbarrows. Paths also require maintenance.

Most vegetables need at least 6" of soil. 12-18" will accommodate most crops. Root vegetables need a deep, friable soil for best growth.

Materials:

Raised beds require quite a bit of soil and it has to come from somewhere. Bringing in topsoil is an additional cost and topsoil harvesting may have ecological implications, when possible try to educate yourself on where the topsoil you are getting is coming from. All soils used for food production should be tested for heavy metals and other contaminants.

Simple mounds can be used as raised beds. Accessible and low-cost, these mounds will need to be reconstructed annually. Other materials such as wood and cinderblocks are often used to construct raised beds. Wood used for edible garden beds should be free of contaminants - avoid older, pressure-treated lumber and railroad ties. Wood will rot eventually and may harbor some pests, but does not have to reconstructed annually, and is lighter than cinderblocks. Wood is very commonly used and many DIY plans are available online. Cinderblocks require a bigger time and money investment upfront, but would last the longest of these options.



Thomas Street Gardens, Capitol Hill
Seattle, WA

NewHolly Rockery Community Garden and Market Garden
Seattle, WA

Private Residence in Magnolia
Seattle, WA

Private residence in Columbia City
Seattle, WA

RESOURCES

Berle, David Christian. “Extending the Crop Season: Unheated Spaces.” University of Georgia Extension, February 1, 2013. https://extension.uga.edu/publications/detail.html?number=C1027-3&title=Raised Beds vs. In-Ground Gardens.

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Polomski, Bob, Bob Polomski, Debbie Shaughnessy, and Burgess. “Raised Beds.” Clemson University Cooperative Extension, August 1, 2017. https://hgic.clemson.edu/factsheet/raised-beds/.

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University of California. “Raised Bed Gardening.” Inyo-Mono Master Gardener Program. https://ucanr.edu/sites/mginyomono/Resources/Vegetables/Raised_bed_gardening/.

“What Are the Benefits of Raised Beds and How Can I Construct One.” UNH Extension. https://extension.unh.edu/blog/what-are-benefits-raised-beds-and-how-can-i-construct-one-myself.

WALL CLIMBERS AND CANOPY

Shelly Woo

Overall general benefits:

noise buffer, safety
aesthetics,shade

living walls and roofs

provides habitat

mitigates loss of species

act as water reservoir

provides food
solace, refuge, reflection

SF MOMA LIVING WALL
https://habitathorticulture.com/projects/sfmoma

SF MOMA LIVING WALL

pollinator habitat-birds, bees, butterflies, insects, has vines, aesthetically pleasing, using stormwater

Vines

Shrubs

Espalier

Canopy

Beacon Hill Food Forest, Seattle

Beacon Hill Food Forest has community p-patches as well as a design provides a less strict design plan but a more playful and exploratory food forest. The public is able to just pick food that is ripe and explore the grounds freely. This precedent can serve as a social justice food lens where people who roam can find raspberries, figs, apples, and other yummy food.

Danny Woo Community Garden, Seattle

Danny Woo has a variety of vines, shrubs, as well has a canopy of fruit trees on their farm. Many vines are used to stabilize certain DIY struc-tures while also providing a way to grow food on every type of open space available.

Meadowbrook Community Gardens and Orchads, Seattle

Meadowbrook has a pretty expansive orchard which grows figs, quinces, apples, pears, and more.

Image: greenroofs.com

California Academy of Sciences Living Roof, San Francisco

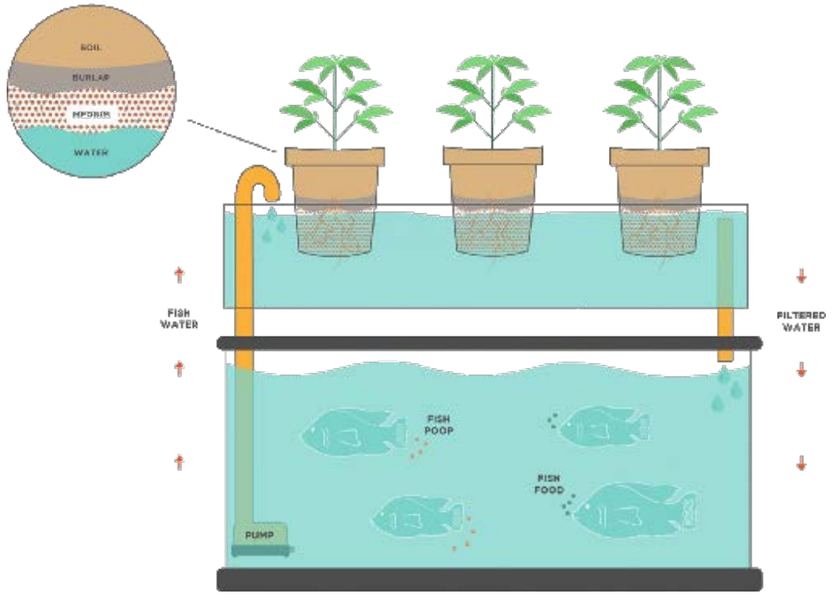
provides shade, canopy, education, stormwater runoff, filters pollutants, microclimates and native plants

ANIMALS ON URBAN FARMS

Xinyu Xu

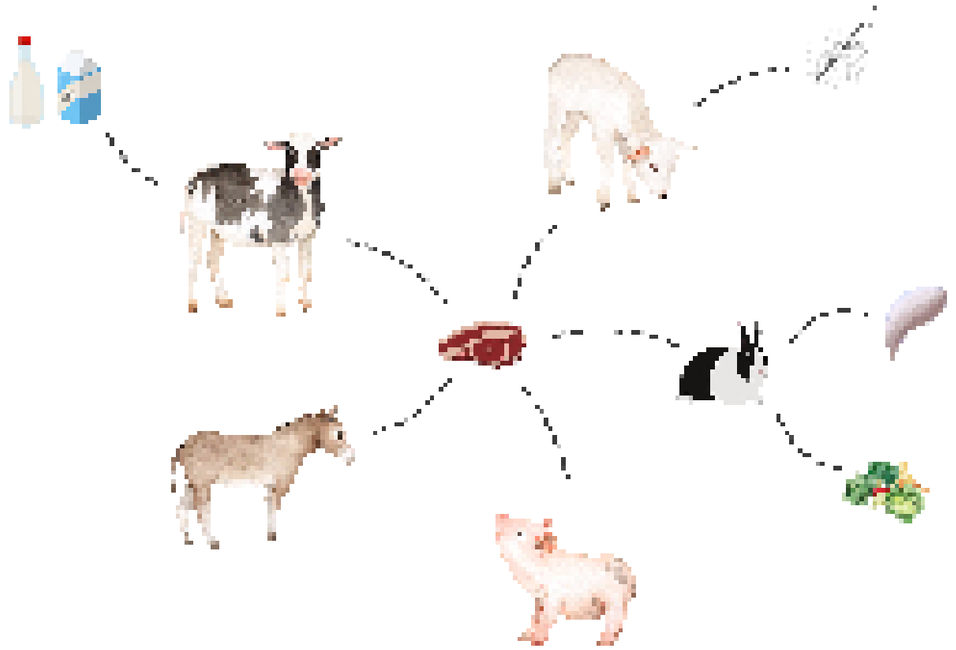
image source: https://www.cocomidori.com/post/83799894541/2010-shiga

Animals In Water



https://aquaponictrend.blogspot.com/2018/06/emerald-aquaponic-farm.html
reference Leafly

Animals In Land



Animals In Sky

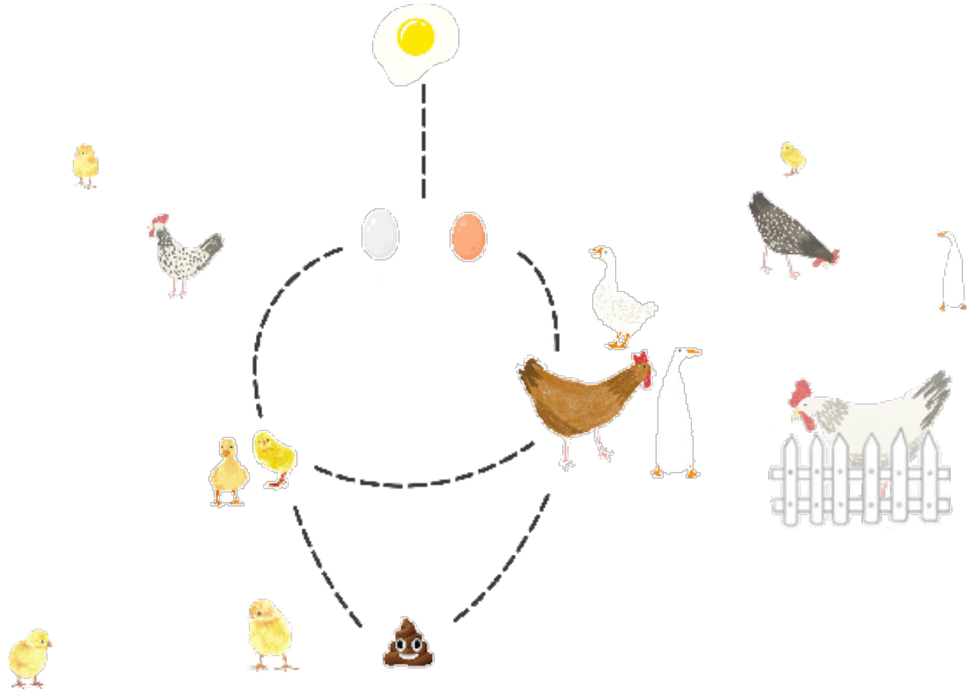


Figure1 Permaculture https://maddieraithby.co.hk

PERMACULTURE PRINCIPLES AND PRACTICES

Yuqing Zhang

Permaculture is becoming an increasingly popular toolbox of ideas for farmers and gardeners. "It is a system for designing agricultural landscapes that work with nature… I like to call it edible restoration, since the tools used in permaculture can help to restore land as well as yield food for humans." —Stross, Amy, and Bayne, Becky. ***The Suburban Micro-Farm : Modern Solutions for Busy People***. Full colored., Twisted Creek Press, 2018.

One of the reasons why a definition of permaculture is so elusive and varied from source to source is because the approach pulls together a wide range of disciplines such as "ecology, appropriate technology, economics, gardening, evolution, construction, energy systems, social justice, and a raft of other seemingly disconnected fields".

The important thing to note is that permaculture is most often used for creating efficient and productive landscapes that sustain themselves into the future by regenerating biodiversity and lost fertility.

Source: "What Is Permaculture?" Tenth Acre Farm, 21 Apr. 2015, https://www.tenthacrefarm.com/what-is-permaculture/.

DEFINITION

"A way for humans to consciously design systems that support ourselves - food production, energy, buildings, trans-portation, technology, even human relationships and financial systems- while acknowledging our roles as equal, co-creative members of natural ecosystems with the ability to regenerate our environment while we're providing for our own needs."

Source: Neiger, Jono. The Permaculture Promise: What Permaculture Is and How It Can Help Us Reverse Climate Change, Build a More Resilient Future on Earth, and Revitalize Our Communities. Storey Publishing, 2016. p11

WHAT IS PERMACULTURE

"A. Design that considers whole systems
A whole system, by definition, comprises all the parts and factors that contribute to the system's dynamic self-sufficiency and function....
Landscape, communities, even organizations are like natural ecosystem—the more they're interconnected and diverse as a whole, the healthier and more resilient they become, and the less waste they generate.

B. A way for humans to be more resilient in a time of climate instability
C. A positivist approach to the challenges of our times"

Source: Neiger, Jono. The Permaculture Promise: What Permaculture Is and How It Can Help Us Reverse Climate Change, Build a More Resilient Future on Earth, and Revitalize Our Communities. Storey Publishing, 2016. p15-18

HISTORY

"The term 'permaculture' was originally coined by Bill Mollison and David Holmgren in their book Permaculture One(1978) as a contraction of 'permanent' and 'agri-culture.' Its etymology reflects the early concept of permaculture as primarily focused on agriculture. By the early 1980s, the definition had expanded in scope to broadly encompass the ways in which people can live on the land and in communities. Now, there are as many definitions of permaculture a s there are permaculture designers--- it's like a language, in the sense that it's con-stantly evolving as people participate in and contribute to it."

Source: Neiger, Jono. The Permaculture Promise: What Permaculture Is and How It Can Help Us Reverse Climate Change, Build a More Resilient Future on Earth, and Revitalize Our Communities. Storey Publishing, 2016. p11

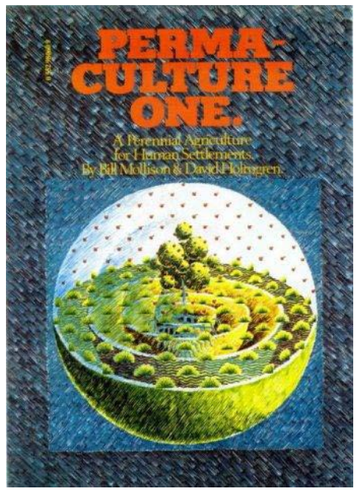


Figure2: Permaculture one https://www.abebooks.com/Permaculture-Perennial-Agricultural-System-Human-Settlements/

PERMACULTURE PRINCIPLES

"1.Observe and Interact with Nature
2.Catch and Store Energy
3.Obtain a yield
4.Apply Self Regulation and Accept Feedback
5.Use and Value Renewable Resources and Services
6.Produce No Waste
7.Design From Patterns to Details
8.Integrate Rather Than Segregate
9.Use Small and Slow Solutions
10.Use and Value Diversity
11.Use Edges and Value Marginal
12.Creatively Use and Respond to Change"

Source: "Permaculture." Wikipedia, 31 Jan. 2020. Wikipedia, https://en.wikipedia.org/w/index.php?title=Permaculture&oldid=938557480.

COMMON PRACTICES

Hügelkultur

Hügelkultur is the practice of "burying large volumes of wood to increase soil water retention. "The porous structure of wood acts as a sponge when decomposing underground. During the rainy season masses of buried wood can absorb enough water to sustain crops through the dry season. This technique has been used "by permaculturalists Sepp Holzer, Toby Hemenway Paul Wheaton, and Masanobu Fukuoka."

Source: "Permaculture." Wikipedia, 31 Jan. 2020. Wikipedia, https://en.wikipedia.org/w/index.php?title=Permaculture&oldid=938557480.

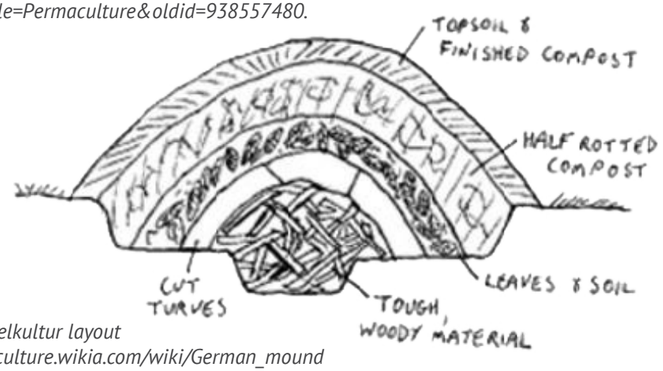


Figure3 Hügelkultur layout http://permaculture.wikia.com/wiki/German_mound

Sheet mulching

In agriculture and gardening, mulch is a protective cover placed over the soil. Any material or combination can be used as mulch, "such as stones, leaves, cardboard, wood chips, gravel, etc.," though in permaculture mulches of organic material are the most common because they perform more functions. "Sheet mulching is an agricultural no-dig gardening technique that attempts to mimic natural processes occurring within forests."
"Sheet mulch serves as a 'nutrient bank' storing the nutrients contained in organic matter and slowly making these nutrients available to plants as the organic matter slowly and naturally breaks down."

Source: "Permaculture." Wikipedia, 31 Jan. 2020. Wikipedia, https://en.wikipedia.org/w/index.php?title=Permaculture&oldid=938557480.

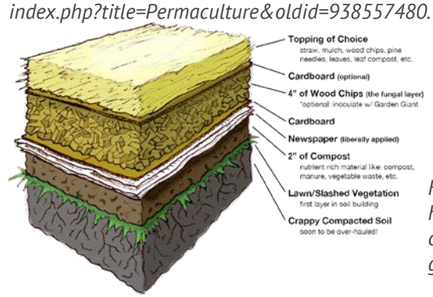


Figure4 Sheet mulching http://veganslivingofftheland.blogspot.com/straw-bale-layering-lasagna-gardening.html

Rainwater harvesting

"Rainwater harvesting is the accumulating and storing of rainwater for reuse before it reaches the aquifer. It has been used to provide drinking water water for livestock, water for irrigation, as well as other typical uses. Rainwater collected from the roofs of houses and local institutions can make an important contribution to the availability of drinking water. It can supplement the subsoil water level and increase urban greenery. Water collected from the ground, sometimes from areas which are especially prepared for this purpose, is called stormwater harvesting. "

Source: "Permaculture." Wikipedia, 31 Jan. 2020. Wikipedia, https://en.wikipedia.org/w/index.php?title=Permaculture&oldid=938557480.

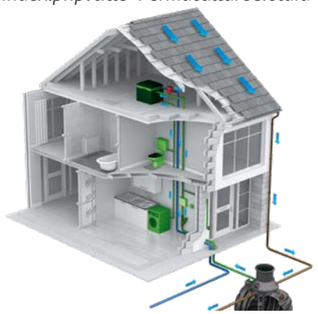


Figure5 greenhouse https://www.whatgreen-home.com/safe-effective-installation-rainwater-harvesting-systems/

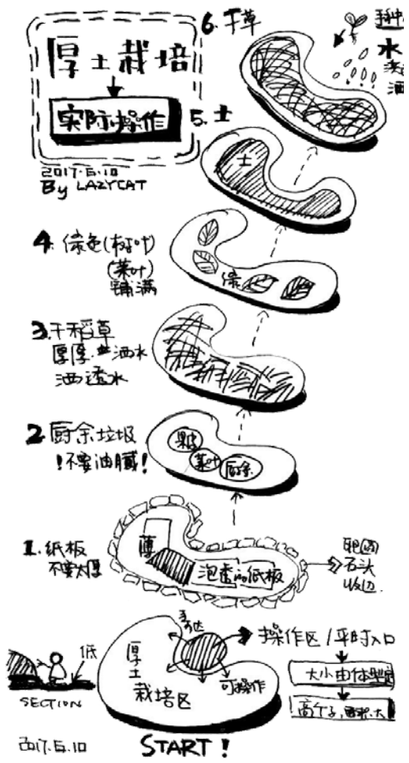
Food Forest

A food forest is a gardening technique or land management system, which "mimics a woodland ecosystem by substituting edible trees, shrubs, perennials and annuals. Fruit and nut trees make up the upper level, while berry shrubs, edible perennials and annuals make up the

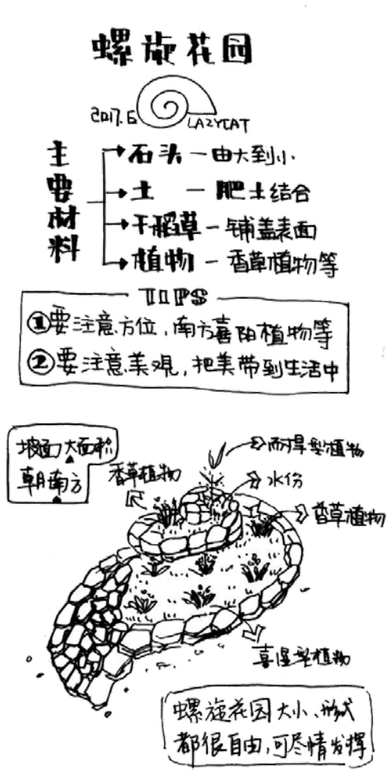
Source: "Permaculture." Wikipedia, 31 Jan. 2020. Wikipedia, https://en.wikipedia.org/w/index.php?title=Permaculture&oldid=938557480.

Figure6 Food forest system http://www.permaculturereaction.org/food-forest-living-web/

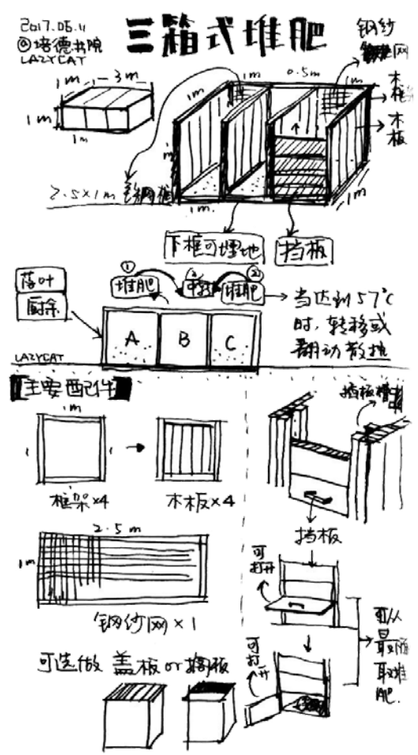
SHEET MULCHING



HELICAL GARDEN



COMPOSED CANS



WORM HOUSE

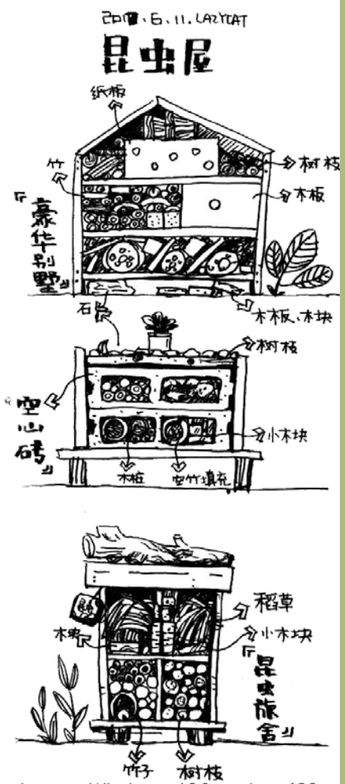


Figure7 Sketches of permaculture https://mp.weixin.qq.com/01f843cb7f30e85dc7f3cec9df12ed5&ascene=1&uin=MTQwMjg1MzQ4MQ%3D%3D&devicetype=Windows+10&version=62070158&lang=zh_CN&pass_ticket=U9tpkW6SiryBkVTBfOnKFYCc3itN8KjQaEdRkG0sU5Ev5e7aHVO90TLCdzj2ZUamweb/

The case study comes from a workshop in China. The participants draw the sketches about 4 ways practiced in permaculture. The first way is using composed things such as soil and grass to make a sheetmulching. The second way is constructing a garden by stones. The third approach is using woods to make composed cans. The last one is worm house, constructed by bricks, stones and woods to create a warm and wet envrionment for worms.

FORAGING NATIVE ECOLOGY

Stuart Johnson

F O R A G I N G

PUGET SOUND NATIVE ECOSYSTEMS

FOR FOOD AND MEDICINE

The relationship between people and plants is known as ethnobotany. Over 130 native plants in the region are traditional food sources for the Coast Salish.

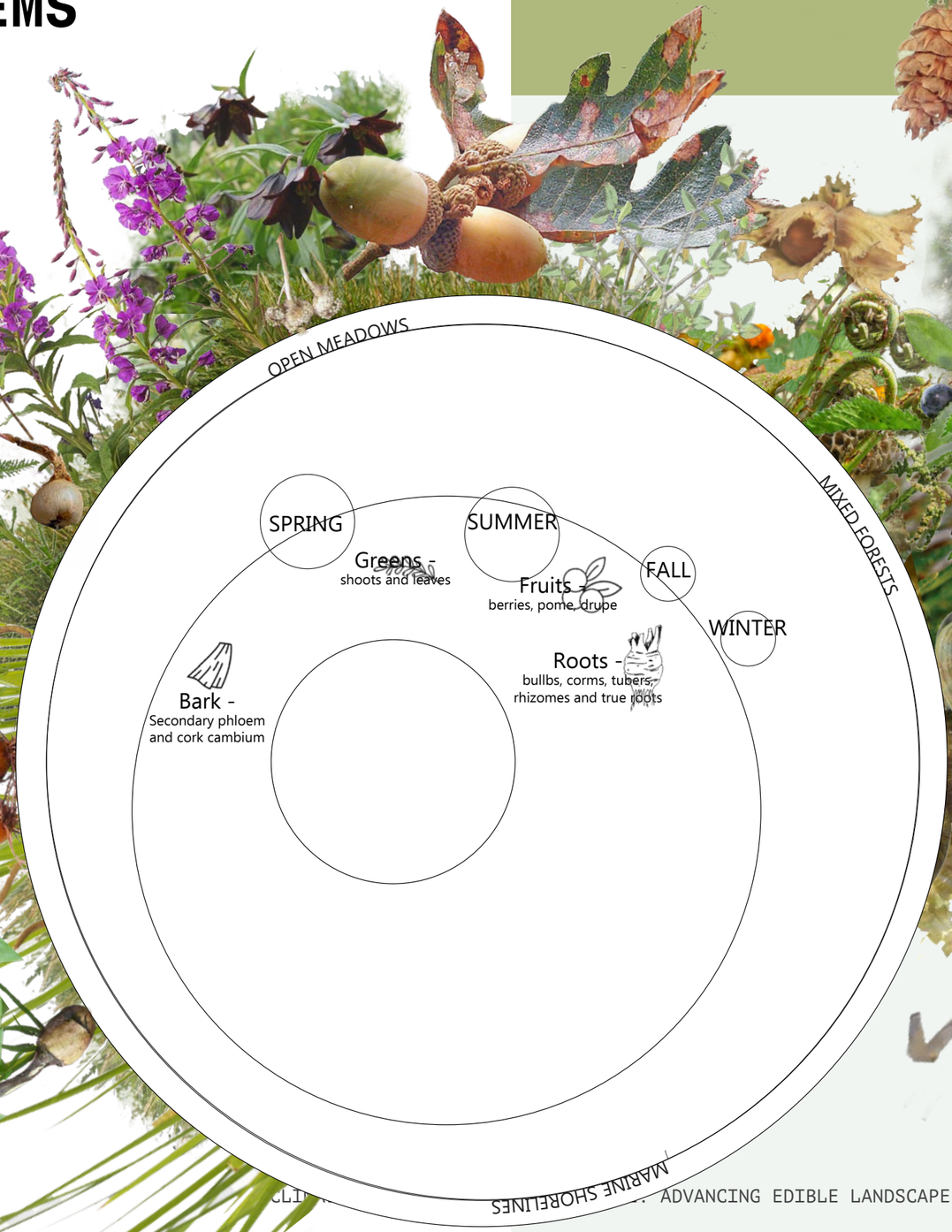
Early in Spring, the sweet tender young shoots and greens are harvested. When the sap starts running, the cambium and inner bark are eaten.

Summer brings a wide spectrum of berries ripening in succession.The Lily family bulbs are dug.

Fall fruits are picked and root vegetables are dug up for immediate consumption or winter storag.

Plants are collected for medicinal uses such as for making teas, salves, tonics, so, and other healing or protective solutions.

Edible native plants exist across Seattle and can be effective in many public landscapes.



SOURCES:

Pojar and Mackinnon, *Plants of the Pacific Northwest Coast. 2016*
www.arcadianable.blogspot.com. Wild Harvests
www.skagitbeaches.org/history/coast-salish-food-traditions.html
http://dnr.wa.gov/seaweed
http://wnps.org/blog/tags/edibleplants
http://wdfw.wa.gov/fishing/shellfishing-regulations

AQUACULTURE PRACTICES AND PRINCIPLES

Niccolo Piacentini

AQUACULTURE

in the Urban environment

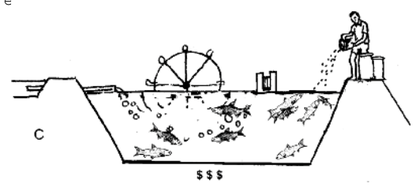
"Urban aquaculture encompasses a broad array of activities, varying from large-scale extensively managed culture-based fisheries like those in the East Kolkata Wetlands to intensive and high-tech production of freshwater and marine fish in tanks" (Bunting 1) .

Intensive

dependence on externally supplied high-protein feed

There are two primary intensive aquaculture systems to produce fish intensivley that can be used in urban environments: recirculating aquaculture systems, and aquaponic systems. Aquaponic systems are devided between Coupled (DAS) and Decoupled (RAS) sytems. All of these sytems have high initial costs as well as high energy requirements to run; however, they offer dif-

they can be e

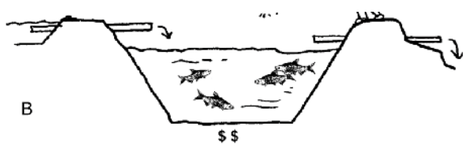


Semi Intensive

exploitation of waste resources and fertiliser applications to enhance natural production and /or the provision of basic supplementary feed

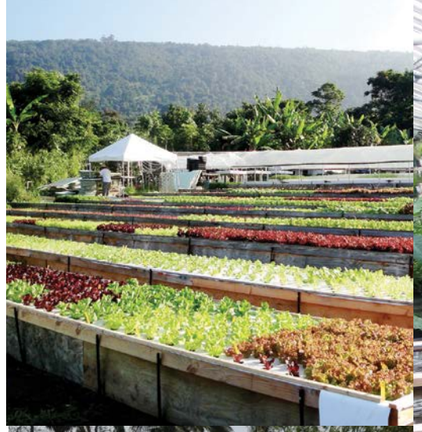
"Unlike aquaculture in reservoirs and large lakes, pond-based aquaculture offers farmers greater control over management and permits better surveillance, enabling producers to guard against theft, predation and contamination. counts of semi-intensive pond-based aquaculture in urban settings reported for several counties, including Cuba, Ghana and Tanzania

Heck and



https://www.canfishfarmingfeedus/photo-bucket-peoplewithnets

https://www.aquaponicfarmersinitiative.org

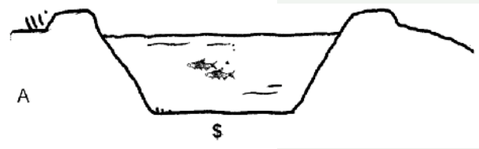


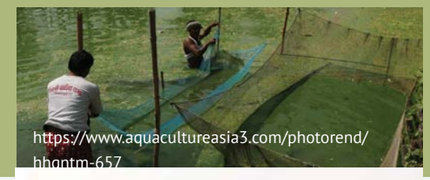
https://www.seasiaaquaculture/photo/farm-building/

Extensive

natural production enhanced indirectly through nutrient rich surface runoff and drainage water

"Extensive aquaculture is practised in a number of urban settings; the most notable approach consists of stocking fish in reservoirs and large urban water bodies, followed by recapture after a period of 1-2 years" (Bunting 4). The most notable difficulties are managing these extremely complex ecosystems while also allowing for other sometimes conflicting activities that these bodies of water also support. This type of aquaculture should only be employed in specific situations, it is most prevalent in South America, Asia and some parts of Africa.





https://www.aquacultureasia3.com/photorend/hhgptm-657

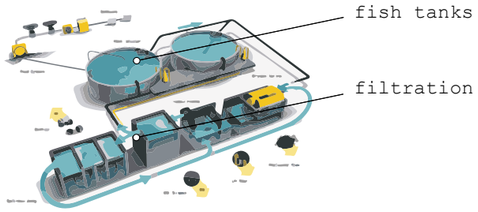
https://www.jonbarron.org/article/fish-farming

https://careers2030.cst.org/jobs/aquaponic-fish-farmer/

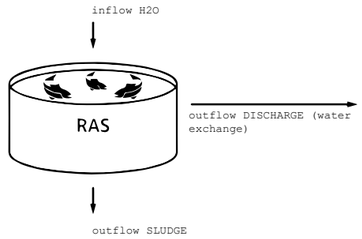
Sources:
Bunting, Stuart W. Principles of Sustainable Aquaculture : Promoting Social, Economic and Environmental Resilience. Abingdon, Earthscan, 2013.
https://www.researchgate.net/figure/A-extensive-B-semi-intensive-and-C-intensive-fish-farming-methods_fig2_242179738

Intensive

RECIRCULATING AQUACULTURE SYSTEM (RAS)

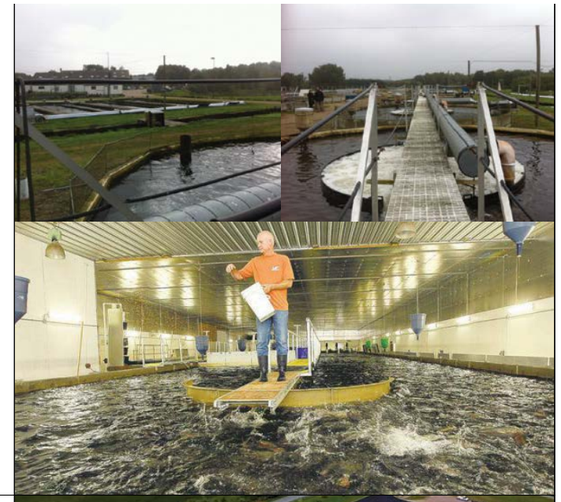


This is a closed loop system where fish are fed, then the waste water is cleaned mechanically and recirculated through the fish tanks. While it saves water, waste still needs to be disposed of off site.



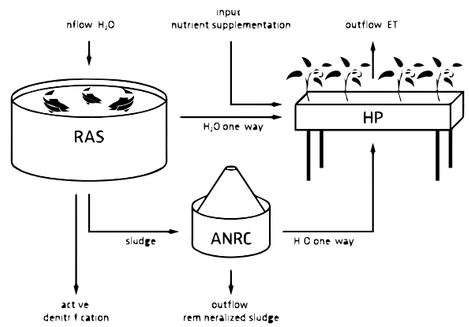
DANISH TROUT FARMS
DENMARK
www.agribenchmark.org

The Danish trout sector is traditionally dominated by pond aquaculture. The tightening of environmental regulations in recent decades has led to an ongoing restructuring of the Danish trout farming: Larger farms using recirculating techniques internalize the costs of effluent discharge and enhance productivity.



DECOUPLED AQUAPONIC SYSTEM (DAS)

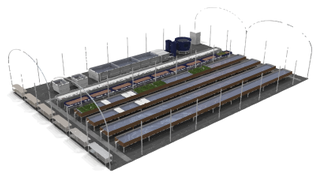
This is a system that optimizes aquaponic production by decoupling the plants from the fish, essentially creating a RAS system, whose waste feeds a hydroponic system. This technology is showing a lot of promise b/c it takes waste that would normally be produced in RAS and reuses it on site.



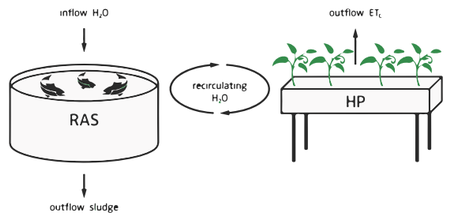
CASE STUDY: Superior Fresh, Hixton, Wisconsin, USA
https://www.superiorfresh.com

Superior Fresh, the world's largest aquaponics facility, located in rural Hixton, Wisconsin, opened in August 2017 with a vision to change the world through sustainable agriculture and healthy food. Its 123,000-square-foot greenhouse and 1-acre fish farm provide leafy greens to retailers, restaurants, schools and hospitals all over the Midwest.

COUPLED AQUAPONIC SYSTEM (AS)



This is a system that combines fish farming and hydroponic vegetable growings within the same circuit. While it is relativley inexpensive and simple to set up, it does not maximize vegetable or fish growth.



CASE STUDY: Ecolife Innovation Center Escondido, CA, USA
https://www.ecolifeconservation.org

At Ecolife's Aquaponics Innovation Center at Escondido, over 200 pounds of food is grown and distributed to food banks each month. The non-governmental organization's mission is to provide education to the community about farming that reduces clear-cutting (the practice of uniformly cutting down trees) and uses land and water efficiently.

Semi Intensive

CASE STUDY: Chinampas, Mexico

Chinampas are small, strip-shaped islands creating a network of canals (Torres-Lima et al. 1994). This pre-hispanic crop system produced a wide variety of crops, based on integrated nutri- ent management from lake sediment, aquatic plants, crop and livestock residues; and on integrated water management including irrigation, waste decomposition and fishing. Along with the crops, several non-domesticated plants with medicinal, food or forage use were tolerated or encouraged (Jiménez-Osomio and Gómez-Pompa 1991).

CASE STUDY: Integrated Farming, Mekong Delta, Thailand

Integrated farming models, which combine rice cultivation and aquaculture (either fish or shrimp), have been implemented for decades in the Mekong Delta. This model enables the sustainable intensification of food production while diversifying income and decreasing farmers' vulnerability to crop failure. Typically, fish is cultivated communally during the flood season and the same land is cultivated individually with rice during the dry season.

Extensive

CASE STUDY: West Kolkata Wetlands, Bengal, India (Bunting 8)

Around Kolkata, West Bengal, India, urban aquaculture is practised in ponds covering an area of approximately 3,500 ha where the majority of production is based on wastewater inputs from canals draining the city.

CASE STUDY: Donghu Lake, Wuhan, (Bunting 10)

Culture-based fisheries in Donghu Lake, Wuhan, which covers 1,500 ha are dependent on stocking millions of carp, and providing nursery areas in dammed coves, net-barred bays and net cages to ensure fingerlings are only released when they are sufficiently large to avoid predation. Harvesting is undertaken after a year when fish are around 1 kg in weight.

WHAT IF?

What could we envision as new physical and operational models of urban agriculture, across a transect of highly urban to peri-urban site(s) and across short and longer timeframes, based on climate change projections and without current regulatory constraints?

- **Advance Resilience** [Through food security, biodiversity, environmental justice, adapting ecosystems, community connections]
- **Obstacles** [What obstacles need to be addressed and how may they be overcome?]

These quickly-developed conceptual projects boldly imagine scenarios of urban agriculture to provoke new thinking about our public landscapes and infrastructure.

WHAT IF WE IMAGINED UNEXPECTED PLACES AND EXPRESSIONS OF URBAN AGRICULTURE?

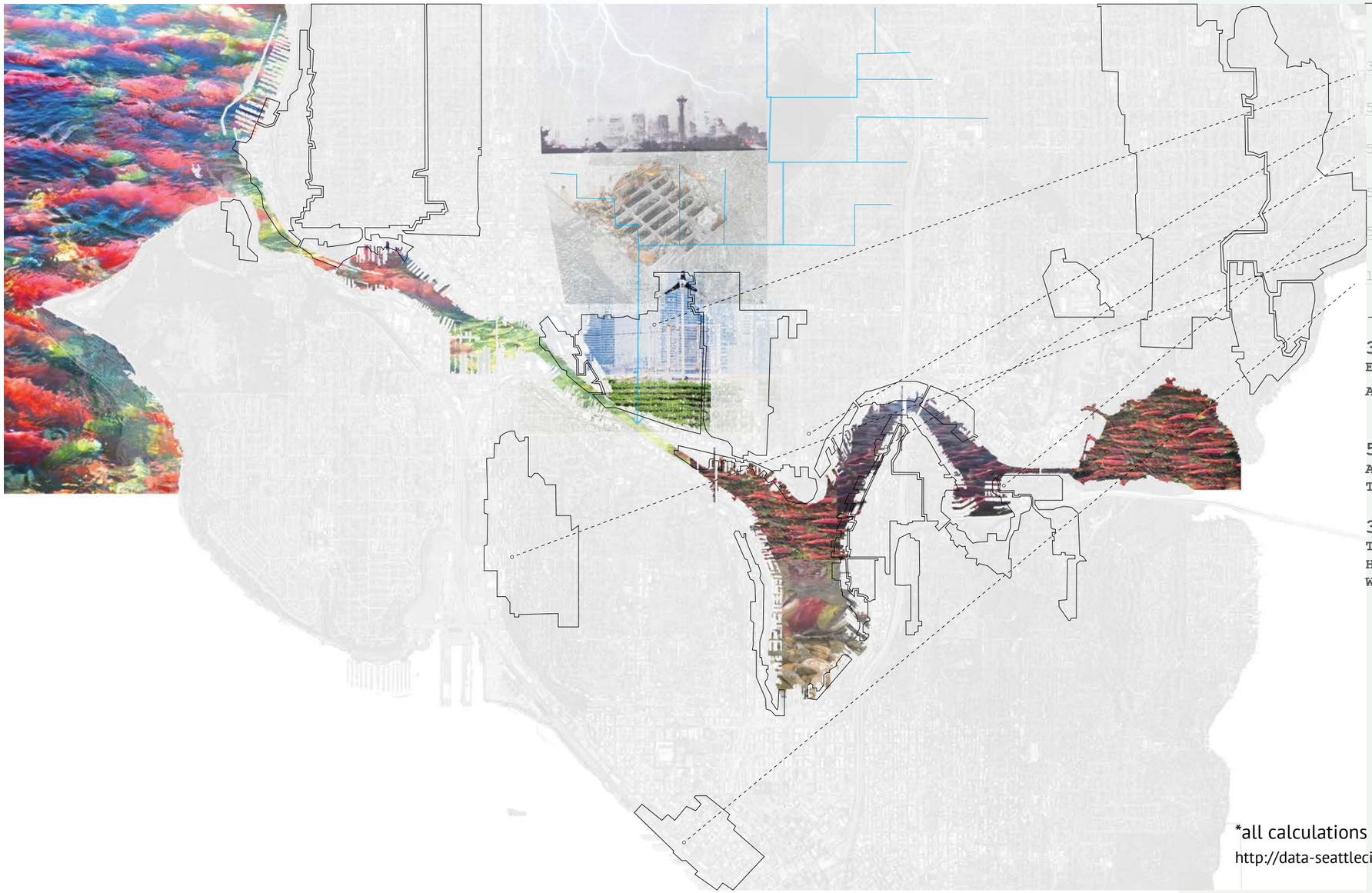
Niccolo Piacentini	From Stormwater Runoff to Production	: Seattle
Dorothy Mulkern	Libraries for Food	: Seattle
Emma Petersen	The Emerald City	: Seattle Center
Michelle Woo	Social Resilience, A Culinary Exhibit	: International District
Brian Deck	Green Lake Agro District	: Greenlake Park
Claudia Hennum	Agricultural Urbanism, Education, Innovation	: North Seattle College
YuqingZhang	Pollinator Cross Corridors	: I-5
Xinyu Xu	LID 1-5 Food Forest	: I-5
Stuart Johnson	Edible Trails	: West Duwamish Greenbelt

from RUNOFF to PRODUCTION

what if we could grow food with excess stormwater?

WHAT IF STORMWATER WAS USED TO PRODUCE FOOD?

Niccolo Piacentini



STORMWATER BASIN SURPLUS

300,000 LBS OF FOOD

50,000 LBS OF FOOD

50,000 LBS OF FOOD

50,000 LBS OF FOOD

50,000 LBS OF FOOD

10,000 LBS OF FOOD

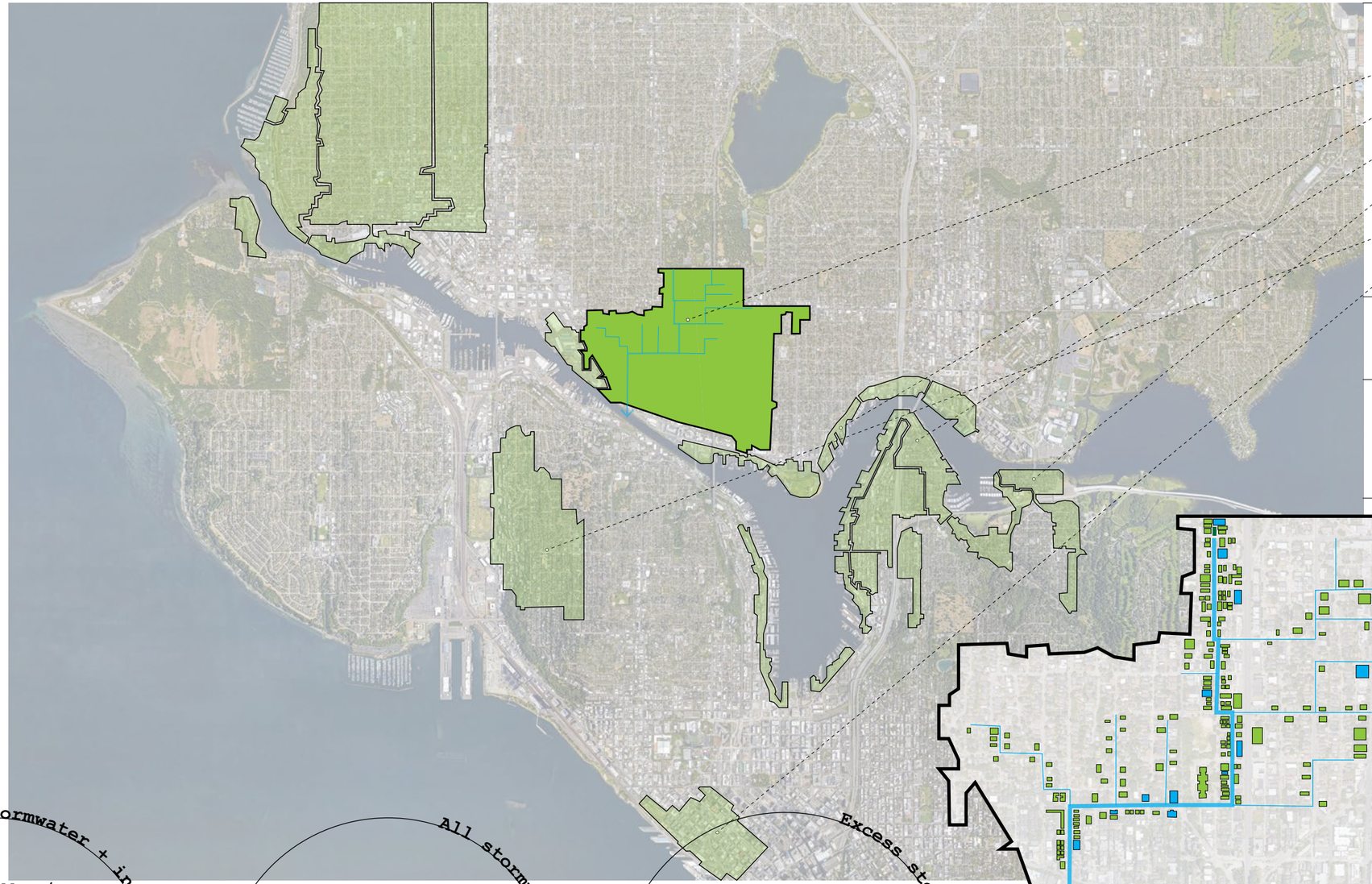
30,000,000 gallons/year
EXCESS WASTEWATER DUMPED INTO PUGET SOUND AND LAKE WASHINGTON EVERY YEAR

510,000 LBS/YEAR
AMOUNT OF FOOD THAT COULD BE GROWN WITH THAT WASTEWATER. 1/4 OF SEATTLE's DEMAND.

30,000 LBS/YEAR
THE SUSTAINABLE PRE INDUSTRIAL SALMON HARVEST FROM THE LAKE WASHINGTON WATERSHED

*all calculations were based on data from seattle.gov GIS layers
http://data-seattlecitygis.opendata.arcgis.com/datasets/drainage-basins

Combined Sewer Overflow Basins, Seattle Washington



STORMWATER BASINS

24,000,000 gallons/year

1,000,000 gallons/year

1,000,000 gallons/year

1,000,000 gallons/year

1,000,000 gallons/year

2,000,000 gallons/year

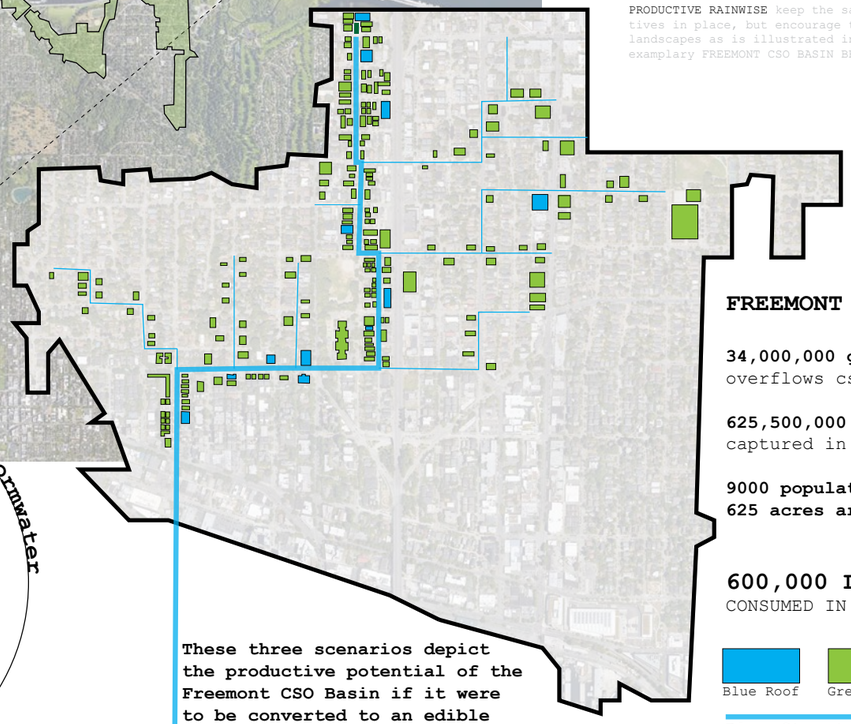
30,000,000 gallons/year
WASTEWATER DUMPED INTO ECOSYSTEM

CURRENT MANAGEMENT

RAINWISE PROGRAM gives rebates and incentives to install green stormwater infrastructure for both residential and commercial projects. This program that is already in place could easily be ammended to allow for the creation of edible landscapes as stormwater infrastructure.

PROPOSED MANAGEMENT

PRODUCTIVE RAINWISE keep the same program of incentives in place, but encourage the creation of edible landscapes as is illustrated in the sections and examplary FREEMONT CSO BASIN BELOW.



FREEMONT CSO BASIN

34,000,000 gallons
overflows cso yearly

625,500,000 gallons
captured in basin yearly

9000 population
625 acres area

600,000 LBS OF FOOD
CONSUMED IN A YEAR

Blue Roof Green Roof

Blue Street

These three scenarios depict the productive potential of the Freemont CSO Basin if it were to be converted to an edible landscape.

All stormwater + integrated ag

625,500,000 gallons/ year

600 acres of farmland

300,000 lbs of food

50% of total food demand

scenario 3

All stormwater

625,500,000 gallons/ year

600 acres of farmland

216,000 lbs of food

24% of total food demand

scenario 2

Excess stormwater

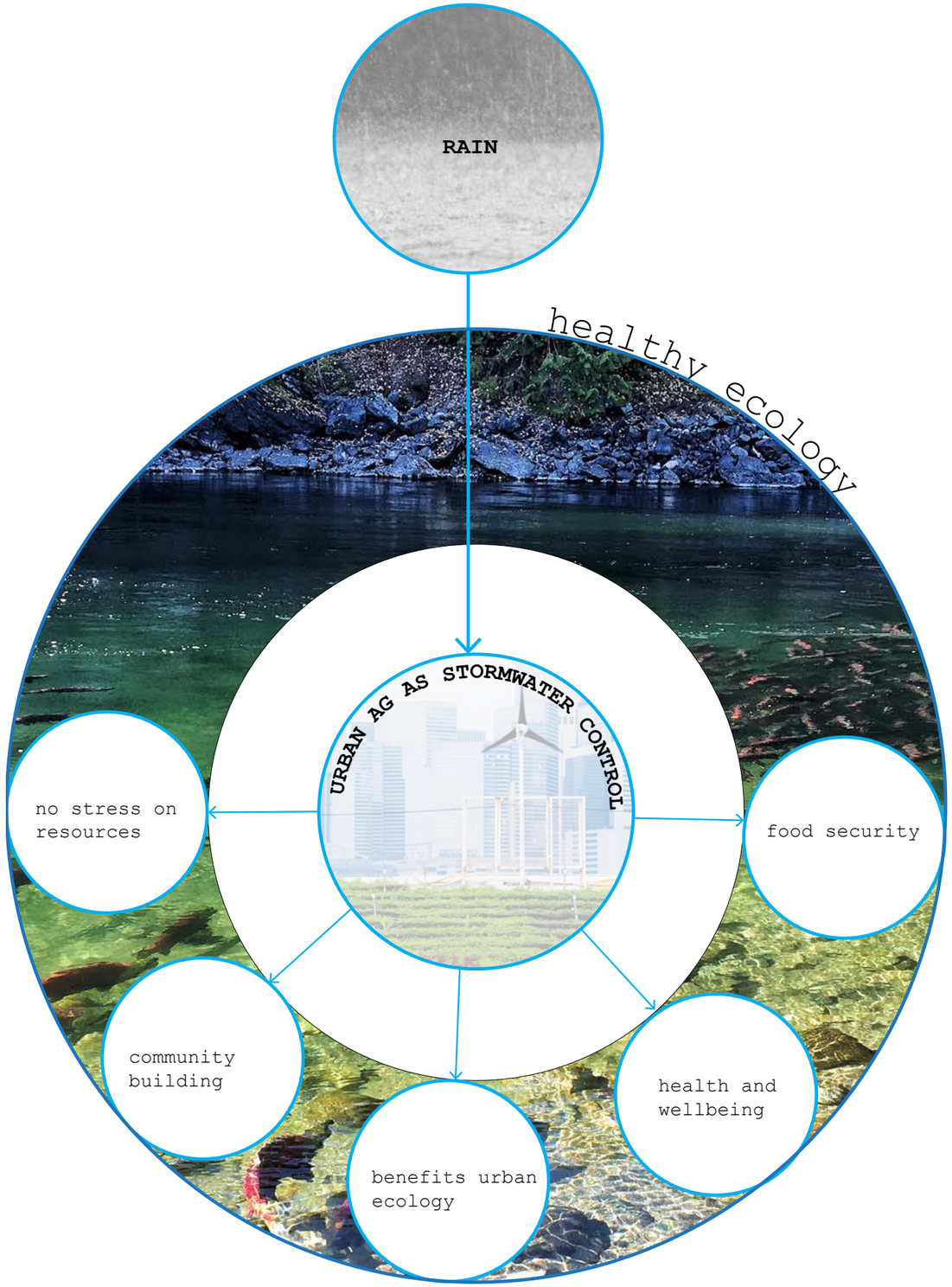
24,000,000 gallons/ year

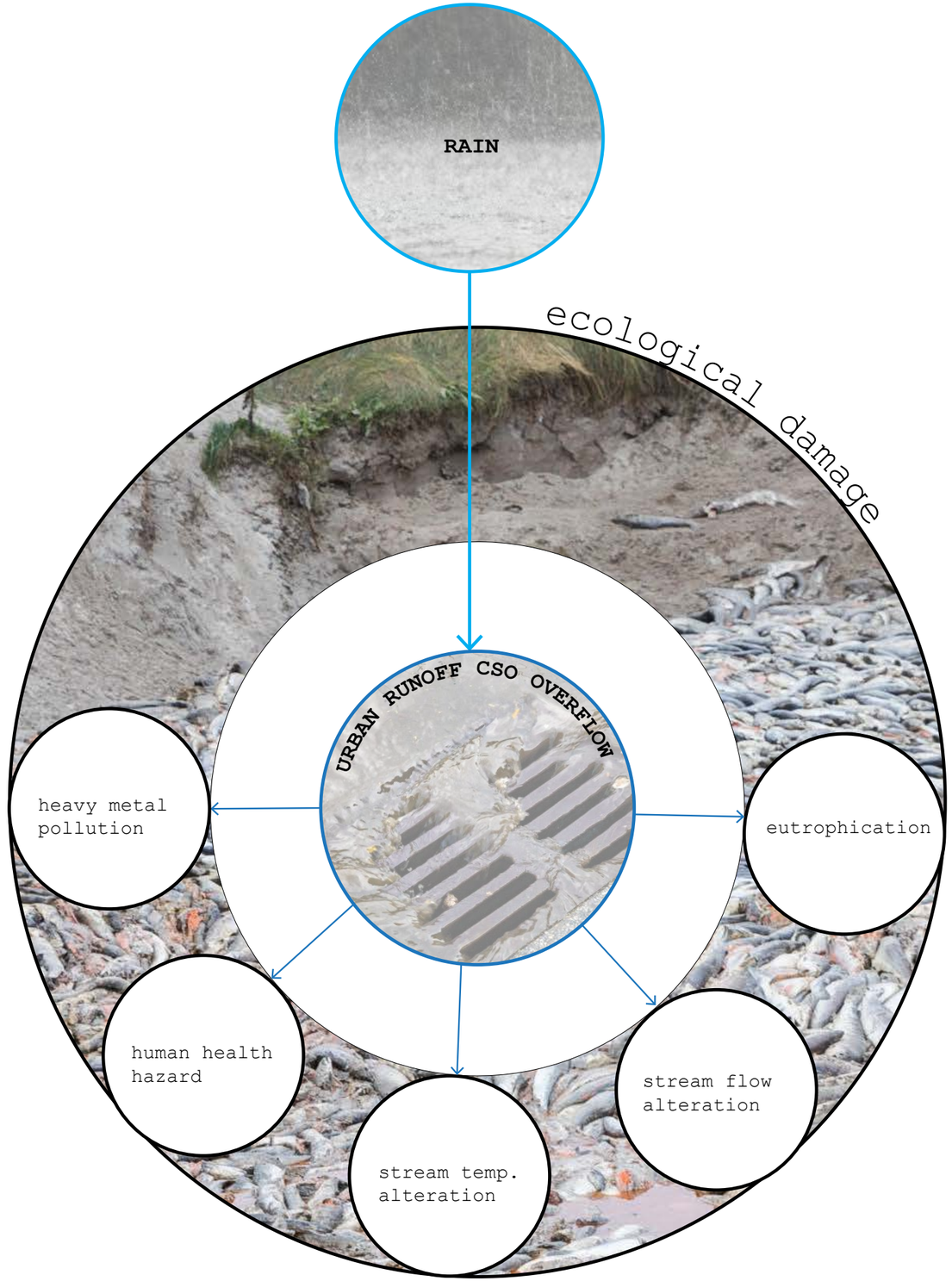
24 acres of farmland

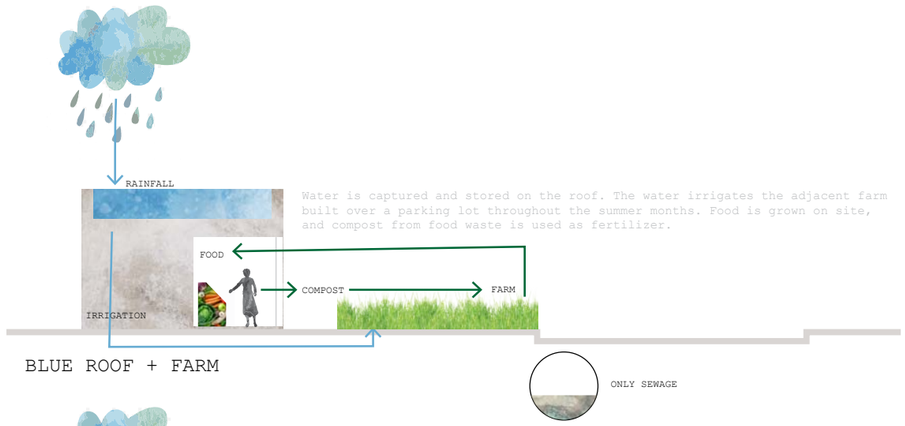
9000 lbs of food

5% of total food demand

scenario 1

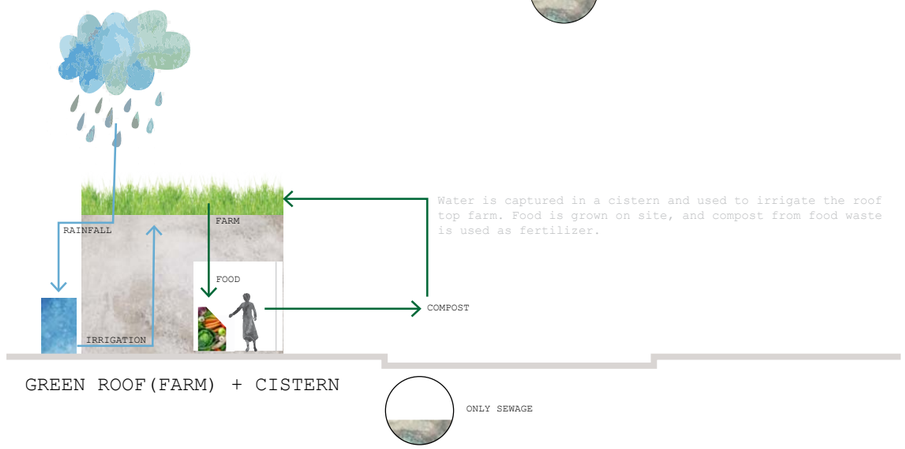

RAIN
healthy ecology
URBAN AG AS STORMWATER CONTROL
no stress on resources
food security
community building
health and wellbeing
benefits urban ecology


RAIN
ecological damage
URBAN RUNOFF CSO OVERFLOW
heavy metal pollution
eutrophication
human health hazard
stream flow alteration
stream temp. alteration



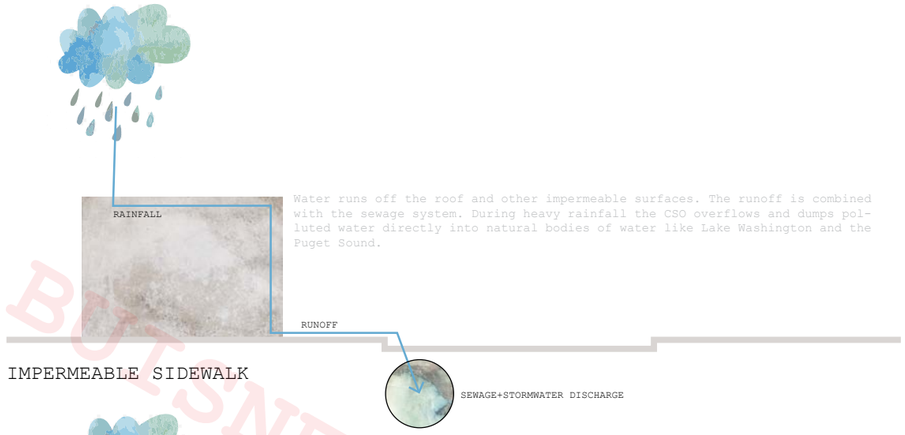
Water is captured and stored on the roof. The water irrigates the adjacent farm built over a parking lot throughout the summer months. Food is grown on site, and compost from food waste is used as fertilizer.

BLUE ROOF + FARM



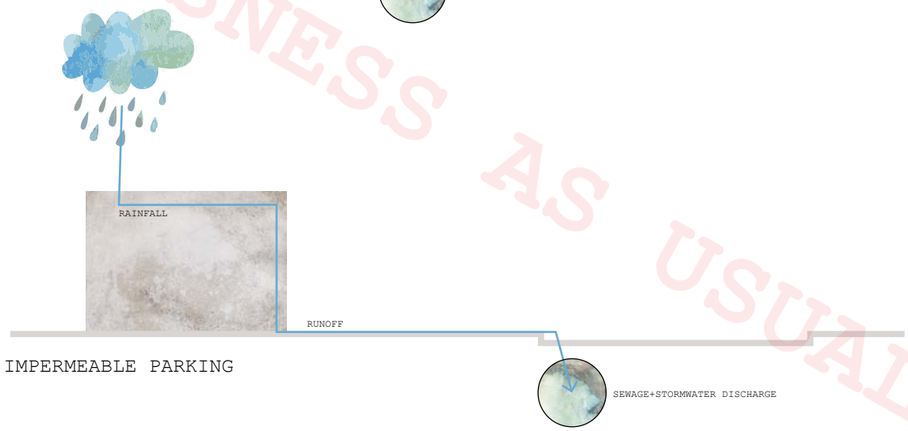
Water is captured in a cistern and used to irrigate the roof top farm. Food is grown on site, and compost from food waste is used as fertilizer.

GREEN ROOF(FARM) + CISTERN

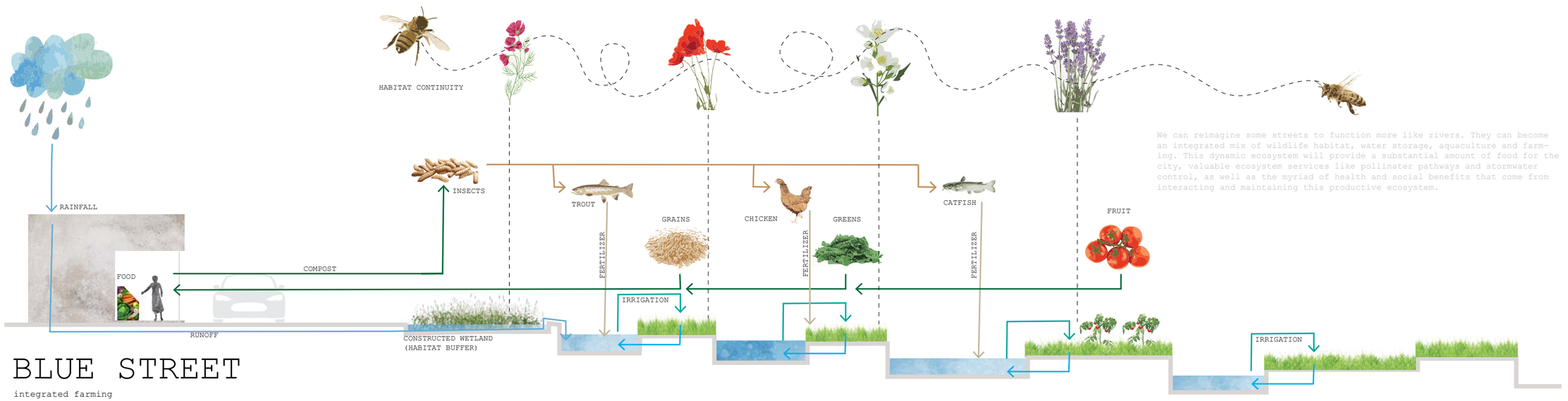


Water runs off the roof and other impermeable surfaces. The runoff is combined with the sewage system. During heavy rainfall the CSO overflows and dumps polluted water directly into natural bodies of water like Lake Washington and the Puget Sound.

IMPERMEABLE SIDEWALK



IMPERMEABLE PARKING



BLUE STREET

integrated farming

We can reimagine some streets to function more like rivers. They can become an integrated mix of wildlife habitat, water storage, aquaculture and farming. This dynamic ecosystem will provide a substantial amount of food for the city, valuable ecosystem services like pollinater pathways and stormwater control, as well as the myriad of health and social benefits that come from interacting and maintaining this productive ecosystem.

Image Citation: https://medium.com/@psychbrother/how-meal-prepping-can-help-you-lose-weight-and-save-time-larry-williams-ea874e1f7562

FOOD FOR LIBRARIES LIBRARIES FOR PEOPLE

Dorothy Mulkern

Last year in Seattle, 1 in 8 people did not have enough food to eat.

What if a library could help ease food insecurity and provide community access to quality food?

Seattle's Healthy Food Availability & Food Bank Network Report, published February 2019, examined communities experiencing food insecurity. The study took the national food desert map looks at low income communities and distance to a supermarket and expanded the assessed variables. The Healthy Food Priority Index includes income (% of pop below federal poverty level, travel times to healthy food retailers (10m+ one way) and how inundated an area is by retailers selling less healthy food (food swamp). From this index, researchers created Healthy Food Priority Areas (HFPAs) to focus efforts on neighborhoods that needed help the most.

As climate change increasingly impacts global food supplies access to quality food will become more difficult. This will increase instances of food insecurity in Seattle and worldwide.

Urban agriculture is a powerful tool to address the existing problem of insecurity and to prepare for the possibility of a more complicated future.

Additionally, libraries are an important hub for community services and are primed to be part of the solution for food insecure communities. Seattle libraries don't just loan books, they provide technology and language classes, tax help, assist with job placement and business development and have early learning programs for kids.

For more information about food insecurity you can read Seattle's Healthy Food Availability & Food Bank Network Report here: https://www.seattle.gov/Documents/Departments/CityAuditor/auditreports/030519%20Corrected%20Healthy%20Food%20Availability%20Food%20Bank%20Network%20Report_FINAL.pdf

Image Citation: https://liamd.pw/

ANALYSIS Site Scale

Public library branches in Seattle come in a variety of shapes and sizes. No two branches are identical. Initially, I thought urban and suburban libraries had similar characteristics and could be grouped by archetype. Upon further examination it is clear that suburban libraries do not necessarily equate to outdoor space. (See Delridge example below.)

Central Library:

The Central Library downtown has almost no outdoor space. Inside the library, however, there is a lot of space, light and vertical opportunity.

Image Citation: Google Maps

Image Citation: Google Maps

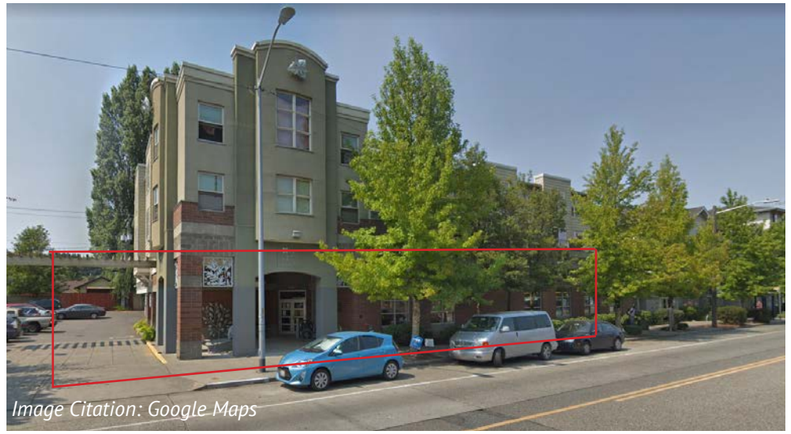


Image Citation: Google Maps

Rainier Beach Library:

This library is located in the suburban neighborhood of Rainier Beach. The property contains not just the library building but an extensive parking lot and landscaped grounds with ornamental.

South Park Library:

Located in the South Park neighborhood, this library has little outdoor space save a small parking area. South Park is surrounded by Seattle's industrial area and close to the Duwamish River.

Delridge Library:

The Delridge Library is located in the Delridge Neighborhood of South Seattle. It occupies the first floor of this apartment building.

Healthy Food Priority Areas in Seattle, WA in 2018

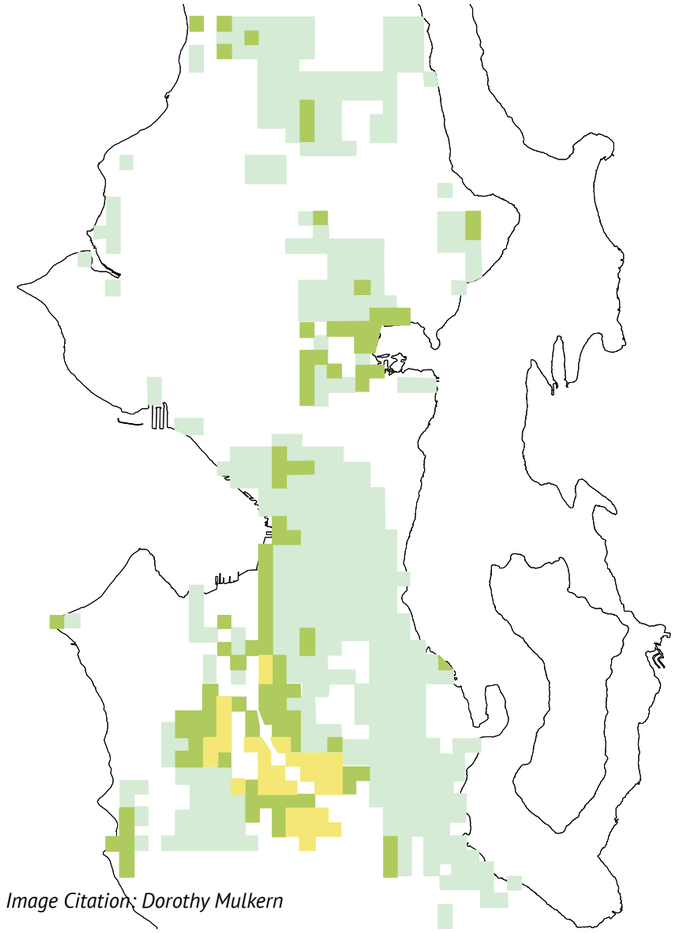
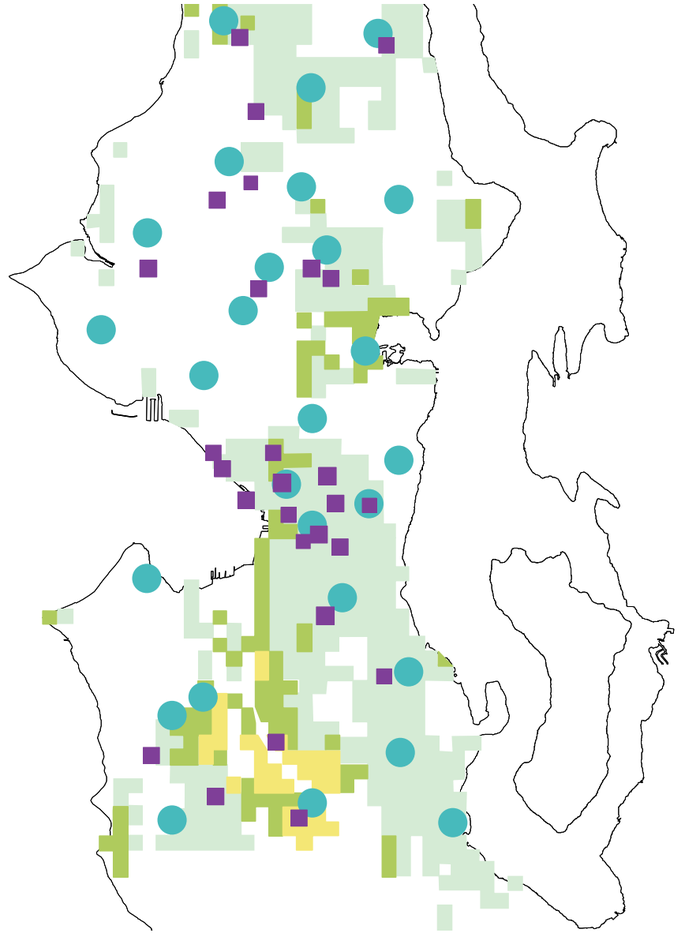


Image Citation: Dorothy Mulkern

HFPAs with Libraries & Food Banks



Map Legend:

- Poverty + 2 Factors
- Poverty + 1 Factor
- High level of poverty
- Library
- Food Banks

More about the Healthy Food Availability Index:

"The healthy food priority area (HFPA) index is constructed from three true/false factors: (1) more than 25% percent of population is below 200% of the federal poverty level, (2) average travel time to the nearest 4 healthy food establishments is greater than 10 minutes, and (3) food swamp score is above the 90th percentile." Healthy Food Availability & Food Bank Network Report, p22

ANALYSIS City Scale

The map to the left shows Healthy Food Priority Areas as designated by the City of Seattle's Healthy Food Availability & Food Bank Network Report. Light green represents areas where high levels of poverty exists.

Yellow represents the highest priority Healthy Food Priority areas. These are clustered near the southern boundary around the Duwamish waterway and include Georgetown, South Park, Delridge and High Point neighborhoods.

We also see pockets throughout Seattle of medium priority areas, represented in dark green, in far North Seattle around the city boundary, parts of Greenwood and Sand Point, the University District and Central District.

The map in the center of this pages shows Healthy Food Priority Areas overlaid by Seattle Public Libraries in blue. It is clear to see that many library branches are in or very close to high food priority areas and could be instrumental in reducing food insecurity for the communities they serve.

Potential Partnership:

Food banks are a common sense potential partner in increasing food security in Healthy Food Priority areas. In the center map, food banks are represented in purple. Often food banks have limited hours and do not carry fresh produce. Incorporating urban agriculture at libraries and coordinating hours with food banks would mean increased access to food for hungry community members.

TOOLS Small Space Interventions

As demonstrated in the case studies, libraries come in all shapes and sizes. And so should their tools for integrating urban agriculture. For smaller sites with indoor space green integration should be modular, movable and take advantage of available vertical space.

Image Citation: https://www.amazon.com/Indoor-Light-3-Tier-SunLite-Garden/dp/B007XIWCA8

Modular Shelving with Grow Lights:

For indoor and protected outdoor space, modular shelving units provide additional vertical growing space. These units are ideal for small starts and greens with a quick growing cycle.

Image Citation: https://arborgate.com/blog/garden/how-do-i-keep-the-birds-out-of-my-grapes/

Edible Climbing Vines:

Vines with edible fruit demonstrate potential for small spaces. Hardy kiwi, grapes and nasturtiums can be trained up walls or trellises. Fruiting vines are both bountiful and hardy.

Image Citation: https://livewall.com/portfolio-items/leafy-green-wall-planting-lettuce-kale-chard/?portfolioCats=251

Edible Green Walls:

Green walls are a beautiful and functional addition to any indoor or outdoor space. The edible green wall pictured contains various greens including lettuce and kale.

Image Citation: https://www.gardeners.com/buy/vegtrug-mini-wallhugger-planter-with-cover/8598339.html

Mobile Planters:

Modular, rolling planters are a great small space solutions for urban agriculture. They are easily moved and easily replanted. Units can be covered for temperature and humidity manipulation.

Image Citation: https://www.dannywoogarden.org

TOOLS Large Space Interventions

Larger spaces represent the possibility of a larger, more diverse harvest. If we expand our idea of urban farming to include animals, there are space requirements to do so humanely. With outdoor space, keeping chicken, bees and fish become options.

Image Citation: Dorothy Mulkern

Image Citation: https://chpn.net/2018/12/06/east-end-library-hosting-a-free-class-on-raising-urban-chickens/

Community Gardens:

Community gardening is when a group of people farms one piece of land together. This option represents a good opportunity for people with unpredictable work schedules to get involved.

Chickens:

Community gardening is when a group of people farms one piece of land together. This option represents a good opportunity for people with unpredictable work schedules to get involved.

Edible Green Roof:

Rooftop space represents extensive untapped potential in cities. Pictured above is a Copenhagen rooftop farm, ØSTERGRO, that prepares and serves meals at their rooftop restaurant.

Additional Tools:h

P-Patches
Chickens
Aquaponics
Bee Keeping
Water Harvesting

Community Garden

Chicken Coop

Cisterns for Rainwater Harvesting

Edible Green Roof

Food Forest with Easy Public Access

Modular Shelving with Grow Lights at Entrance

Permeable Pavement

Small Scale Orchard along Parking Lot Edge

At Site Scale - Rainier Beach Library:

Rainier Beach Library was selected as the site for implementation of urban agriculture tools because it presents extensive outdoor opportunities and has room for small and large scale interventions. This plan presents initial suggestions diagramatically.

Image Citation: Dorothy Mulkern

A Green Entrance:

Utilizing small and large scale tools, Rainier Beach Library could integrate edible plants into the landscape. This vignette shows lit, modular shelving in the entry for small micro-greens. Plum trees and blueberries replace ornamentals in planting beds. Plants from the green roof spill over down the walls of the building.

Image Citation: https://www.washingtonpost.com/express/2019/05/23/urban-farms-fuel-food-literacy-programs-southeast-dc/

1) Workshops on urban agriculture for community members
2) Free seedlings & seed library
3) Excess produce goes to local food bank
4) Programs for children & young adults

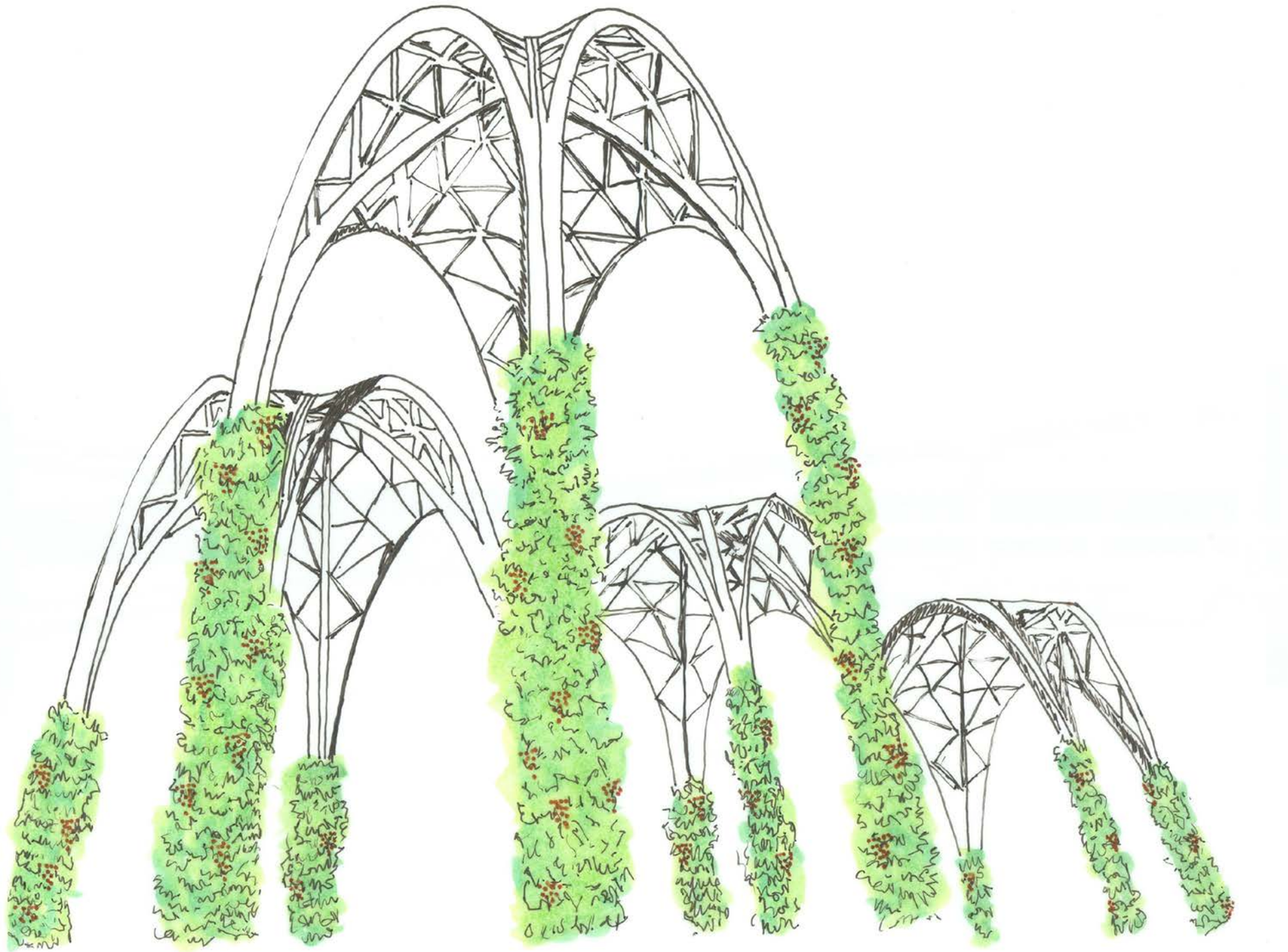
Programming:

Programs supporting urban farms in libraries are critical in the success of this integration. The community will be the audience for farm programs. Community participation will be a important driver in creating and maintaining these sites.

It is important to have trained, paid urban farm staff on site. These farms should at least have a farm manager and assistant position to coordinate and facilitate day to day urban farm responsibilities. These positions would also be responsible for enagaging and educating community members. These positions create opportunities to support local agriculture by hiring people knowledgable in the field.

Volunteers will make up the majority of the workforce. The advantage of community gardens is that no one is solely resposible for the success or failure of crops. The hope is especially busy people, working one or more jobs, that may want to participate but cannot commit to a schedule can still get involved.

I'd like the benefit of this urban farm to be immediate. If you show up and put in time, you walk away with some sort of food item. That is the benefit of keeping chickens, their constantly laying eggs, so even if there's not a vegetable or fruit in season volunteers might be able to go home with eggs.



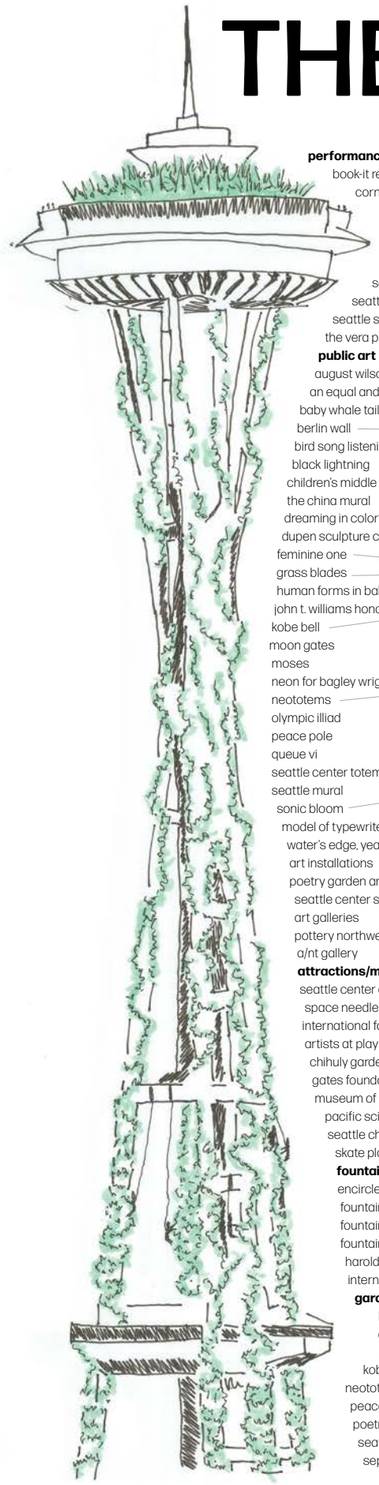
THE EMERALD CITY

Emma Petersen

What if Seattle could become the first city to identify itself as an urban agricultural city? This project re-envisions the Seattle Center as a symbol of what can happen to a community when food is used both as an educational tool to care for the earth, and provide food access to everyone, including climate refugees that will inevitably move to the global north. All green space will be used for food production, and the architectural symbols that have defines Seattle will be taken over by edible plants. This change will represent a shift in the values the City of Seattle upholds, creating an equitable and sustainable place for all people to live.

THE EMERALD CITY

What if...Seattle were to redefine itself as an agri**cultural** city?



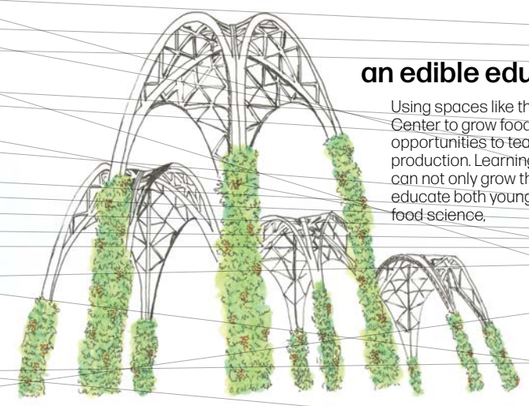
performance venues
- book-it repertory theatre
- cornish playhouse
- kexp
- marion oliver mccaw hall
- pacific northwest ballet
- seattle children's theatre
- seattle opera
- seattle reperatory theatre
- seattle shakespeare company
- the vera project

public art
- august wilson way portal
- an equal and opposite reaction
- baby whale tail neototems children's garden
- berlin wall
- bird song listening station
- black lightning
- children's middle east peace sculpture
- the china mural
- dreaming in color
- dupen sculpture collection
- feminine one
- grass blades
- human forms in balance
- john t. williams honor pole
- kobe bell
- moon gates
- moses
- neon for bagley wright theatre
- neototems
- olympic illiad
- peace pole
- queue vi
- seattle center totem
- seattle mural
- sonic bloom
- model of typewriter erase, scale x
- water's edge, year's round
- art installations
- poetry garden art series
- seattle center sculpture walk
- art galleries
- pottery northwest
- a/nt gallery

attractions/museums
- seattle center armory
- space needle
- international fountain
- artists at play
- chihuly garden and glass
- gates foundation discovery center
- museum of pop culture (mopop)
- pacific science center
- seattle children's museum
- skate plaza

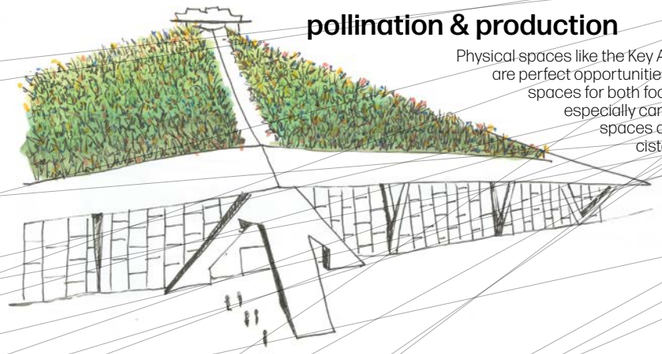
fountains
- encircled stream fountain
- fountain of creation/dupen fountain
- fountain of the northwest
- fountain of seseragi
- harold s. wright memorial fountain
- international fountain

gardens
- broad street sculpture garden
- chihuly garden and glass
- donnelly garden at theater commons
- kobe bell mediation garden
- neototems children's garden
- peace garden
- poetry garden
- seattle tree walk
- september 11 memorial garden



an edible education

Using spaces like the Pacific Science Center to grow food will grant optimal opportunities to teach about food production. Learning spaces like these can not only grow their own food, but educate both young and old about food science.



pollination & production

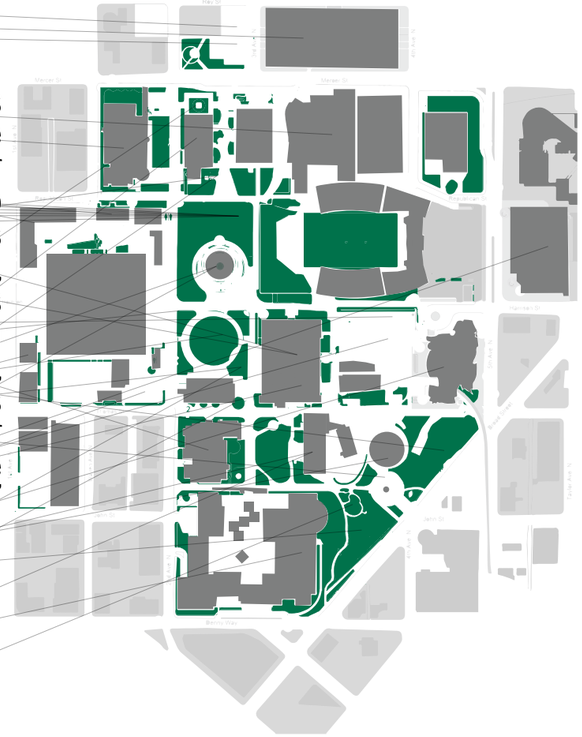
Physical spaces like the Key Arena rooftop and walls are perfect opportunities to create productive spaces for both food and pollinators. Rooftops especially can be used for water collection and spaces around buildings can be transformed into cisterns.

artful irrigation

Mixing art and urban agriculture at the International Fountain creates a new kind of agri**culture**. There can be beauty in urban farming. Mixing not only fountains, but public art pieces will transform the way people think about art and food.

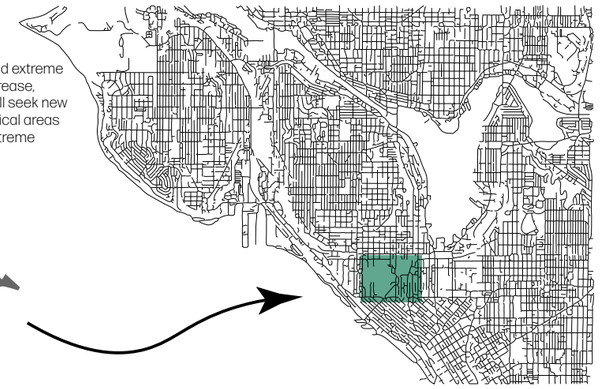
seattle center is full of opportunities

"Experiences at Seattle Center continue to touch us individually, knit us together as a community, and help us share our collective humanity"

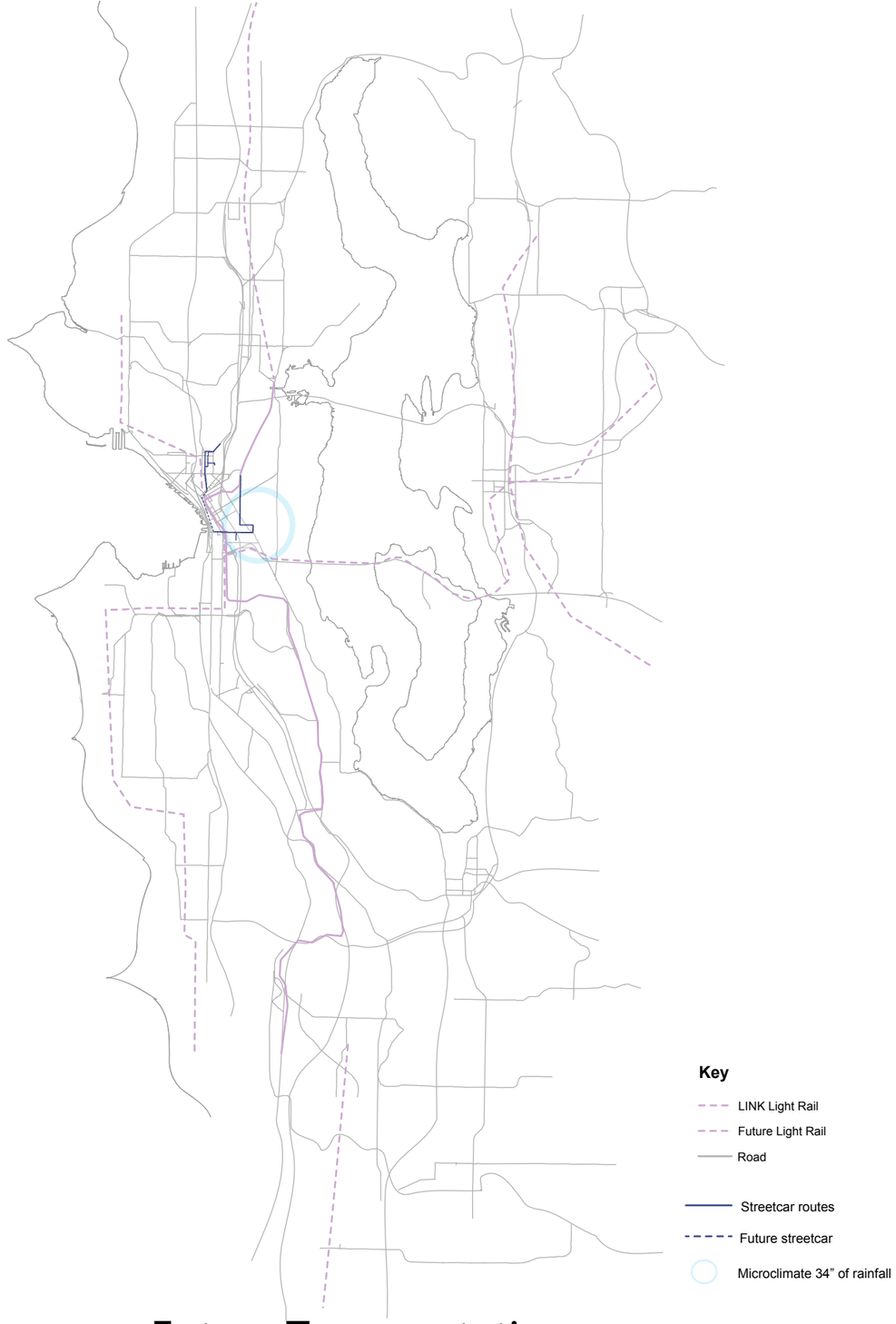


climate change will drive refugees to seattle

as temperatures and extreme weather events increase, climate refugees will seek new homes in geographical areas that will see less extreme changes.



Emma Petersen | larch 501



Future Transportation Infrastructure

SOCIAL RESILIENCE : A CULINARY EXHIBIT

Shelly Woo

Seattle's population is growing every year and transportation infrastructure is developing along side with it. As more transportation access is creating new opportunities for people to travel to and from main city hubs, the climate mate is also getting warmer. This means colder winters and warmer sum mers. As population density increases so is the need for clean, healthy local food. Climate solutions are important to address alongside with our social needs. Building stronger community networks are imperative for social resilience and thus climate resilience.

The International District is right next to Seattle's main transportation hub that will be developing. As more pedestrian traffic and population growth increases, International District historic neighborhood has the opportunity to address climate needs through urban agriculture. This green infrastructure will provide shade, access to clean and healthy food production, harvest rainwater, feed a growing population and close food waste cycles . Urban Agriculture will connect and strengthen community stakeholders in the area to preserve and celebrate a vibrant and rich culture that has been contributing to Seattle's history. Educational opportunities alongside with a culinary food tour will speak to a culturally relavant urban agricultural system as a climate model. Social infrastructure at this level will increase gathering opportunities and community engagement for resilient residents, strengthen climate resilience as a learning lab, and bring economic oppor tunities to build a positive relationship with the public.

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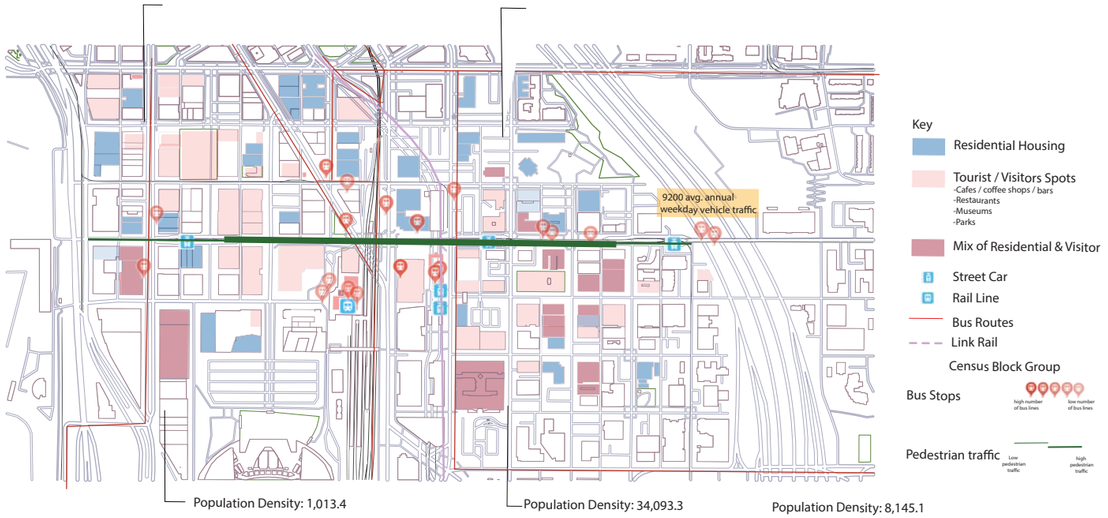
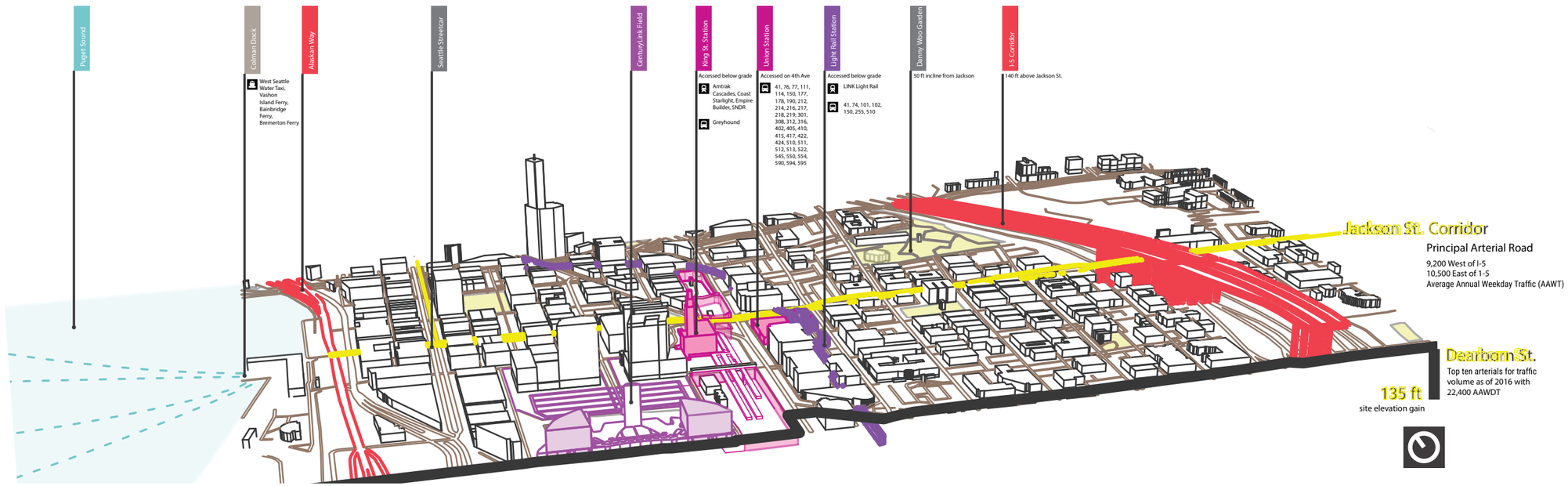
JACKSON HUB

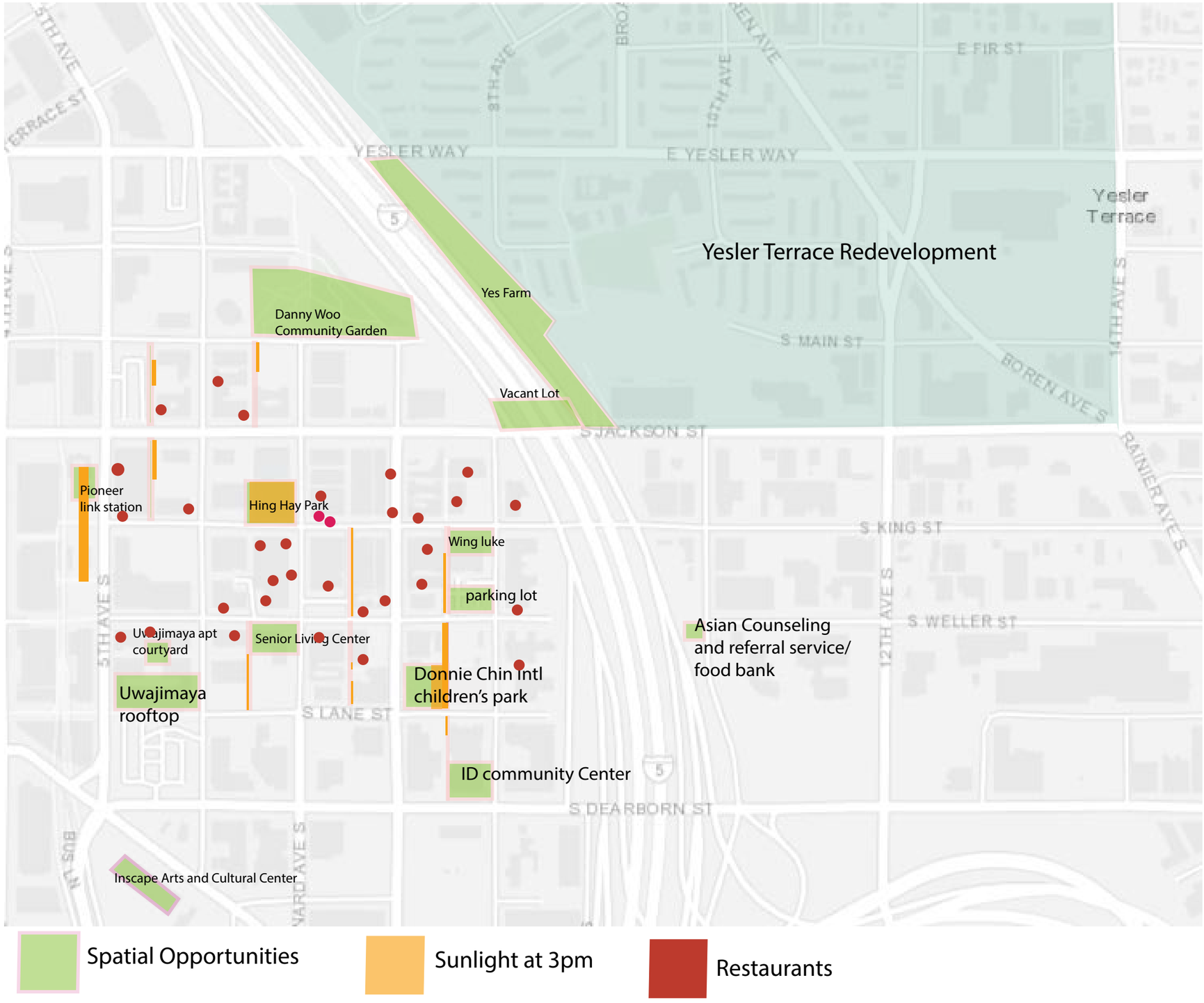
Heavy pedestrian traffic along Jackson St and population density



Data from BE 505 | February 2019

Gathered with Jiao Mei, Julie Yuan, Suzy Pan, Shelly Woo, Kelsey Crotty, & Manette





basemap from archgis.com

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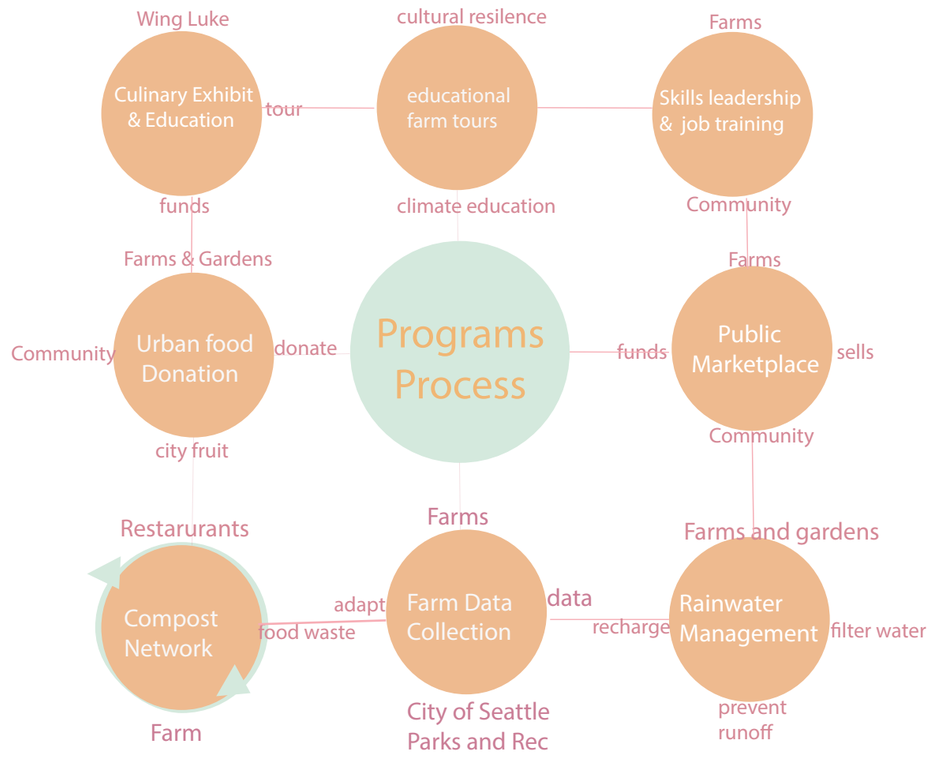
Stakeholders:

Danny Woo Community Garden
Yes Farm
City of Seattle Parks and Recreation
City Fruit
Wing Luke Museum
Restaurants in ID
Inscape Arts and Cultural Center
Uwajimaya
Uwajimaya Apartments
ID Senior Living Center
ID Community Center
SDOT
Asian Counseling Referral Service and Food Bank



Cultural Resilience

provide job growth, farm leadership and job training
connect, expand, and strengthen community networks
Community ownership
intergenerational education and cooking classes
grow culturally relavant food, healing herbs
provide inclusive gatheringspaces that nurture and break social isolation in a city,
youth education and leadership
Cultural education demystifying stereotypes thruogh culinary exhibit
memoralize past and living histories
strengthen multicultural identities
learn about nutrition, healthy eating, and mental wellness

physical outdoor activities

Climate Solutions

Capture rain water
filter and provide clean water
address food waste, close the loop
Shade
Reduce air Pollution from I-5
Sequester Carbon, prevent runoff
provide access to healthy local food
Manage farm impact and share growing practices
Typologies:
Community programs
Rooftop gardens, vertical gardens, community gardens, parking lots and alleyways
centralize farm and market operations through public marketplace
demonstrate impact of activities
create citywide policy

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Growing culturally relavant fiber materials such as bamboo to be harvested for building uses as well as culturally relavant food like bitter melon is also grown in the green spaces of Hing Hay Park. A place for recreation, gathering, healing, and community building. Intergenerational space for the sharing of knowledge and fun

Public market with produce grown on Yes farm, Umajimaya rooftop and
Community Center, Hing Hay Park, Donnie children's park, parking lots a
holders and farm programs

apartment courtyard, Senior living Center Rooftop, ID
nd alley ways. Funds go directly back to Community Stake-

GREEN LAKE AGRO DISTRICT

SPIN FARMING
CURTIS STONE - Kelowna, BC, Canada

+

RETROFIT ROOF GARDEN
RESTURANT
OSTERGRO - COPENHAGEN, DM

NEW DEVELOPMENT
ROOF FARM
UP TOP ACRES- WASHINGTON D.C.

AGRICULTURAL
SYSTEMS

SOCIAL
SYSTEMS

EDIBLE PLACE-MAKING
CIVIC SPACE
NABOLAGSHAGER- OSLO, NO

+

TEACHING GARDENS
GROW TO LEARN NYC, CITYWIDE SCHOOL
GARDENS INITIATIVE - NYC, NY

CIVIC RESILENCE CENTERS
PUBLIC / CIVIC BUILDINGS

GREEN LAKE AGRO DISTRICT

BRIAN DECK

What if public parks were co-managed by non-profit social enterprises that leveraged the green space for training, incubating, and centering neighborhood efforts to be sustainable while socially engaged? With Green Lake Park as the center for applied agroecology practices those practices could expand into the commercial, residential zones around Green Lake to create a district focused on management of public green spaces for creating identity and social circles of urban agriculture. While climate change responses would direct agricultural systems and applications the resilience would come from the social networks growing through those efforts.

ORCHARD + EDIBLE COMMONS

Interplanting of fruit and nut trees with existing multi-generational park trees would create diverse agricultural use layered on the recreational use. Rotational grazing from the adjacent Woodland Park Zoo animals would make the green spaces interconnected in fertilizer cycles.

FOOD FOREST ORCHARD
OTAKARO ORCHARD - CHRISTCHURCH, NZ

+

EDIBLE COMMONS
ROIMATA FOOD COMMONS, EDIBLE CANTERBURY / FOOD RESILIENCY NETWORK - CHRISTCHURCH, NZ

+

POLLUNATION ACTIVATION
FOR THE LOVE OF BEES - AUCKLAND, NZ

+

SILVOPASTURE
http://csanr.wsu.edu/blog15what-is-holistic-agriculture/

G.L.A.D. COMMUNITY CENTER

A center for urban farmers would allow for incubator programs, spaces, and demonstration plots as a social hub within the park. A diversity of social uses like education and training would be overlayed with small enterprise opportunities within the greater neighborhood context. Opportunities for incubation of social-enterprise and small-business urban agriculture activities.

FARM APPRENTICE PROGRAM
WINDY CITY HARVEST - CHICAGO, IL

+

AQUAPONIC GREENHOUSE
GROWHAUS - DENVER CO

+

URBAN AGRICULTURE CENTER
R-URBAN - PARIS, FR

+

INDIGINOUS FOODS GARDEN
NATIVE GATHERING GARDEN CULLY PARK - PORTLAND, OR

PAY-AS-CAN RESTURANT
EVERYBODY EATS - AUCKLAND, NZ

+

COMMERCIAL KITCHEN
RAINIER BEACH AND URBAN FARM - SEATTLE, WA

+

FOOD WASTE RESCUE
KAIBOSH - WELLINGTON, NZ

+

COMMUNITY ENTERPRISE
COMMON UNITY AOTEAROA REMAKERY - WELLINGTON, NZ

LAKE FARMING + STORMWATER HABITAT

As part of the long-term sustainable management of the Green lake body of water, aquatic agriculture and public spaces would activate select areas. With stormwater coming into the static lake and high nutrient composition of the water, select areas could grow surface and subsurface plants in deep water while regenerating the marsh-like ecology through stormwater buffers. Providing public amenities via a boardwalk would connect people with the lake in fresh perspectives.

FLOATING RESTURANT
GARDEN ISLAND - COPENHAGEN, DM

+

DUCKWEED FARMING
PARABEL - FLORIDA

+

STORMWATER PARK
WAITANGI PARK - WELLINGTON NZ

+

SHORLINE HABITAT
MARSH ISLAND TRIAL - SEATTLE

Connecting the management of the park ecology with the urban agriculture potentials would create additional community building power in addition to the existing recreational use of the park.

AL2(SO3)3 ALUMINUM SULFITE

REDUCES DISOLVED OXYGEN

LEMNA MINOR.
DUCKWEED GROWS OFF
EUTHROPIC GREENLAKE

CONSTRUCTED WETLAND AND FLOATING GARDENS REMEDIATE AND PROVIDE NEW PUBLIC SPACE ON THE WATER

HYDRILLA VERTICILLATA

FLOATING CAFE AND GARDENS
DEMONSTRATING RESTO DIET

EDIBLE AQUATIC PLANTS AND MARKET GARDEN CROPS
WATERTHYME "SUPERFOOD" SALADS

GREEN MANURE

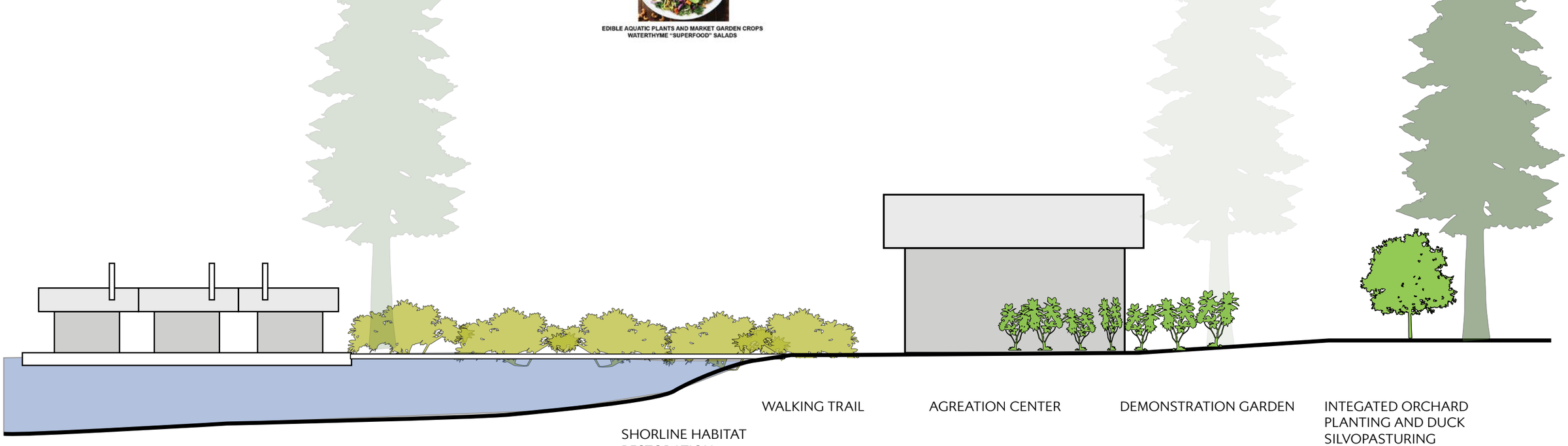
ZOO + FARM ANIMAL FEED

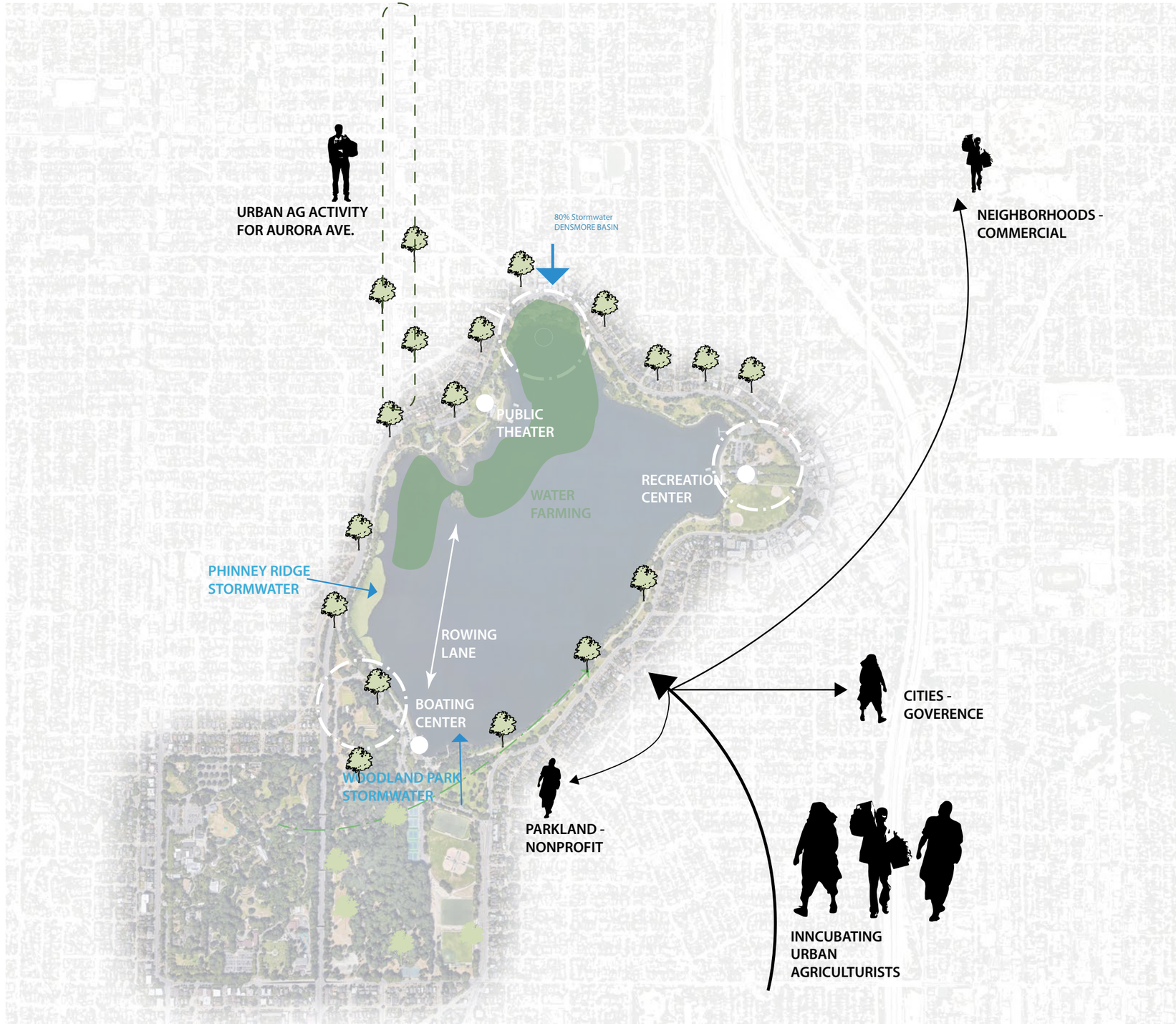
AQUAPONICS FEED

SILVOPASTURE
MANAGED GRAZING WOODLAND

ANIMAL ORGNAIC FERTILIZER
FOR ORCHARD, GARDENS,

WOODY DEBRIS MUSHROOM FARMING





Green Lake Park would provide the hub for social actions that come with urban agriculture. As a centerpiece of many neighborhoods incubators would have ample opportunities to connect the civic, local business, schools, and public green spaces with greater sustainability goals. GLAD would serve as the pilot incubator area for city-wide incubators activity, exporting the knowledge gained about co-managing public parks with residential neighborhoods to other neighborhoods, municipalities, and areas of Seattle. All while treating the maintenance of Green Lake Park as if it were a farm with resources to regenerate while building community of the commons.

AGRICULTURAL URBANISM AT NORTH SEATTLE COLLEGE

Claudia Sackett Hennum

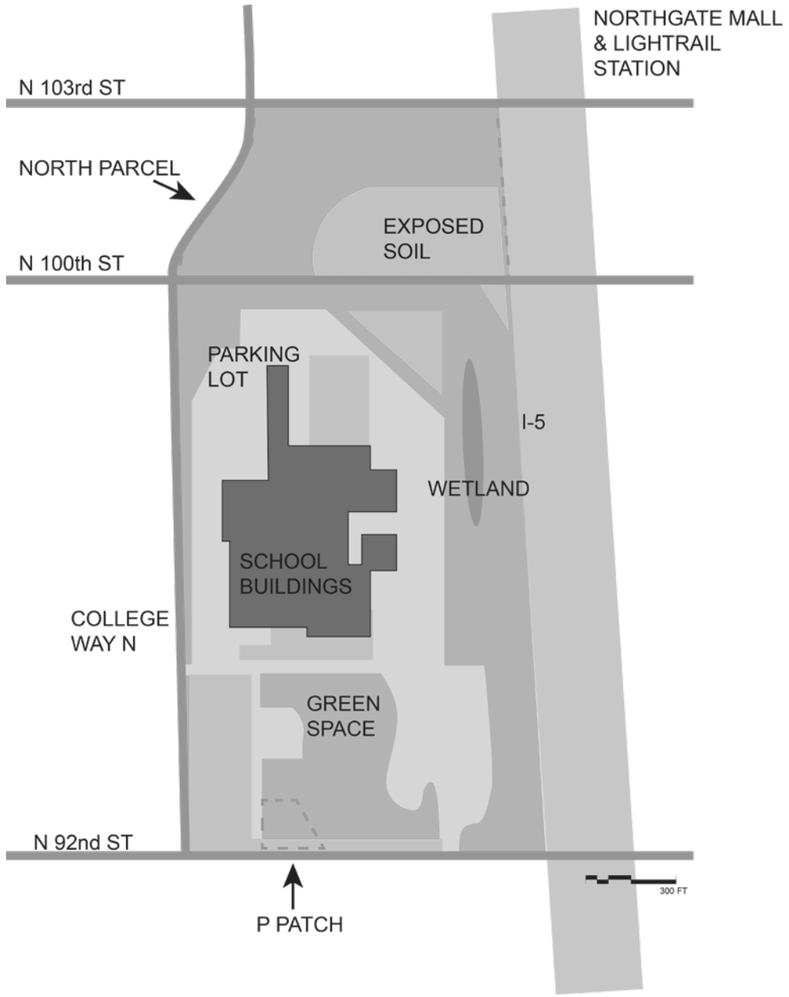
This project explores re-imagining North Seattle College as a place for training, experimentation and technical demonstrations of urban agriculture.

As a community college, NSC has a diverse user group with a variety of skills, resources and experiences which can allow for ongoing development of climate appropriate and climate responsive techniques.

Additionally, as climate change makes conventional agriculture more tenuous, intensive, small scale, and innovative forms of production will be ever more necessary for urban food security and resilience.

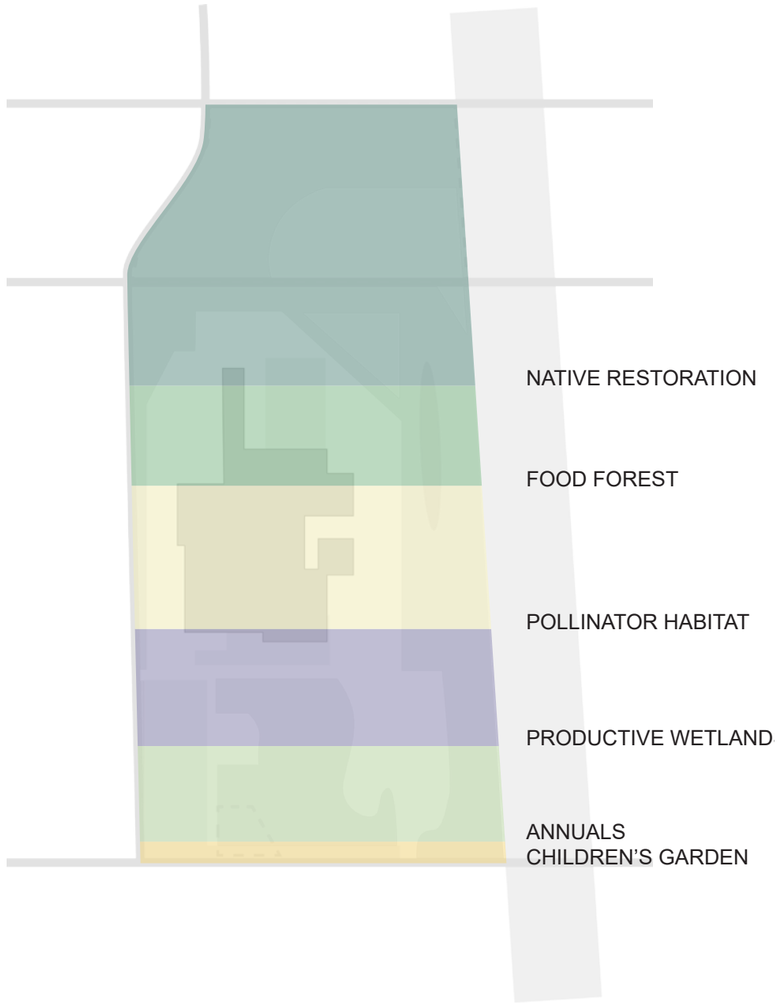
NSC can address these local needs by training new generations of farmers, gardeners and designers.

Google Earth



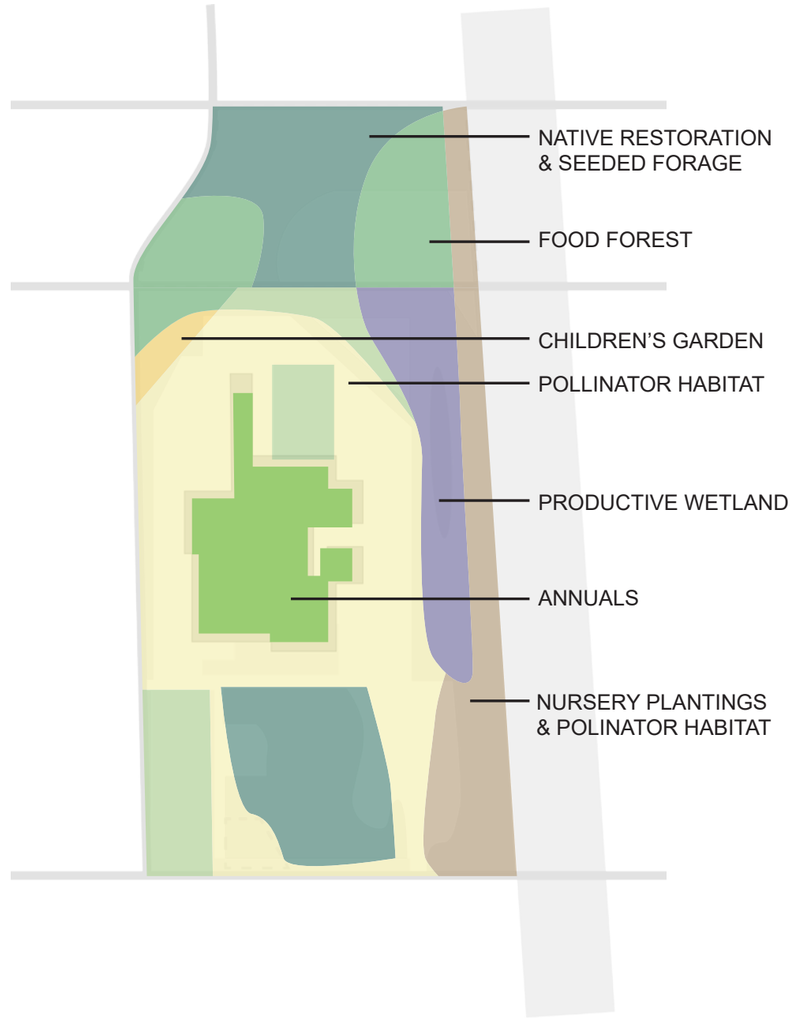
Existing

NSC campus includes a large amount of green space, something that is otherwise in short supply in the area surrounding the North Gate Mall.



Proposed Usage

Going forward, the green space can be converted to productive usage while also retaining ecological functioning. Native management of a large portion of the site should be renewed and restored, honoring the history of the site as a traditional source of food.



Proposed Spacialities

As a part of the programming, typographies of usage would be in constant flux. One permutation might look like the map above.

Site Analysis

HISTORICAL USAGE Native stories identify this site as a source of food and nourishment going back thousands of years. More recently, Japanese American farmers have grown food here for the past 100 years.

ACCESSIBLE EDUCATION Community Colleges educate a diverse student body. Education in sustainable, regenerative and organic agriculture is often exclusive. By locating regenerative agricultural education on a community college campus it becomes more accessible and can respond to the knowledge and skills which already exist within the diverse student body.

Site Opportunities

NSC campus shows a variety of opportunities for rooftop planting, green walls, productive courtyards and annual spaces. The P-patch on site demonstrates the productive potential for the land, and local interest in productive landscapes.

FOOD JUSTICE College and University students experience a high rate of food insecurity. As the cost of living in Seattle increases it is important to increase access to fresh healthy produce. By locating a productive farm on a college campus, students and volunteers not only have access to that food, but can also learn how to grow food at home.

INNOVATION As climate change progresses we need to continue to develop and experiment with various productive systems and crop selection. At North Seattle College, students and professors can research, study and innovate agricultural resiliency.

Precedents

In the last several decades, forms of studying and participating in urban agriculture have proliferated.

Many of these approaches rely on volunteers, work trade arrangements or wealthy patrons, making the training inaccessible to working people.

Educational programs which focus on agriculture often lack extensive hands on training, while apprenticeship programs lack the scientific grounding of college and university programs.

Developing a program at NSC allows an opportunity to integrate the hands on skills of the apprenticeship model with classroom educational and practical work force training associated with community colleges and technical schools.

UC Sant Cruz Urban Farm and Orchard (personal photo)

South Seattle College http://fruitinwestseattle.org/

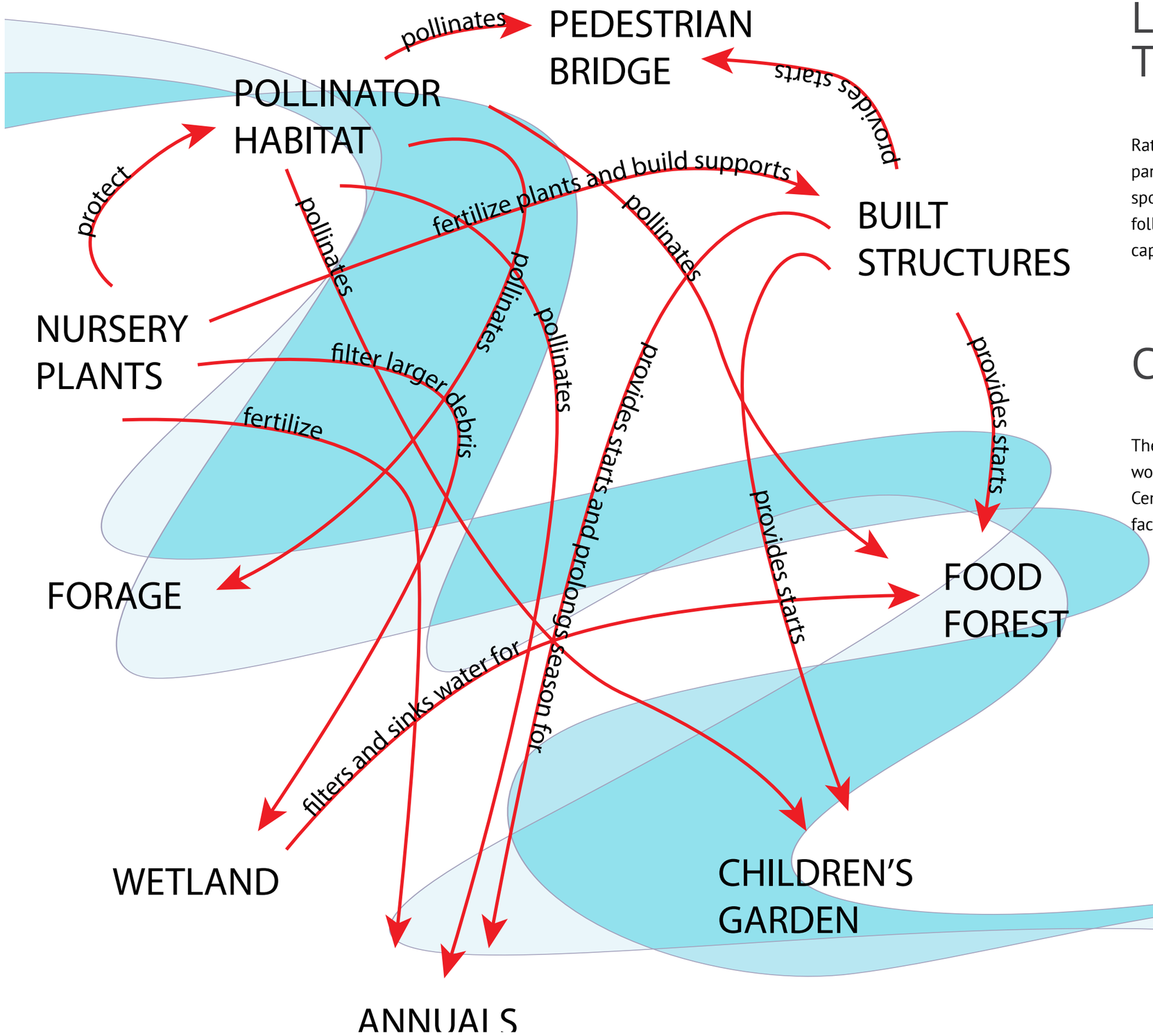
The Free Farm Stand https://missionlocal.org/2011/10/the-free-farm-stand-will-stay-city-says/

Bluma Farm
https://www.berkeleyside.com/2019/06/17/flowers-in-the-sky-these-crops-grow-on-a-berkeley-rooftop

Indian Valley College Organic Farm
https://patch.com/california/novato

Viva Farms
https://vivafarms.org/farm-business-incubator/

University of Washington Farm
https://botanicgardens.uw.edu/

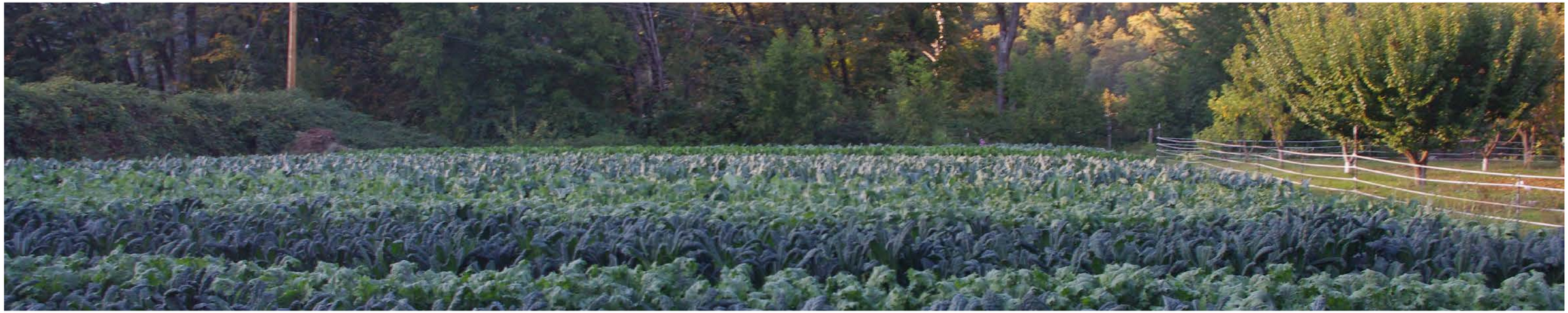


Landscape Typologies & Their Relationships

Rather than developing a deterministic design, I propose a kit of parts, or landscape typologies, that can develop and change in response to changing environmental and cultural conditions. The following pages show potential land typologies and their productive capacities.

Curriculum

The ongoing innovation and stewardship of urban farming at NSC would be worked into the curriculum for a new department the Center for Agricultural Urbanism + Regenerative Food Systems. The facing page shows a potential curriculum for such a program.



NORTH SEATTLE COLLEGE
CENTER FOR AGRICULTURAL URBANISM + REGENERATIVE FOOD SYSTEMS

Description

The Certificate in Agricultural Urbanism prepares students to produce food in a high density urban system. The program focuses on climate change adaptation, food justice and hands on agricultural education. The aim of the program is to increase food security and resilience in Seattle, while helping new farmers develop successful, innovative careers.

Learning Outcomes

- Understand the various shapes agriculture can take in a contemporary urban context.
- Know the history of productive landscapes in North Seattle.
- Have the ability to produce healthy, sustainable food for diverse communities.
- Develop and carry out a research project in one of the primary program track.

Program Tracks

In their second year, students carry out a research project alongside colleagues in the same track. At the end of their research project they develop a book or website documenting their discovers which they share with the public at an annual release party.

- Educational Gardens focus on k-8, high school or adult education (offered collaboratively with Education Department)
- Climate Changed Crops crop breeding, selection, propagation and distribution
- Artisinal Farming small scale market farming in the city
- Agriculture and Structures rooftop farms, hydroponics, vertical gardens (offered collaboratively with Engineering Department)

3 year tracks offered collaboratively with South Seattle College

- Edible Landscape Design (offered collaboratively with Landscape Horticulture Department)
- Farm to Table (offered collaboratively with Culinary Department)
- Urban Agriculture Work Force (offered collaboratively with Labor and Education Research Center)

Core Classes

- Climate Change Science
- Geography of Food Justice
- Introduction to Urban Farming
- Native Lands; Indigenous Land Management
- Soil Science
- Shifting Hydrologies and Strategic Water Use

Electives

- Agroecology in the PNW
- Biointensive and Organic Annual Production
- Business Management for Farmers
- Contaminated Landscapes
- Designing Specialized Farm Tools
- Dirt First: Compost, Biochar and Humanure
- Food Safety and Nutrition
- Japanese American Agriculture
- Nursery Management
- Markets and Distribution
- Orchard Management
- Permaculture Design
- Theory and Applications of Restoration Agriculture
- Urban Pests

What are some potential job titles?

Community Garden Manager
Edible Landscape Designer
Gardener
Market Gardener
Nursery Manager
School Garden Teacher
Urban Farmer

Landscape Typologies

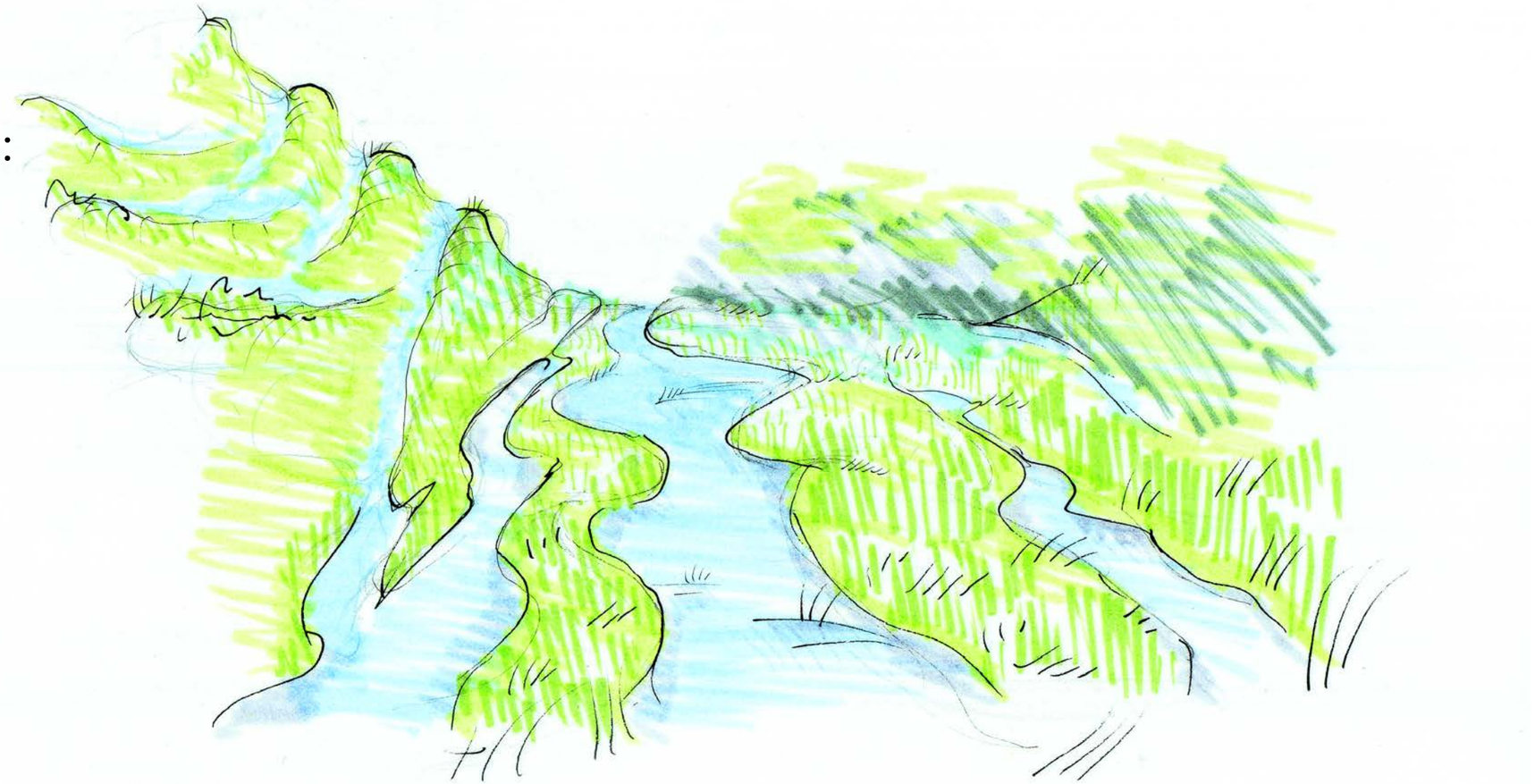
WETLAND

ENVIRONMENTAL CONDITIONS:

- steep slopes
- depressions

SERVICES:

- water retention
- water filtration
- aquifer recharge



camas

wild rice

cranberries

FOOD FOREST

ENVIRONMENTAL CONDITIONS:

- medium slopes
- medium access

SERVICES:

- carbon sequestration
- nutrient cycling
- cooling

kishu mandarin

edible lupin

parsnips

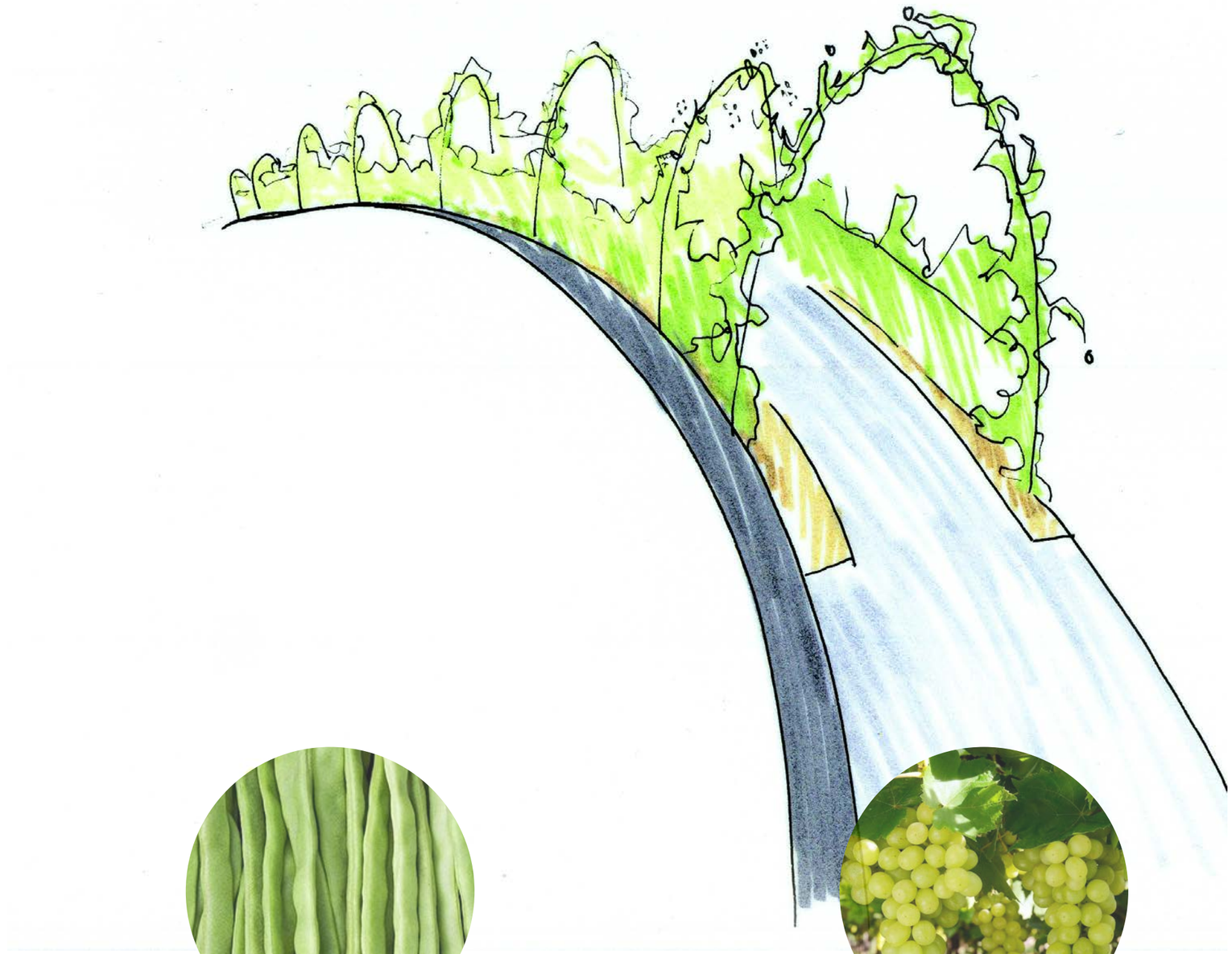
PEDESTRIAN BRIDGE

ENVIRONMENTAL CONDITIONS:

- bridge from light rail station

SERVICES:

- cooling
- pollinator food source
- drawing people to site



kiwi

kentucky pole beans

table grapes

FORAGE

ENVIRONMENTAL CONDITIONS:

- Historically significant foraging area (North Campus Parcel)
- wild lands
- mid- high slope

SERVICES:

- carbon sequestration
- nutrient cycling
- cooling
- biodiversity

chantarelles

fiddle heads

black walnuts

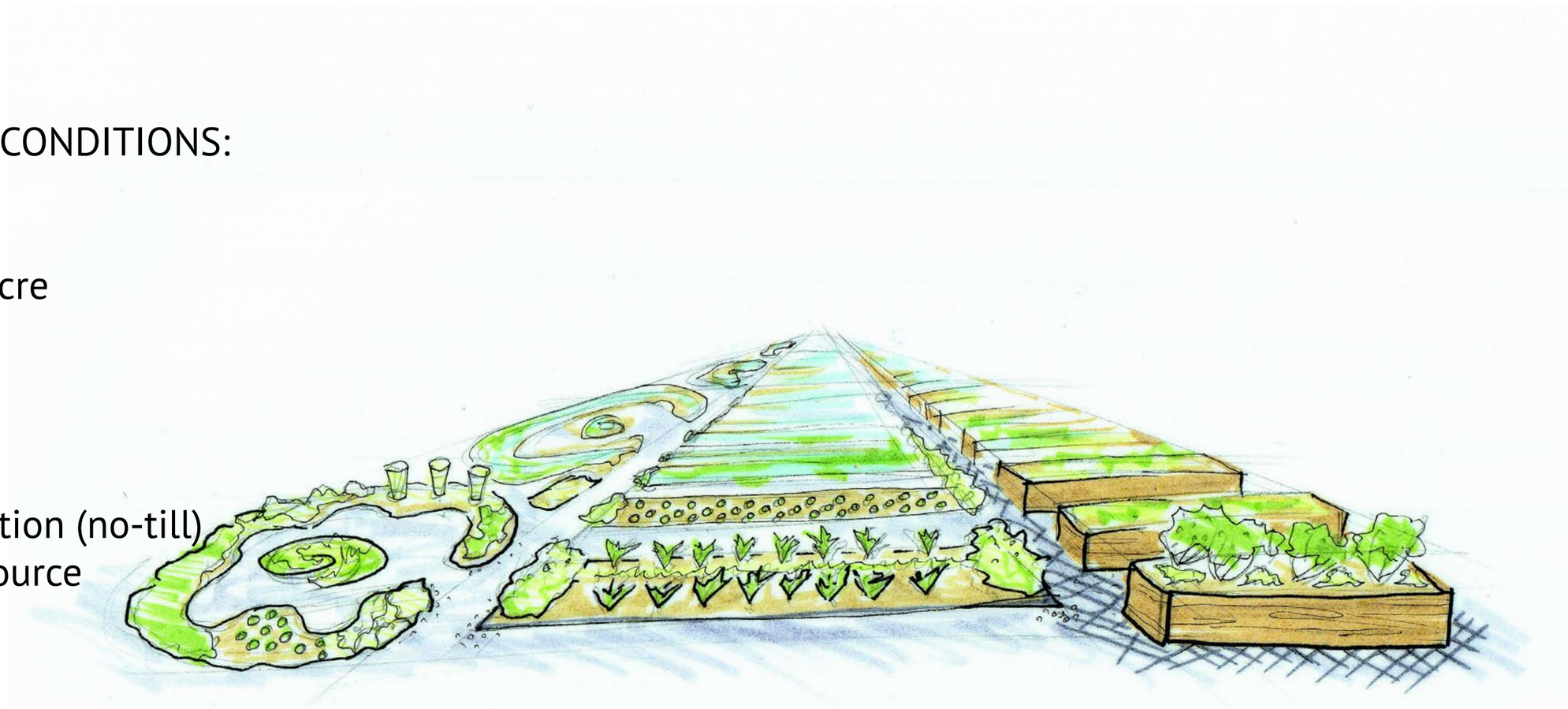
ANNUALS

ENVIRONMENTAL CONDITIONS:

- lowest slopes
- .5 + continuous acre
- best access

SERVICES:

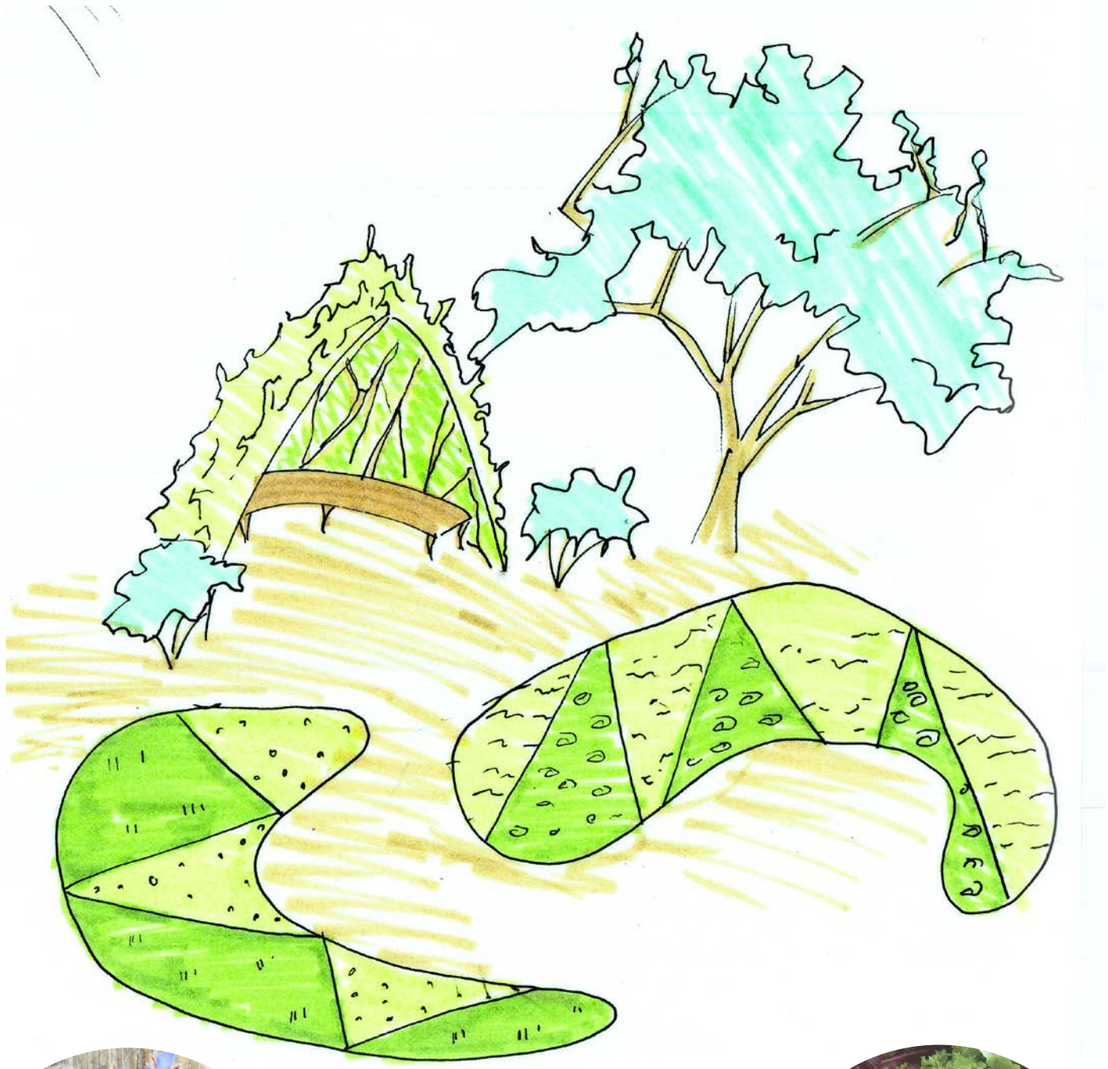
- carbon sequestration (no-till)
- pollinator food source



okra

hot peppers

sour gherkin



CHILDREN'S GARDEN

ENVIRONMENTAL CONDITIONS:

- proximity to education department or daycare
- mid quality land

SERVICES:

- carbon sequestration (no-till)
- play

borage flowers

salad mix

raspberries

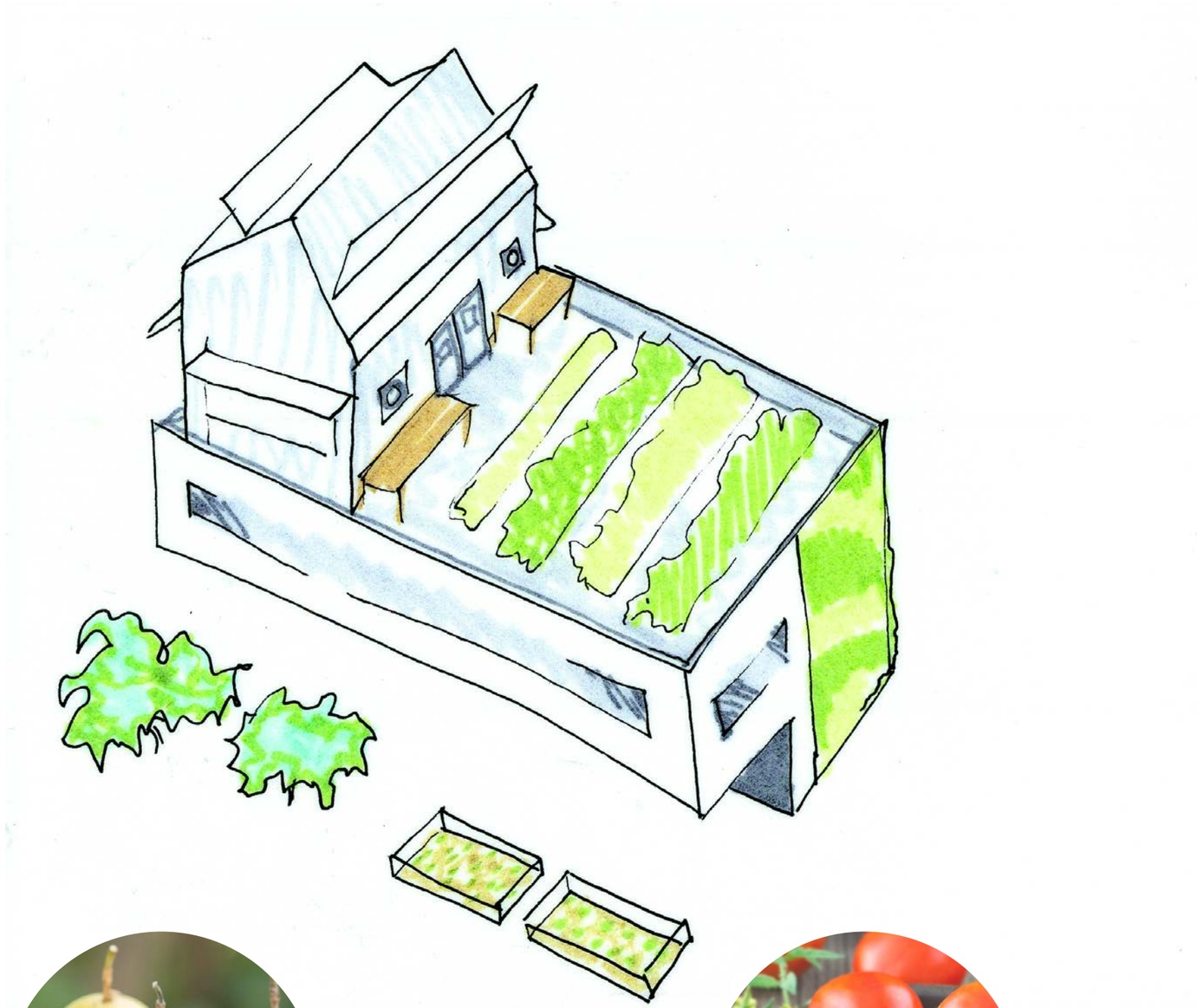
BUILT STRUCTURES

ENVIRONMENTAL CONDITIONS:

- existing and future structures
- good light
- best access

SERVICES:

- cooling
- pollinator food source



bananas

passion fruit

tomatoes

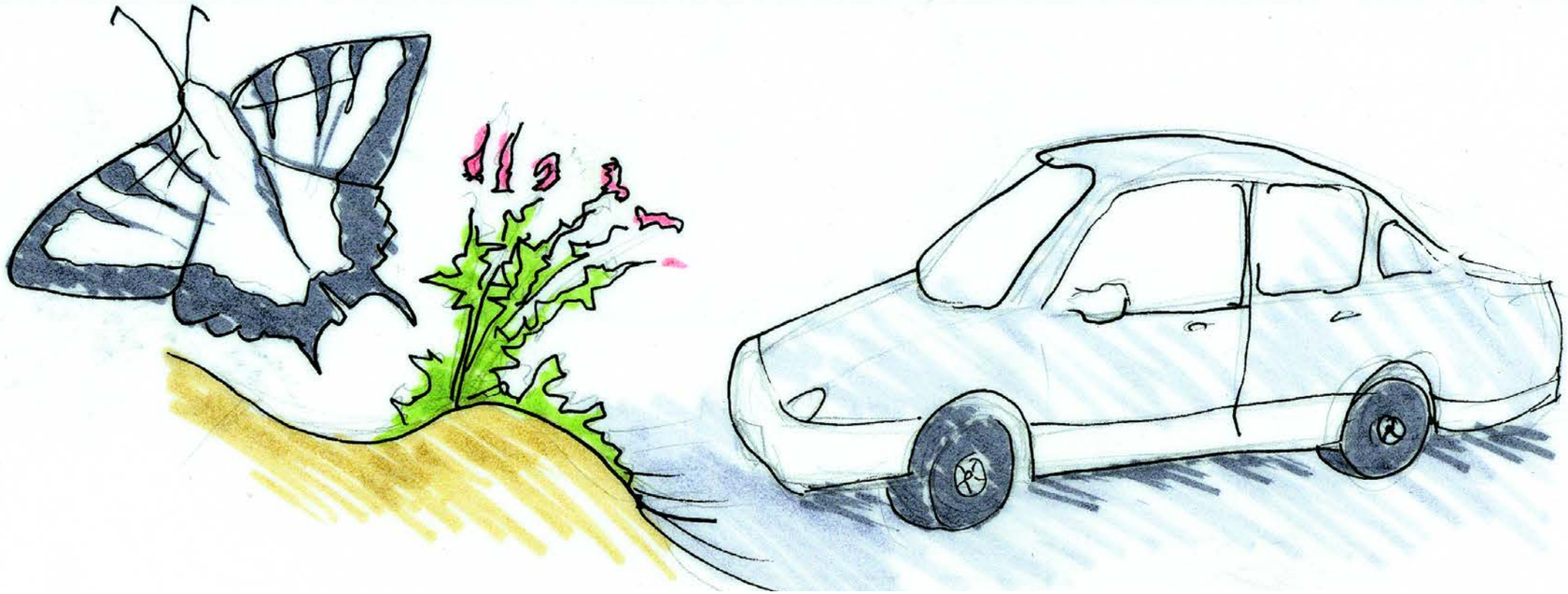
POLLINATOR HABITAT

ENVIRONMENTAL CONDITIONS:

- medium or low access
- steep slopes
- small or isolated spaces
- ideal habitat for nesting

SERVICES:

- beauty
- pollinator food source



echinacea

rosemary

honey

NURSERY PLANTS

ENVIRONMENTAL CONDITIONS:

- steep slopes
- along freeway
- poor or dangerous soil
- low access

SERVICES:

- protection
- pollinator food
- soil remediation

Image Sources for Produce Photos

Wetland
https://foodal.com/knowledge/paleo/wild-rice/
https://www.larnerseeds.com/product/blue-camas
https://snaped.fns.usda.gov/seasonal-produce-guide/cranberries

Food Forest
https://www.fast-growing-trees.com/products/kishu-mandarin-tree
https://www.rareseeds.com/giuletti-giant-mediterranean-e-lupine/reviews/
https://snaped.fns.usda.gov/seasonal-produce-guide/parsnips

Pedestrian Bridge
https://snaped.fns.usda.gov/seasonal-produce-guide/kiwifruit
https://paramountseeds.com/product/kentucky-pole-bean-og/
http://merselfoods.com/table-grapes/

Seeded Forage
https://naturitz.com/chantarelle-mushrooms-2
https://bishopsorchards.com/recipe/sauteed-fiddlehead-ferns/
https://www.fast-growing-trees.com/products/black-walnut-tree

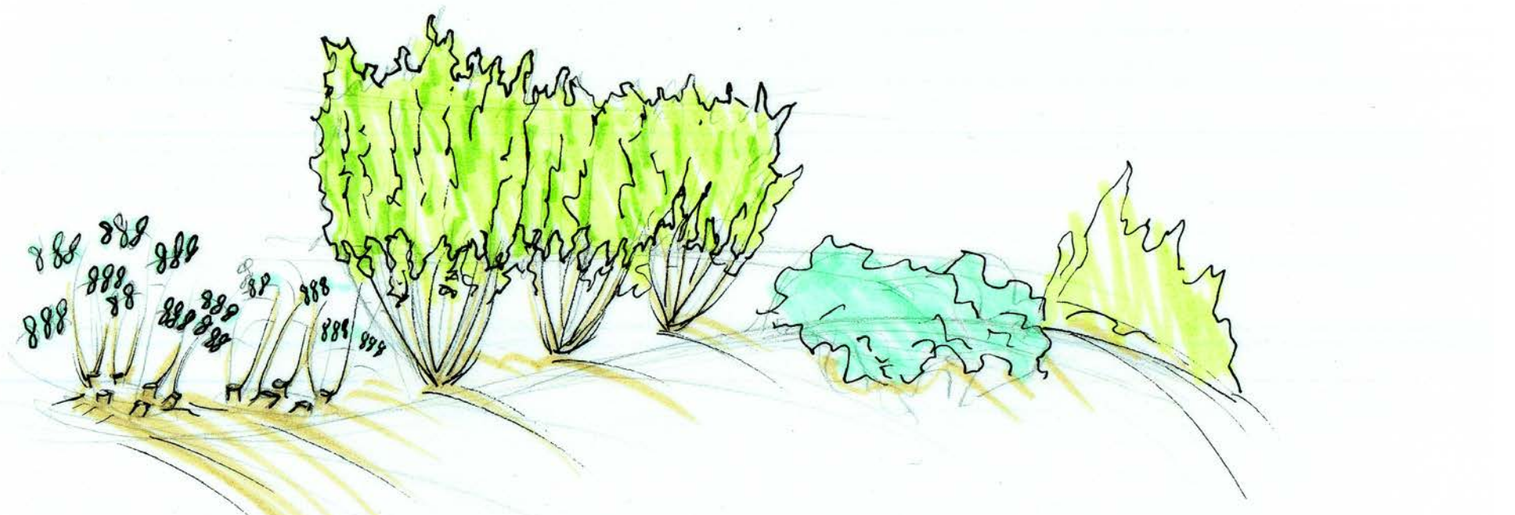
Annuals
https://www.pinterest.com/pin/446208275574997720/?lp=true
https://www.adaptiveseeds.com/product/vegetables/peppers/hot-peppers/hot-pepper-adaptive-early-thai-grex-organic/
https://www.landrethseed.com/vegetable-seeds/cucumber-seeds/mexican-sour-gherkin-cucumber

Children's garden
https://www.edenbrothers.com/store/borage_seeds.html
https://www.johnnyseeds.com/vegetables/lettuce/lettuce-mixes/five-star-greenhouse-lettuce-mix-vegetable-seed-192.11.html?source=google_johnny_seeds&gclid=Cj0KCQjwi7DtBRCLARIsAGCJWBrqK5Uo8plXyeaN6bSzh-QZq5olMLA36OeCAIxparHXfJtYwAFp6fsEaAqUXEALw_wcB
https://en.wikipedia.org/wiki/Raspberry

Built structures
https://www.hsph.harvard.edu/nutritionsource/food-features/bananas/
https://www.attainable-sustainable.net/passion-fruit-juice/
https://bonnieplants.com/product/heinz-super-roma-tomato/

Pollinator Habitat
https://www.highcountrygardens.com/perennial-plants/echinacea/echinacea-purpurea-magnus
https://www.landrethseed.com/herb-seeds/rosemary
https://www.medicalnewstoday.com/articles/321873.php

Nursery Hedge
http://juliefarris.squarespace.com/misc/black-locust-wood-as-alternative-to-ipe
https://www.etsy.com/hk-en/listing/607844776/hand-made-basket-willow-mountain-laurel
https://www.studentenergy.org/topics/biochar



black lucust lumber

basket willow

biochar

CENTER FOR AGRICULTURAL URBANISM & REGENERATIVE FOOD SYSTEMS

2069 Annual Events Calendar

JANUARY 12, 2069 SCION SWAP
6:00 PM Bring your favorite fruit tree scion and baked goods to swap and share with local Seattle Growers!

JAN 25 - FEB 5, 2069 URBAN FARM CONFERENCE
Join us for presentations on new and old farming practices, successful farmers and skillshare workshops

JANUARY 12, 2069 FRUIT TREE PRUNING
9:00 AM- 6:00 PM Learn how to prune and care for your fruit trees

MAR 1- MAY 1, 2069 SEED LIBRARY
Visit the College of North Seattle Library to pick up seeds, grow them over the rest of the year, and save new ones when the season is over! New to seed saving? Ask for a mentor!

WEEKENDS IN APRIL PLANT SALE
10 AM- 5PM Purchase your favorite local cultivars

APR 14, 2069 IRRIGATION
1:00-4:00 PM Workshop sharing the latest tips, trick and research on irrigating in the new climate regime

JUNE 14- 28, 2069 PERMACULTURE DESIGN
Join us for the classic 2 week Permaculture Design Course

JULY 13, 2069 SUMMER SMASH
All day farm festivities!

SEPTEMBER 21, 2069 HARVEST DANCE
6:00 PM Help us celebrate the end of the growing season!

ONGOING

FRESH PRODUCE *Join our CSA or stop by our campus farm stand 4-7 PM Tuesdays and Sundays*

FRUIT TREES FOR SEATTLE *Join the list for up to 3 free fruit trees.*

MONTHLY AG TEACH-INS *Every first Sunday from 4-6 join a "Farm Elder" to learn new skills; let us know if you would like to lead a teach-in.*

REMOTE LEARNING *Our student research is available! Look online or find catalogues at your local library.*

TIME BANK *Join the exchange where every one's time is equally valued- farm skills are allways needed.*

WORK PARTIES *Join us every Sunday from 10-3 to work on the farm.*

Figure1 Pollinators are crucial https://www.citylab.com/design/2019/06/national-pollinator-week-bees-birds-butterflies-flower-garden/592267/

WHAT IF...
I-5 AS CITY-CROSSED

Yuqing Zhang

What if highways could be the corridors for pollinators which may contribute to urban agriculture? The project focus on the greenspace along the highway. The vacant space could be reuse for different functions. As researching along the I-5, I category three types of land--- wetland,concave and convex. These three different situations will come out different solutions. Therefore, the toolbox is listed as solutions.

WHY?

17,000,000 acres of possible pollinator habitat conservation opportunities along the highways over the U.S..

——Highways BEE Act

SOURCES: https://www.agri-pulse.com/ext/resources/pdfs/b/e/e/c/t/BEE-Act.pdf

BENEFITS OF POLLINATOR GARDENS

20 Billion Worth of Food in United States.

75% Flowers Need Pollination.

1,200 Types of Corps Get Pollination Services

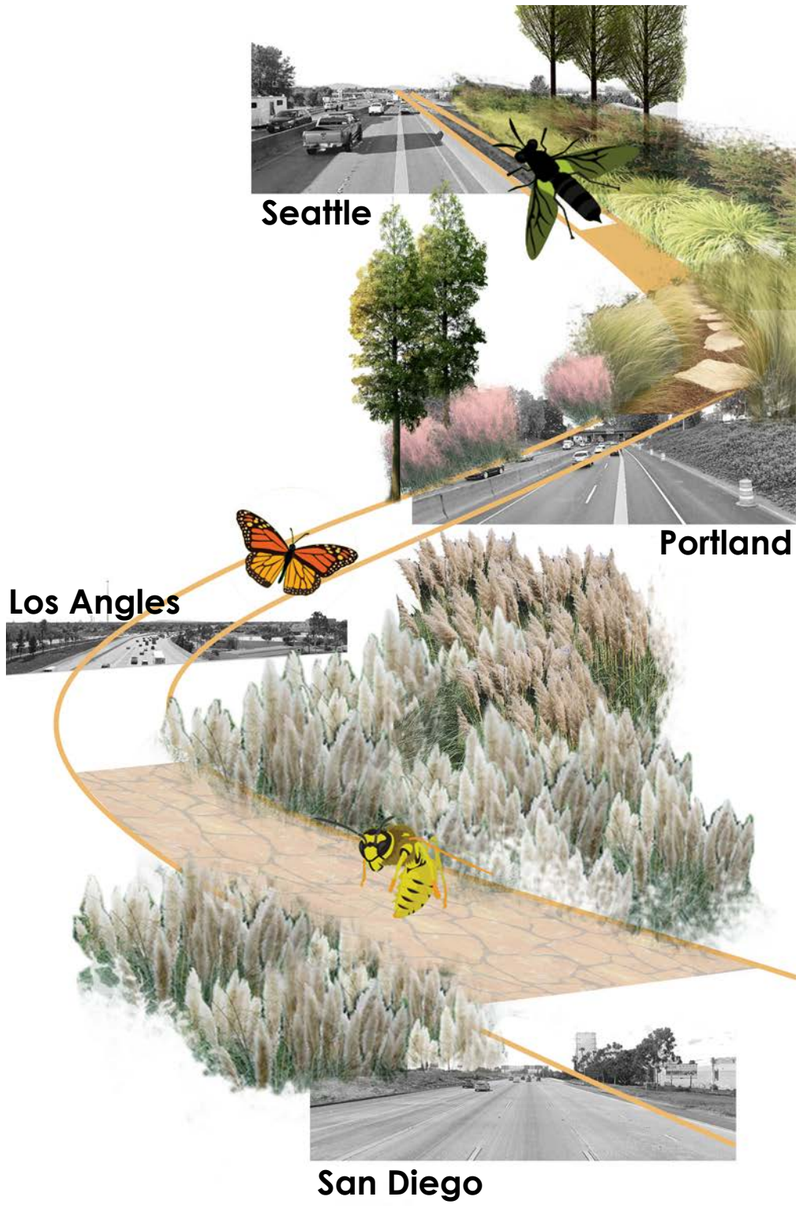
5.4 Billion Dollars Add by Honey Bees

Source: https://www.pollinator.org/pollinators

EFFECTS OF POLLINATORS' GARDEN

Stabilize soil | Protect from severe weather | Clean the air | Support wildlife

POLLINATOR CORRIDOR

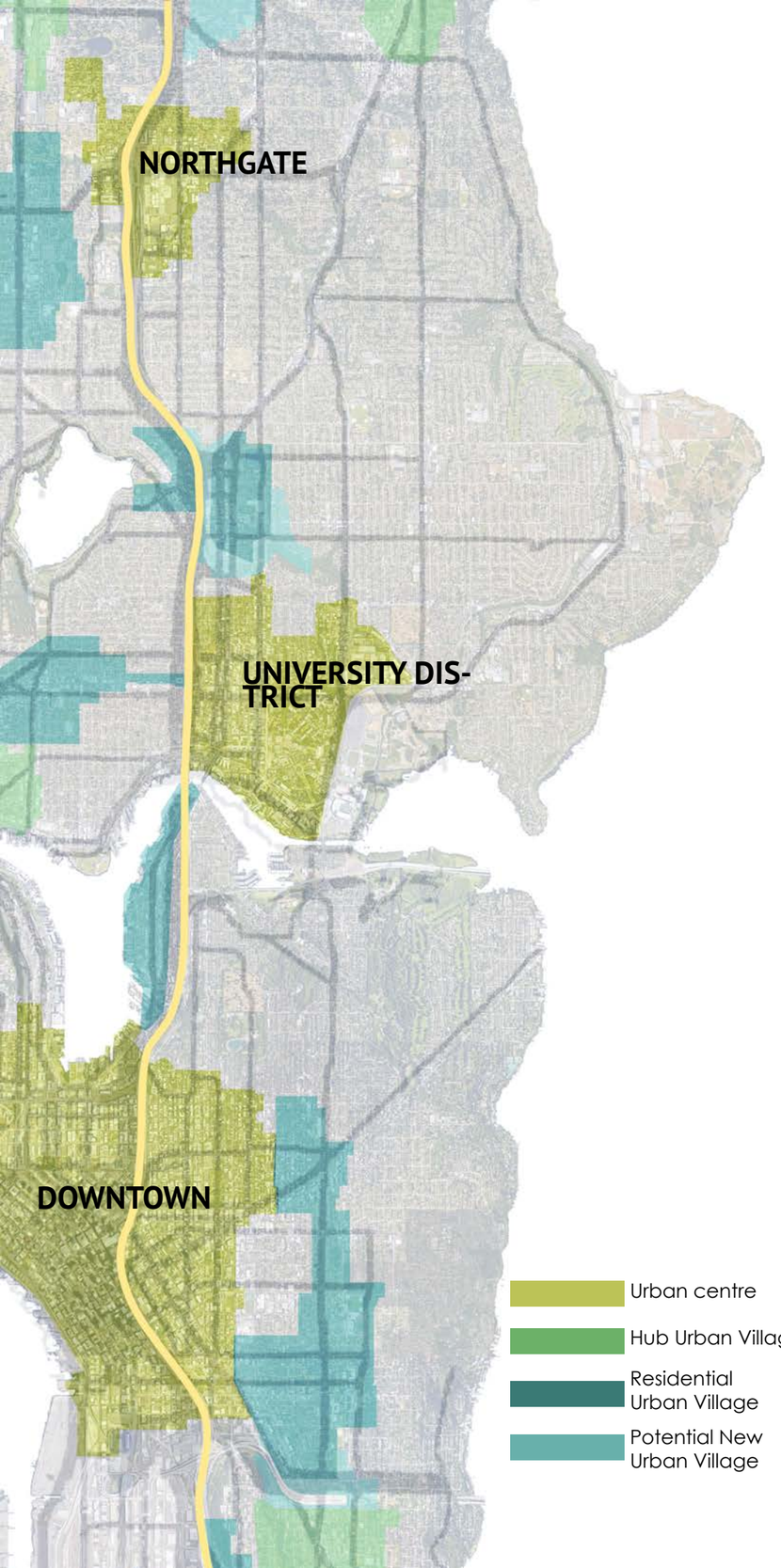


I-5 EXPRESS AS CORRIDOR

FOR PEOPLE & POLLINTORS

RESIDENTIAL CORRIDOR

Source: all aerial maps from Google Maps



WHERE?

With the great expension of Seatlle center and multi-city centers raised along the i-5 Express, the total area of open space decreased trem-endously.

Some green space along the i-5 Express might be redeveloped as urban agriculture use.

COMMON ISSUES

1. FOOD SECURITY
2. LONG-TERM MAINTANCE
3. POLLINATOR-FRIENDLY PLANTS
4. RESILIENT AGRICULTURE

A: WETLAND

SPECIAL FOCUS:

1. Pollutions like vehicle oils, heavy metals in the wetland.
2. Pollinator-friendly plants should also be water resilient.
3. Species lived in the water contribute to the pollinator garden

B: CONVEX

SPECIAL FOCUS:

1. Steep slope needs improved design.
2. Runoff water restoration.
3. U-District community need a place to build community-connection.
4. Safety issues along the highway.

C: CONCAVE

SPECIAL FOCUS:

1. Attracting people
2. Connecting with surrounding green space
3. Fight against the city sprawl

Source: all aerial maps from Google Maps

HOW?

These six toolboxs could be conduct along the highway while facing different situations like wetland in northgate, convex in u-district and concave in downtown.

1.Phytormeditaion
By using the hight difference, 3 steps of slope could refine the water quality by adding some plants could not only absorb the pollution but also attract pollinators.

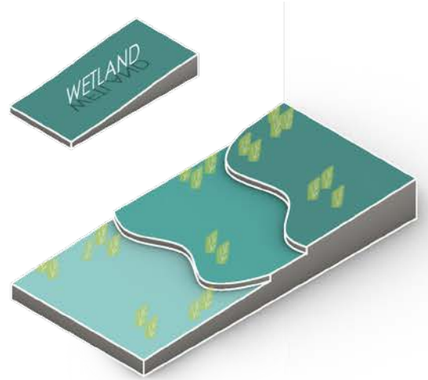
2. Slope Reform
Inserting some flat ramp for activities and planting the pollinator-friendly and edible plants.

3. Add Activities
Attracting people by adding activites like p-patch, Children's Garden and Lesiure places etc.

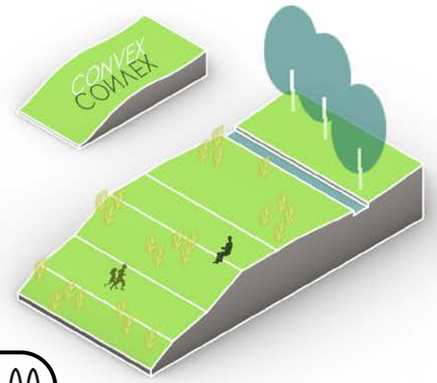
4.Pollinator Garden
Along the I-5 express side, we can sow seeds attract pollinators. These will not only be the habit of pollinators but also keep the site safe from the traffic.

5.Infrastructure
ADA access trial, bicycle trials and bus stops should be considered in part of the design as a low-carbon transportation

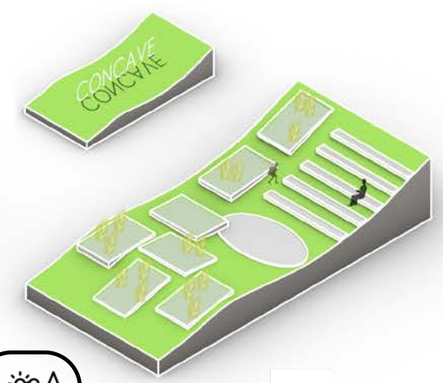
6.Permaculture
Permaculture could be the instructor for the proposal for sustainable agriculture. We could conduce concept like: Hugelkultur, Food Forest, Rainwater harvesting and sheet mulching etc..



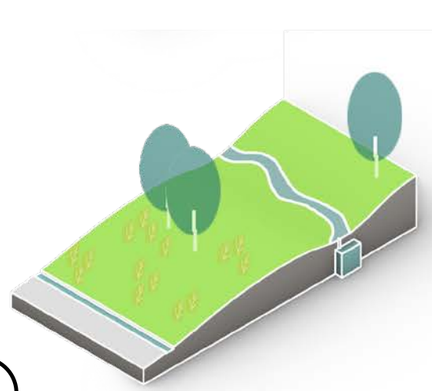
Phytoremediation



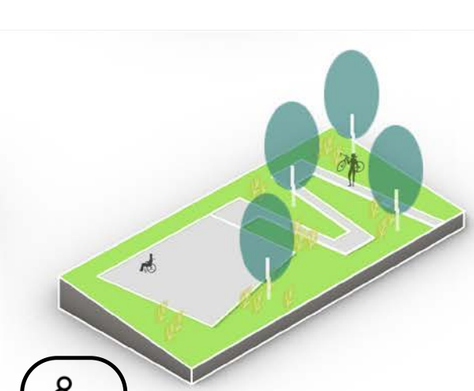
Slope Reform



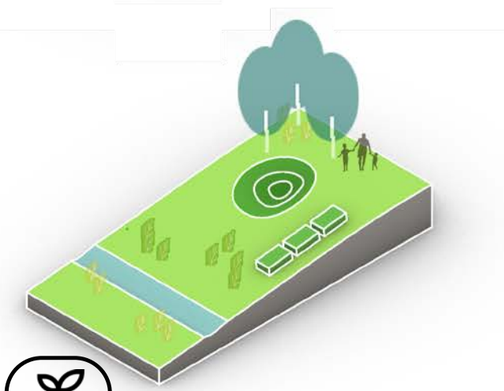
Add Activities
(P-Patch, Children's garden)



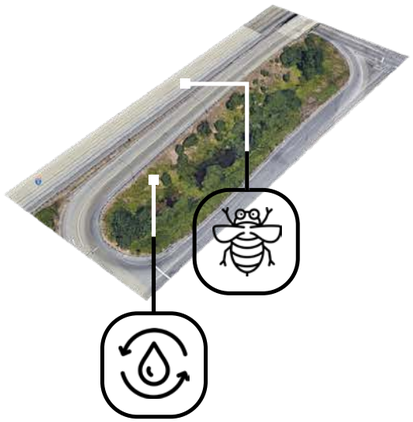
Pollinator Garden



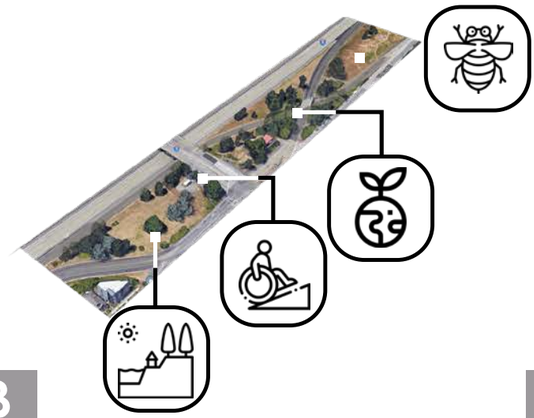
Infrastructure



Permaculture
(Hugelkultur, Food Forest
Composed cans)



A



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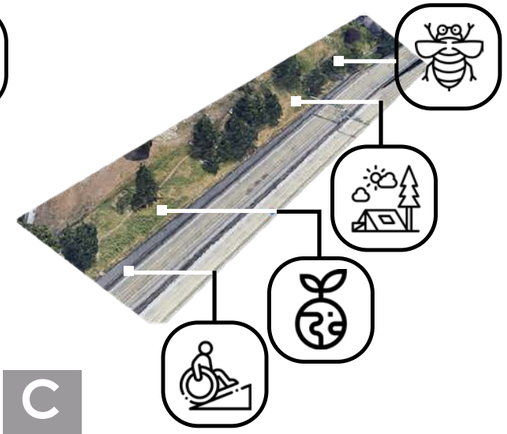
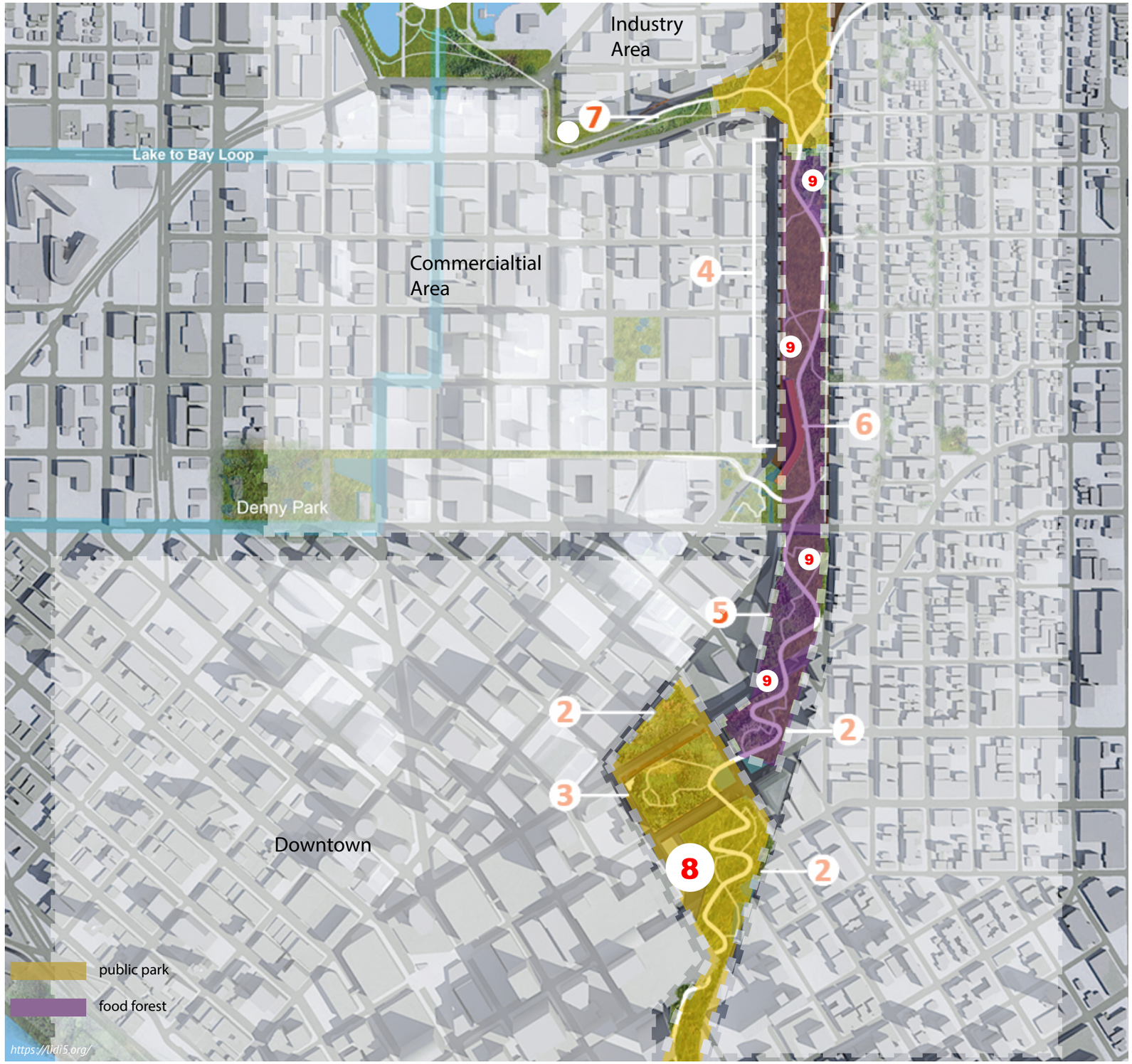


C

Source: all aerial maps from Google Maps



LID I-5 FOOD FOREST

Xinyu Xu

NEW PROJECT GOALS

45 ACRE FOOD FOREST PARK

Trails, Paths, Overlooks, Community Spaces, Community Gardens, P-Patch, Food Forest

RECNNECT NEIGHBORHOODS AND THE URBAN FABRIC OF THE CITY

PUBLIC BENEFIT FROM DENSIFYING URBAN CORE

ENERGY GENERATION, NOISE REDUCTION, STORMWATER MITIGATION, EMISSIONS CONTROL

ARCHITECTURAL INFRASTRUCTURE AT A CITY SCALE IMPLEMENTS

45 acre food forest park
convention center expansion
downtown arena
downtown housing
cultural and activity spaces
collective views of the city, water and mountains
edible landscape provide products and foods
rainwater harvest system

SITE PLAN

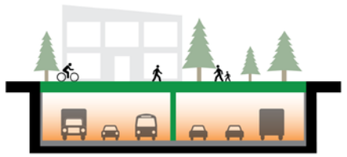
1.park
2.convention + hotel
3.arena
4.housing
5.parking
6.cultural center
7.office/research space
8.agriculture center
9.community garden

LID I-5 PROPOSAL

IMAGE : https://lidi5.org/

In some places I-5 is a trench. Other places, it's a wall. Every once in a while, a bridge spans the rushing flow of motor vehicles or a street travels under the immense elevated wonder. But more often than not, I-5 divides communities, destroys biking and walking connections, and

Current Conditions



Future Opportunities

Problems of surrounding area

Excellent
population load

Long distance
to public space

Poor access to

Long distance
to amenities

Safety issue

data resource: Outside Citywide map tool

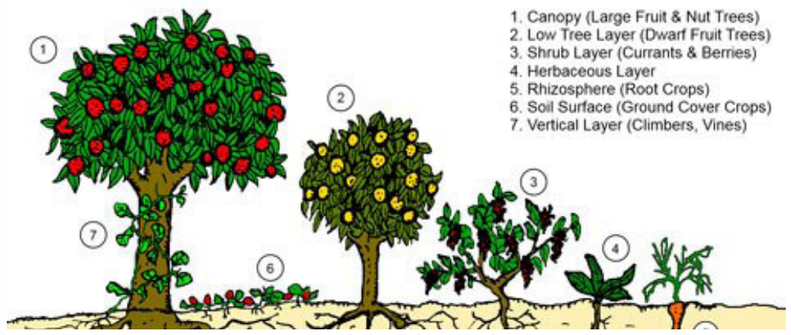
How do LID I-5 Food Forest deal with climate

How will LID I-5 Food Forest benefit our life?

There are 56 p-patches in Seattle, but in recent years, the number of p-patches is in short supply. LID i-5 food forest park has set up several p-patches and community gardens near residential areas to provide

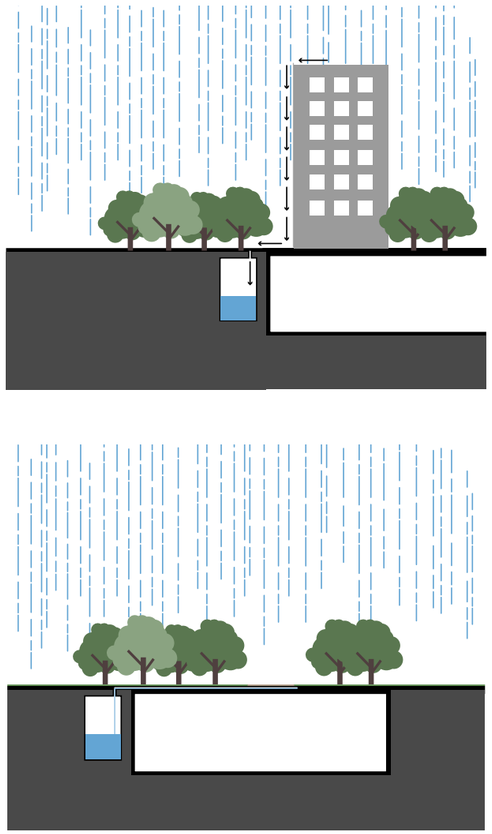
Plants selection

The 45 acres of food forest park can only realize planting management in a small part of the area. Therefore, for the edible landscape of a large



Rainwater harvest

A number of water storage points are set up in the site to collect rainwater from the roof and road surface. Rain water will be used to



Agriculture center

The agricultural center is located near downtown as a new landmark. As an exhibition and educational institution, agricultural center has set up Seattle agricultural history exhibition hall, agricultural education center and children's education center to popularize various agricultural knowledge and cultivate excellent talents.

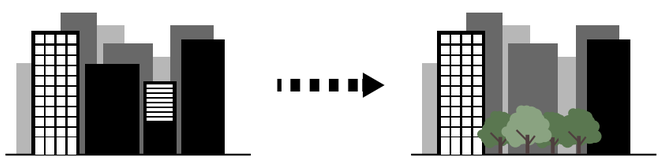
At the same time, as an agricultural exhibition hall, the agricultural

https://www.eyeofdubai.ae/ar/news/details/saudi-agriculture-exhibition-2018-to-tackle-sustainability-food-security

How do LID I-5 Food Forest deal with climate

City back to nature

The I-5 freeway is a major environmental issue, with significant noise, air pollution, and visual impacts to thousands of people who live and work nearby and walk across it every day. Where topography allows lids to be built, they reduce these impacts. Lids will also enable more people to live, work, shop, and play in walkable urban neighborhoods and drive



Provide food

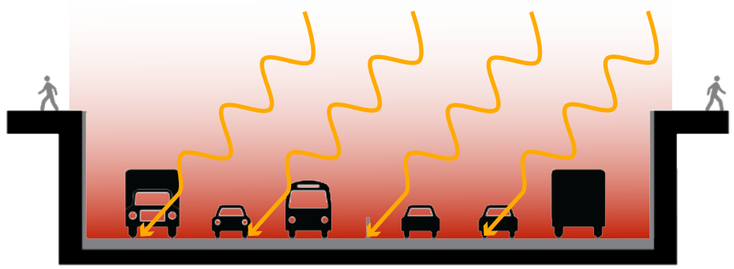
For Lid I-5 Food Forest, we have 70% of the site for food forest and 25% for community garden.

The main point of edible landscapes, is to grow plants that are edible. Not only do they contribute to a greener environment by assisting with the absorption of carbon dioxide, but they also help feed hungry people.

Growing edible plants is a sustainable way to feed neighborhoods and communities. Folks who live in food deserts don't have to rely on chips and junk food for sustenance. It also cuts down on the amount of mass farm being produced and sold in commercial stores. Taking the supermarket out of the equation means not supporting a pesticide, machine based organization.

Reduce heat issue

Low albedo asphalt increases the solar heat absorbed by the surface.The sun's rays hit the i-5 asphalt, absorbing heat and causing the temperature to rise, creating an urban heat island effect and exacerbating climate

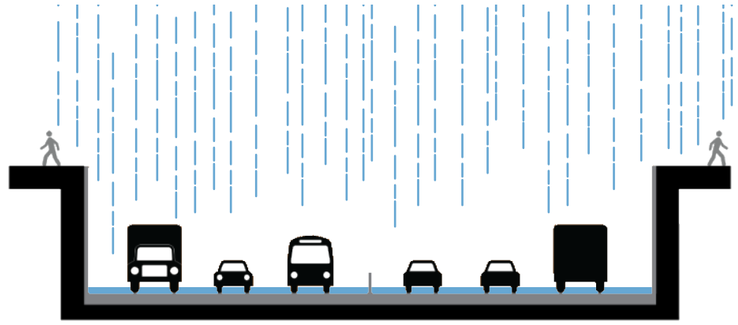


Solar energy is used by plants to absorb climate-changing carbon dioxide and release oxygen through photosynthesis.

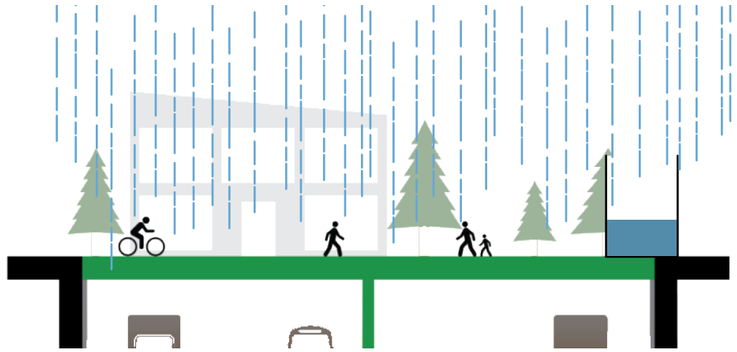
Through reasonable arrangement of plants, let plants better use the

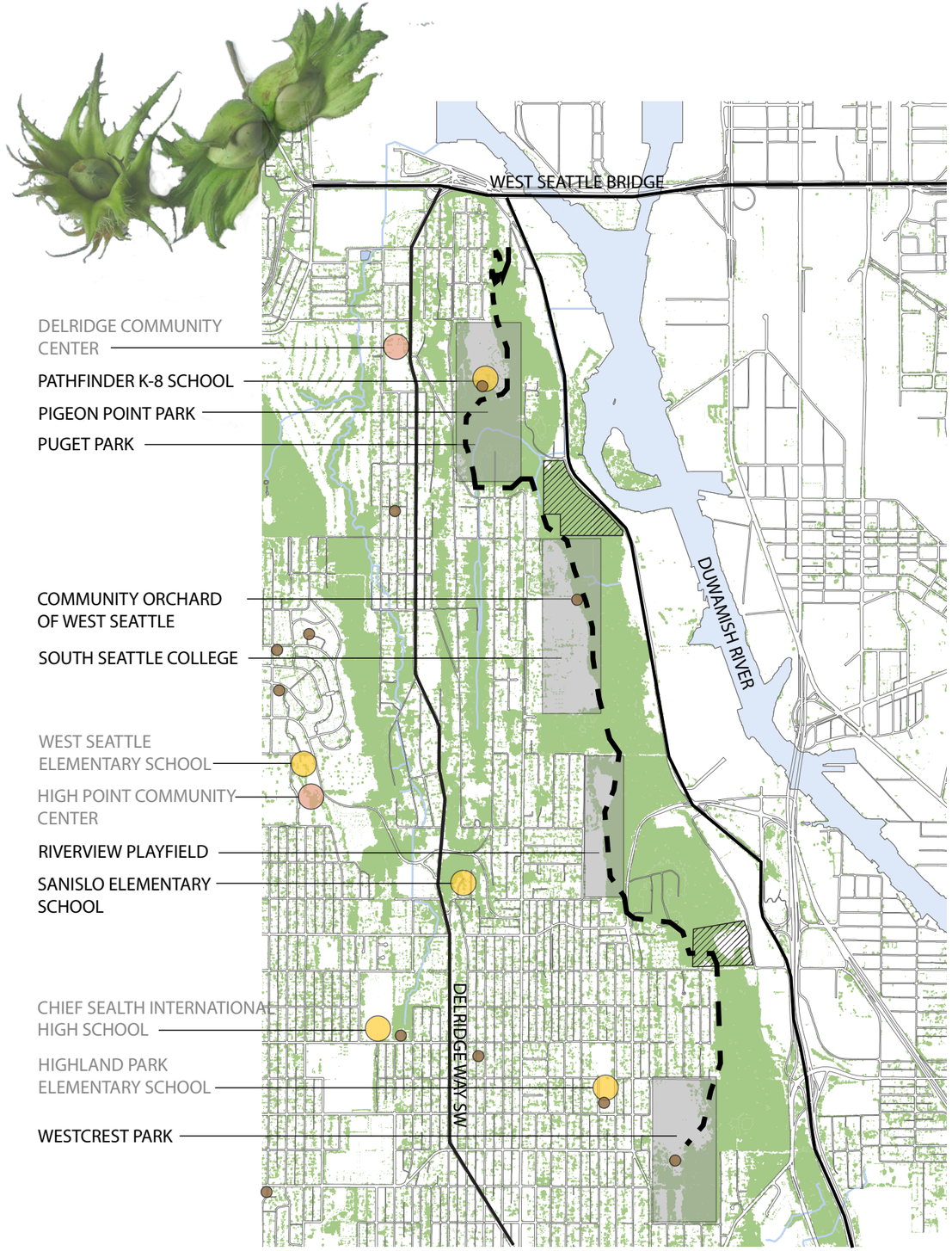
Rainwater harvest

Seattle is the rain city, Seattle averages 37.49 inches of precipitation a year. Asphalt pavement is impermeable to water, resulting in a lot of rain water resources are not used.



Lid i-5 food forest park increases the green area, which can effectively store rainwater. Meanwhile, rain water collection devices are set up in different parts of the site, and the collected rain water will be used for





UNIVERSITY OF WASHINGTON LANDSCAPE ARCHITECTURE
STUART JOHNSON FALL 2019

WEST DUWAMISH GREENBELT EDIBLE TRAIL

Stuart Johnson

THE WEST SEATTLE COMMUNITY IS HOME TO APPROXIMATELY 30,000 PEOPLE AND GROWING. THE WEST DUWAMISH GREENBELT IS THE LARGEST IN THE CITY, AT OVER 500 ACRES AND OVER 4 MILES LONG. THE UPLAND FORESTED SLOPES ABOVE THE DUWAMISH RIVER HAVE LONG PROVIDED FOOD FOR HUMANS AND WILDLIFE. TODAY, GROUPS CARE FOR THE SLOPES, ENHANCING TRAILS AND RESTORING NATIVE VEGETATION.

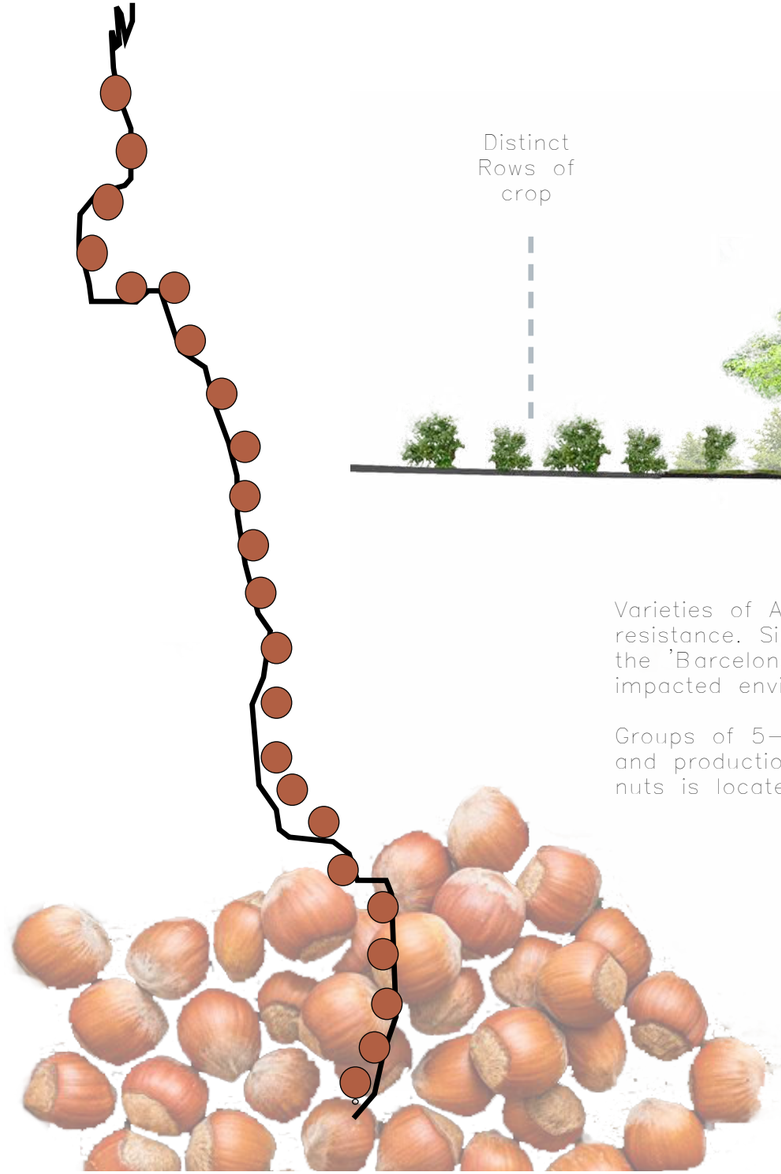
SCHOOLS, PARKS AND COMMUNITY CENTERS SUPPORT GARDEN SPACES LOCATED THROUGHOUT NEIGHBORHOODS FROM YOUNGSTOWN TO WHITE CENTER.

TYPICALLY, THE METHOD WE USE TO QUANTIFY THE BENEFITS OF THESE TWO COMMUNITIES HAVE SEPARATED THEM.

AS SEATTLE GROWS AND CLIMATE CHANGE CONTINUES TO PRESSURE URBAN FOOD RESOURCES, COMMUNITIES THAT PROVIDE SUSTENANCE, ENCOURAGE STEWARDSHIP, AND FACILITATE MULTIMODAL TRANSPORTATION SHOULD BE EMPOWERED.

Coryllus cornuta var. californica – BEAKED HAZELNUT
MONOECIOUS, SELF-INCOMPATIBLE, ANEMOPHILOUS TREE

21,120 ' LONG TRAIL
20' O.C. PLANTING,
DOUBLE ROWS
2000 NUT BEARING TREES
25LBS A YEAR/PER TREE
50,000LBS NUT HARVEST



Varieties of American and European hazelnuts are bred for blight resistance. Since multple varieties are needed for pollination, varieties of the 'Barcelona' and 'Sacagewea' strains are planted. The variability of future climate impacted environmental changes is addressed through the diverse selections of trees.

Groups of 5–20 trees are 'adopted' by the public. Public workshops for pruning, harvesting, and production are housed in community meeting spaces. Communal equipment for processing nuts is located onsite, easing the burden of shelling.

Rubus parviflorus – THIMBLEBERRY
Native deciduous shrub found in moist to dry open woods, edges, and open fields. Patches grown along the greenbelt's open border for public
foraging and wildlife.

Rubus leucodermis – BLACK RASPBERRY
Native deciduous shrub grows in fields and open forests. Whitish–bluish canes can be trained onto frames, resulting in striking form. Harvested late summer, eaten raw or cooked in pies, jams.

Vaccinium ovatum – EVERGREEN HUCKLEBERRY
Native evergreen shrub is common in second growth forests, along edges and openings.
Fruit ripens late summer, plant doesn't require much pruning and is virtually pest free.


Westcrest Park 324'
1.25 miles
Riverview Playfield 250'
.75 miles
Seattle South College 260'
.75 miles
Puget Park 180'
.2 miles
Pathfinder K-8 School 260'
.5 miles
17th Ave. Southwest 50'
GROWING SEATTLE
HERBS
VEGETABLES
GOODS
CUT FLOWERS
COMPOST
FRUIT
STORMWATER FILTRATION
WILDLIFE HABITAT
SERVICES
SHADE
EROSION CONTROL
CLEAN AIR

https://www.nordictrack.com/treadmills/commercial-2950-treadmill?pp=0&epik=dj0yJnU9S3BYQ2daUWtVVnJsZmpDbktrRXlENF96aEtXdU5RZ0kmbj1lcXBKV25IaFkybWE4LVhTallEUUlnJnQ9QUFBQUFGNDdXZUk

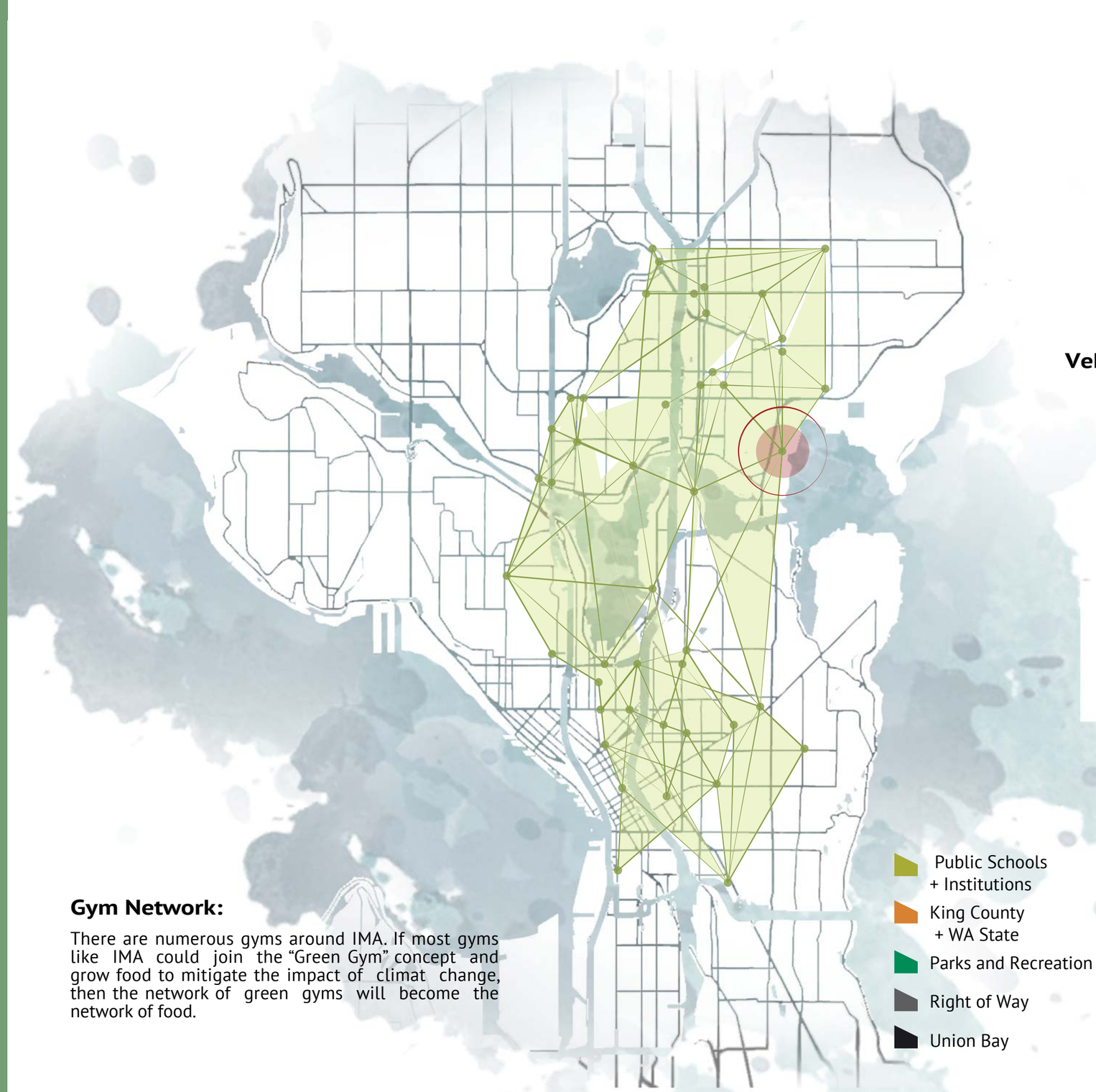
IMA “WHOLE HEALTH” SYSTEM

Shanshan Shang

As evidence of accelerated climate change across the globe, and the increasing concern for the quality of food, especially in urban areas. Growing edible plants not only provides food but also lets people get fit through gardening.

What if IMA could join the “Green Gym” concept and support UW farm as well as lead to a healthy natural system and “whole health” lifestyle?

“Green gym” not only creates an outdoor space to improve fitness but also provides people with a way to enhance their mental health by taking action to grow edible plants- through the sense of biophilia.



Gym Network:

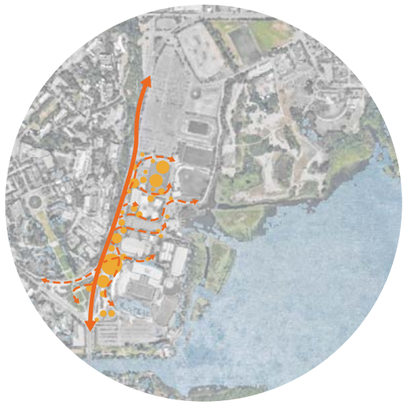
There are numerous gyms around IMA. If most gyms like IMA could join the “Green Gym” concept and grow food to mitigate the impact of climat change, then the network of green gyms will become the network of food.

All base maps from Google Maps

Vehicle Circulation and Parking Lots

Drainage

Exercise Track



Density of Crowd

Public + Open Space

Green Space

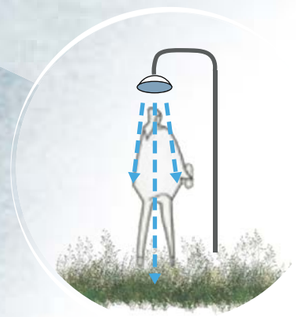
- Public Schools + Institutions
- King County + WA State
- Parks and Recreation
- Right of Way
- Union Bay

N

0 — 1000 — 3000 Ft

How can IMA respond to climate change?

- Heating is supported by Pedal Power



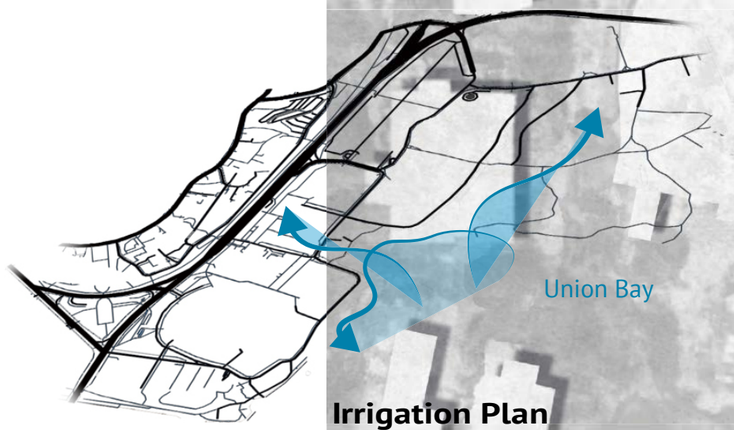
- Recycle shower waste water for irragation

N

25 175

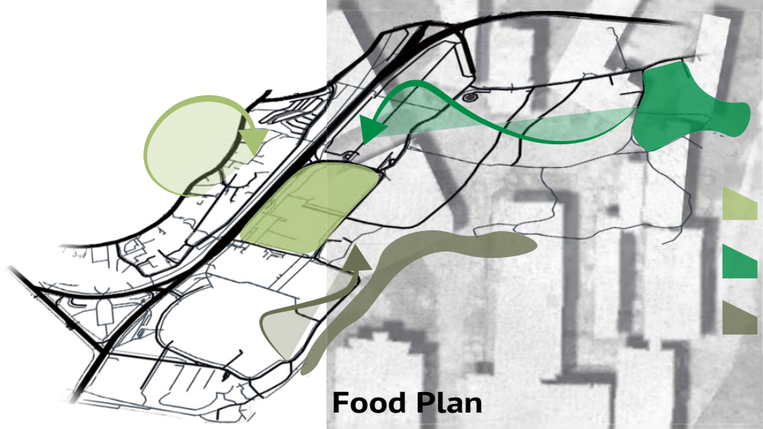
0 75 Ft

All base maps from Google Maps



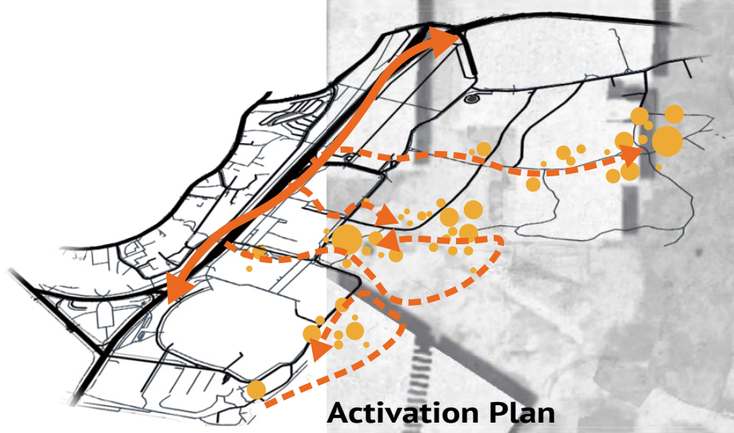
Irrigation Plan

Use Union Bay to irrigate IMA surrounding food area and UW Farm.



Food Plan

Connect three food areas and provide food to IMA.



Activation Plan

Both boat cruise and exercise track will activate UW Farm and Union Bay which bring more volunteers and students to these place.

All base maps from Google Maps

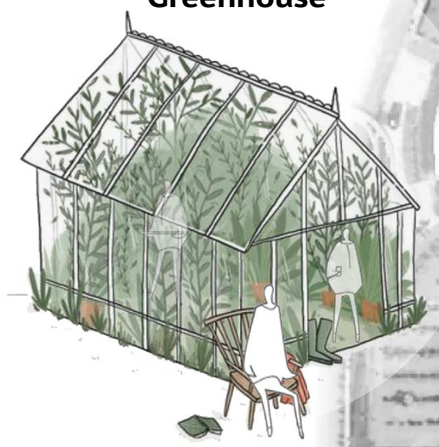
Exercise Track

http://www.shuicaijia.com/m/view.php?aid=281

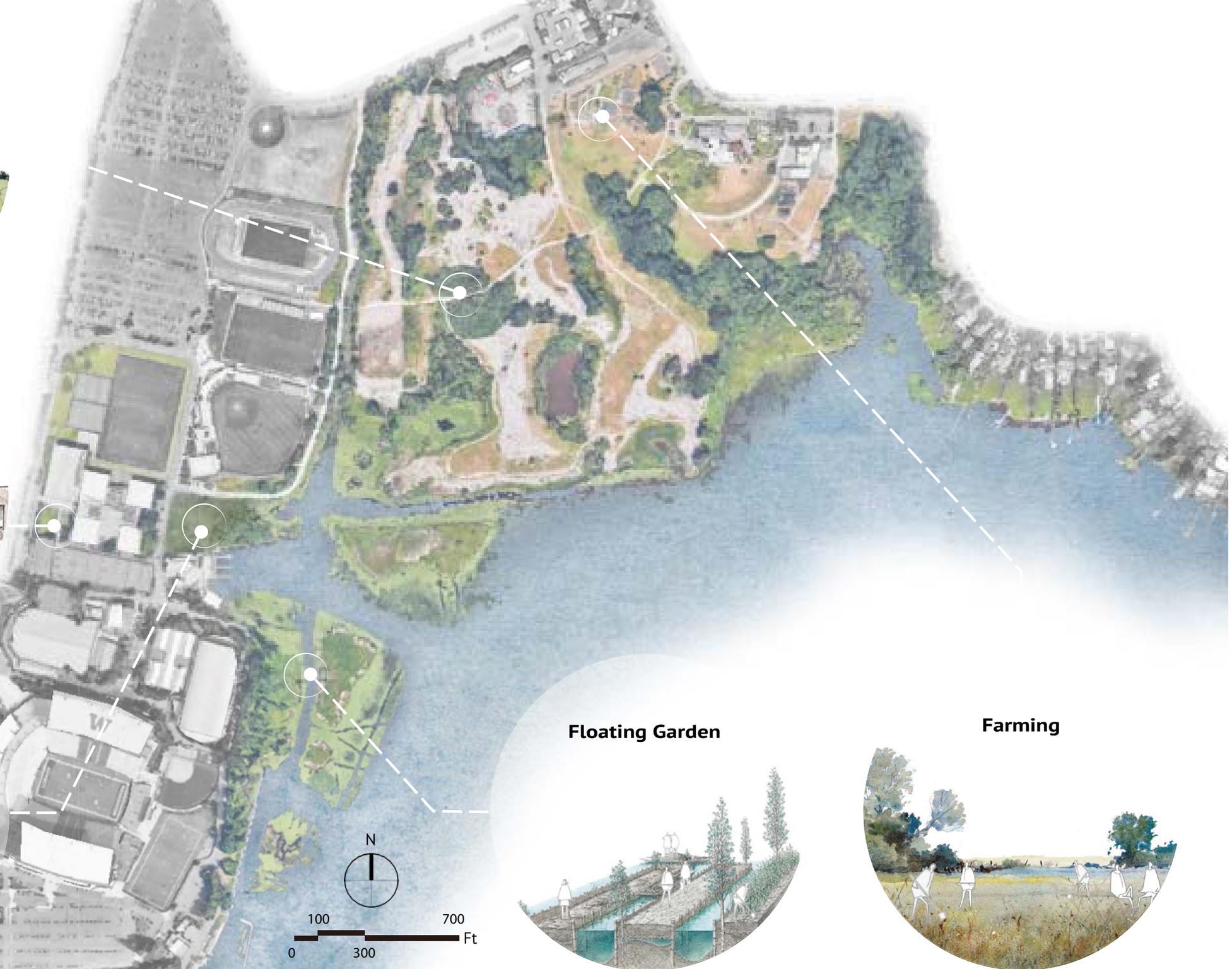
Therapy

https://getgardeningtips.com/category/garden-design/

Greenhouse



https://dribbble.com/shots/4077819-Happy-new-year/attachments/935531



All base maps from Google Maps

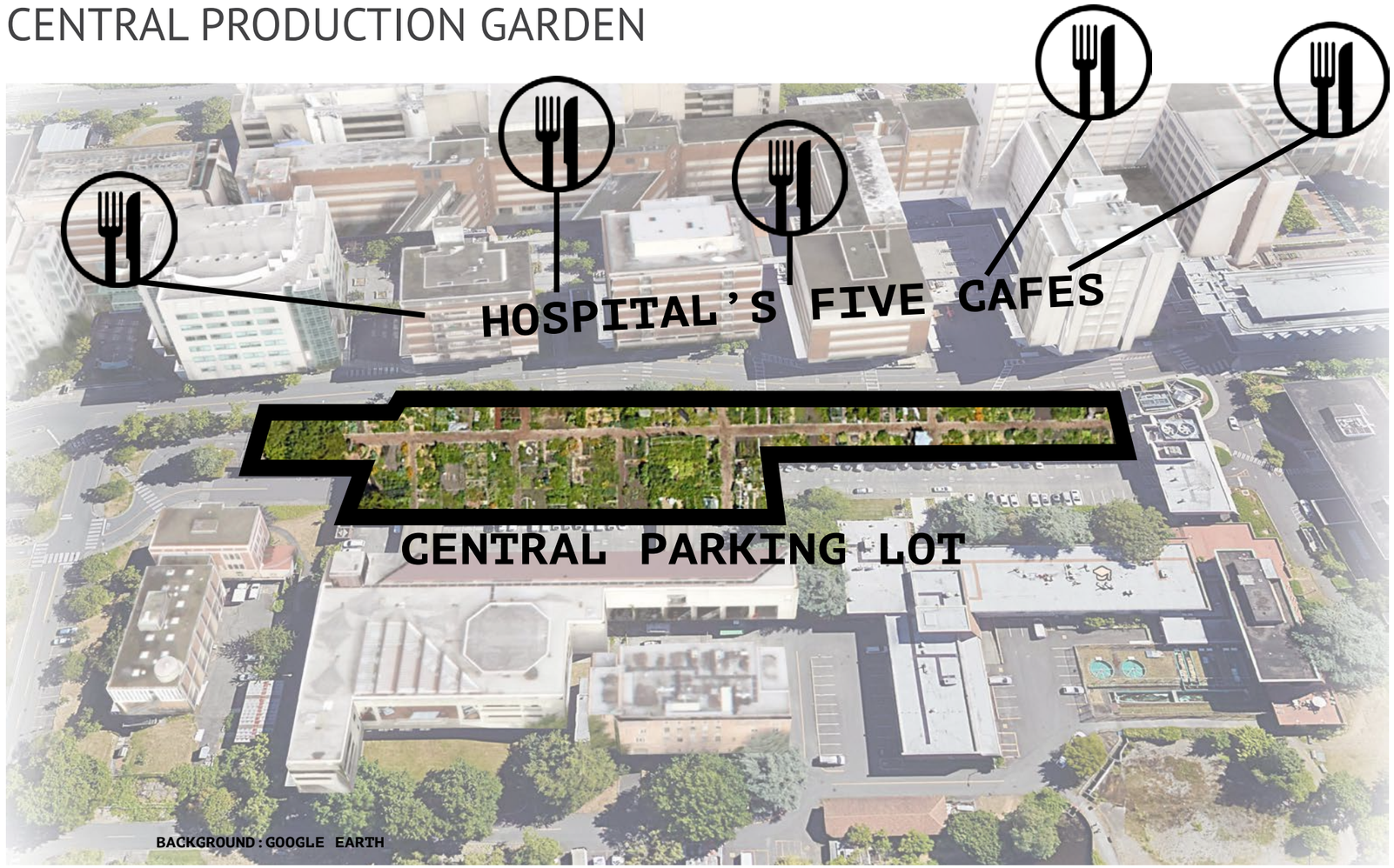
Floating Garden

https://ancientcivilizationkit.weebly.com/a-closer-look.html

Farming

https://www.pinterest.com/mishie/watercolor-inspiration/

CENTRAL PRODUCTION GARDEN



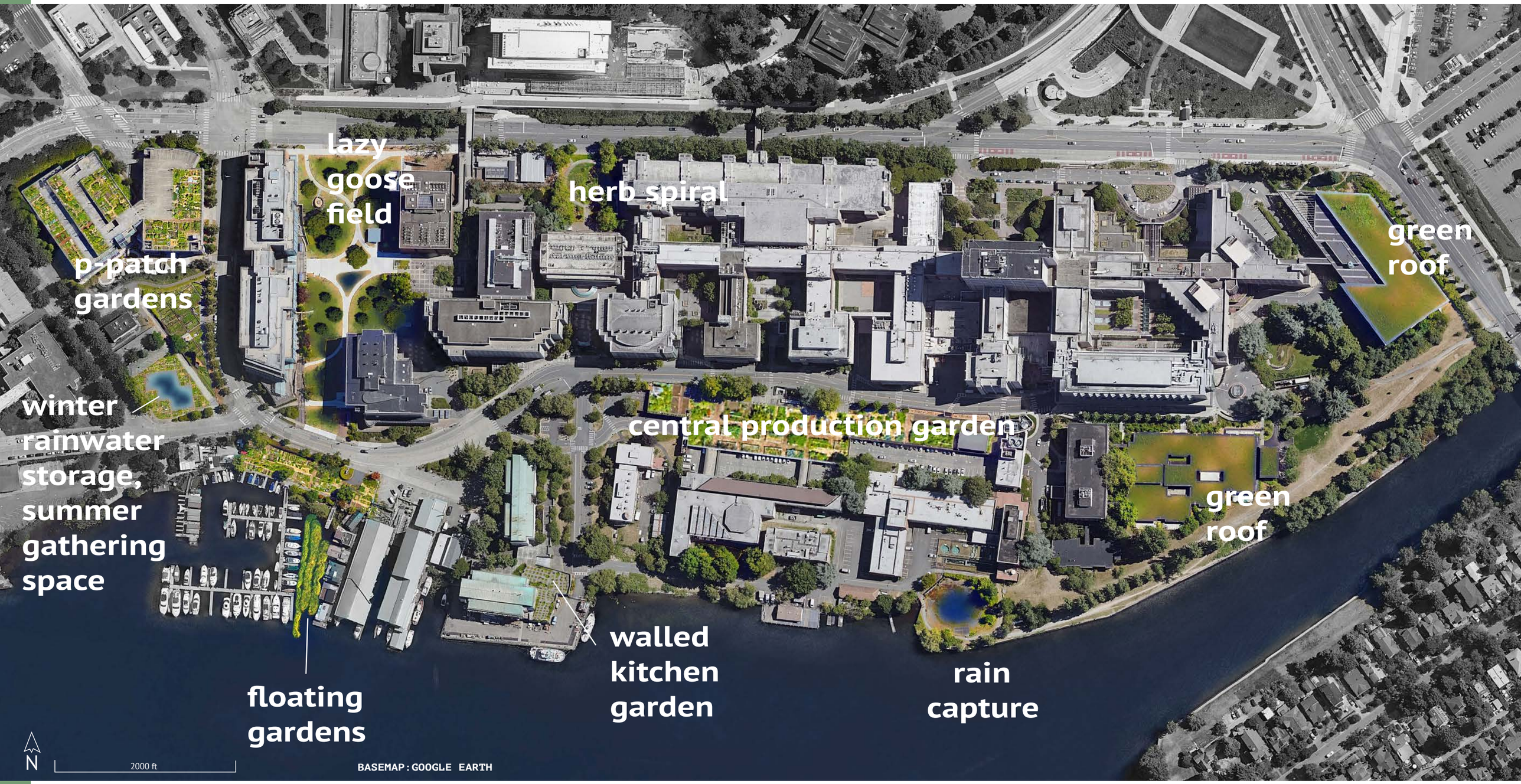
ØsterGRO is the first Danish rooftop farm located in the heart of Copenhagen. Images: www.oestergro.dk

WHAT IF...
HOSPITALS GREW FOOD

Billie Guilliatt

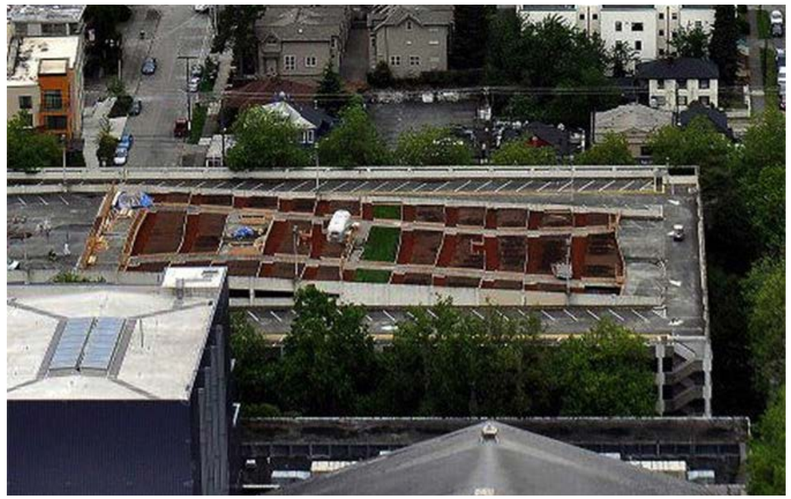
Opportunities for Therapeutic Urban Agriculture at the University of Washington Medical Center include a central, mostly underground parking garage. The upper level of parking is perfect for central production garden, in close proximity to the hospitals cafes and cafeterias.

Animals can provide compost for use on the farm, as well as providing a therapeutic element. Exposure to farm animals is known to prevent symptoms of asthma and allergies in children.

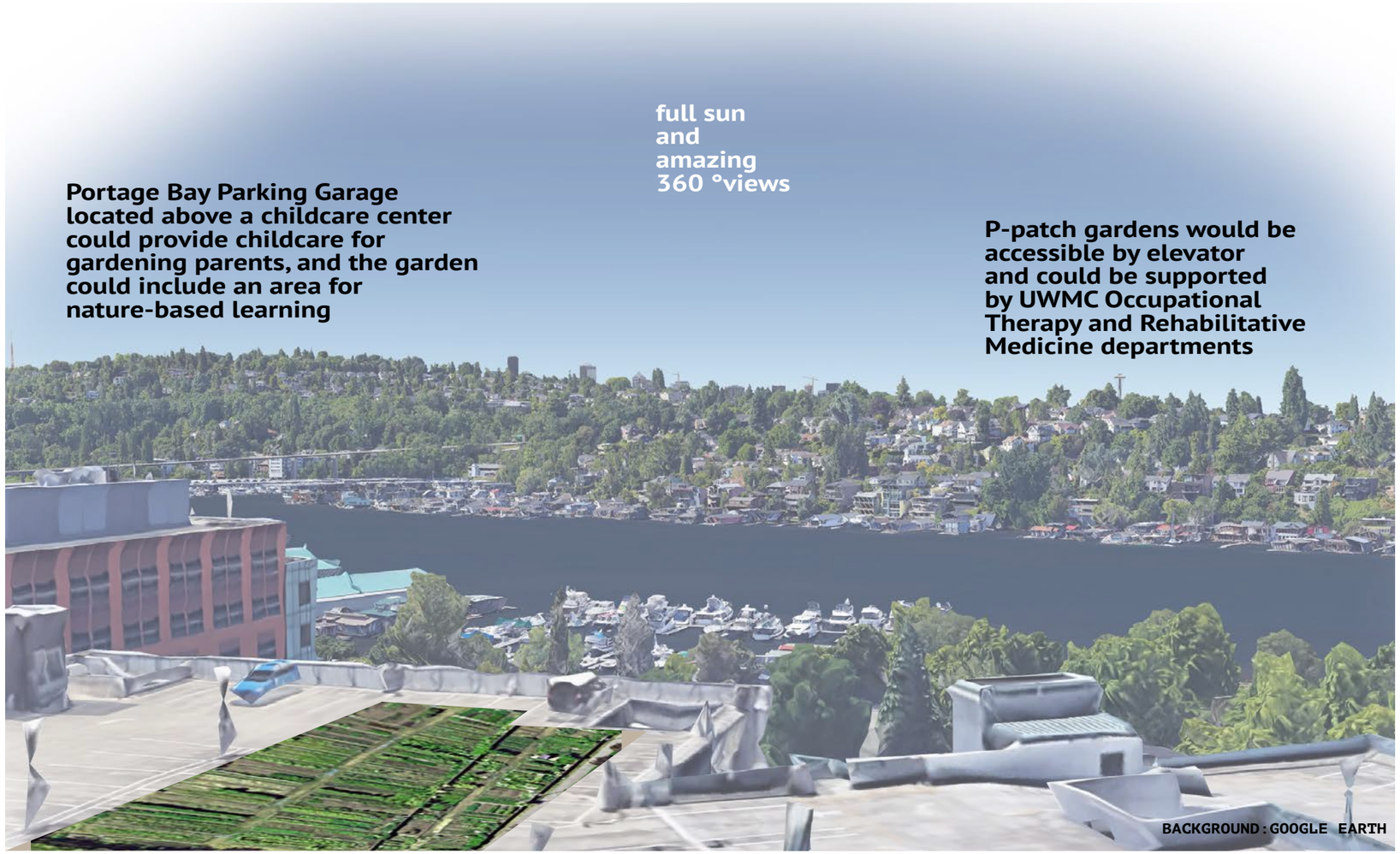


The University of Washington's Medical Center is a large hospital, teaching hospital, medical research center, and houses over 300 medical clinics. South of the medical campus is South Campus, which hosts additional teaching and research facilities including Ocean and Marine Sciences. The site offers unique opportunities including being located on Portage Bay, and large parking areas that are often not full.

PARKING GARAGE ROOFTOP GARDEN OPPORTUNITIES



Images: www.convenepllc.com/portfolio_page/upgarden/



UpGarden P-Patch

Seattle's public community garden system, called the P-Patch Program, began in 1973. The UpGarden P-Patch is a community garden located on top of a parking garage in downtown Seattle. In the dense urban neighborhood near Seattle Center, open space is hard to come by. The highly successful p-patch is a popular community asset.

As a proof of concept, the UpGarden opens up the possibility of creating green, open space, on top of parking garages everywhere. The University of Washington Medical Center has some parking garages, which are never full, which would be perfect locations for community gardens with a view.

LAZY GEESE

Natural Goose Farm

In a new field between the medical complex and the bioengineering building, geese naturally flock. Taking inspiration from Spanish goose farmer Eduardo Sousa, the field could be planted with native Garry Oak and olives, both adapted to the hotter, drier summer Seattle is expecting in the future.

image: www.npr.org/sections/thesalt/2016/08/01/487088946/this-spanish-farm-makes-foie-gras-without-force-feeding his Spanish Farm Makes Foie Gras Without Force-Feeding

INTEGRATING URBAN FORESTRY


pink blueberries


red huckleberry


evergreen huckleberry


blueberries


BACKGROUND : GOOGLE EARTH

SOUTH CAMPUS CENTER

has a south-facing slope that would be perfect for growing traditional agricultural crops if it wasn't shaded by three large oaks. Retaining trees is an important way to combat heat-island effect. Planting shade-tolerant berry crops and native edible turns this landscape into a productive ecosystem.

SENSORY HERB FORAGING SPIRAL

herbs for shade:

bee balm

lemon balm

chives

pepper

peppermint

calendula

parsley

oregano

Image from: https://depts.washington.edu/uwbg/blog/2015-07/medicinal-herb-garden

THERAPEUTIC TRAIL

A therapeutic sensory trail near the health center would provide a biophilic experience for staff, students, and patients. Many herbs have additional sensory qualities and health benefits.

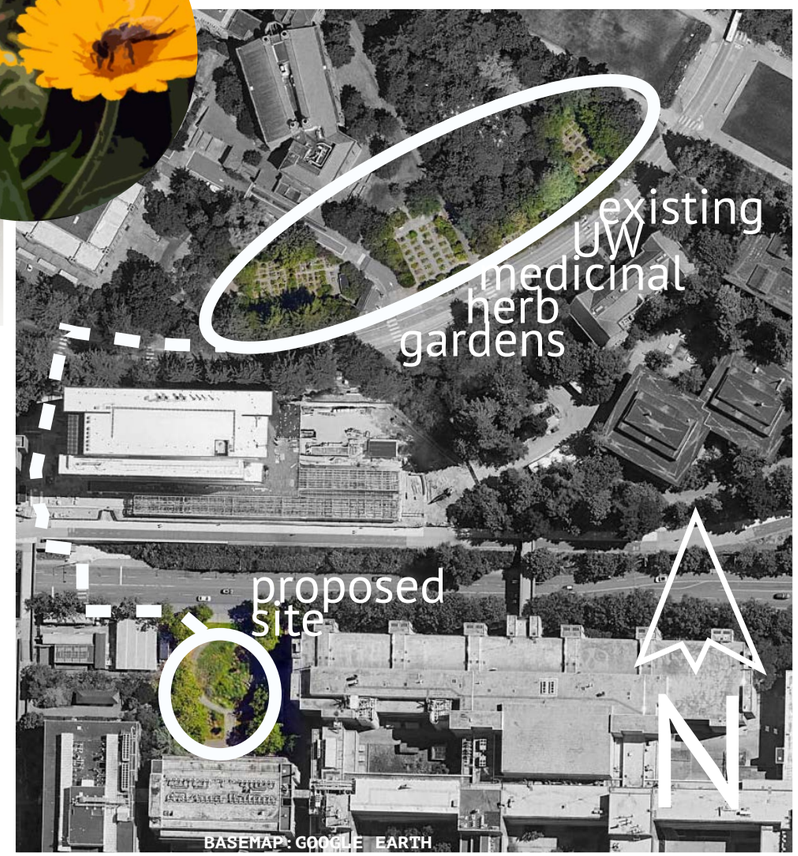


Image Citation : https://www.google.com/maps/place/Centennial+Park/@47.6230713,-122.3670463,1084m/data=!3m1!1e3!4m8!1m2!2m1!1scentennial+park!3m4!1s0x5490156435d9b2ed:0x74e880b6c7ec72aa!8m2!3d47

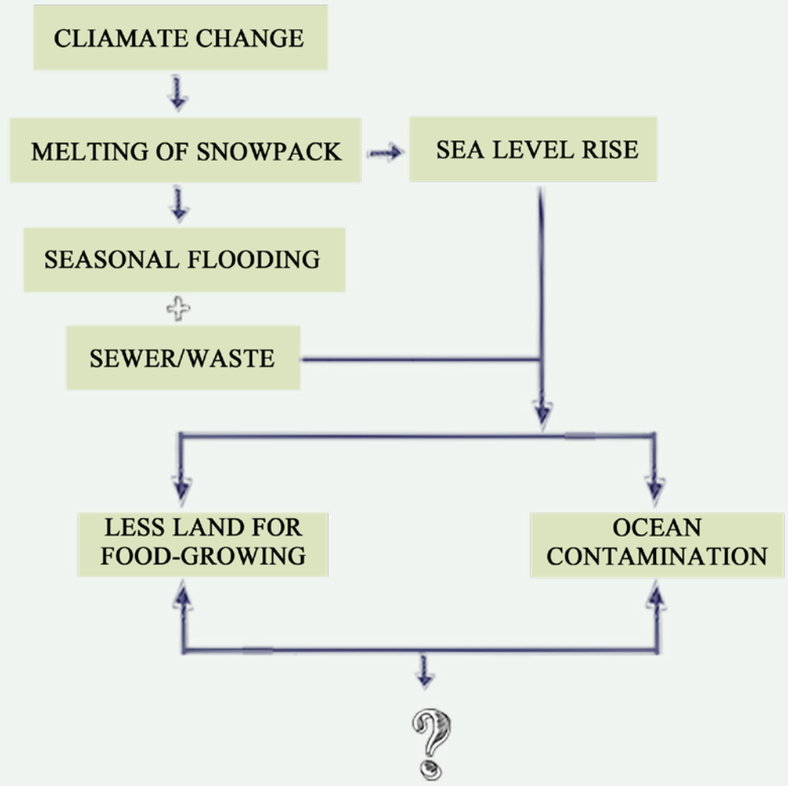
OCEAN FARMING
CENTENNIAL WATERFRONT PARK

Yingjie Luo

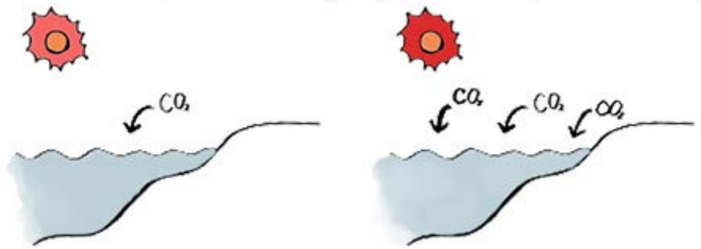
Situation & Challenge

Because of the increase of temperature under climate change, snow-packs are melting which result in sea level rise and extreme precip-itation events.

And in order to solve the problem resulting from decreasing land of food-growing and ocean contamination, what can urban agriculture do?



Contamination



Higher Temperature & Acidic Water

Industrial Zone

https://www.pinterest.com/pin/760334349571320975/

Liquefaction Zone

https://www.pinterest.com/pin/257831147398412381/

Sea Level Rise

Less Habitat For Shell-

Flood Zone

https://www.pinterest.com/pin/179229260156980106/

Tideflat

https://www.pinterest.com/pin/781022760347934909/

Overfishing

https://www.pinterest.com/pin/800796377472844735/

Wildlife Corridor

https://www.pinterest.com/pin/781022760347934909/

The impact of climate change would directly endanger our social and ecological environment.
Sea level rise will decrease the available land for creatures to live and grow food;
warming climate and increasing amount of Carbon dioxide will make marine environment dangerous and unlivable;
the extreme precipitation will result in flooding which would pollute the whole ocean environment.

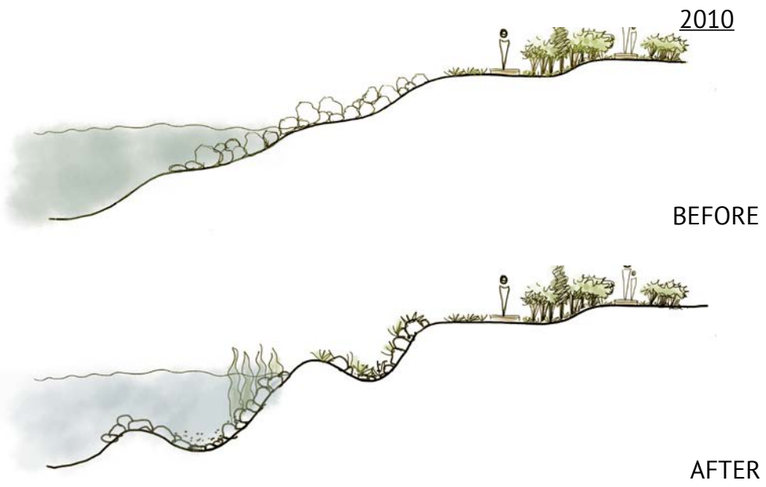
NEARSHORE: To Create a Buffer Zone for Shellfish and Salmon

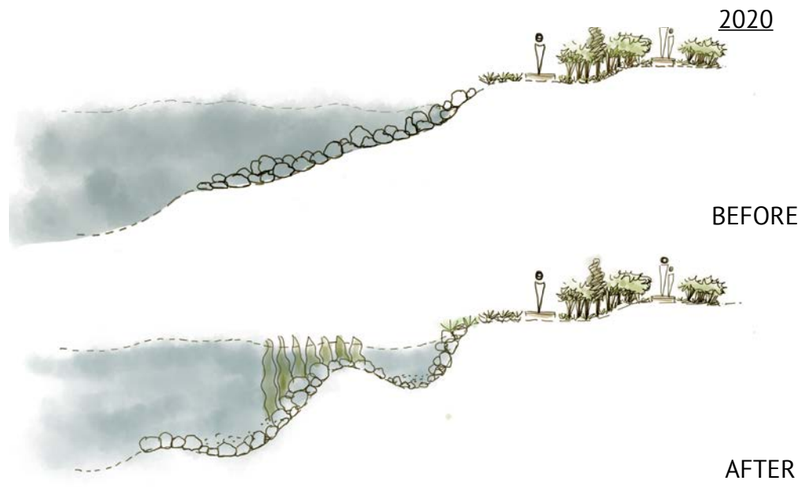
The Puget Sound nearshore - where land and marine waters meet - is a dynamic and interdependent ribbon of life for many plants and creatures. And the shoreline now are suffering from the risk of sea level rise and liquefaction which would endanger the habitats for creatures.

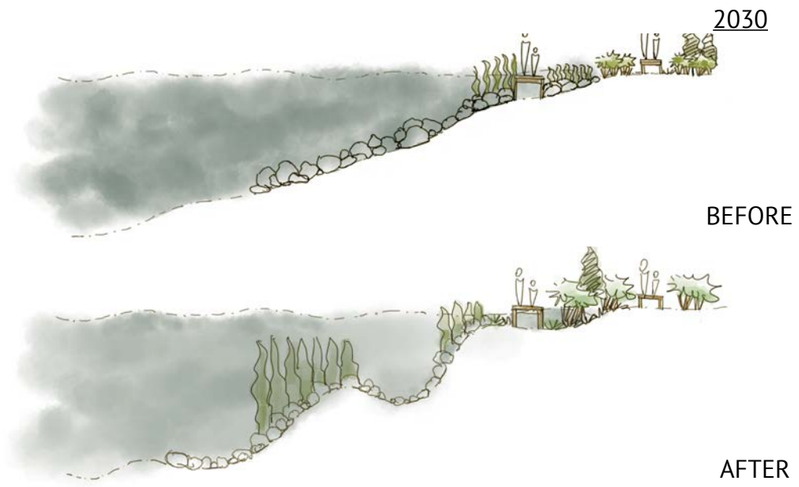
Many shellfish of Puget Sound live on low-lying reservations surrounded by water. So, as climate change causes the oceans to rise, tribal land is disappearing. Climate change also threatens the fish and shellfish these groups rely on for food and income. When Seattle's existing waterfront was developed and projected rise of sea level is coming, habitats for fish and shellfish are under treats.

In order to mitigate the impact of climate change, creating a cove or habitat bench is an ideal method. Habitat bench can raises the seabed, providing some intertidal marshes and mudflats for shellfish to inhabit and allowing fishes (salmon) to swim without struggling against deep currents. Together, these elements re-create native shoreline characteristics in a highly urban setting.

Image Citation : https://www.google.com/maps/place/Centennial+Park/@47.6230713,-122.3670463,1084m/data=!3m1!1e3!4m8!1m2!2m1!1scentennial+park!3m4!1s0x5490156435d9b2ed:0x74e880b6c7ec72aa!8m2!3d47







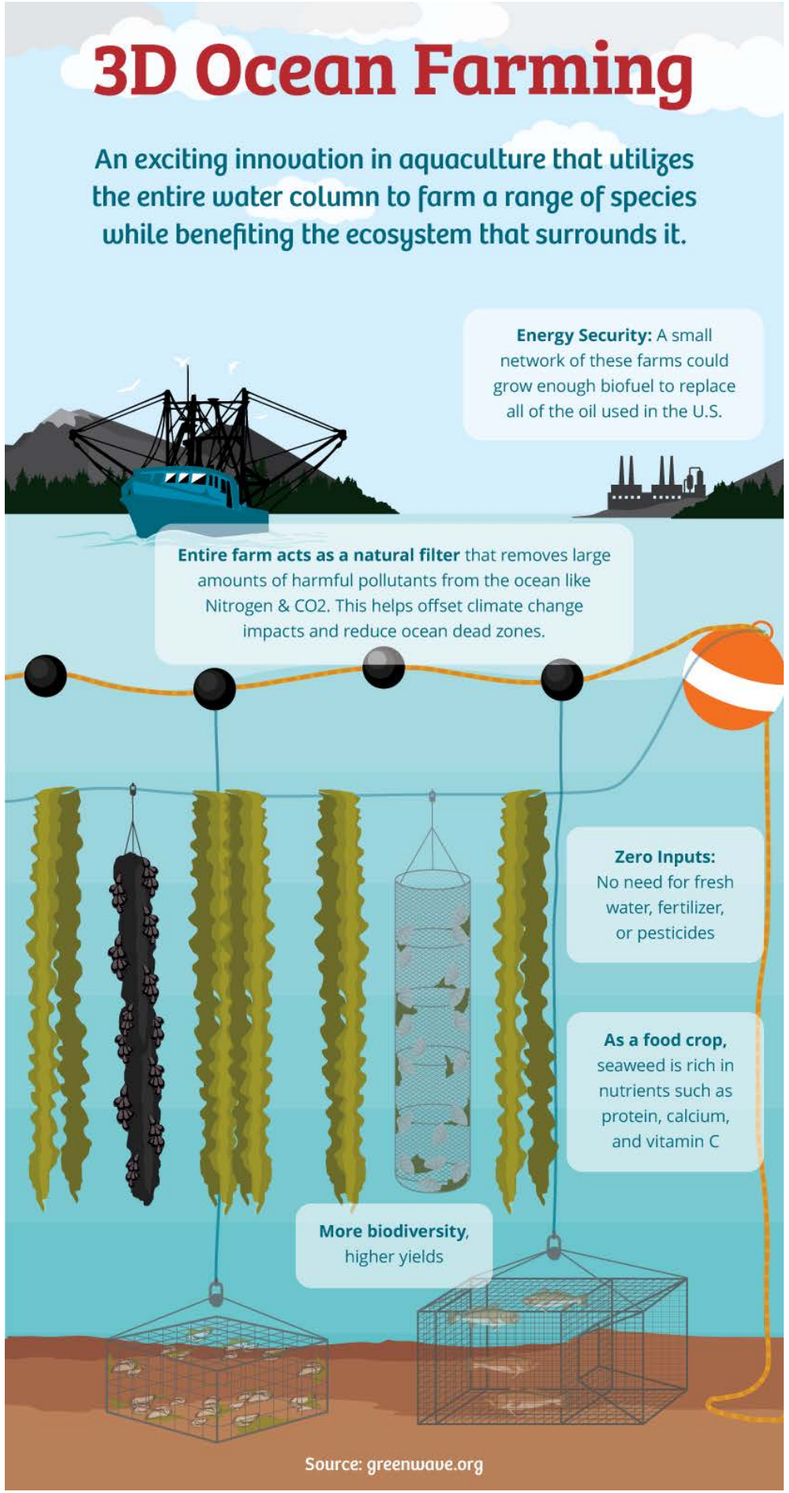


Image Citation: https://www.fix.com/blog/breaking-down-fish-farming/

OFF SHORE: 3D OCEAN FARMING

What is 3D ocean farming? "Bren Smith: a simple, replicable type of ocean farming which uses the entire water column to grow restorative species. It has a small footprint, because we grow vertically, and has a low aesthetic impact, too."[1]

There are some benefits to seaweed cultivation beyond carbon offsets as well: "dense forests of seaweed can create crucial habitat for marine animals, combat ocean acidification, and hypoxia – low oxygen waters."[1] But there are also some constrains of seaweed cultivation: "certain temperature and nutrients for growing and the cost of production."[1]

"Imagine them as underwater gardens with hurricane-proof anchors on the edges, connected by floating horizontal ropes from which kelp and other seaweeds grow vertically next to scallops in lantern nets and mussels in their socks. Below are oysters in cages and clams buried in the sea floor. These farms are replicable in that they're very simple and cheap to build since we don't have to fight gravity underwater, which means that anyone with 20 acres and a boat can have their own farm. We've open sourced our model and now have requests to start our farms in every coastal US state and 20 countries."[1]

PRECEDENT: Bren Smith, the fisherman shaping the future of sustainable ocean farming

Company, Thimble Island Oyster Co. operates one of the first sustainable 3D ocean farms in the U.S."[2]

"Nestled in the Thimble Islands of Long Island Sound, his 40-acre farm uses the entire water column to grow a variety of species — ranging from sugar kelp and oysters to mussels and scallops — and has emerged as a national model for hyper-local sustainable food production, ocean restoration, and economic development."[2]

"Bren started GreenWave to replicate this model throughout the U.S. and globally, both by creating new 3D farms but also by pushing the edge of what's possible in the sea, such as embedding 3D farms in offshore wind farms. His goal is to train thousands of new ocean farmers, and we asked the ocean innovator how he intends to do so."[2]

Source: https://medium.com/thebeammagazine/bren-smith-the-fisherman-shaping-the-future-of-sustainable-ocean-farming-e3217835e274

GOAL

"Restoring ocean ecosystems, mitigatng climate change, and creating blue-green jobs for fishermen while ensuring healthy, local food for communities."[2]

Source: https://medium.com/thebeammagazine/bren-smith-the-fisherman-shaping-the-future-of-sustainable-ocean-farming-e3217835e274

DIFFERENCE WITH INDUSTRIAL AGRICULTURE

They grow species that "require zero input (no feed, no fertiliser), within a polyculture system (our farm can grow at least five different species). The species they grow provide valuable ecosystem services that work to restore the surrounding ecosystem."[2]

Source: https://medium.com/thebeammagazine/bren-smith-the-fisherman-shaping-the-future-of-sustainable-ocean-farming-e3217835e274

SEAWEED: "CLEANING" THE OCEAN

"Seaweeds soak up carbon and excess nutrients for the water column as they grow. When the seaweed is removed from the water at harvest, so are the excess nutrients."[1]

Source:
[1] https://www.nourishlife.org/2016/12/3d-ocean-farming/
[2] https://medium.com/thebeammagazine/bren-smith-the-fisherman-shaping-the-future-of-sustainable-ocean-farming-e3217835e274

WHAT NOW?

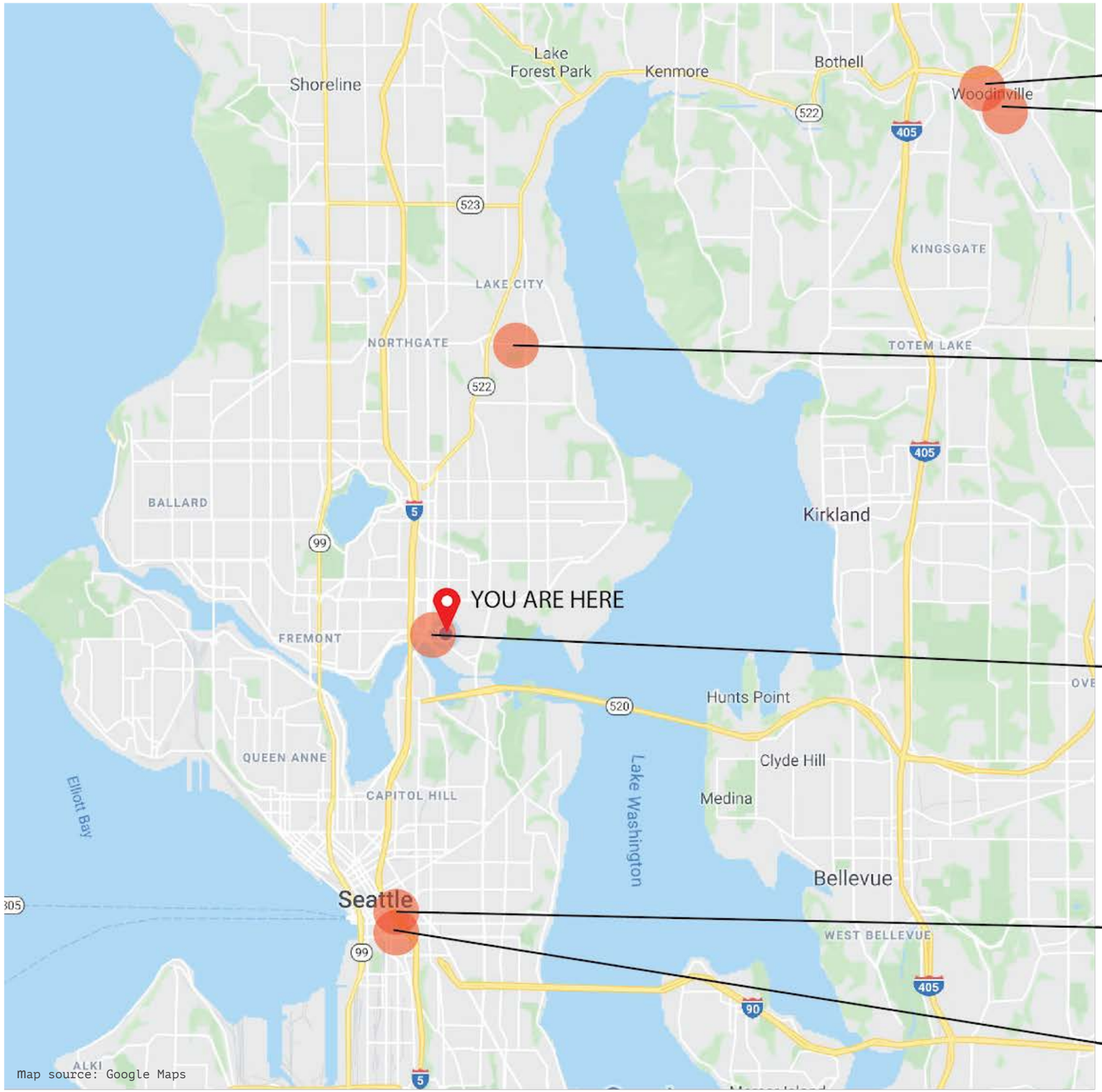
In the context of six urban agriculture sites in metropolitan Seattle, how can we learn from and support the development of these sites through a design process that strives for appropriate, manageable and impactful work?

These design proposals respond to needs identified by site leaders as well as investigate context-based strategies that may support greater climate resilience across myriad dimensions.

The processes and relationships that underlie each of these projects provide lessons that need to translate across all scales of design. Systems in addition to forms, matter to the life of the project.

WHAT NOW FOR URBAN AGRICULTURE PARTNERSHIP PROJECTS?

Billie Guilliatt	Soil Story	: 21 Acres
Claudia Hennum	Flora Flux	: 21 Acres
Brian Deck	Floodplain Farming	: VIVA Farms
Niccolo Piacentini	Teaching Resilience	: Nathan Hale High School Urban Farm
Xinyu Xu	UW Mercer Farm	: UW Farm
Yingjie Luo	UW Mercer Farm	: UW Farm
Shanshan Shang	Yes Identity	: Yes Farm
Emma Petersen	Giving and Receiving	: Yes Farm
YuqingZhang	Connected Urban Agriculture	: Yes Farm
Shelly Woo	Embracing Community Wellness	: Danny Woo Community Garden
Dorothy Mulkern	Goats at Danny Woo	: Danny Woo Community Garden
Stuart Johnson	Danny Woo Pollinator Garden	: Danny Woo Community Garden



21 ACRES

VIVA FARMS

NATHAN HALE HIGH SCHOOL
URBAN FARM

UW FARM - MERCER COURT

YES FARM

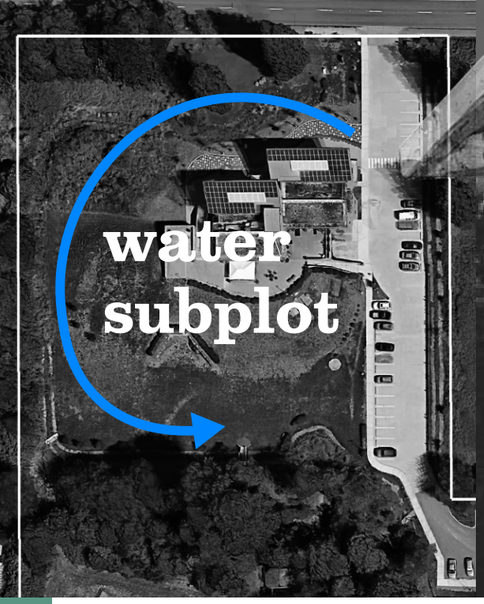
DANNY WOO COMMUNITY GARDEN

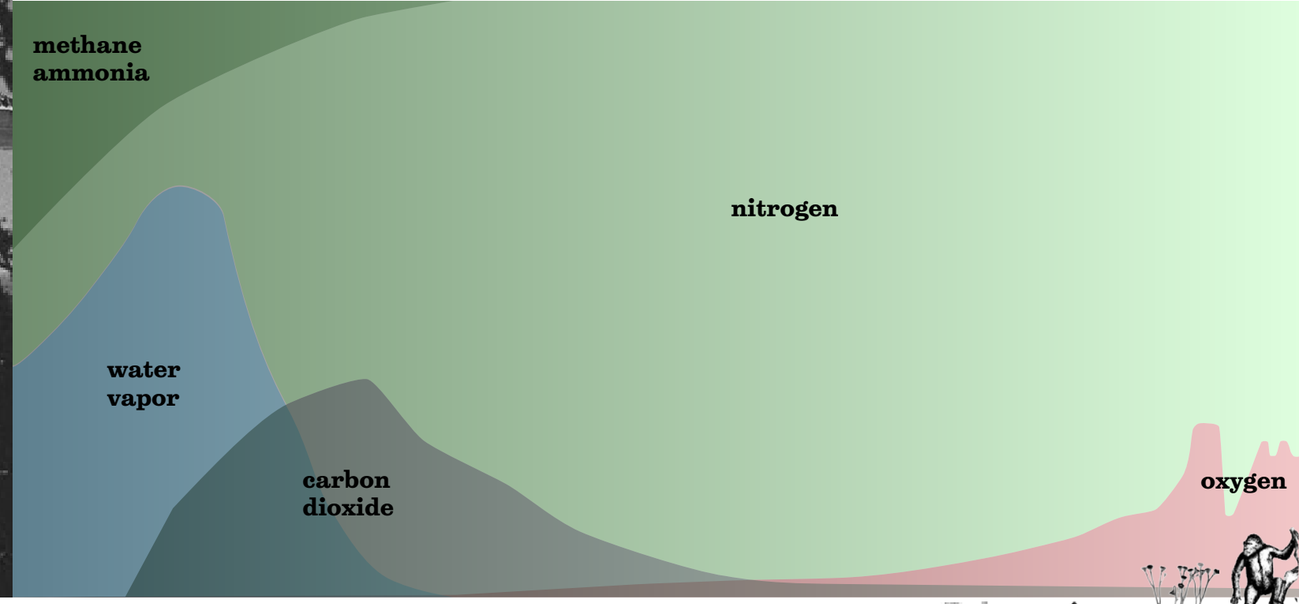
SOIL STORY

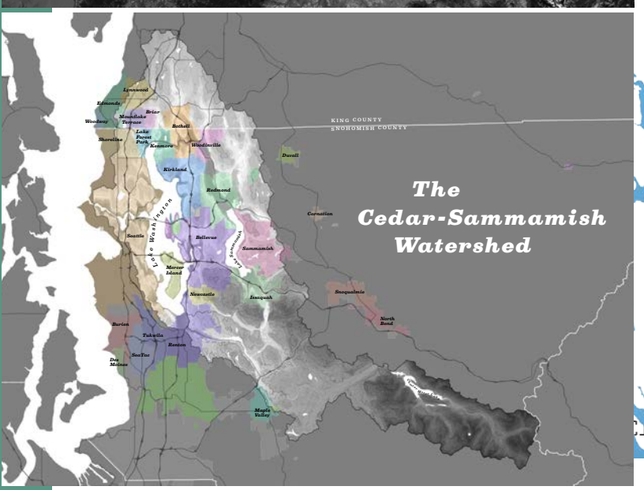
Billie Guilliatt

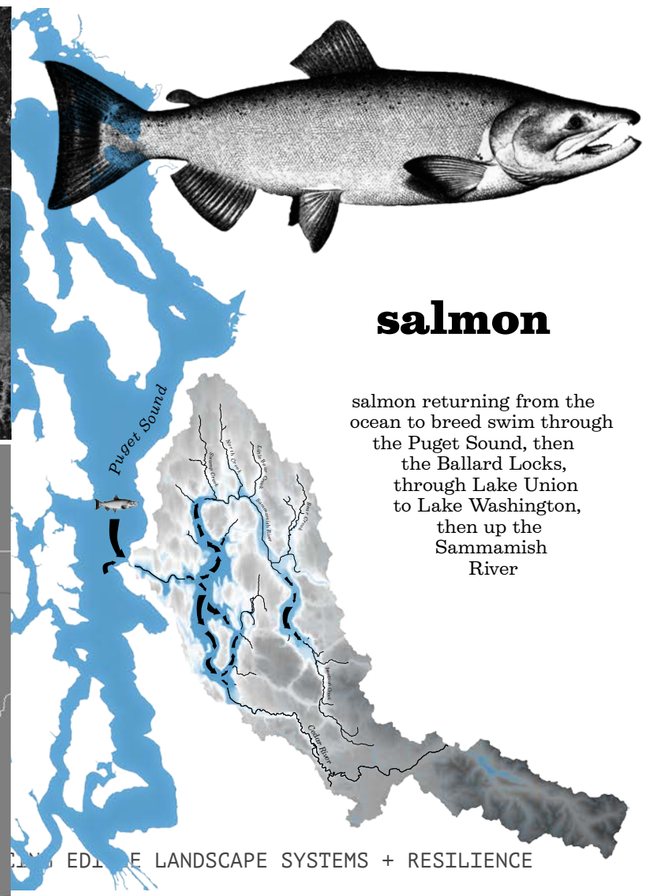
This project explores how to tell the story of the importance of soil in mitigating climate change and cultivating local resiliency at 21 Acres, a non-profit center for sustainable agriculture.

BASEMAP: GIS.ESS.WASHINGTON.EDU



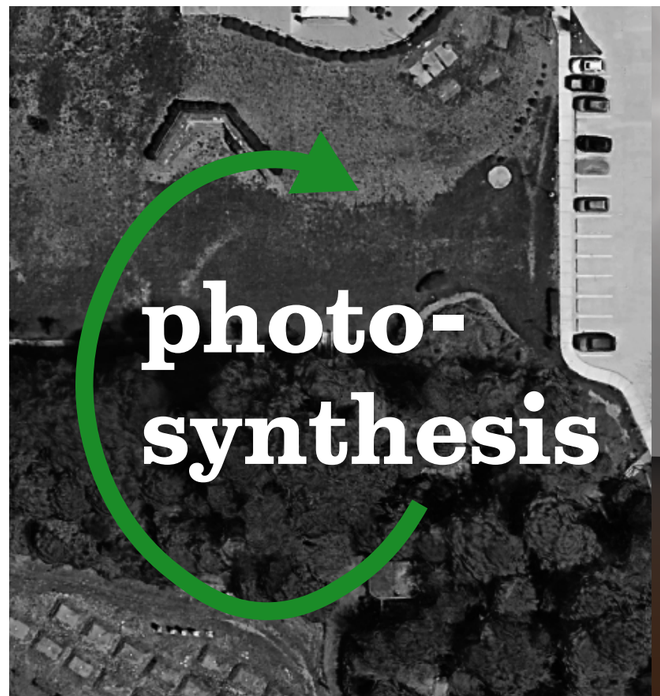


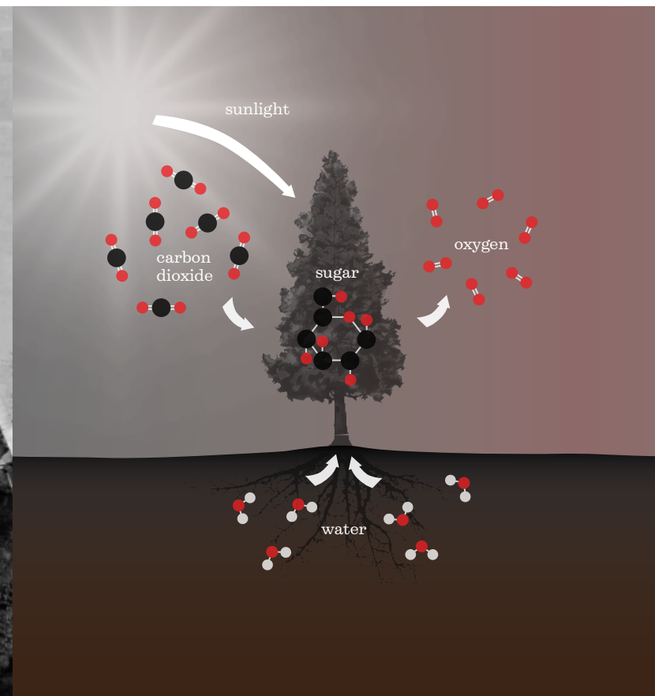




salmon

salmon returning from the ocean to breed swim through the Puget Sound, then the Ballard Locks, through Lake Union to Lake Washington, then up the Sammamish River





water cycle

ACT I

photo-synthesis

fire

wetlands

ACT II

native plants

food webs

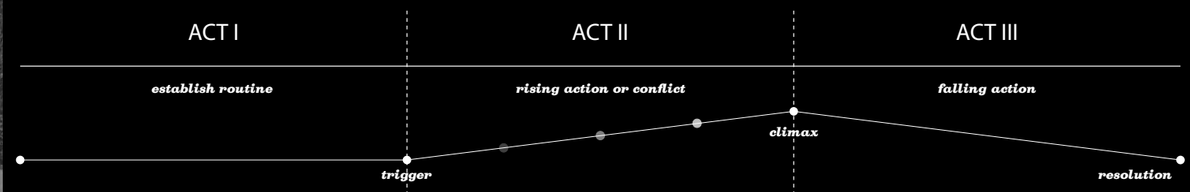
perennial crops

climate change

ACT III

regenerative agriculture + conservation tillage

Soil Story



ACT I	ACT II	ACT III
WATER CYCLE	EMBODIED CARBON	SOIL BUILDING
NUTRIENT CYCLES	FOOD WEBS	RESTORATION
PHOTOSYNTHESIS	FIRE	CONSERVATION
	COMBUSTION	CLIMATE CHANGE

IMAGE: GOOGLE EARTH - LANDSAT / COPERNICUS

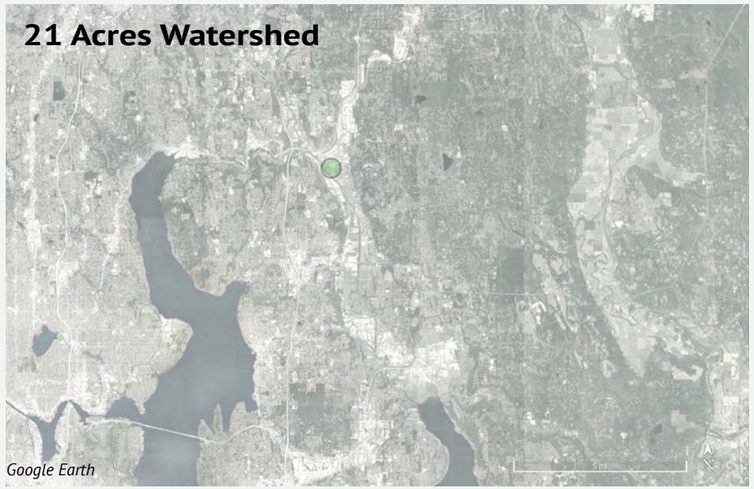
FLORA FLUX

Claudia Sackett Hennum

The client partner for this design is 21 Acres, an educational farm in Woodinville, WA. They requested a youth garden which could cater to diverse student groups across a wide range of ages, throughout multiple seasons.

The resulting design mixes productive, educational and experiential landscapes. Embedded within it are many opportunities for learning about the history, ecological impacts and potential of agricultural lands.

Late Spring Garden Path



Google Earth

21 Acres

21 Acres is oriented around sustainable agricultural education through

Farmer's Market/ Food Hub
Community Participation/ Youth Education
Sustainable Innovation/ Modeling
Regenerative Farming/ Habitat Restoration

For this projects, they requested a youth garden design in a designated field which is currently in cover crop.

Future Youth Garden Site

21 Acres Map

Google Earth

Conceptual Framing

Climatic Shifts and Co-Occurent Phenology
Flowering meadow along ADA path

According to Wikepedia, phenology "is the study of periodic plant and animal **life cycle events** and how these are influenced by seasonal and interannual variations in climate, as well as habitat factors (such as elevation)."

As **climate change** progresses, **plant and pollinator phenology are coming out of sync**. An example of this is a butterfly hatching before the plant it requires as a food source begins to produce pollen.

I took this rarely discussed implication of climate change as the starting point for my design. I created a path in which **flowers bloom in sequential order throughout the year**. The resulting design facilitates both year round interest, and, for regular visitors, a heightened awareness of seasonal changes and bloom cycles. This pathway can serve as a point of curiosity, an **embedded opportunity for lessons** in plant and insect biology, and a source of cut flowers and medicinal herbs.

Soil Story | Water Story
Moving along paths as nutrients move through water

21 Acres is located alongside the Sammamish River. Like many farms, it is a beneficiary of many cycles of flooding and sediment deposition.

In the youth garden, I wanted to reference the river, sediment deposition, and the overlapping beds that characterize free flowing riverine system.

I did so through a series of overlapping paths. They start at the northernmost entry to the youth garden and gesture towards the Sammamish River in the distance.

Agroecology | Braiding Land Use Systems
Deconstructing the wildland/farmland binary

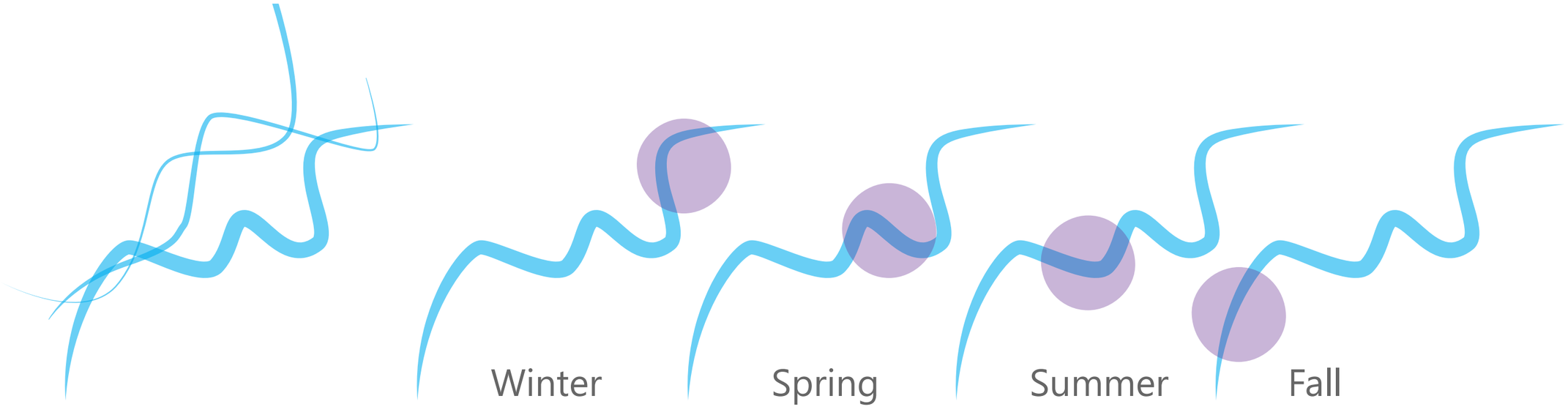
21 Acres brings together agriculture and restoration.

The present day practices of extractive, industrial agriculture is often at odds with the needs of native species and goals of conservation. However, in many cultures, **agriculture, ecological management** and the stewardship of native species are **intertwined practices**.

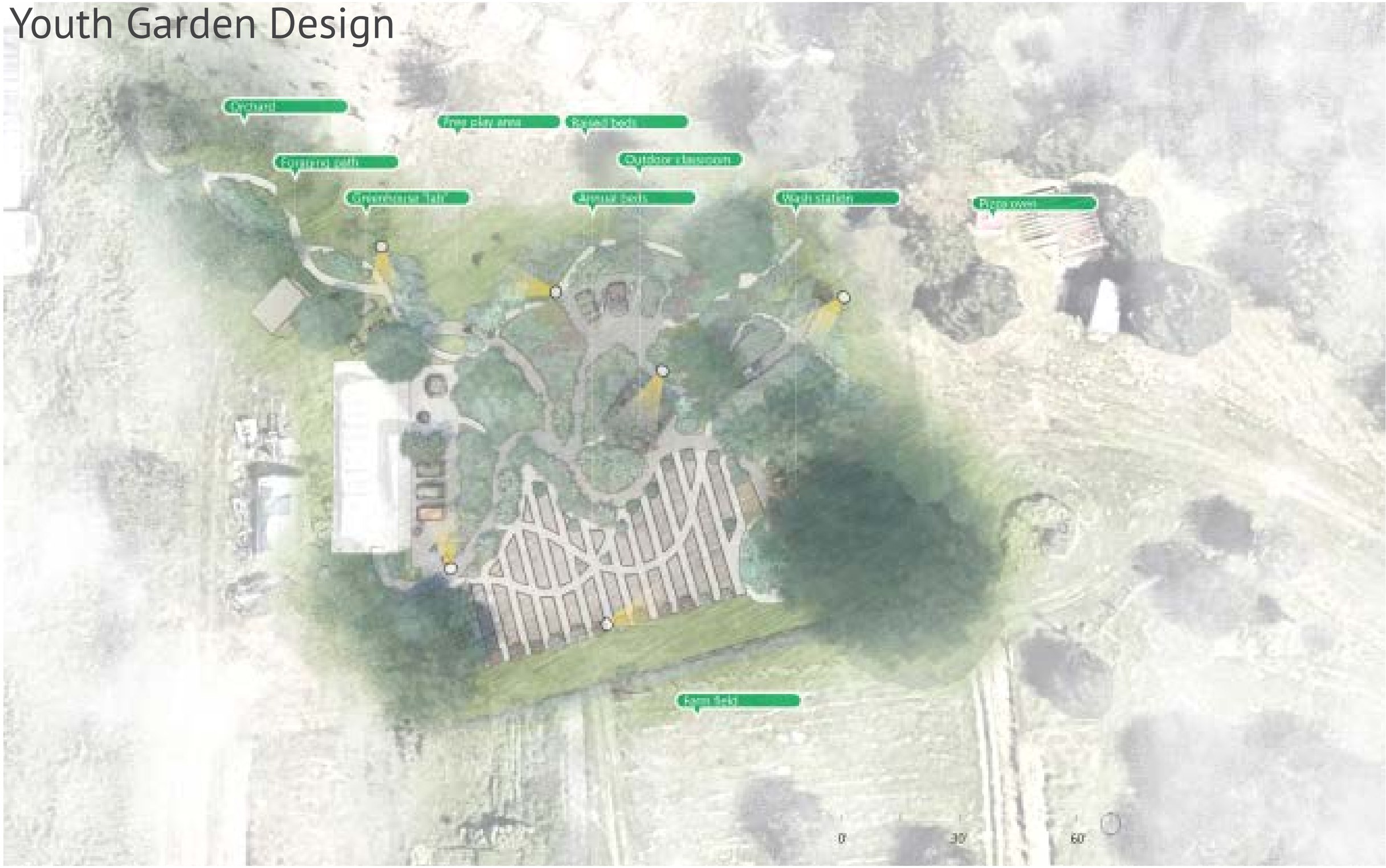
As a reference to the integrative practice already taking place at 21 Acres, this youth garden design integrates different forms of productive landscapes. It essentially **weaves together the surrounding landscapes** into a tapestry that connects the adjacent fields while also creating a novel garden.

Design Translation
Garden Paths are reminiscent of a fluxuating river bed

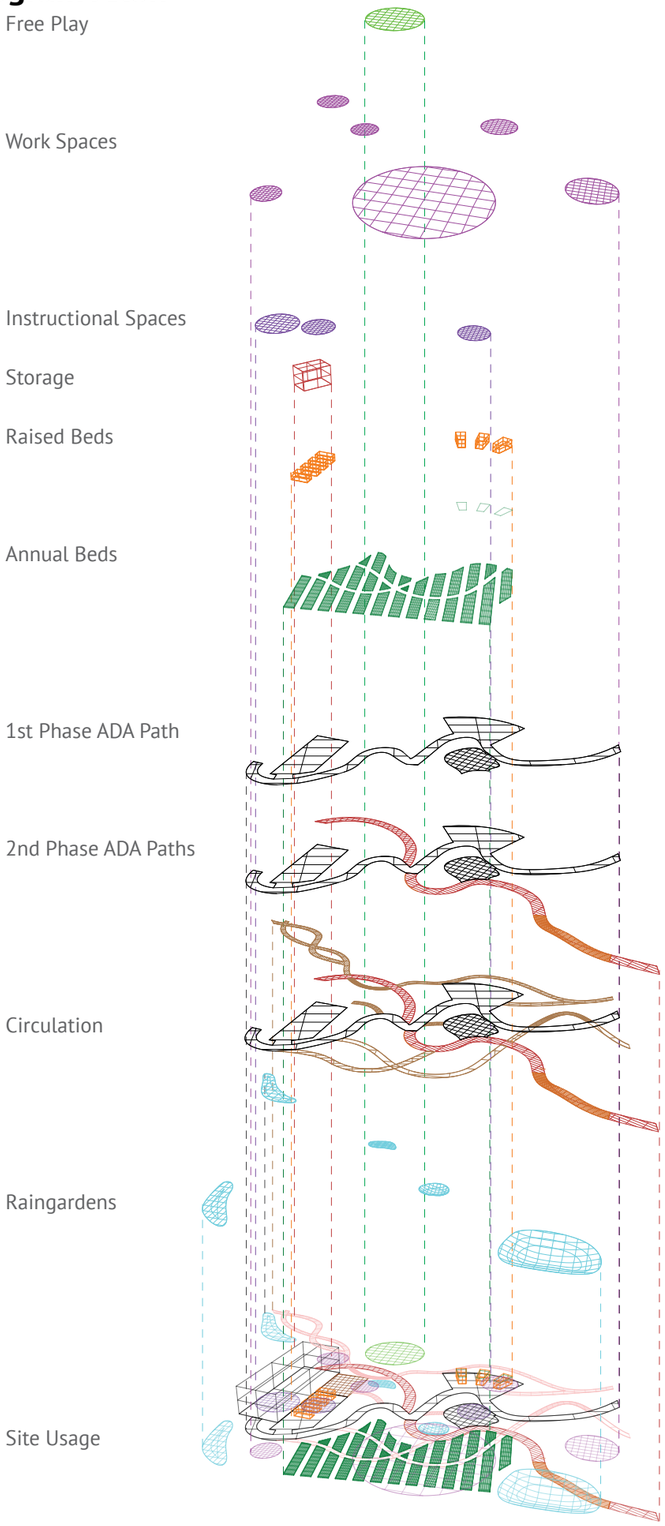
The sections of the meadow path in bloom shifts along with the seasons allowing for an opportunity to create leasson plans around plant phenology and climatic shifts



Youth Garden Design



Program Axon



Embedded Lessons

Plant Phenology

The meadow/ADA path allows for lesson plans around seasonal shifts and plant phenology.

Experimentation

The outdoor lab and annual beds allow student groups to experiment with different crops and plsnting techniques.

Soil

The compost zone and outdoor lab allow students to learn about soil building processes. The raised beds in the outdoor lab include doors which allow students to learn about the root masses of different plant types. One set of beds is planted with midwestearn prairie grasses (also used in the meadow planting), while others can change from season to season.

Exploration and Discovery

The berry path is a zone of exploration and discovery, allowing students to develop confidence and curiosity about the world of plants.

Traditional and Heirloom Foods

Integrated into the planting plan are various edible plants such as Jerusalum Artichoke and Ostrich Fern, which allow studens to learn about the vast array of edible plants which exist in the world.

Climate Adaptation

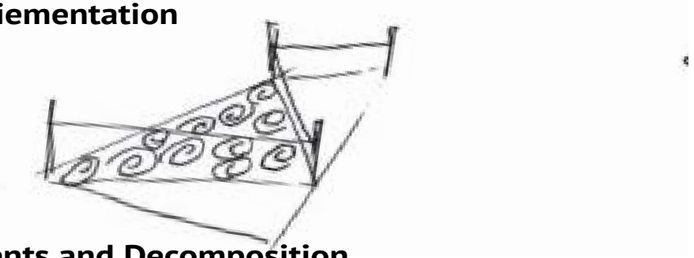
This site addresses climate change primarily through **education**. By participating in education programs, children and adults learn forms of land management which produce food while sequestering carbon.

Within the youth garden, **biodiversit**y creates redundancy. By sourcing a wide variety of herbal, edible and productive plants, food sources for people and pollinators can persist through various environmental stressors and climatic shifts

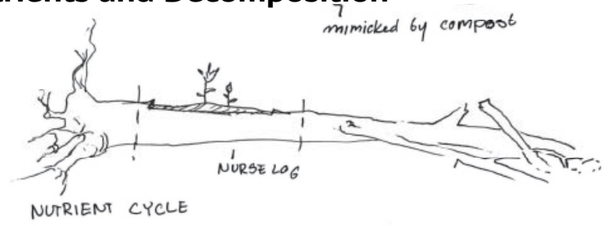
Additionally, raised beds, detachable cold frames and hoop house **protect crops in unpredictable weather,** while generous rain gardens for storm water management.

In order to reduce carbon emmissions from soil manipulation, and to align with 21 Acres' no till policy, there are **no topographic changes** suggested in this design.

Experiementation



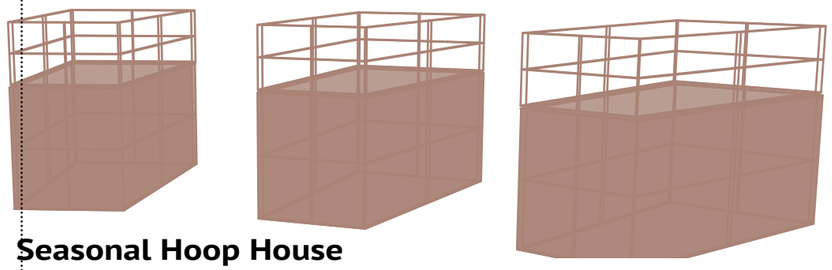
Nutrients and Decomposition



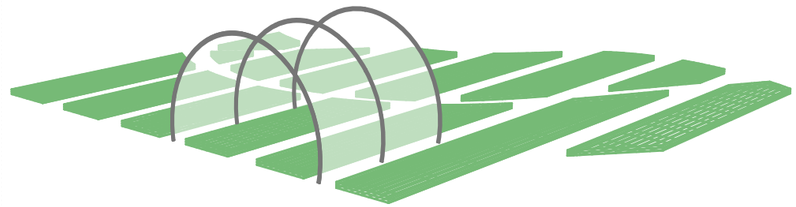
Soil and Root Growth

Exploration and Curiosity

Cold Frame Raised Beds



Seasonal Hoop House



Outdoor Classroom Looking South Towards Lower Beds

The outdoor classroom sits at the center of the site and affords views in all directions. Located on the primary ADA path, it is accessible to all visitors. It is surrounded by several species of lavender and covered in hardy kiwi.

Looking South from Berry Path at Hardening Off Area/ Nursery

The hardening off area acts as a nursery and transitional space for the seedlings growing inside the greenhouse. On sunny days, it allows larger groups to work with seedlings and learn about potting up plants without being crowded in a hot greenhouse. When the soil in the annual beds is too wet to work, it allows an alternative opportunity for engaging work parties, field trips and after school programs.

Lower Beds Looking Past Wash Station Towards Outdoor Kitchen

The wash station is located between the annual production beds and the outdoor kitchen. It makes use of the shade of the large tree and water hook up already on site to process vegetables before cooking them or moving them on to storage. The water collects in the naturally occurring wetland on the youth garden site which is augmented into a rain garden with wetland plants and gentle grading.
At three feet wide, the annual beds are narrow enough for young people to access. They are broken up in a variety of lengths to serve various age groups and different numbers of students throughout the seasons.
Crabapple trees provide supplemental shade, bird habitat, and an embedded opportunity to teach about ancestral species and crop development.

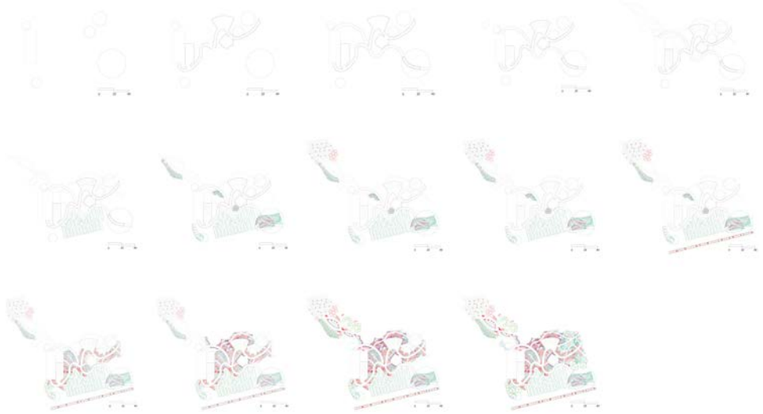
Looking North at Outdoor Lab from the Meadow Path

The outdoor lab acts as a counterpoint to the indoor lab in the adjacent greenhouse. It consists of 4 raised beds with peak-a-boo doors.
2 of the beds are planted with PNW native shrubs and the same North American prairie grasses used in the meadow plantings. These allow for a conversation around and exploration of subsoil biomass associated with different plant communities.
The other 2 beds are planted with annuals selected yearly by student groups, which allows them to direct and carry out their own experimentation.

Planting Plan

The planting plan is divided into a series of zones. The zones corrispond to existing conditions of topographic low points, shade and sun patterns as well as designed elements. While some plants exist in multiple zones, most show up in only one or two. This allows for a phased installation, where different zones can be installed as plant material becomes available and labor is on hand.

Installation Phasing



Plant ecological Services Key

- Nitrogen fixing
- Edible Parts
- Bee habitat
- Butterfly habitat

Plant Image Sources

http://hoffmannursery.com/grasses

https://www.gardenia.net
In order of appearance...
Helleborus 'Ana's Red'
Helleborus 'Ivory Prince'
Allium
Iris reticulata
Scabiosa
Paeonia
Yarrows
Echinacea
Coreopsis
Perovskia
Salvia
Eryngium
Helenium
Helianthus
Sedum
Astilbe
Crocus chrysanthus
.....
Salix
Origanum vulgare

https://www.sevenoaksnativenursery.com/
Lupinus
Douglas iris
Anapholis
Ceanothus
Thimbleberry

http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Symphyotrichum%20subspicatum
Douglas Aster

https://www.anniesannuals.com/plants/view/?id=818
Penstemon heterophyllus

http://www.gardening.cornell.edu/homegardening/scenec09b.html
Artichoke

https://www.johnnyseeds.com/
Salvia Officionalis
Chamomile
Strawberries
Nasturtium
Calendula
Borage
Asparagus
Chives
Oregano

Thyme
Jerusalem artichoke
Crimson Clover

https://www.monrovia.com/
Rosemary

https://www.amkhaseed.com/
American Cranberrybush

Bulbs:
https://www.dutchbulbs.com/
Daffodils
Snowdrops

Annuals and Bulbs to add to Plant List
Daffodils
Snowdrops
Crocus
.....
Nasturtium
Calendula
Borage

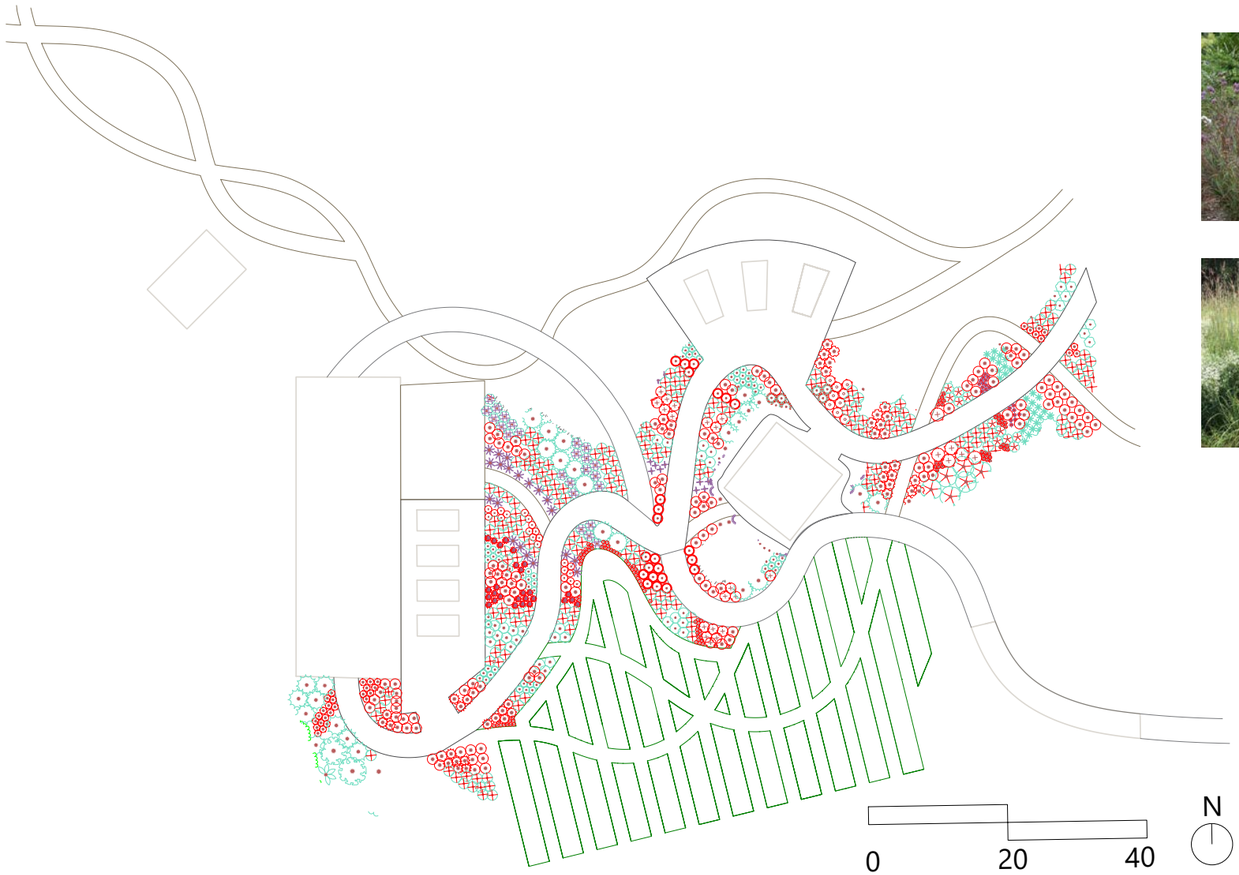
https://www.prairienursery.com/
Arctostaphylus
Asarum

https://www.greatplantpicks.org/
Sword fern
Deer fern
Blueberries
Oregon crabapple
Ribes sanguinium
Vaccinium ovatum

Wikepedia.com
Gooseberry
Camellia sinensis
Vaccinium pervifolium
Nootka rose
English lav
Spanish Lav
Society Garlic

https://www.thespruce.com/how-to-grow-sorrel-4121351
sorrel

Meadow Path



Grasses

Flowers

Winter

Seasonal Character

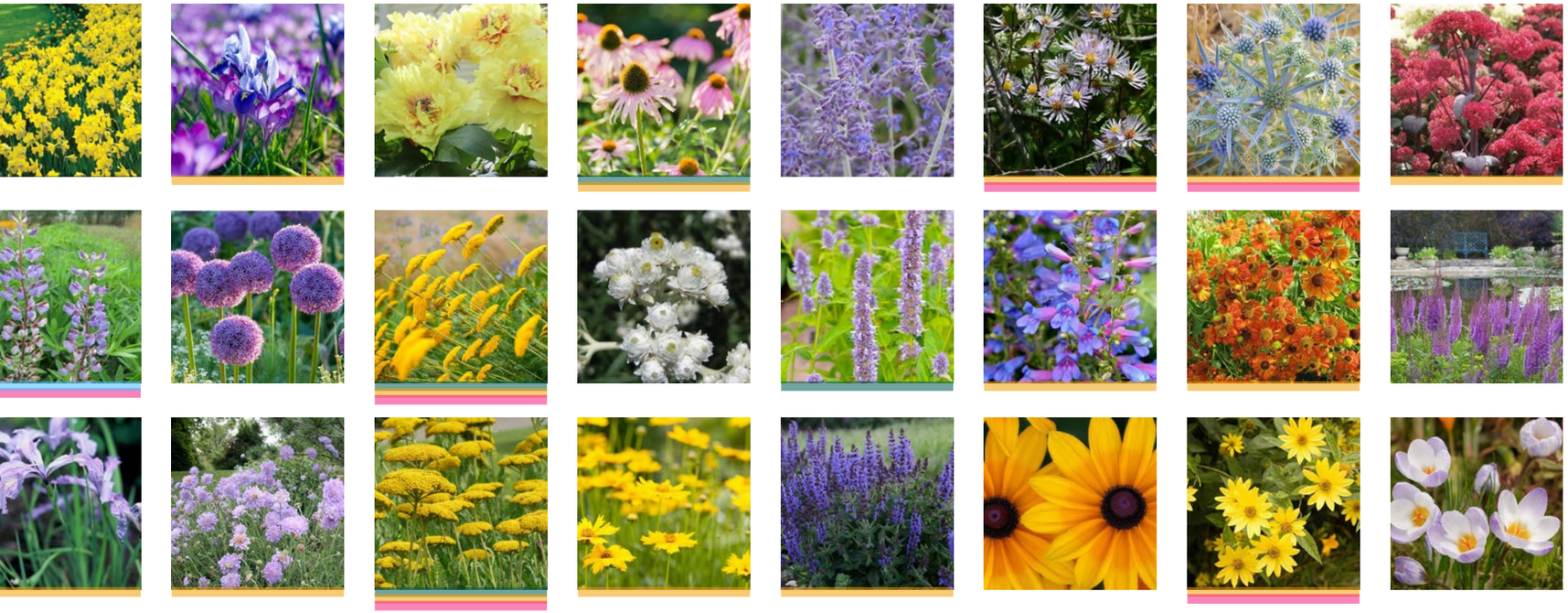
Winter


https://www.jasoningram.co.uk/gardens/piet-oudolf-field-hauser-wirth-somerset/#gallery/9bfda4bfaa1dc684d0def123ea72d768/1139

Spring


https://oudolf.com/garden/oudolf-hummelo

Fall



Summer

https://www.gardenista.com/posts/garden-design-learning-plant-piet-oudolf-way/

Fall

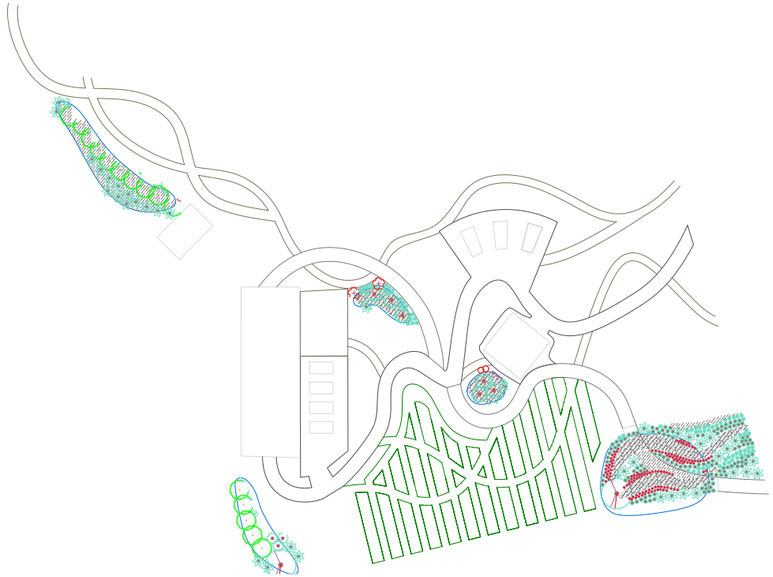
https://www.gardenista.com/posts/garden-design-learning-plant-piet-oudolf-way/

Plant Pallet

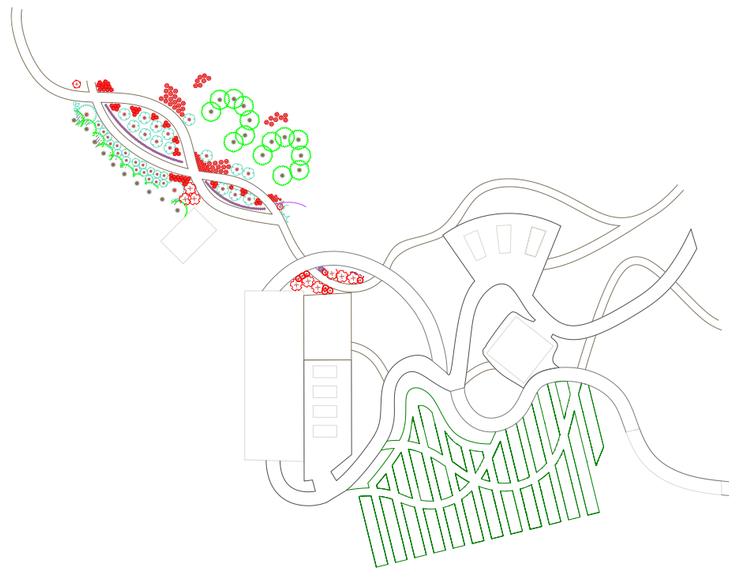
Meadow Path

Andropogon gerardi	Big Bluestem
Panicum virgatum	Switch Grass
Achillea millefolium 'Coronation'	Common Yarrow
Achillea x 'Moonshine'	Moonshine Yarrow
Agastache x 'Blue Fortune'	Anise Hyssop
Allium x 'Globemaster'	Hybrid Star of Persia
Anaphalis margaritacea	Pearly Everlasting
Astilbe chinensis taqueti 'Superba'	Fall Astilbe
Coreopsis verticillata 'Zagreb'	Zagreb Thread Leaf Coreopsis
Echinacea purpurea	Purple Coneflower
Eryngium amethystinum	Amethyst Eryngo
Helenium x 'Moerheim Beauty'	Sneezeweed
Helianthus x 'Lemon Queen'	Lemon Queen Helianthus
Helleborus x	Hybrid Hellebore
Helleborus x 'Anna's Red'	Anna's Red Hellebore
Iris reticulata	Iris
Lupinus polyphyllus	Large-leaved Lupine
Nepeta faassenii	Catmint
Paeonia x 'Bartzella'	Bartzella Itoh Yellow Peony
Penstemon heterophyllus	Foothill Penstemon
Perovskia atriplicifolia	Russian Sage
Rudbeckia hirta	Black-eyed Susan
Salvia nemorosa	Perennial Salvia
Scabiosa japonica	Pincushion Flower
Sedum 'Red Cauli'	Red Cauli Sedum
Symphyotrichum subspicatum	Douglas Aster

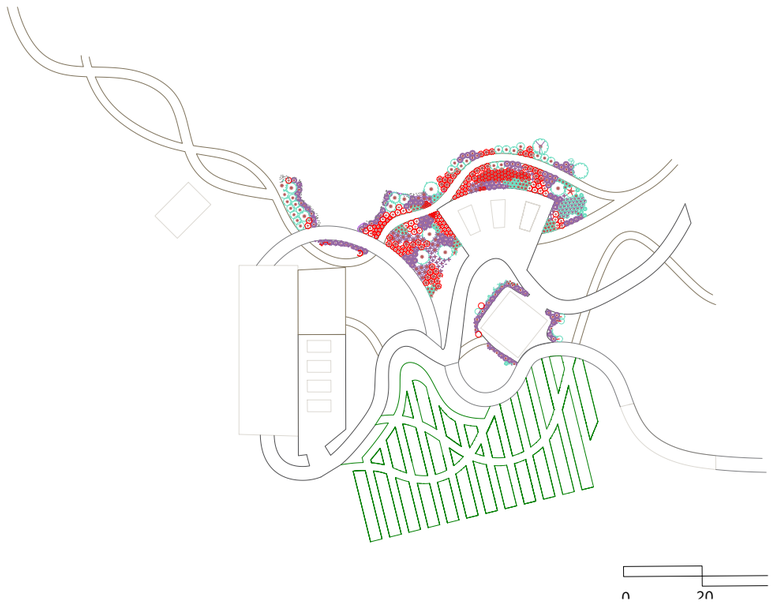
Orchard

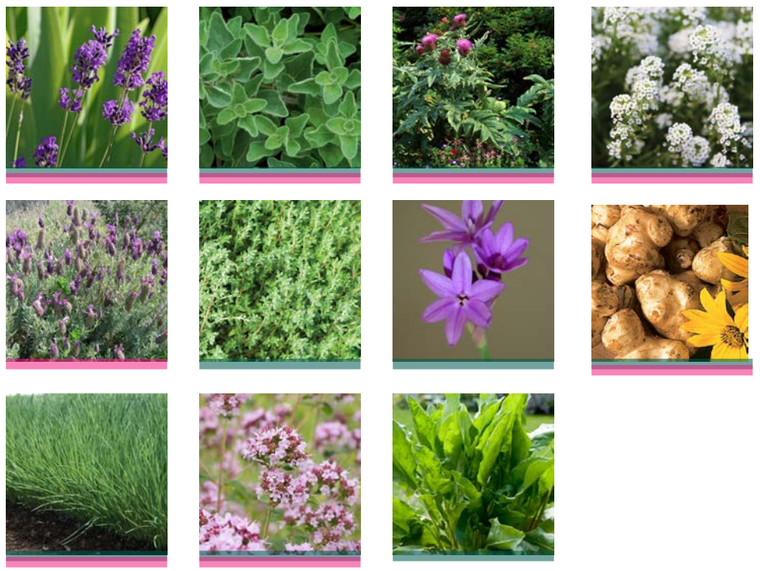


Berry Path

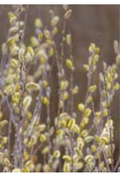


Herb Garden





Shade Garden

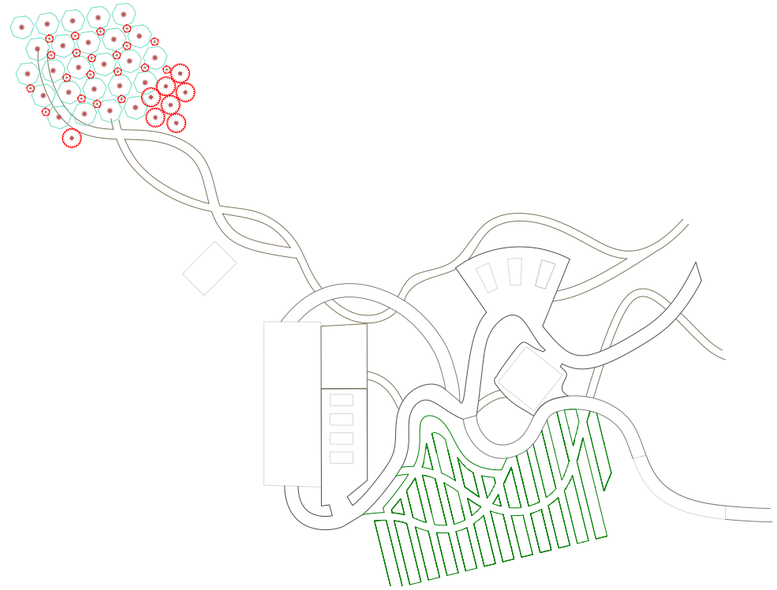




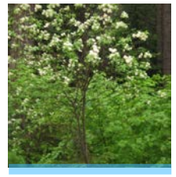


Orchard







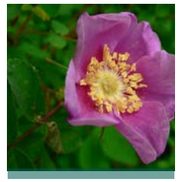


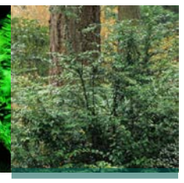
Mediterranean Border

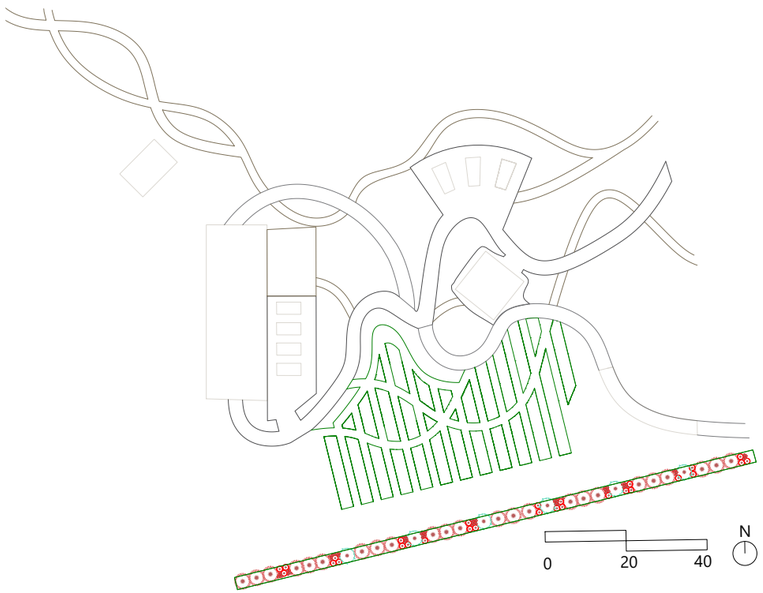











Plant Pallet

Rain Garden

Camassia quamash	Small Camas
Iris douglasiana	Douglas Iris
Salix caprea	French Pussy Willow
Viburnum trilobum	American Cranberrybush

Herb Garden

Lobularia maritima	`Royal Carpet` Sweet Alyssum
Allium schoenoprasum	Common Chives
Lavandula angustifolia	English Lavender
Lavandula stoechas	`Anouk` Spanish Lavender
Origanum majorana	Sweet Marjoram
Origanum vulgare	Oregano
Origanum vulgare hirtum	Greek Oregano
Rumex acetosa	Garden Sorrel
Thymus vulgaris	Common Thyme
Tulbaghia violacea	`Tricolor` Tricolor Society Garlic

Berry Path

Chamaemelum nobile	Chamomile
Fragaria x ananassa	Strawberry
Ribes uva-crispa	European Gooseberry
Rubus idaeus	Raspberry
Rubus parviflorus	Thimbleberry
Vaccinium corymbosum	Highbush Blueberry

Shade Garden

Asarum canadense	Canadian Wild Ginger
Asparagus officinalis	Garden Asparagus
Blechnum spicant	Deer Fern
Camellia sinensis	Tea
Malus fusca	Oregon Crab Apple
Matteuccia struthiopteris	Ostrich Fern
Polystichum munitum	Western Sword Fern
Rheum rhabarbarum	Rhubarb
Ribes sanguineum	Red Flowering Currant
Rosa nutkana	Nootka Rose
Vaccinium ovatum	Evergreen Huckleberry
Vaccinium parvifolium	Red Huckleberry

Orchard

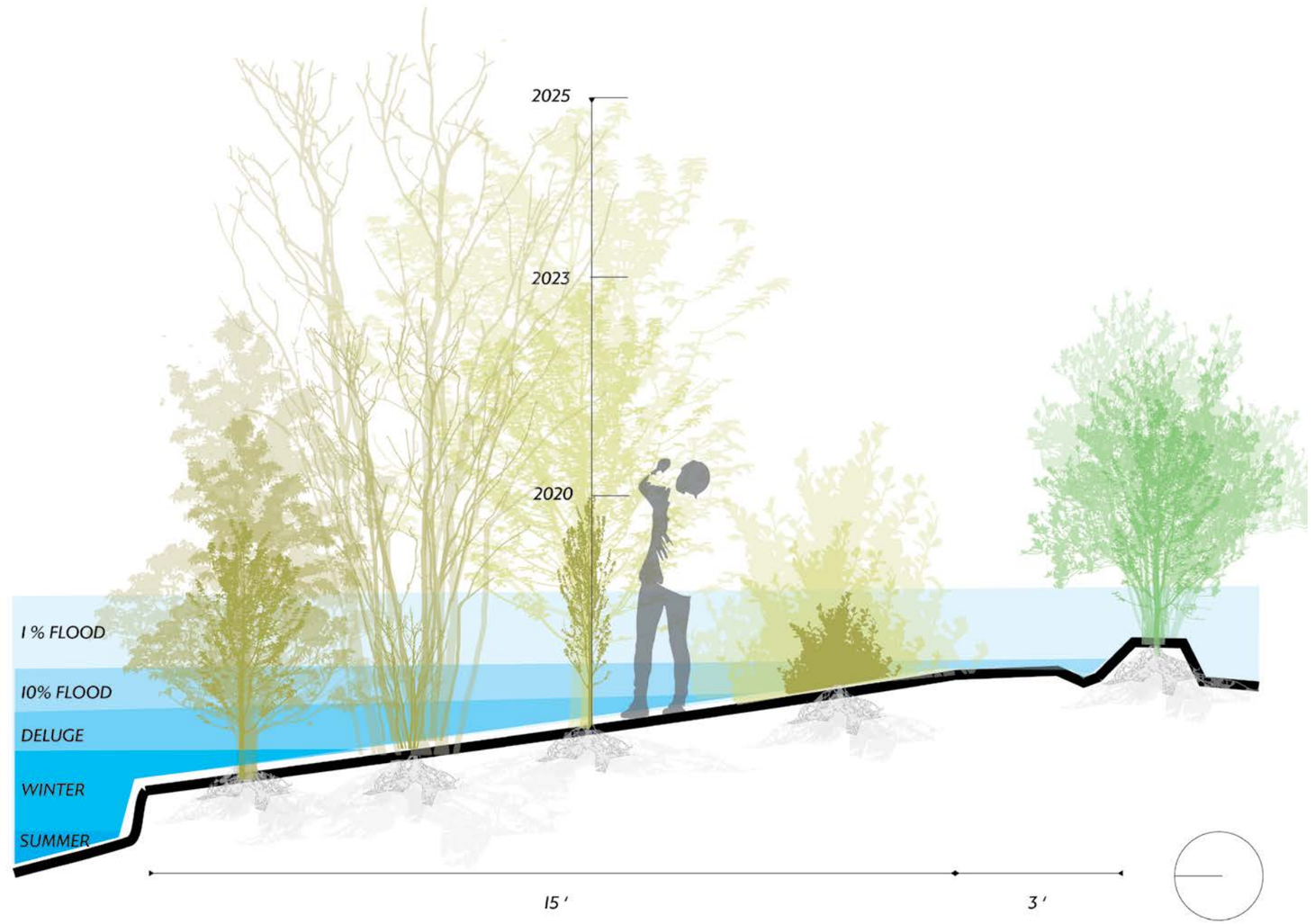
Arctostaphylos uva-ursi	Kinnikinnick
Ceanothus sanguineus	Redstem Ceanothus
Lupinus polyphyllus	Large-leaved Lupine

Mediterranean Border

Cynara scolymus	Artichoke
Helianthus tuberosus	Jerusalem Artichoke
Rosmarinus officinalis	`Tuscan Blue` Rosemary
Salvia officinalis	Garden Sage

FLOODPLAIN FARMING

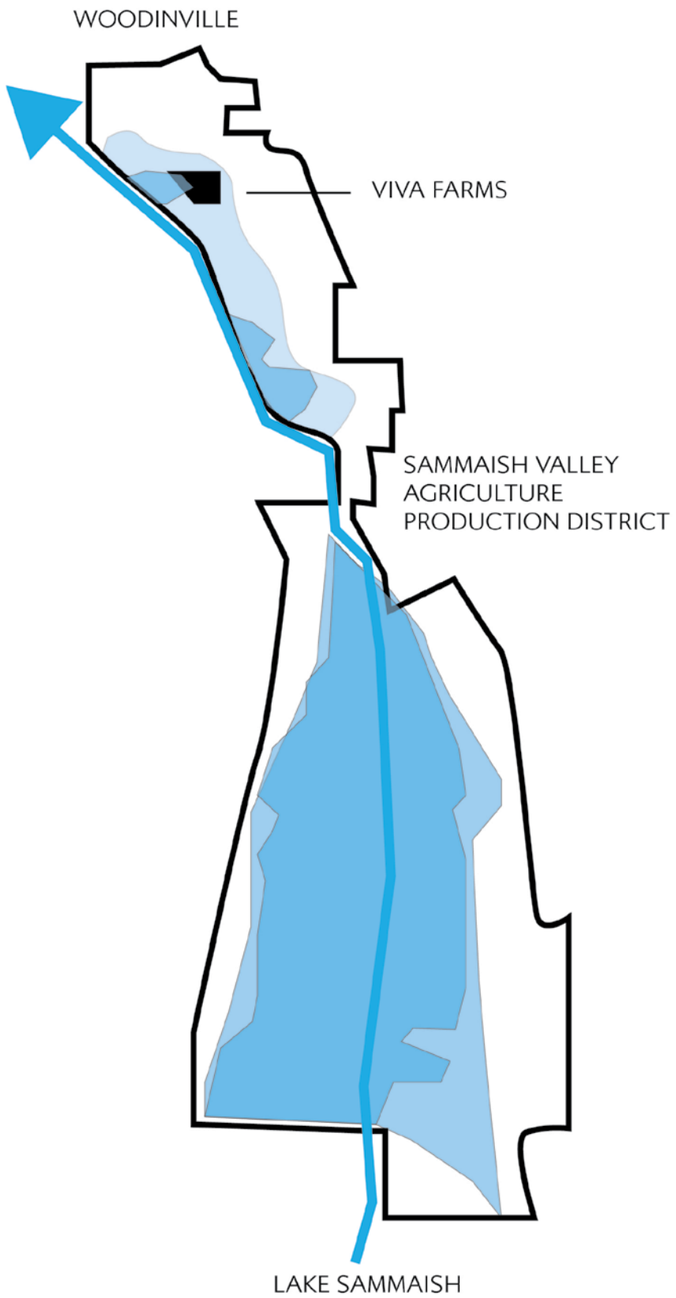
BRIAN DECK

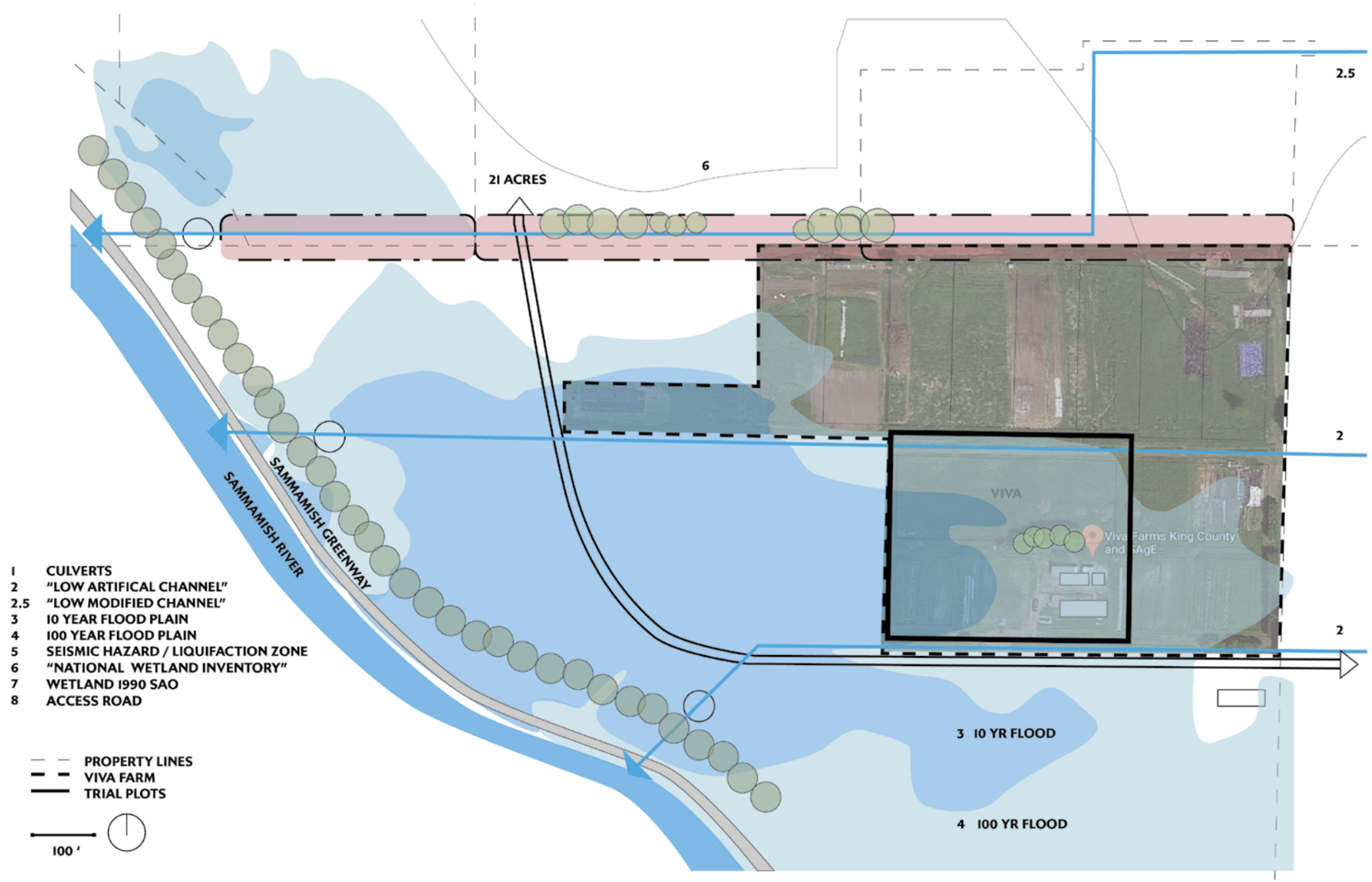


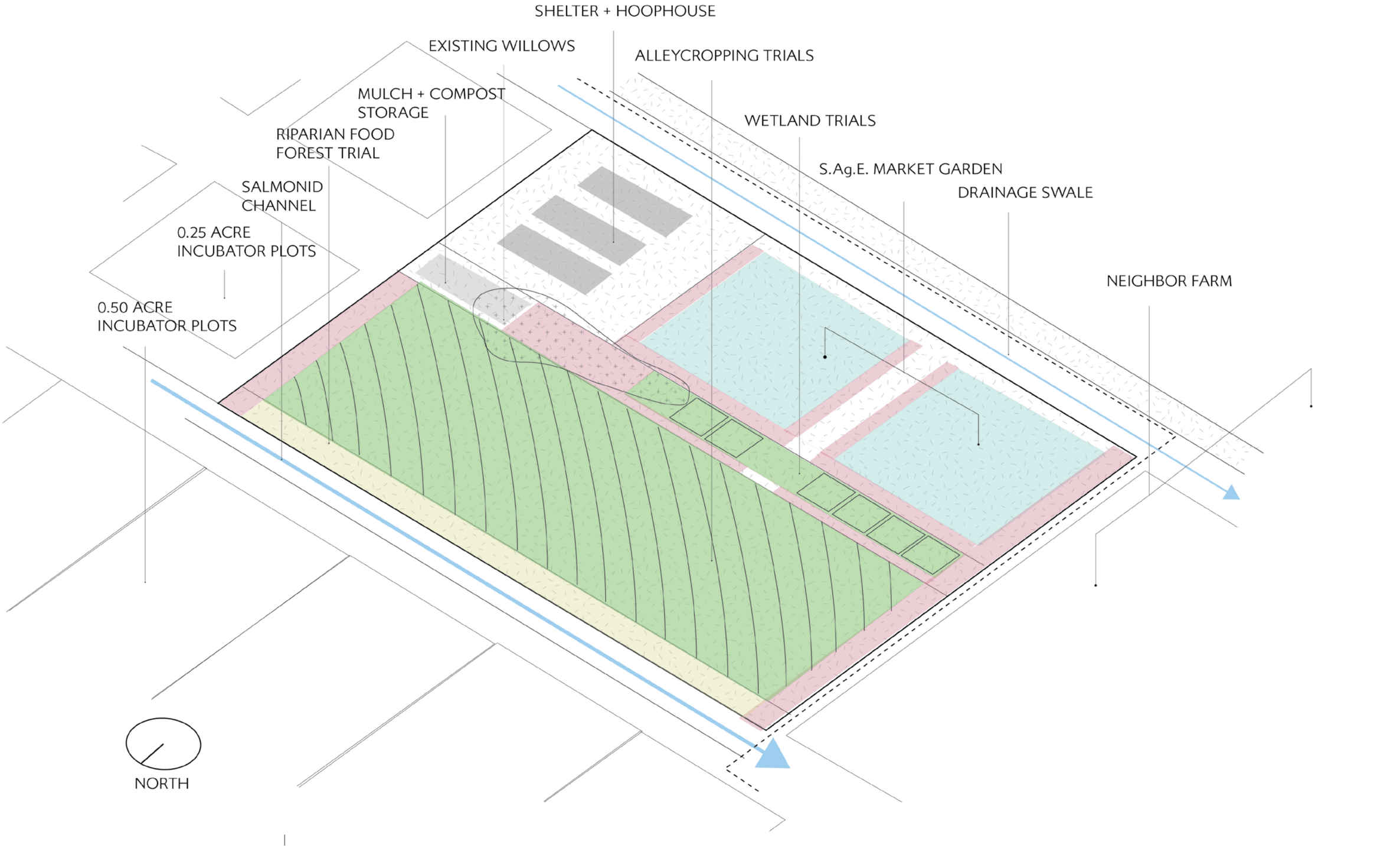
RIPARIAN FOOD FOREST

1% Flood is known as the 100-Year Flood because it is expected to occur once every hundred years. 10% Flood is known as the 10-Year Flood because it is expected to occur once every ten years. Deluge represents a flash heavy downpour. Winter represents a typical wet season. Summer represents a typical dry season.

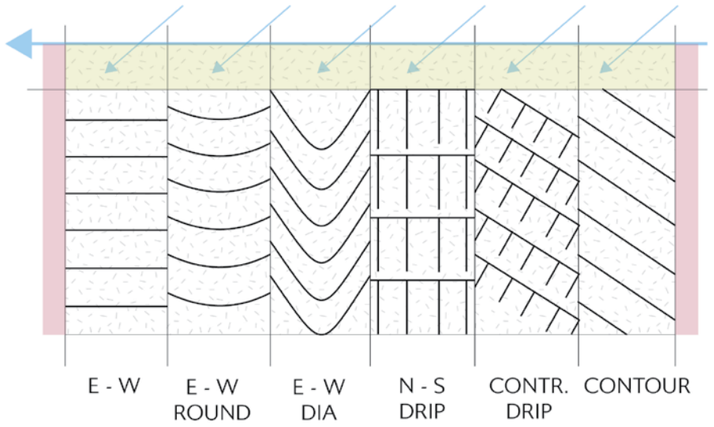
How can educational farmland experiment with agroforestry by mimicking to the ecology of the floodplain? This project was a partnership with VIVA Farms, a non-profit incubator farm that educates upcoming farmers and provides assistance for starting a small farm business. Their second location in the Sammamish Valley, one of five King County Agriculture Production Districts, is challenged to do annual row cropping because of the drainage of the former floodplain. This project begins to look at how introducing alleycropping of wetland tree species with a riparian food forest buffer and living edible hedges can provide ecologic infrastructure to VIVA Farms. Agroforestry would allow the annual row crop education to be combined with restoration agriculture adding additional yields from the perennials and winter beyond the summer growing season. The plantings and systems are intended to test flood-tolerent annual and perennial crops. Innovative and adaptive strategies are needed to adapt to climate changes issues like intense but sporadic rainfall and flooding events, hotter and drought possible summers, and warming plant hardiness zones.


WOODINVILLE
VIVA FARMS
SAMMAISH VALLEY
AGRICULTURE
PRODUCTION DISTRICT
LAKE SAMMAISH

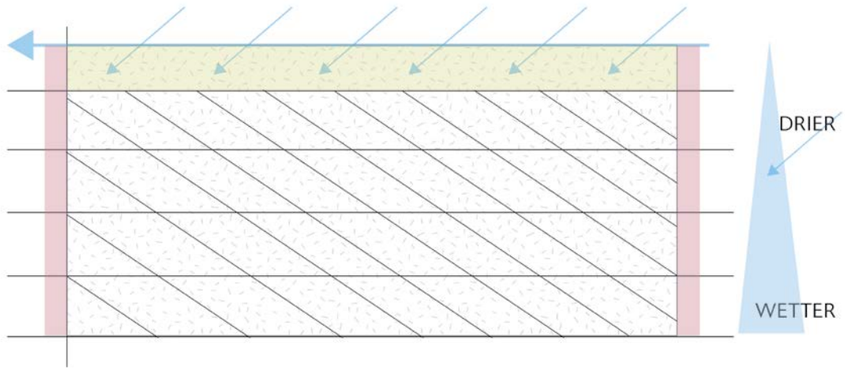

1 CULVERTS
2 "LOW ARTIFICAL CHANNEL"
2.5 "LOW MODIFIED CHANNEL"
3 10 YEAR FLOOD PLAIN
4 100 YEAR FLOOD PLAIN
5 SEISMIC HAZARD / LIQUIFACTION ZONE
6 "NATIONAL WETLAND INVENTORY"
7 WETLAND 1990 SAO
8 ACCESS ROAD
PROPERTY LINES
VIVA FARM
TRIAL PLOTS
100 '
21 ACRES
6
2.5
2
2
SAMMAMISH RIVER
SAMMAMISH GREENWAY
VIVA
3 10 YR FLOOD
4 100 YR FLOOD


SHELTER + HOOPHOUSE
EXISTING WILLOWS
ALLEYCROPPING TRIALS
MULCH + COMPOST
STORAGE
WETLAND TRIALS
RIPARIAN FOOD
FOREST TRIAL
S.Ag.E. MARKET GARDEN
SALMONID
CHANNEL
DRAINAGE SWALE
0.25 ACRE
INCUBATOR PLOTS
NEIGHBOR FARM
0.50 ACRE
INCUBATOR PLOTS
NORTH

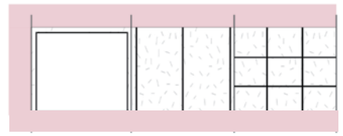
BERM LAYOUT VARIATIONS



ALLEYCROPPING GRID

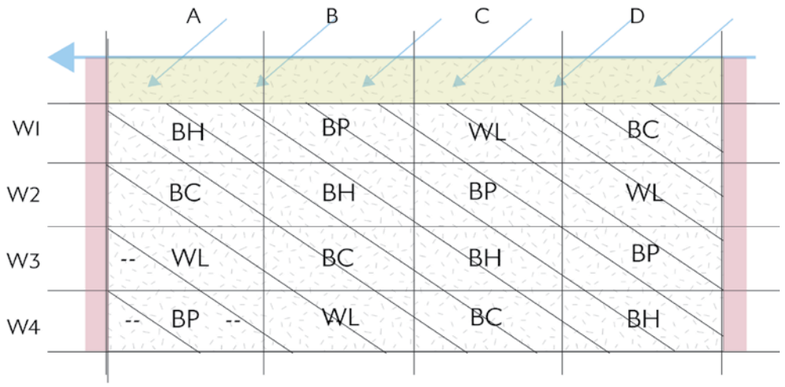


ALLEYCROPPING LANES ON CONTOUR

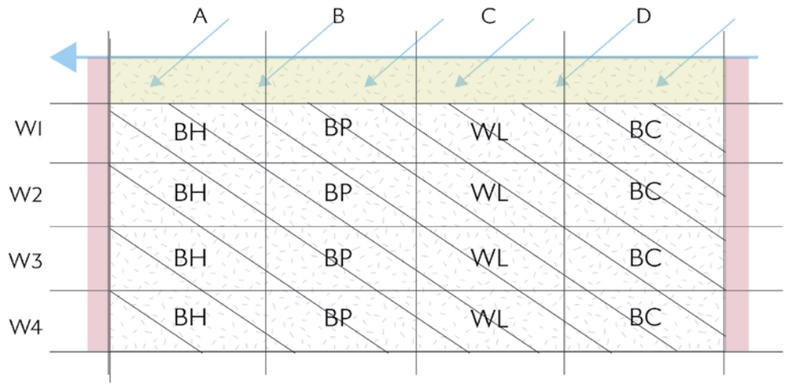


POND BASINS | 30 X 10 BASINS | 10 X 10 BASINS

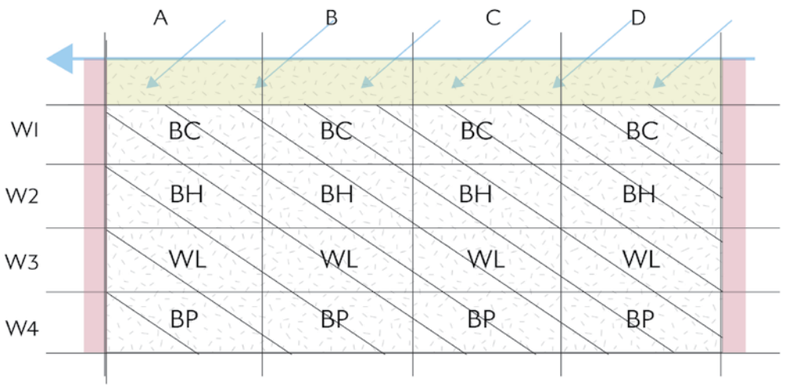
330' L X 130'W
1/8 ACRE PLOTS - 6 TRIAL PLOTS
130 'L X 40' W . SECTIONS ARE 20' L X 40'W



ALLEYCROPPING SPECIES - RANDOMIZED CONTOURS



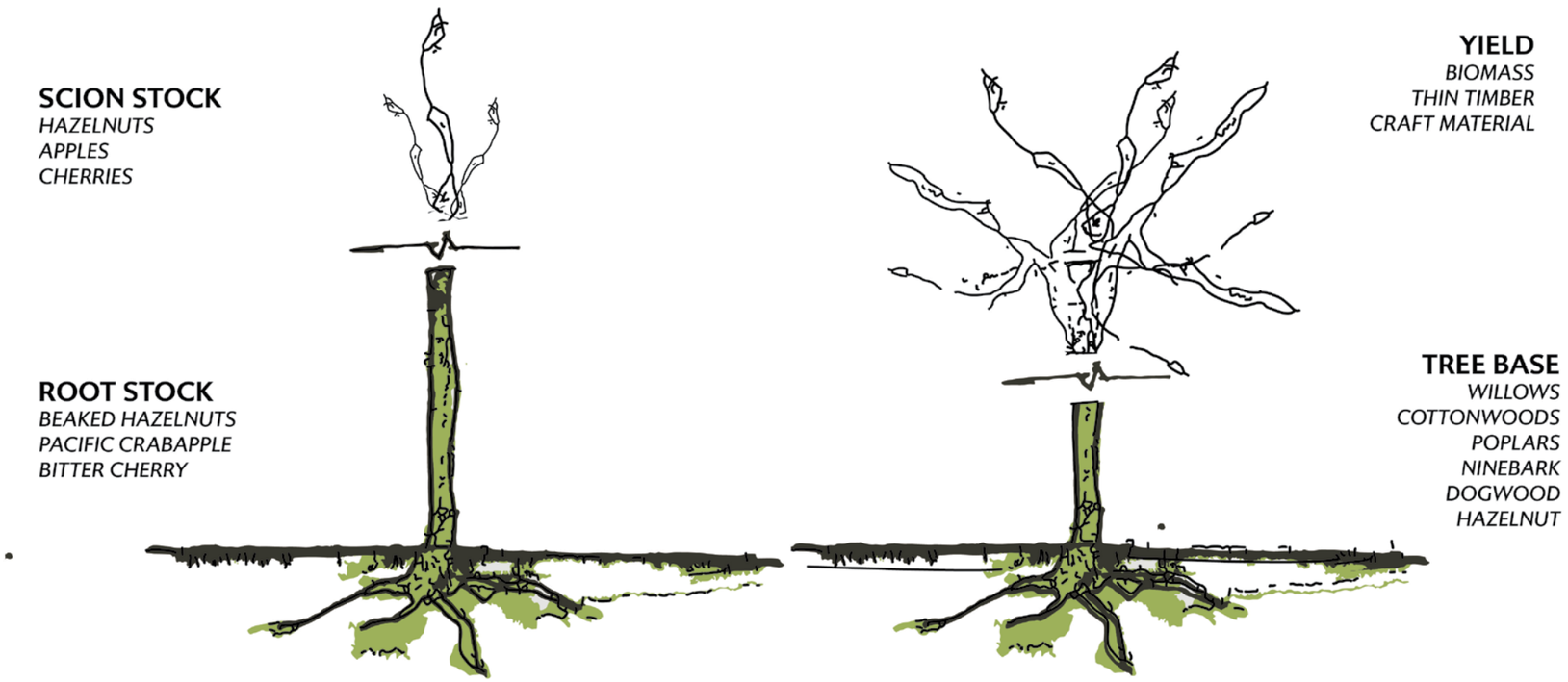
ALLEYCROPPING SPECIES - COLUMNS



ALLEYCROPPING SPECIES - FAVORABLE WATER ROWS

ALLEYCROPPING SPECIES

BH - BEAKED HAZELNUT
BC - BITTER CHERRY
WL - WILLOW
BP - BALSAM POPLAR



GRAFTING FRUIT / NUT TREE

SHORT ROTATION COPPICING TREE

WHAT AGRICULTURAL SPECIES AND SYSTEMS PRODUCE YEILDS WITH A FLOODPLAIN?

CONTROL VARIABLES
IRRIGATION - SAME
FERTILZE - NONE/LITTLE
LOCATION - SIMILAR
SOLAR EXPOS - EQUAL
PLANTING DENSITY - EQUAL
SHEAR UTTER TOTAL NEGLECT
HAND CULTIVATION

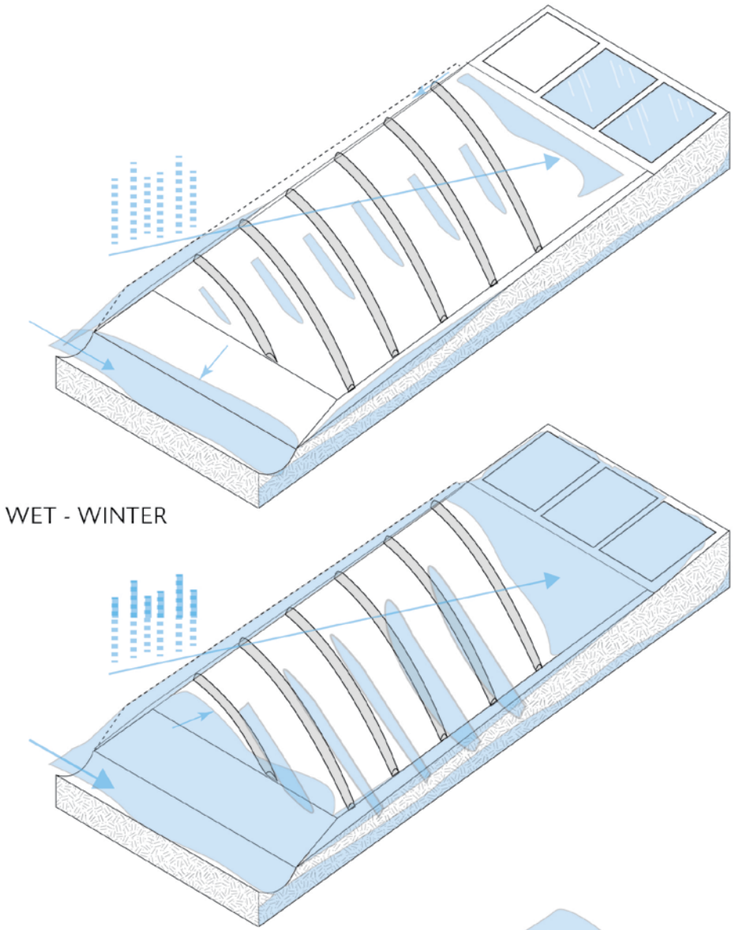
LABOR VARIABLES
MOWING ALLEYS
COVER CROPS
(F) ANIMAL GRAZING ALLEYS

UNKNOWN VARIABLES
FLOODING INTENSITY ON SITE
- DROUGHT - YEARS
- DRY - SUMMER
- WET - WINTER
- FLOODING I0 - I:I0 YEARS
- FLOODING I00 - I:I00 YEARS

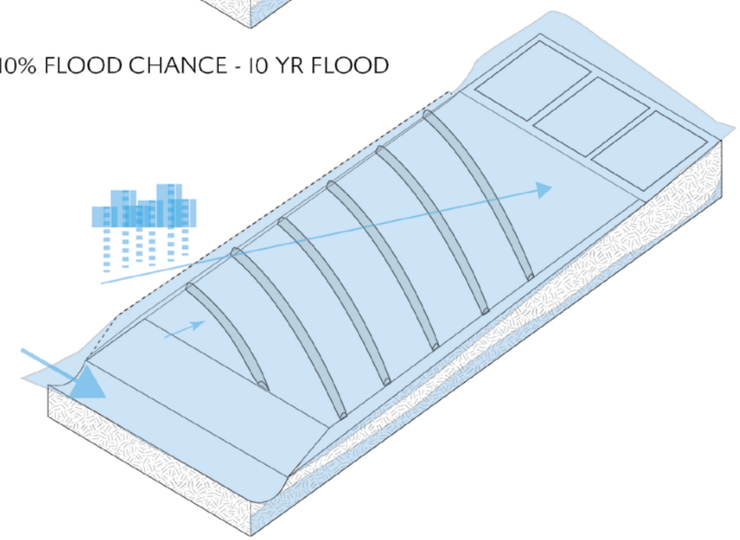
SPECIES SELECTION
- POLYGENETIC SOURCING

POTENTIAL RESPONSES
PLANT YIELD VIABILITY
AG SYSTEM VIABILITY
YIELDS / SQ FT
BIODIVERSITY INDICATORS
- POLLINATORS
- WILDLIFE
- POLYGENETIC SPECIES

SPECIES SELECTION OVER TIME
DISEASE RESISTENCE
HEAT TOLERENT
COLD HARDY
REPRODUCE FAST YIELDS
REPRODUCE HIGH YIELDS

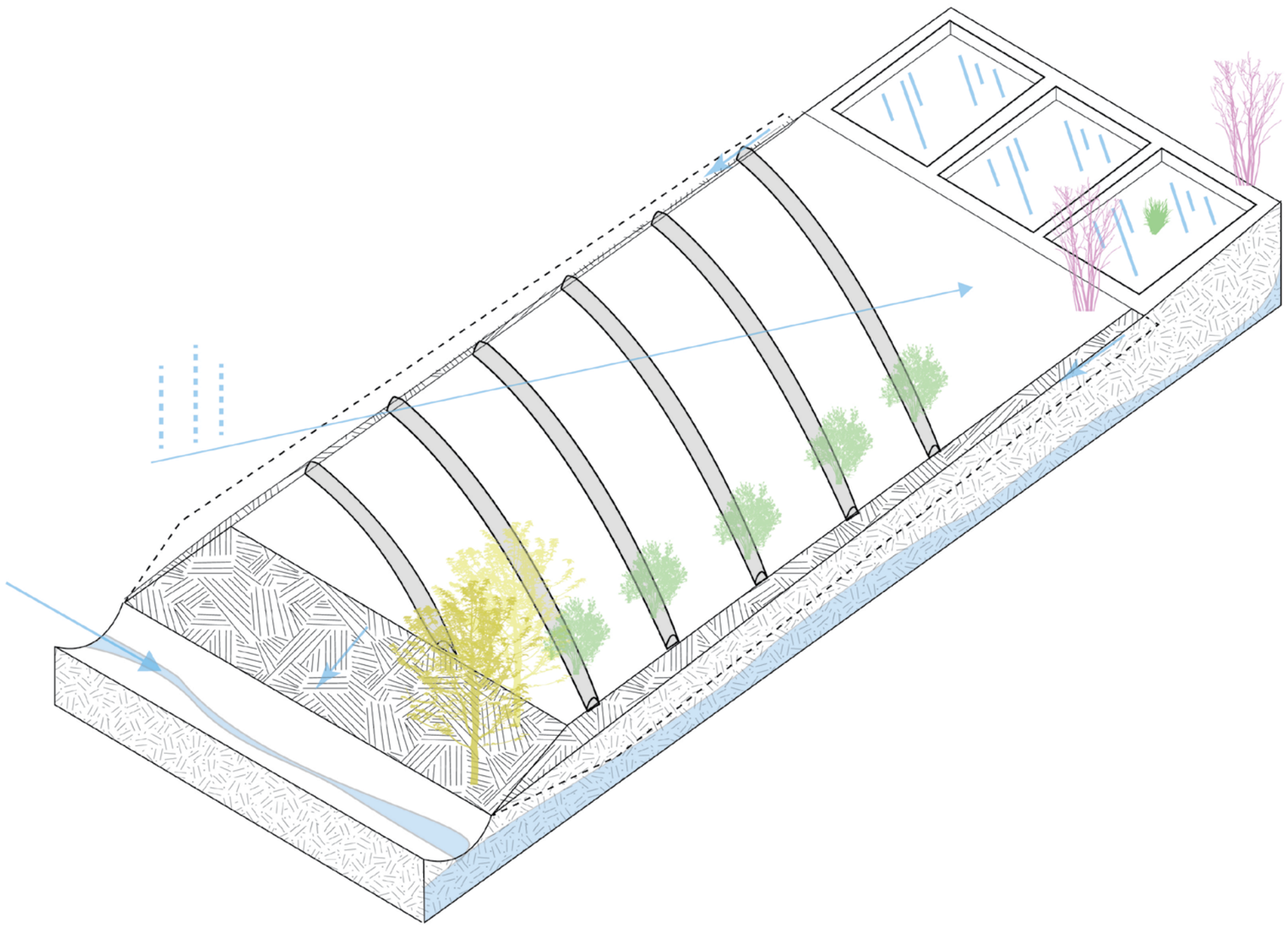


WET - WINTER

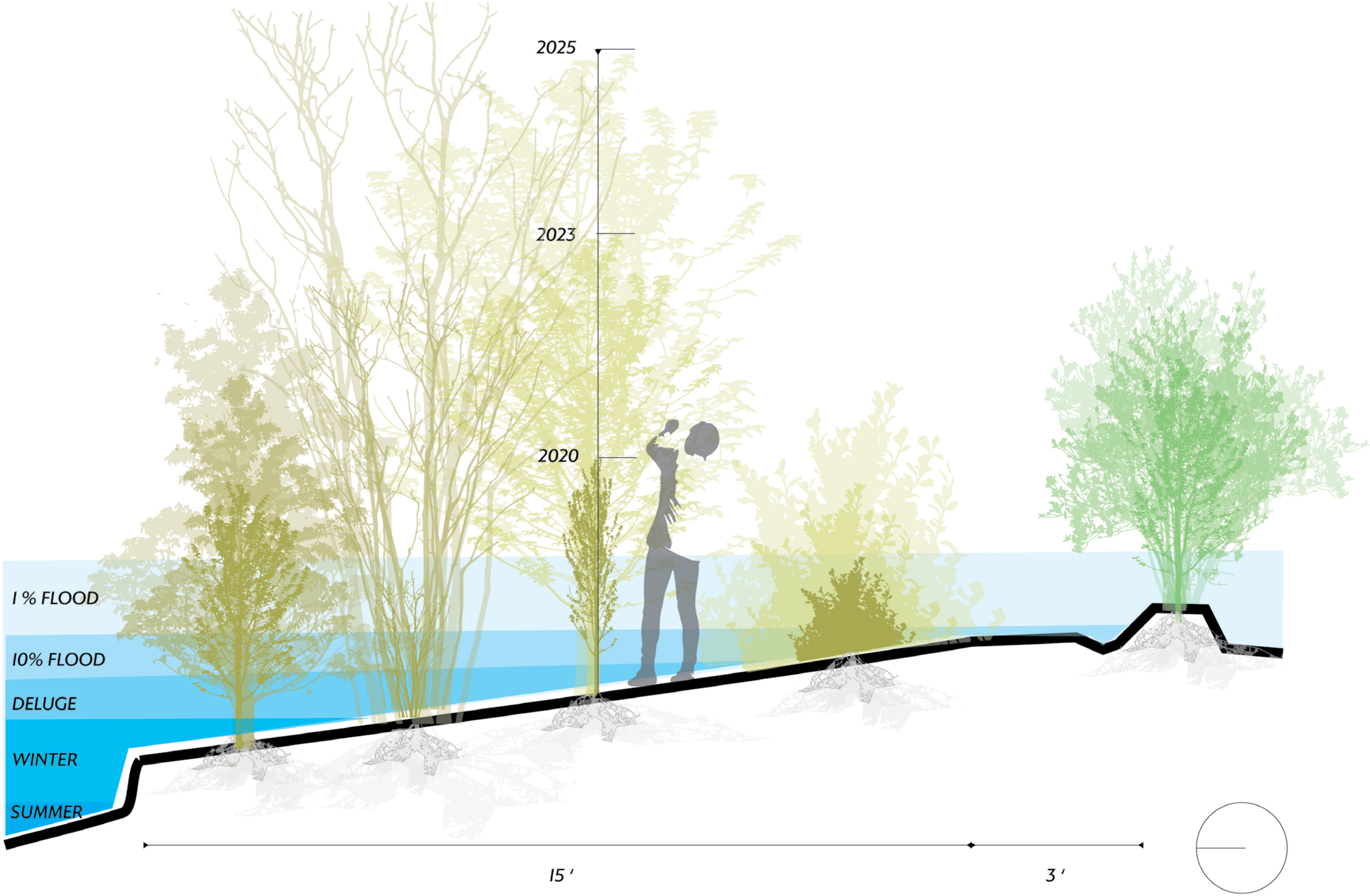


10% FLOOD CHANCE - 10 YR FLOOD

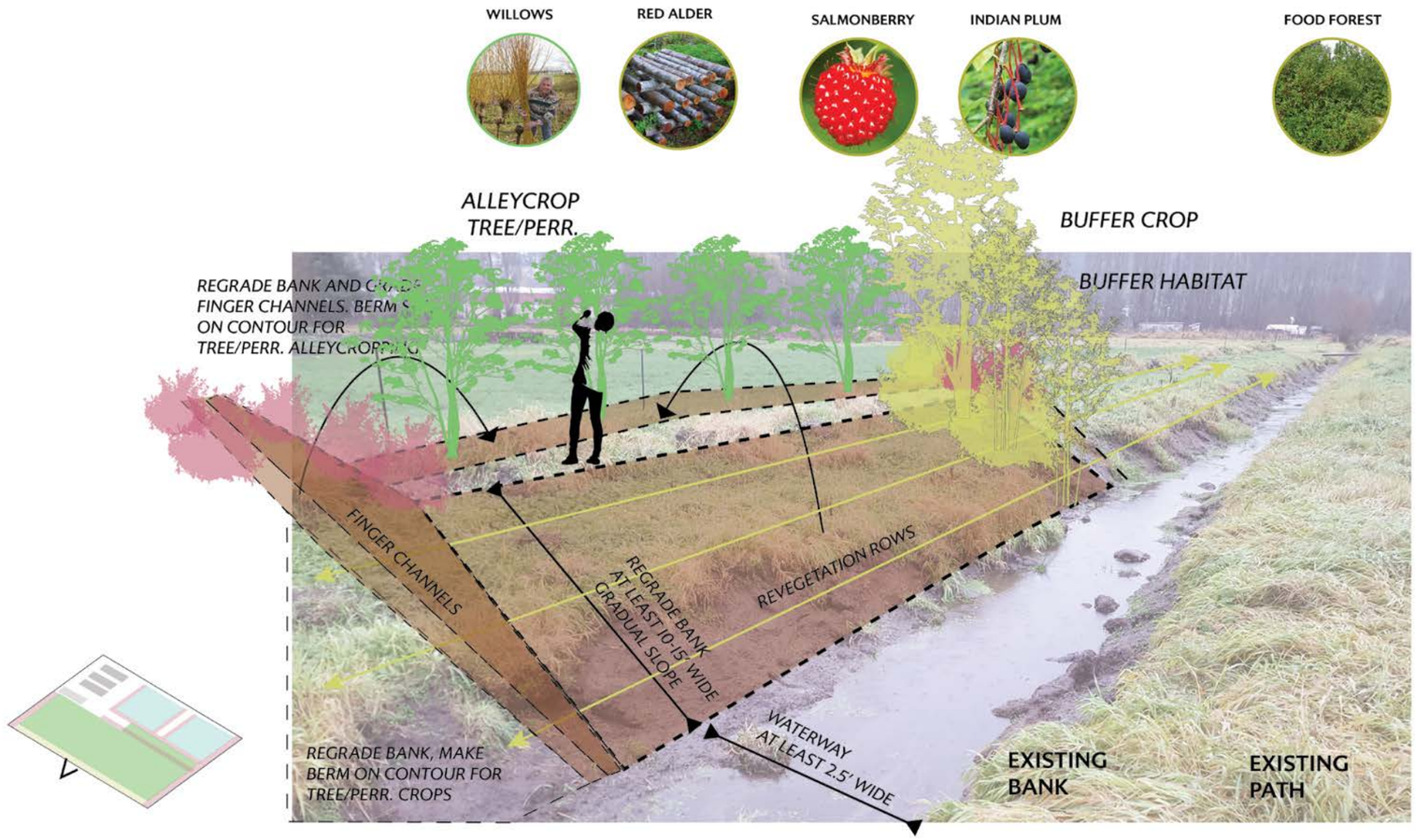
1% FLOOD CHANCE - 100 YR FLOOD



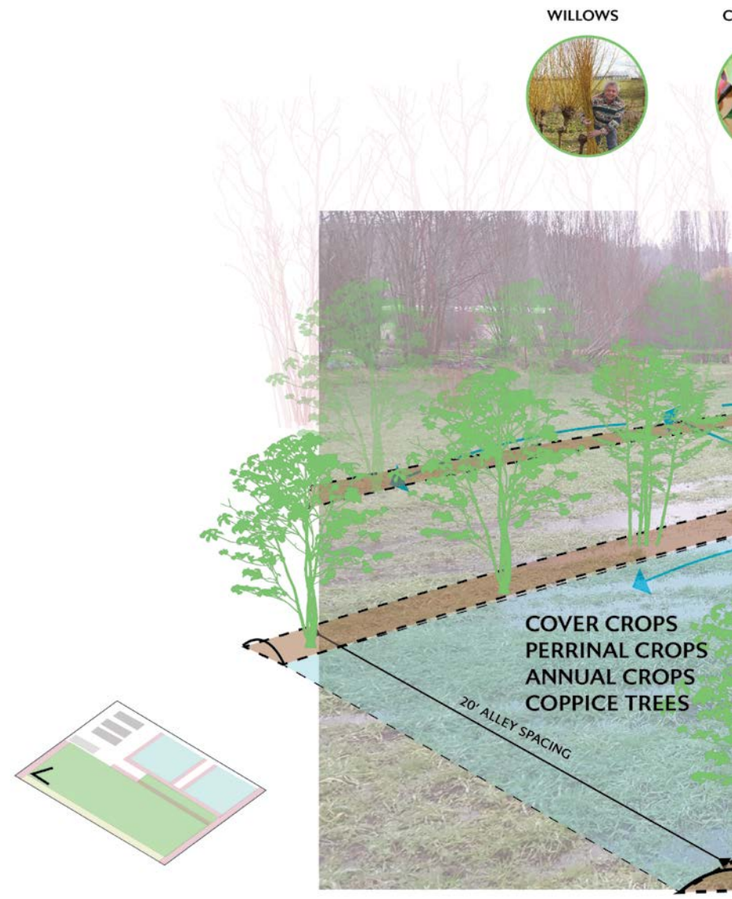
ALLEYCROPPING ON CONTOUR WITH POND BASINS
DRY - SUMMER



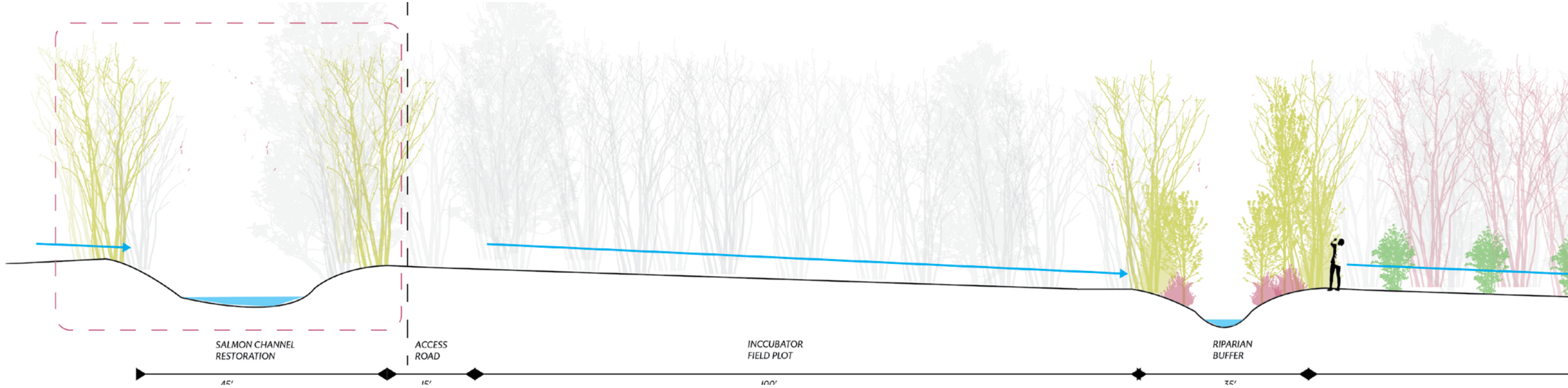
RIPARIAN FOOD FOREST

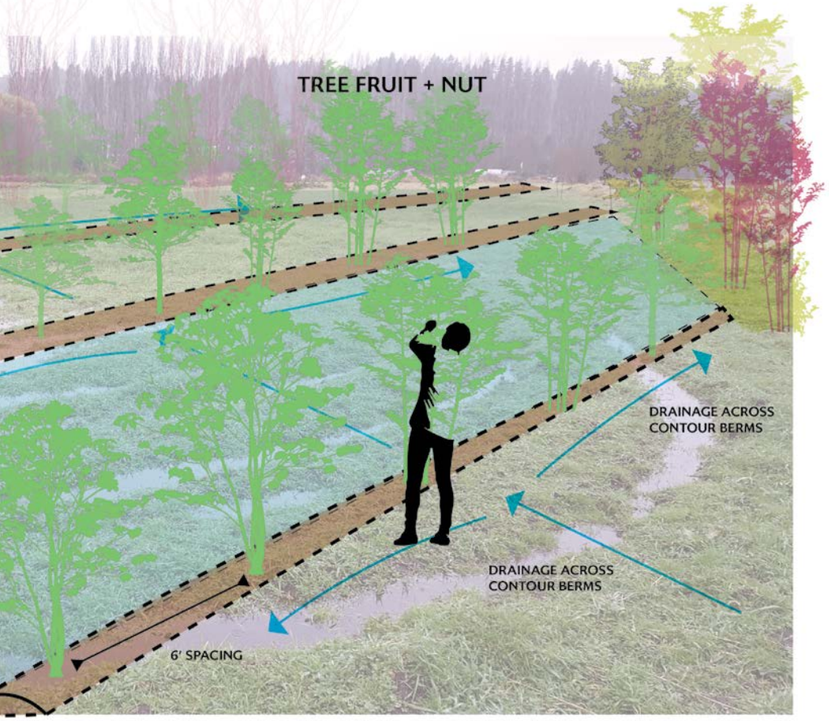


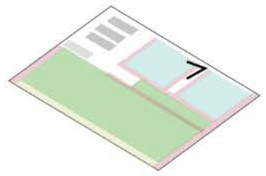
RIPARIAN FOOD FOREST BUFFER



TREE CROP ALLEYCROPPING

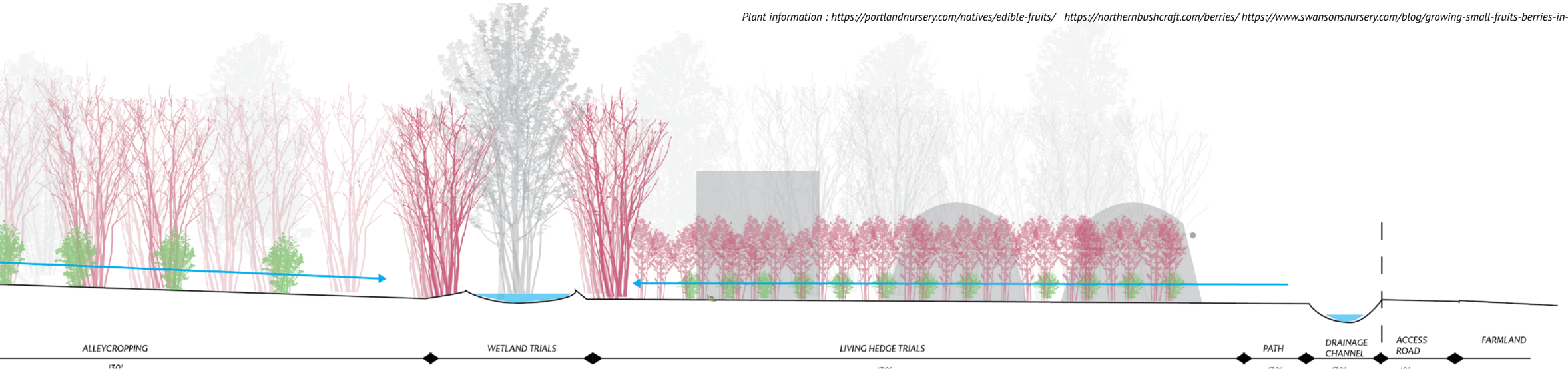






LIVING HEDGES

Plant information : https://portlandnursery.com/natives/edible-fruits/ https://northernbushcraft.com/berries/ https://www.swansonsnursery.com/blog/growing-small-fruits-berries-in-the-pnw



AR — *ALNUS RUBRA*
- RED ALDER

RS — *RUBUS SPECTABILIS*
- SALMONBERRY

S — *SALIX*
- WILLOW

PC — *PHYSOCARPUS CAPITATUS*
- PACIFIC NINEBARK

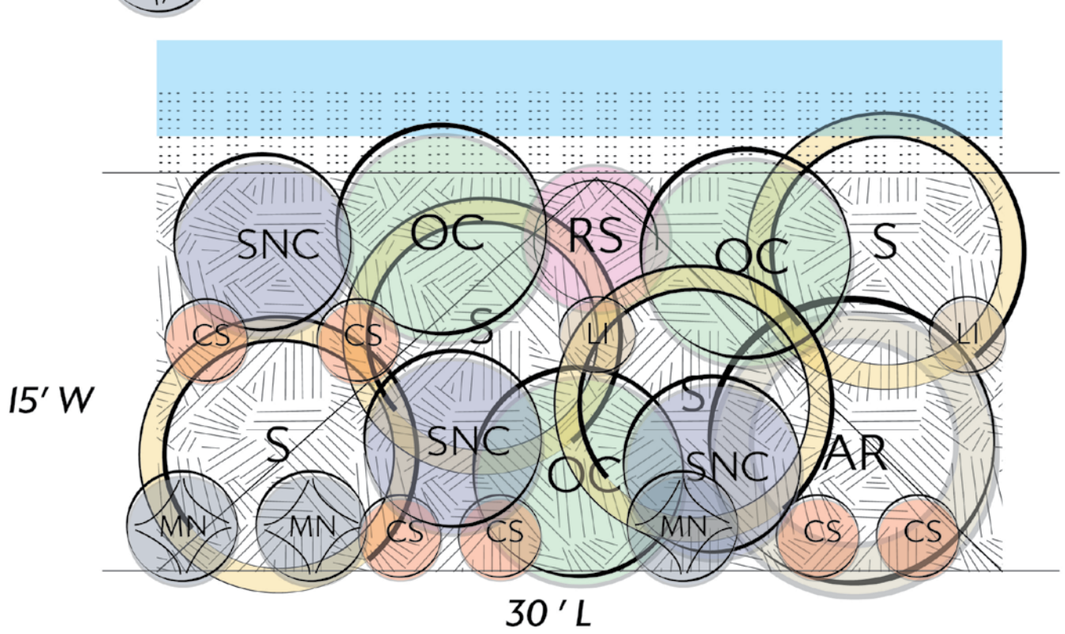
MN — *MAHONIA NERVOSA*
- LOW OREGON GRAPE

OC — *OEMLARIA CERASIFORMIS*
- INDIAN PLUM

SNC — *SAMBUCUS NIGRA SSP. CERULEA*
- BLUE ELDERBERRY

CS — *CORNUS SERICEA*
- RED TWIG DOGWOOD

LI — *LONICERA INVOLUCRATA*
- TWINBERRY



RIPARIAN FOOD FOREST BLOCK PLAN

AA — *AMELANCHIER ALNIFOLIA*
- SASKATOON SERVICEBERRY

VP — *VACCINIUM PARVIFOLIUM*
- RED HUCKLEBERRY

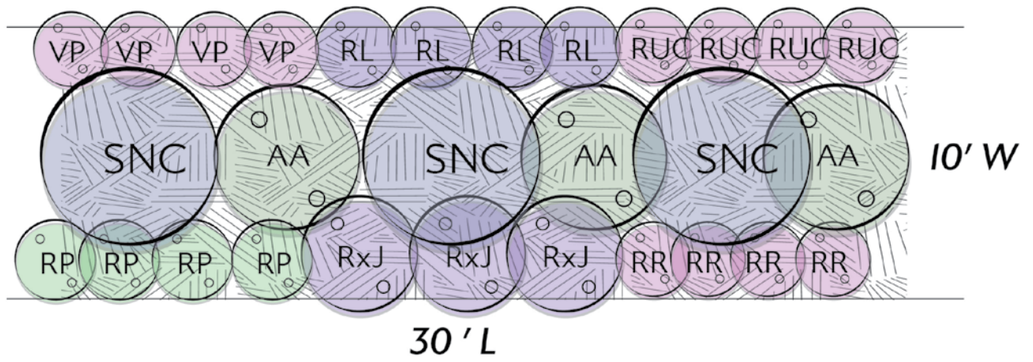
RP — *RUBUS PARVIFLORUS*
- THIMBLEBERRY

RL — *RUBUS LEUCODERMIS*
- BLACKCAP RASPBERRY

RUC — *RIBES UVA-CRISPA*
- GOOSEBERRY

RR — *RIBES RUBRUM*
- RED CURRANT

RxJ — *RIBES NIGRA X RIBES DIVARICATUM X RIBES UVA-CRISPA*
- JOSTABERRY



LIVING HEDGE BLOCK PLAN

image source: Google Earth

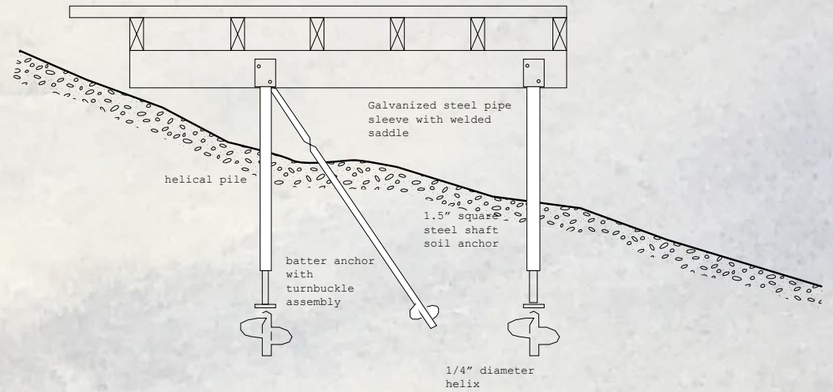
NATHAN HALE HIGH SCHOOL URBAN FARM

NIccolo Piacentini

CLIMATE RESILIENCE THROUGH INCLUSION AND DIVERSITY: Experimenting with different farming techniques at the Nathan Hale Horticulture program allows for students to learn how to cultivate, process and prepare food.

CLIMATE RESILIENCE THROUGH DIVERSITY and INCLUSION

Experimenting with different farming techniques at the Nathan Hale Horticulture program allows for students to learn how to cultivate, process and prepare food.



Helical Piles Detail

source materials

Here we will grow fast growing plants that have structural integrity. These are for the purpose of building things that are necessary around the greenhouse.

Some possible plant choices include:Bamboo, reeds

water storage

Water is collected from the roof and is then stored in cisterns on the North side of the greenhouse.

aquaponic system

Aquaponics recycles fish waste water and feeds it to plants. The plants uptake the nutrients and then return clean water back to the fish. Using this method allows for the growth of many different types of vegetables, especially inside the climate controlled greenhouse.

fruit trees

There are existing quince trees that offer large quantities of fruit on a given year.

vegetables

Garden boxes provide an opportunity to experiment with different types of vegetables and herbs while keeping similar controlled variables.

food forest

The food forest will have a selection of plants that is lower to the ground in order to allow maximum sun exposure on the North side of the walkway. On the South side of the walkway, there will be taller plants that help make a microclimate and can be harvested by taking advantage of the walkway and slope interactions. The students will select the plants, plant them and record their findings.

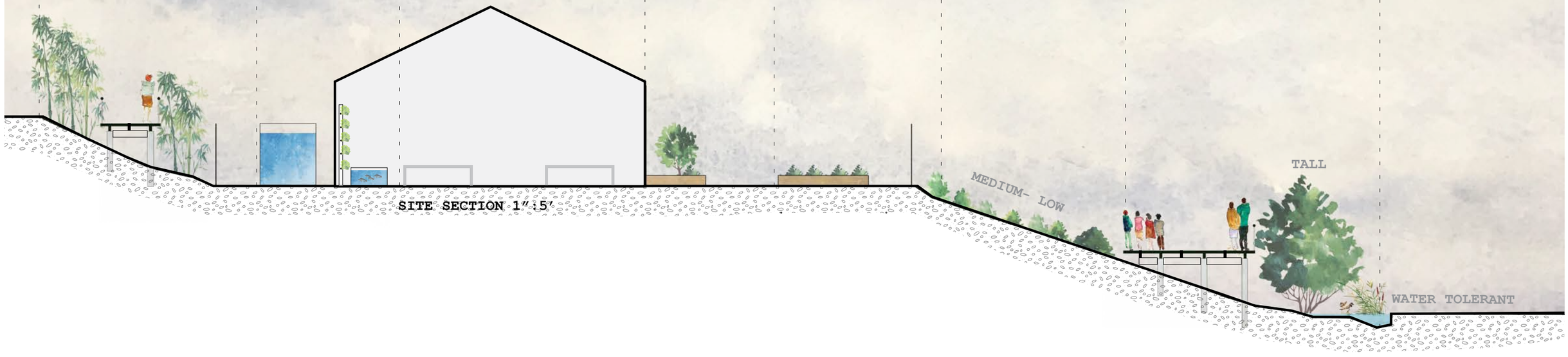
ADA walkway

The walkway works to connect the parking lot to the baseball field, while simoultaneously creating a focal point at the East entrance of the greenhouse. This can act as a gathering space and an event space that is accessible by all. In addition to improving accessibility, the walkway allows to harvest the taller fruit baring trees on the South side, while also giving access to rest of the slope for harvesting and maintenance. The walkway is the preferred solution over terracing because it is allows for the least amount of earthwork; this is both ecologically and economically advantageous.

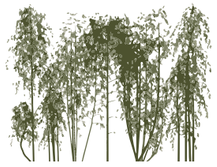
swale

The swale is the final component for the project. It allows runoff water from both the parking lot and the slope to infiltrate into the ground. This decreases the amount of stormwater that the city needs to process, and creates a water rich environment conducive to the growth and experimentation of a wider variety of edible plant species.

Possible plants:
Rice
Watercress

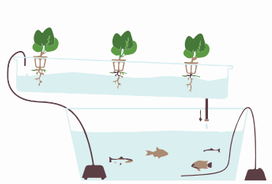


SITE SECTION 1":5'



SOURCE MATERIALS

SHADE HOUSE



AQUAPONICS

HOOP HOUSE

HUGKECULTUR

PRODUCTIVE SWALE

PLANTER BOXES

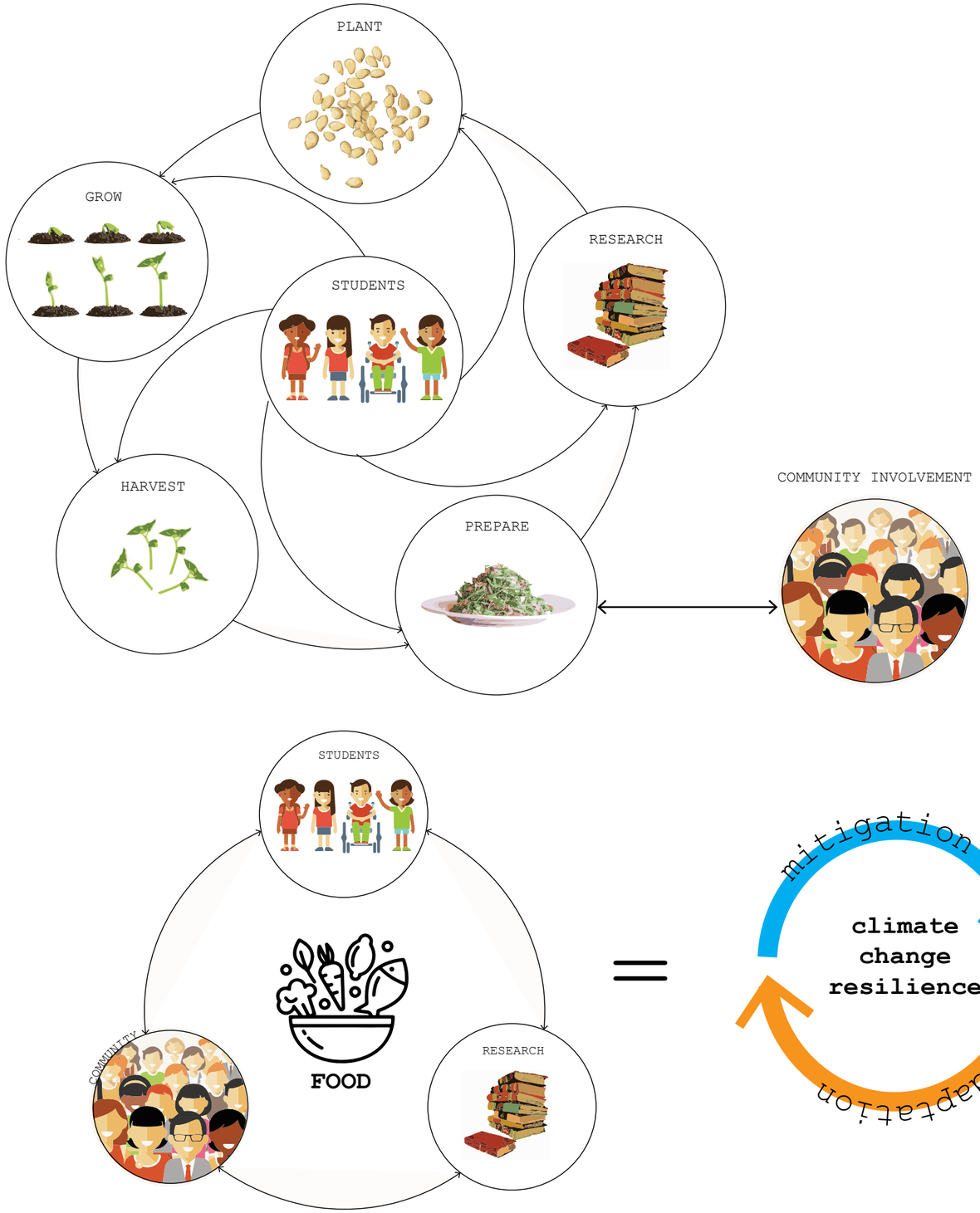
HERB SPIRAL

INTENSIVE FARMING

FOOD FOREST

SITE PLAN

100ft



SWALE

STORMWATER TREATMENT

FOOD GROWTH

WILDLIFE HABITAT

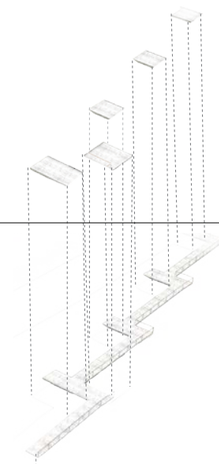
WATER CATCHMENT

2024

PLATFORMS

TEACHING SPACES

2023



ELEVATED PATHWAY

ACCESSIBILITY

LANDSCAPE MAINTENANCE

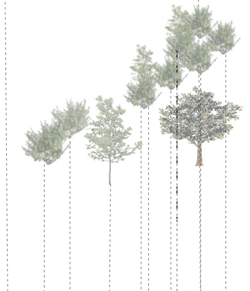
2022

FOOD FOREST

SOURCE OF FOOD

POLLINATOR+WILDLIFE HABITAT

2021



POLLINATOR MEADOW:

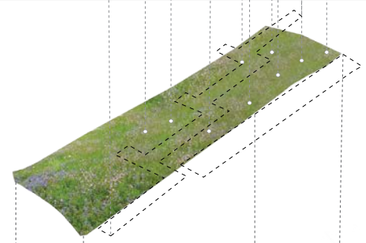
clover + mustard

INEXPENSIVE

POLLINATOR HABITAT

NITROGEN FIXING

2020



FINAL VISION

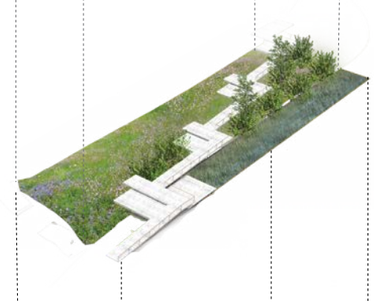
POLLINATOR HABITAT

WILDLIFE HABITAT

FOOD FOREST

ACCESSIBILITY

STORMWATER TREATMENT



POLLINATOR MEADOW:

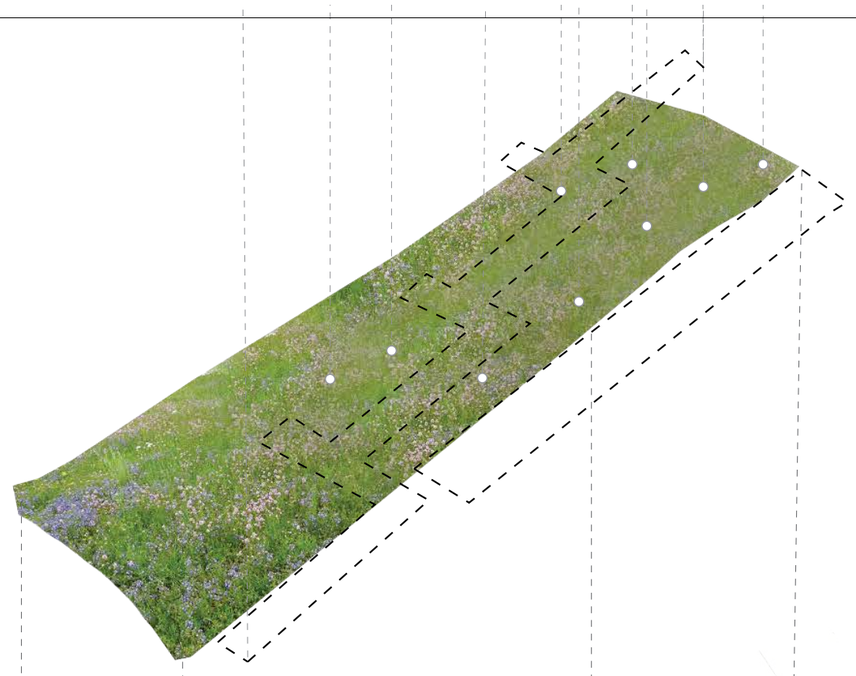
clover + mustard

INEXPENSIVE

POLLINATOR HABITAT

NITROGEN FIXING

2020



FINAL VISION

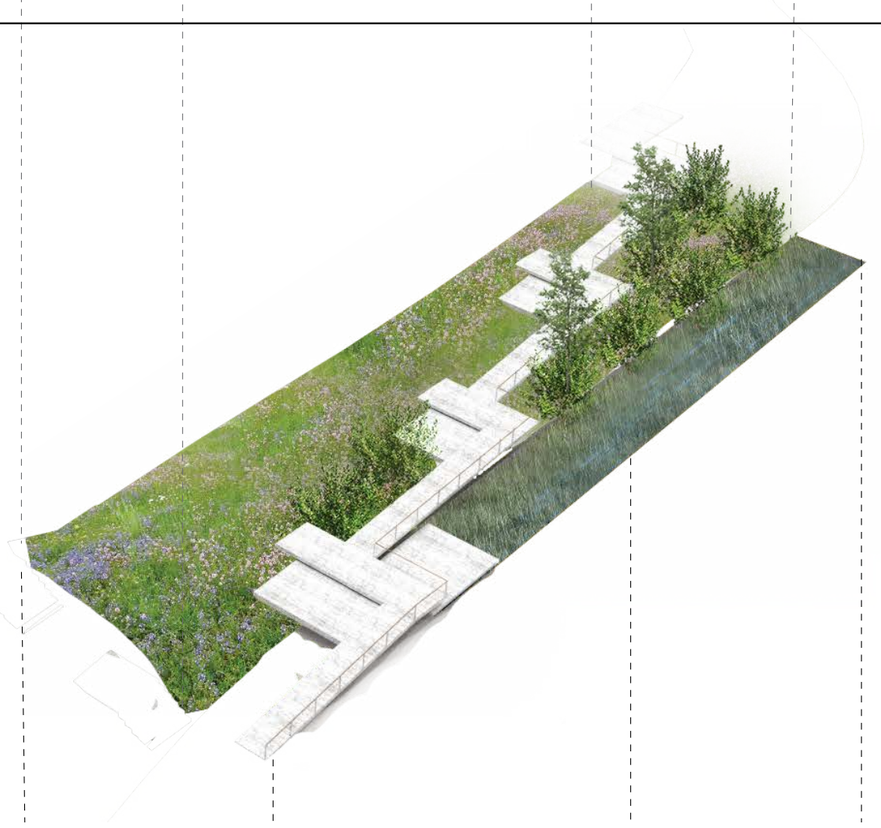
POLLINATOR HABITAT

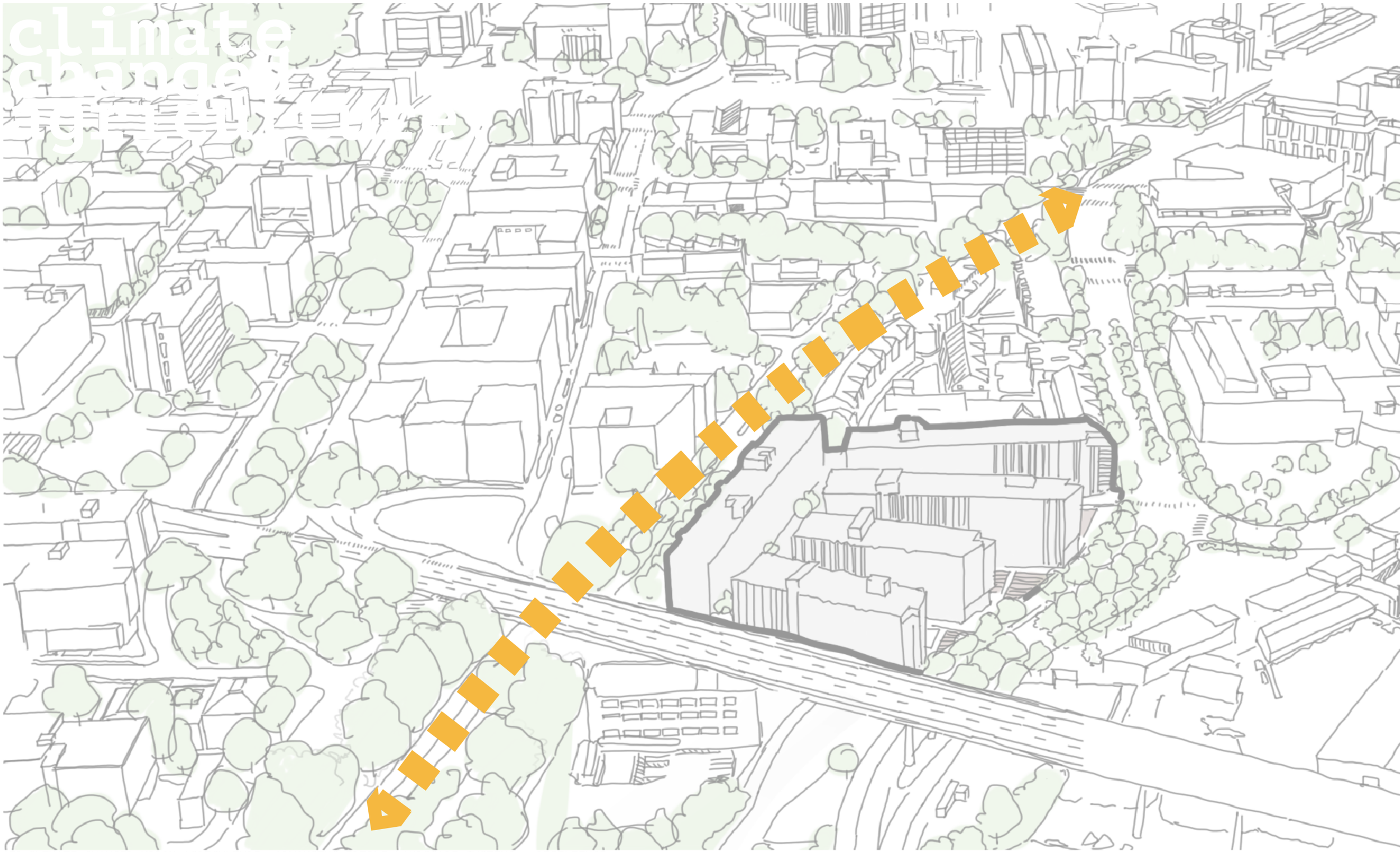
WILDLIFE HABITAT

FOOD FOREST

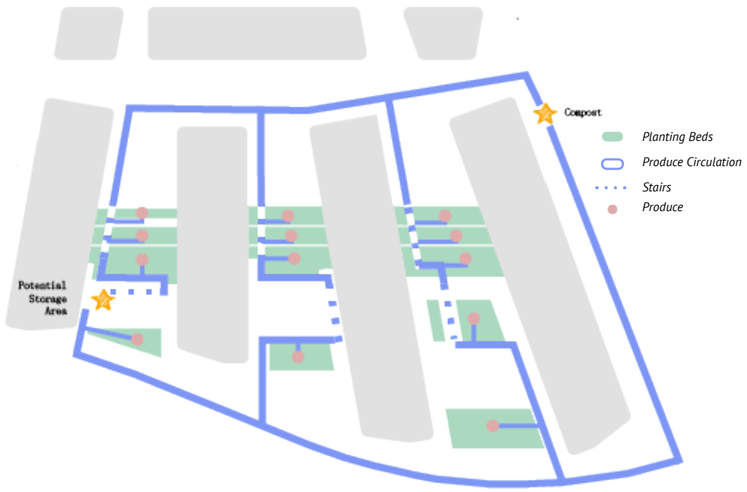
ACCESSIBILITY

STORMWATER TREATMENT




climate
change
agriculture

Source: https://facilities.uw.edu/files/media/2019-04-02-uw-cmp-final-plan-reduced.pdf



UW FARM AT MERCER COURT

Xinyu Xu & Yingjie Luo

The mission of UW Farm is to be the campus center for the practice and study of urban agriculture and sustainability, and an educational, community-oriented resource for people who want to learn about building productive and sustainable urban landscapes. (https://botanicgardens.uw.edu/center-for-urban-horticulture/gardens/uw-farm/)

Started in 2013 and nestled in the Mercer Court Apartments courtyard, a stones throw from the UW Farm Clubhouse, Mercer Court has almost half an acre in production! Mercer Court has become an important part of the student community by promoting education about food in the urban environment and providing a more interesting backyard for residents of Mercer Court. The UW Farm at Mercer shows that farming is fun and doesn't have to be miles out of a city.

The West Campus public realm defines the Innovation District: an inclusive and welcoming academic precinct with industry partners. It should be well maintained and cared for while feeling open and available for use by the public, and valued by the surrounding community; where students gather through their day and visitors feel

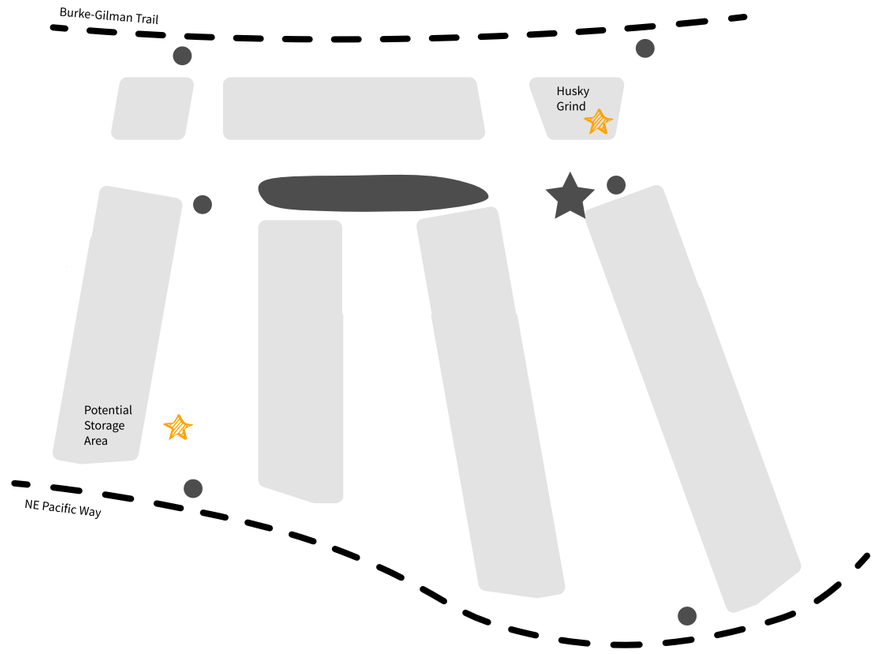
Burke-Gilman Trail

The Burke-Gilman Trail is a popular recreational trail for walkers, runners, cyclists, skaters and commuters. The trail is jointly maintained by Seattle Department of Transportation and Seattle Parks and Recreation. （http://www.seattle.gov/parks/find/parks/burke-gilman-trail）

And Burke-Gilman Trail will provide some strengths and opportunities to UW Farm Mercer based on its popularity and visitors flow. Therefore, UW Farm Mercer can fully make use of these potential resources to to be a more prominent educational feature.

Attraction

As a farm landscape, UW farm is a special presence on campus. However, due to the geographical location far away from the center of the campus, the participation of students, faculty and tourists is not high. We wanted to use some publicity methods to guide people to the farm and



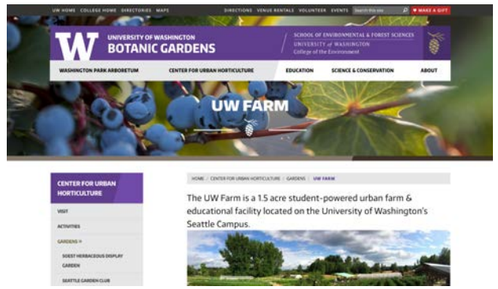
get to know the farm.

Potato

Basic In fo:
Potatoes are generall y grown from seed pota - toes, tubers specificall y grown to be fr ee fr om disease and to p rovide consistent and healthy plants. T o be disease fr ee, the ar eas whe re seed potatoes ar e grown are se lected with c are. In the US, this restricts pr oduction of seed pota -

Planting Signage

Next to the plants are planting signage to introduce the basic information of plants.



Website

Let people know more about uw farm through the university website. The publicity of the website can be combined with the guiding signage to make it more convenient for people to reach the website through the

Guiding Signage

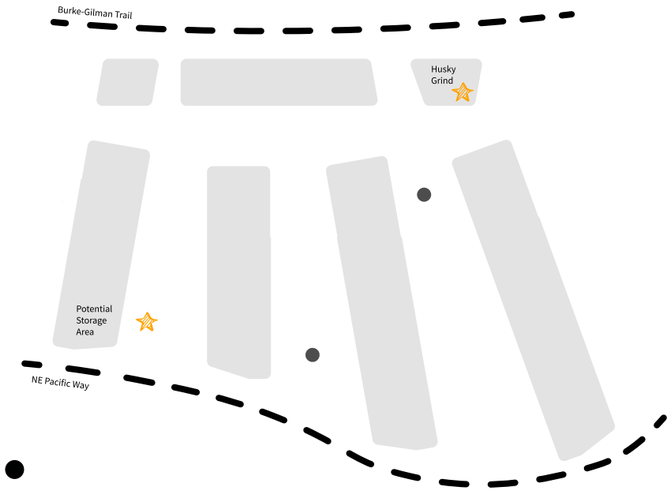
We hope there will be some guiding signages at the entrance to UW Farm and along the surrounding main pedestrian paths. These include signs that tell people in the direction of UW Farm. The sign contains basic information and a QR code on UW Farm's official website for more information.

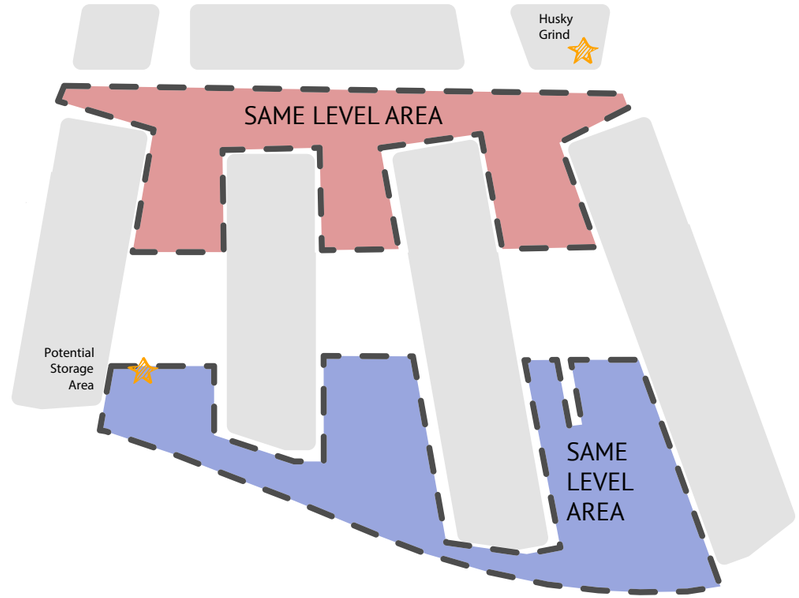
Activities Space

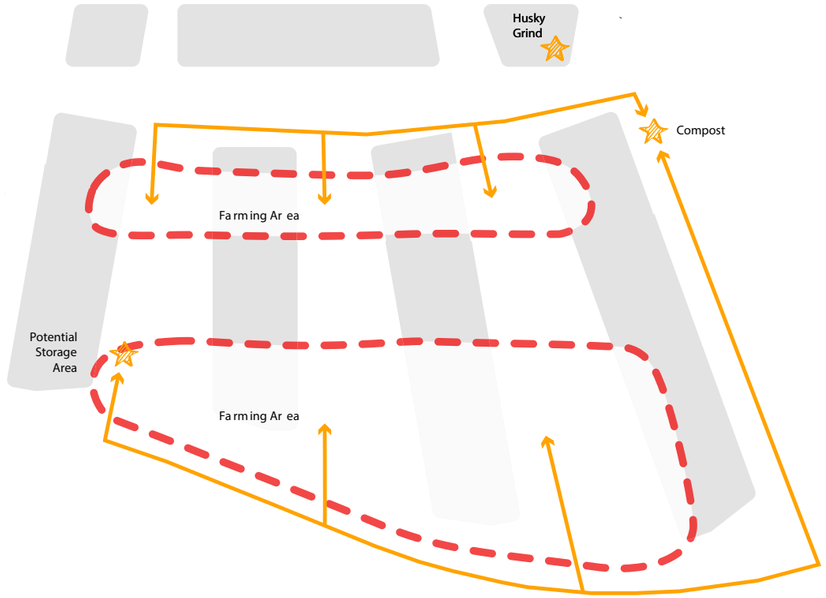
The activity space is located in the north square of uw farm, which is the only way for most students to enter the dormitory building. Therefore, some farm activities are held here to help students better understand the farm, attract students to participate in volunteer activities on the farm, and give students a chance to have direct contact with fresh food.

ADA Accessible

The site is internally resolved by stairs, and ADA is not provided with a passable ramp or an accessible raised beds. In order to advance social and environmental justice, although we cannot change the site in a large scope, we hope to improve accessibility for all people.



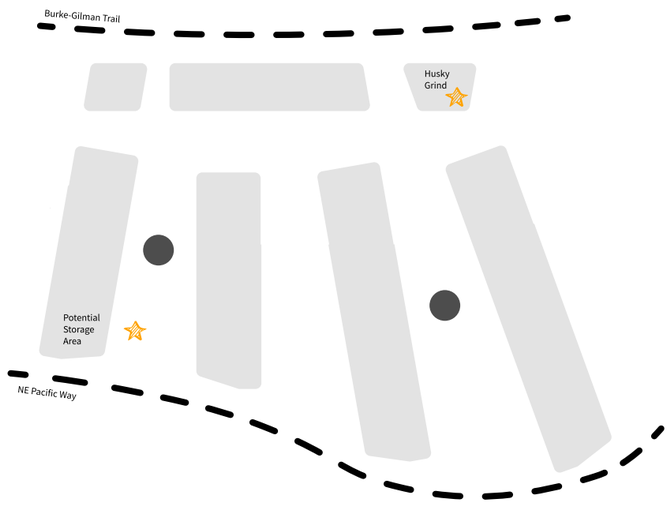





3'
4'
3'

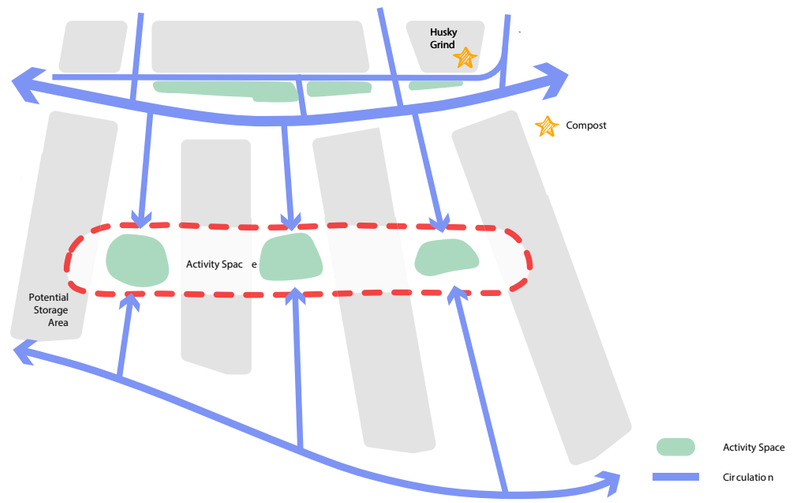
INTERACTION

UW Farm lacks activity space for students, volunteers and faculty. Since the middle area is connected to the upper and lower parts by stairs, it is not convenient for carrying. Therefore, we rearranged the functional space of the site and arranged the activity area inside the site to guide people into the farm and experience the farm landscape. At the same time, activity areas can be used as outdoor classrooms.



Movable Farming Box

In the middle activity area of the site, we hope to have a movable farming box. This device can be moved and reorganized according to the requirements, and can create a variety of different spaces, such as vertical

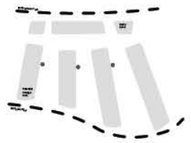


COMPOST REUSE
Soil Resilience

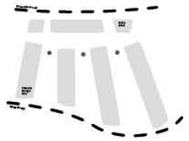
A healthy and resilient soil ecosystem can help mitigate the impacts of climate change. And composting is one of practices to improve soil ecosystem resilience by enhancing organic matter storage and transformation and nutrient storage, and by improving aggregate stability leading to improved soil structure, water transport and water holding capacity.

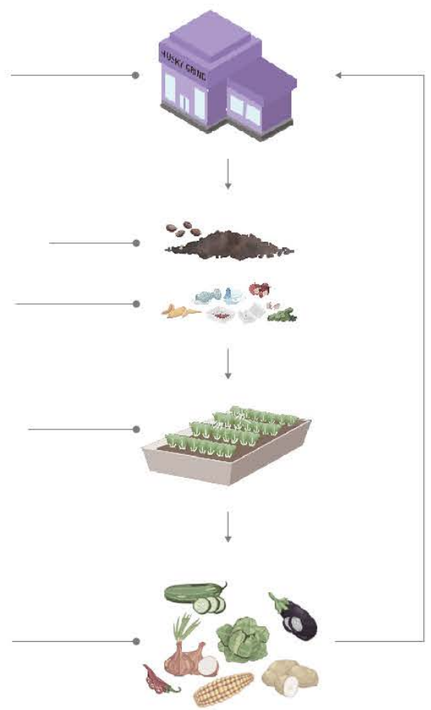
Sources:
Soil Resilience: https://blogs.ei.columbia.edu/2018/02/21/can-soil-help-combat-climate-change/
Coffe Ground Composting: https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=30820
Hügelkultur: https://www.permaculture.co.uk/articles/many-benefits-hugelkultur
Worm Bin: http://compost.css.cornell.edu/worms/basics.html

Hugelkultur are no-dig raised beds with a difference. They hold moisture, build fertility, maximise surface volume and are great spaces for growing fruit, vegetables and herbs. Applying Hugelkultur in areas without irrigation in UW Farm-Mercer Court can help improve the resilience of soil.

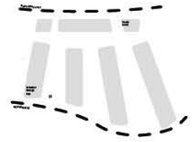


Composting coffee grounds helps to add nitrogen and organic material to the soil, which improves drainage, water retention and aeration in the soil. And it is also a great way to make use of the coffee



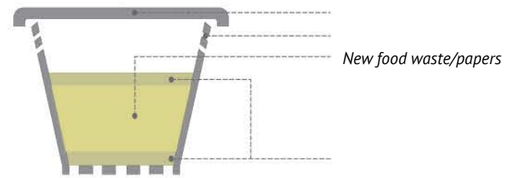


Worm composting is using worms to recycle food scraps and other organic material into a valuable soil amendment called vermicompost, or worm compost. Applying the Worm Bin Composting next to the hub can help make full use of the food waste and build healthy and nutrient soil.



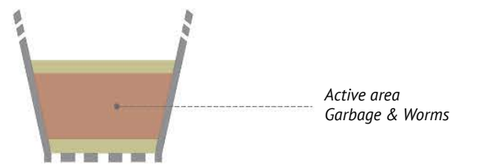
Bin 1

Kichten scraps are place in the top bin.



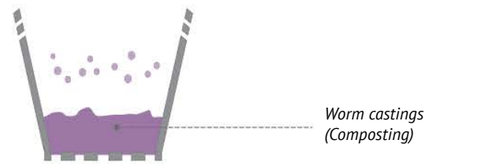
Bin 2

On this level, the worms are busy eating scraps and creating compost.



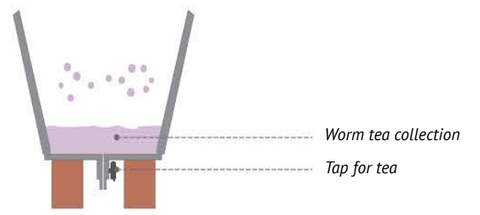
Bin 3

When the worms have done their work, what's left behind are nutrient-rich worm castings.



Bin 4

The bottom bin catches "worm tea" from the composting process which should be drained regularly.

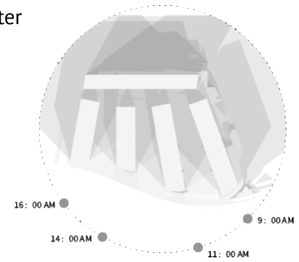


PLANTS SELECTION
Biodiversity

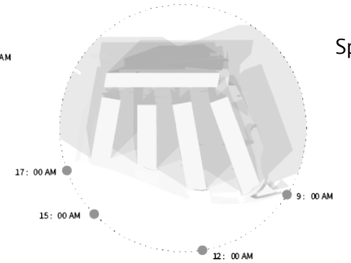
Biodiversity and agriculture are strongly interrelated because while biodiversity is critical for agriculture, agriculture can also contribute to conservation and sustainable use of biodiversity. As the planet warms quickly, mostly due to human activity, climate patterns in regions will fluctuate. Ecosystems and biodiversity will be forced to fluctuate along with the regional climate, and that could harm many species.
Native plant and crops are vital to preserving biodiversity under the climate change by providing habitats for insects, birds and mammals. And because native plants are adapted to local environmental conditions, they require far less water, saving time, money, and perhaps the most valuable natural resource, water.

https://www.cbd.int/agro/importance.shtml

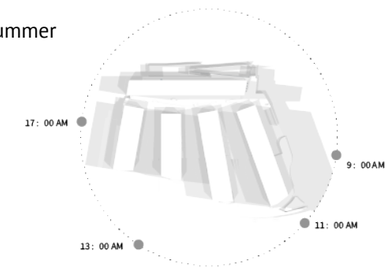
Winter



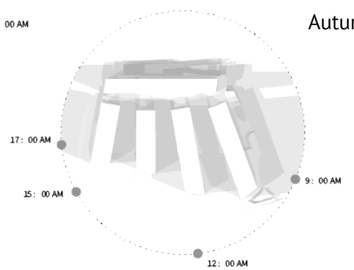
Spring



Summer



Autumn

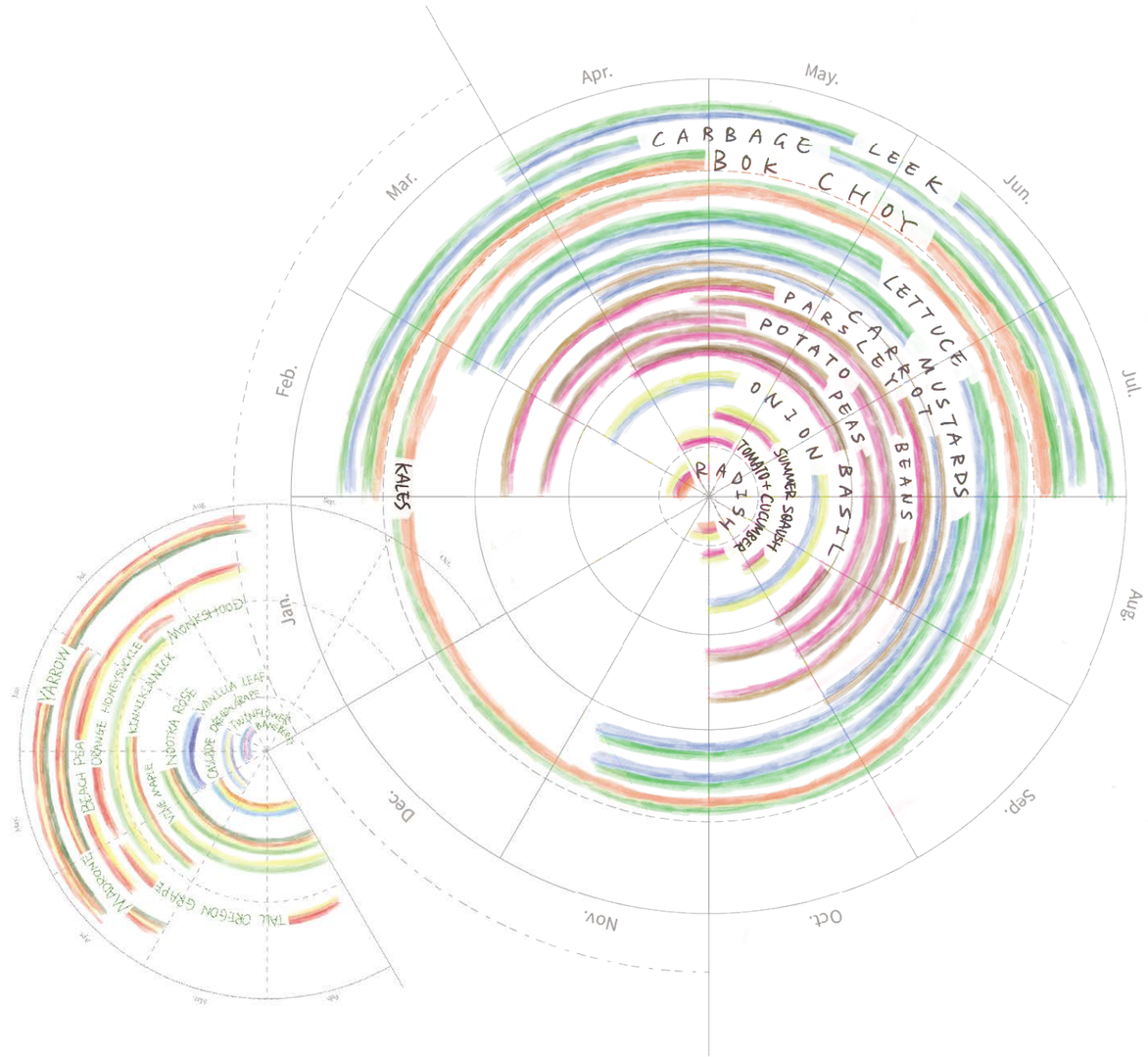


Plants

Flies

Crops

Biennal



Full sun → Full shade

Baneberry *Twinflower* *Cascade Oregon Grape* *Vanilla Leaf* *Deer Fern* *Nootka Rose* *Vine Maple* *Kinnikinnick* *Rocky Mountain Maple* *Monkshood* *Orange Honeysuckle* *Tail Oregon Grape* *Beach Pea* *Madrone* *Yarrow*

YES IDENTITY

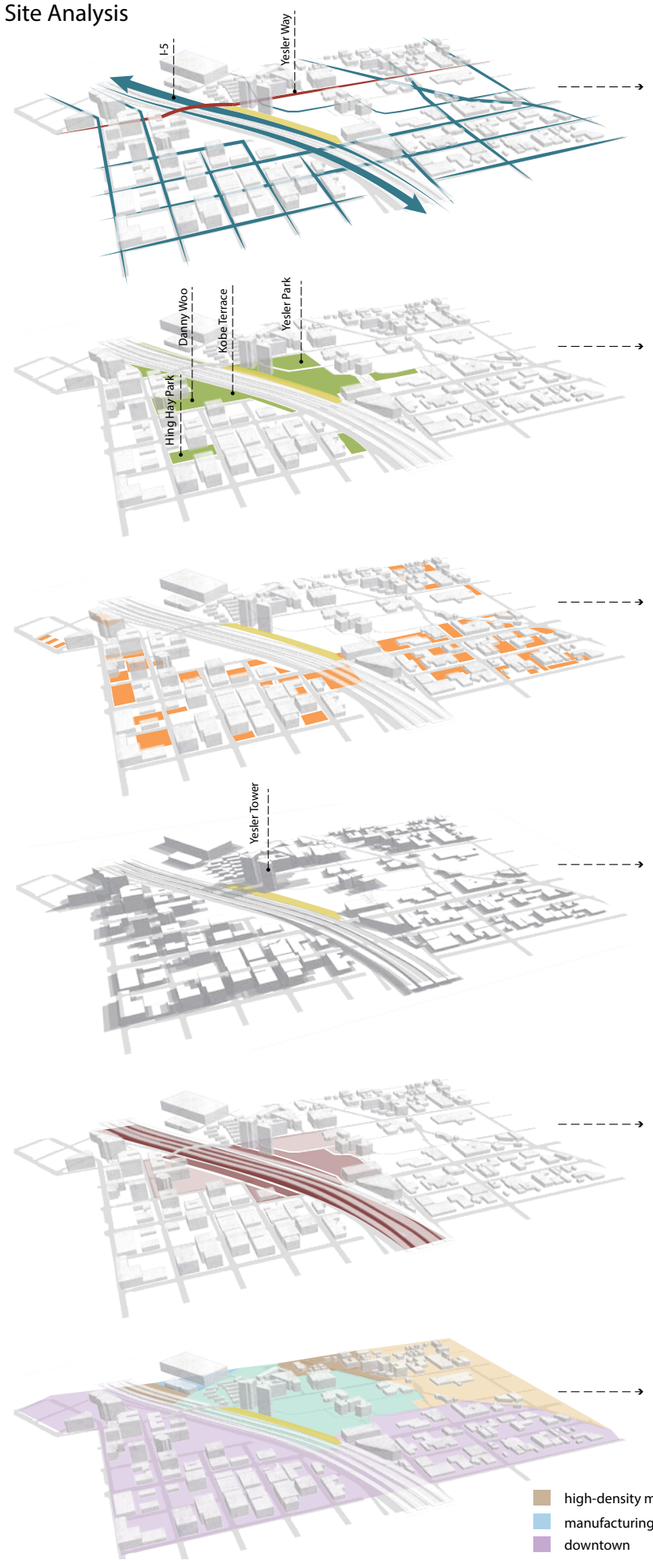
Shanshan Shang

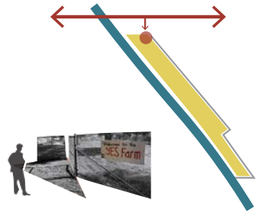
Do you know Yes Farm?

Yes Farm is a community garden created to build trust, improve cooperation, and grow community as we grow food. It plays an important role in helping the community become more resilience under the context of climate change.

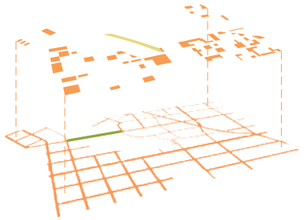
This proposal improves the ability of Yes Farm to respond to climate change through a process of building identity.

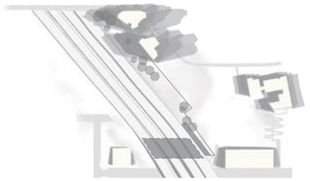
Site Analysis

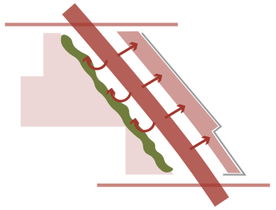


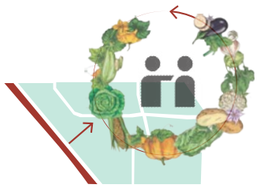


important green space with muti-functions
normal green space
undefined green space
park









high-density muti-family
manufacturing/Industrial
downtown
master planned community
neighborhood commercial

Circulation

- Yes Farm is isolated by I-5
- Yesler Way is the only way to enter Yes Farm
- the entrance image is not obvious enough

Green Space

- Yes Farm and Danny Woo are important green space, both serve diverse functions

Parking Space

- There are a lot of parking spaces including street parking spots.
- It's possible to reduce the parking spots on Yesler Way and use them to grow plants

Light and Shadow

- New construction of two high rise towers will affect the light in Yes Farm, and create more shadow space in northwest farm.

Noise and Air Pollution

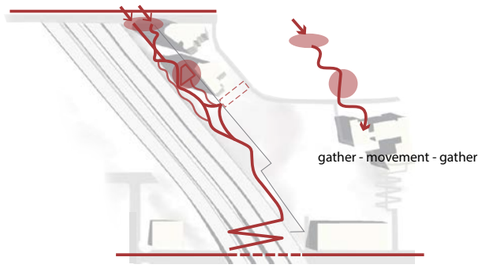
- There are a lot of noise and air pollution from I-5
- There are less noise and air polludion in Danny Woo because the trees in Kobe Terrace block the noise

Zoning

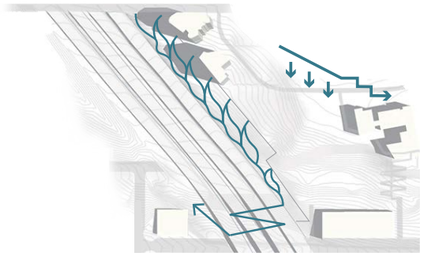
- Yes Farm has close relationship with yesler community
- Yes Farm could mitigate food crisis as population grows, and improve cooperation in the community

Impressions of Yes Farm

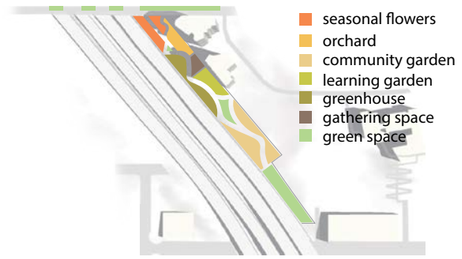
Design Concept



Path : two entrances wth ADA accessible path on the east entrance

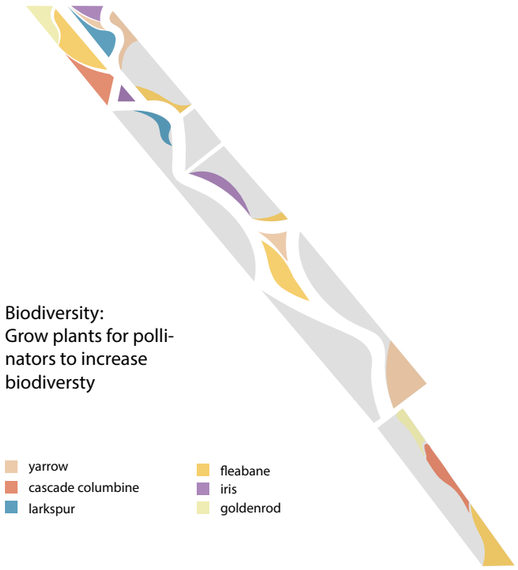


Water : Absorb and reuse stormwater through the drainageway



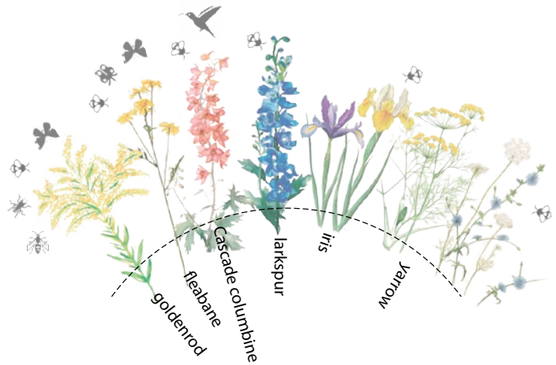
seasonal flowers
orchard
community garden
learning garden
greenhouse
gathering space
green space

Zoning



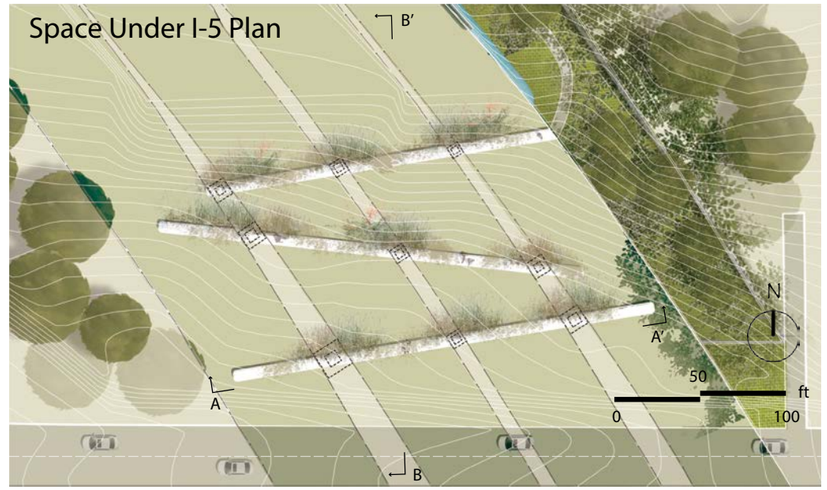
Biodiversity:
Grow plants for pollinators to increase biodiversty

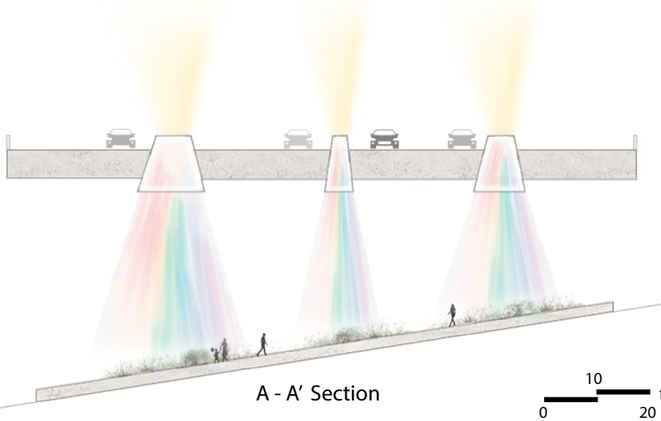
yarrow
cascade columbine
larkspur
fleabane
iris
goldenrod

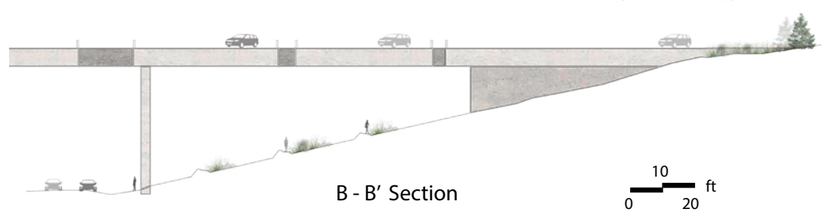


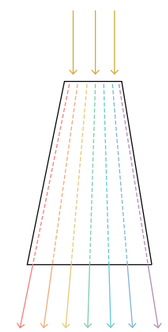
Master Plan

Space Under I-5 Plan

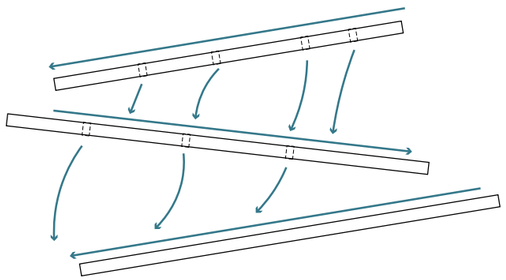


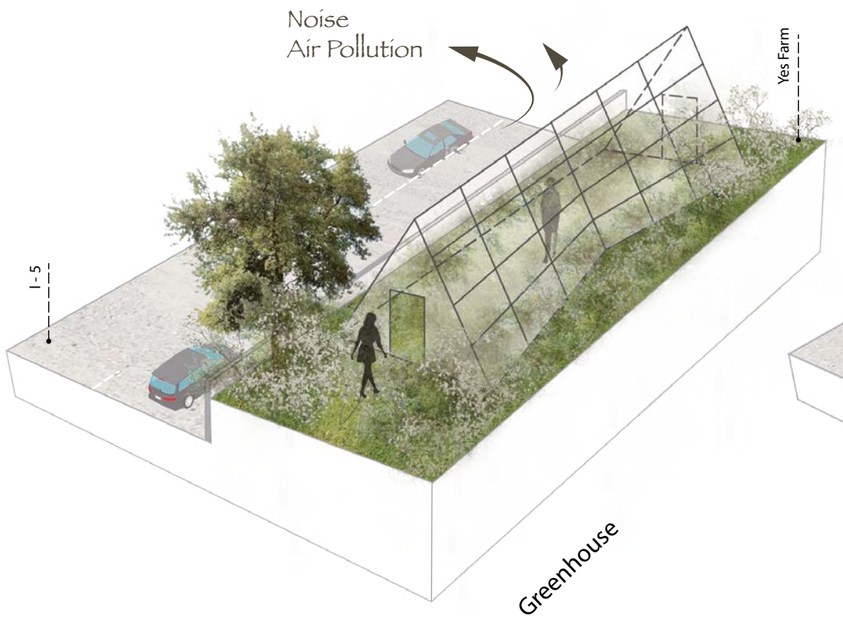


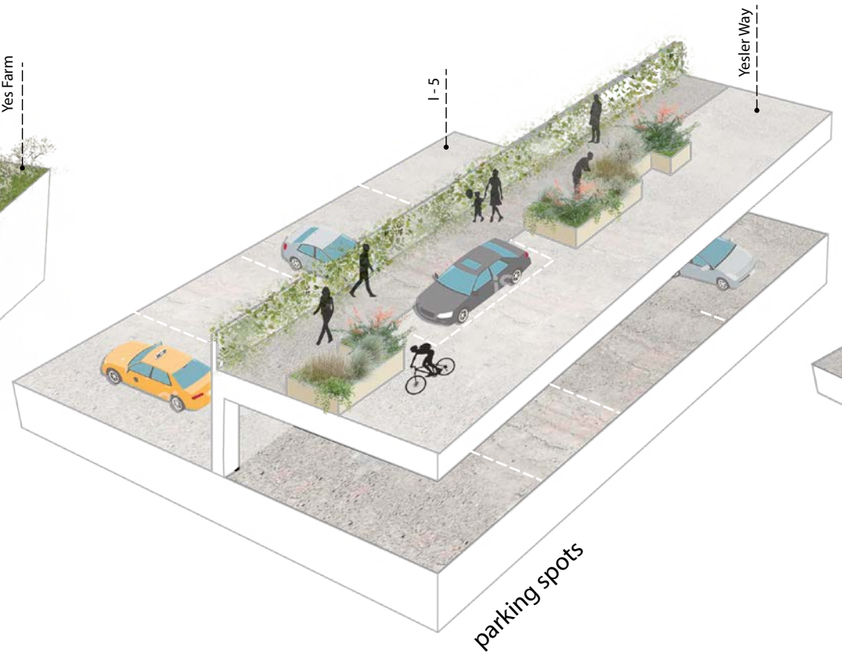




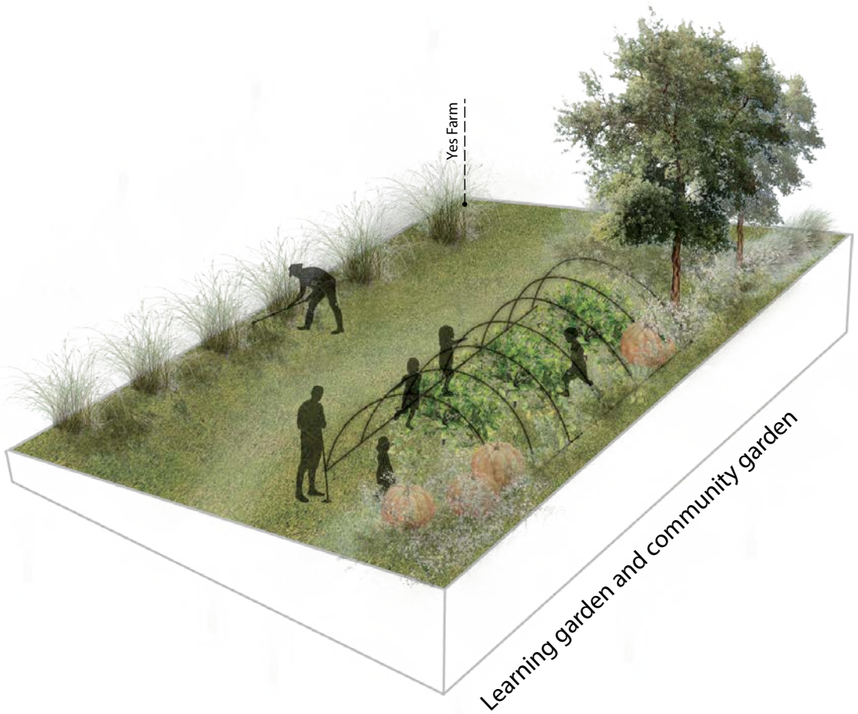
light prism

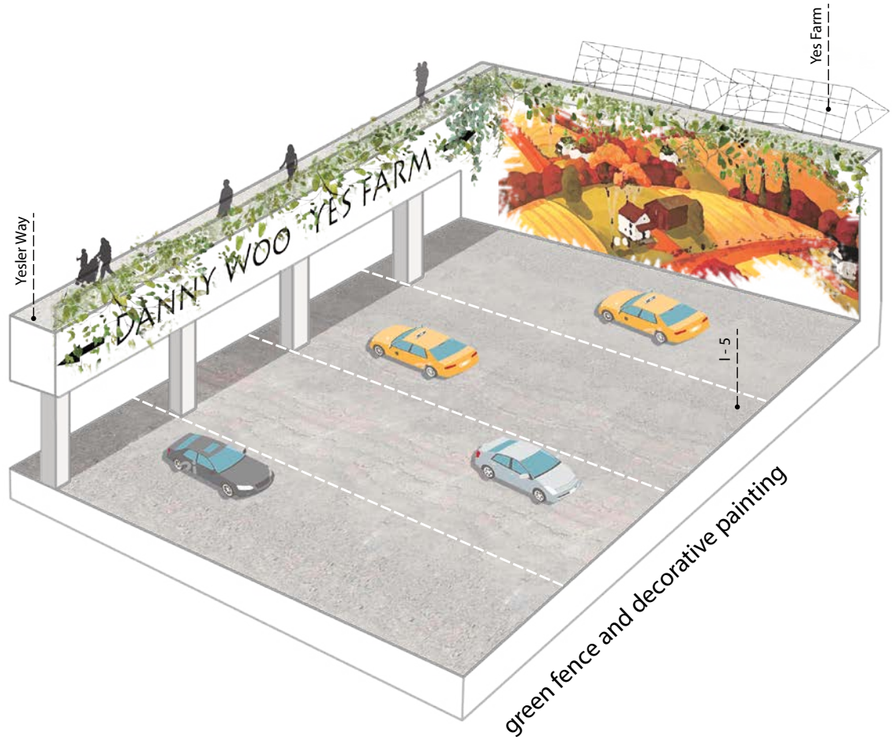


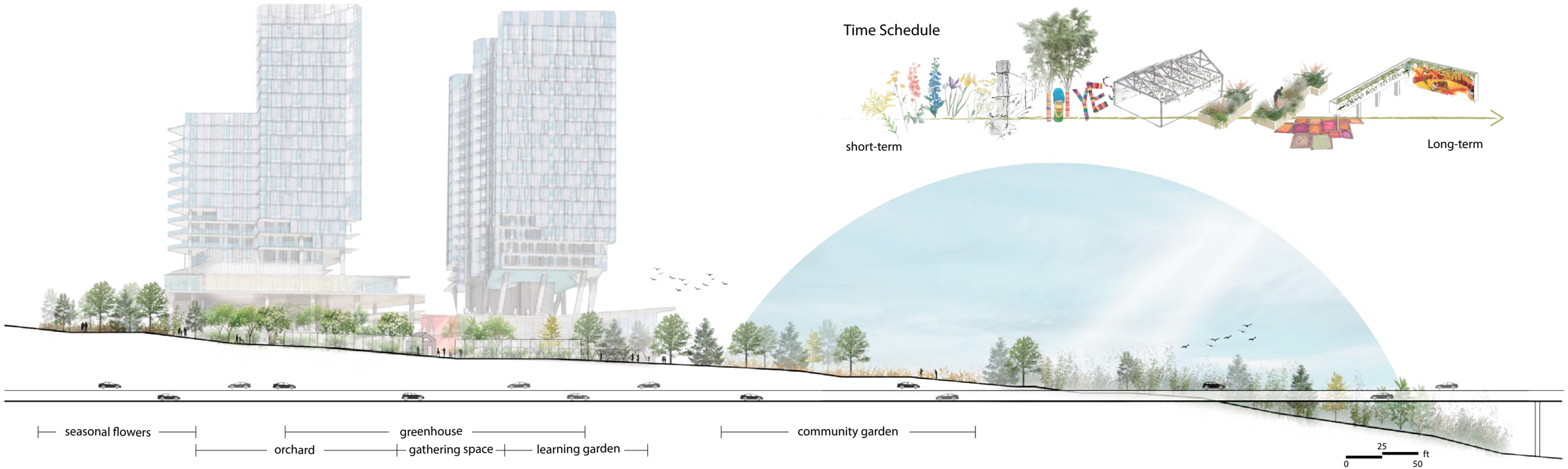

Noise
Air Pollution
I - 5
Yes Farm
Greenhouse


I - 5
Yesler Way
parking spots


Yesler Way
Yes Farm entrance and bus stop


Yes Farm
Learning garden and community garden


Yes Farm
Yesler Way
DANNY WOO "YES FARM"
I - 5
green fence and decorative painting



Working in the Farm

Entrance and Bus Stop

GIVING AND RECEIVING: A VISION FOR THE YES FARM

Emma Petersen

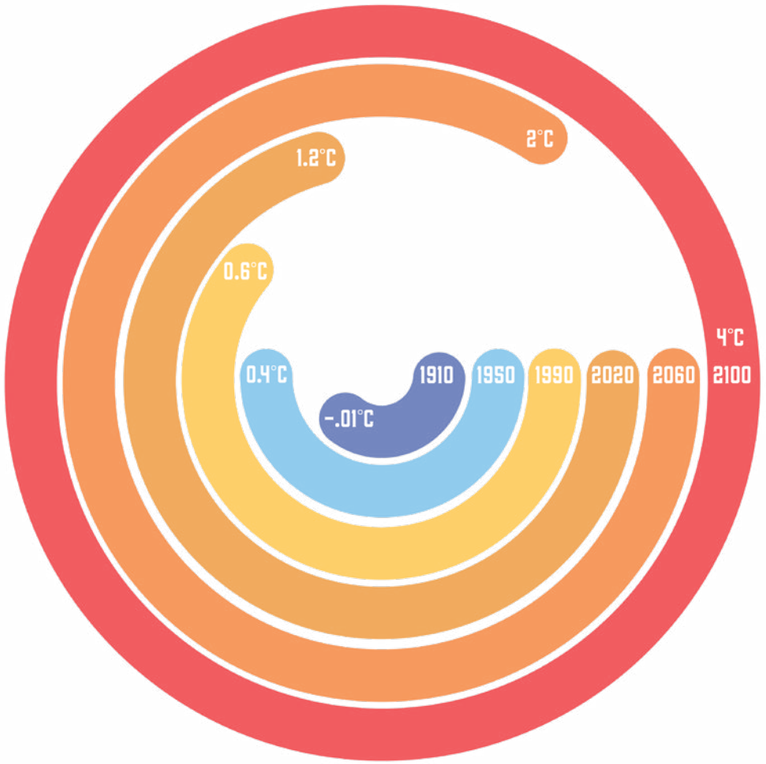
Climate change projections predict that the global average temperature will increase by around 4 degrees celsius by 2100, assuming no there is no reduction in the rate of greenhouse gas productuin (UN Emissions Gap Report). This drastic change will result in extreme weather evens and continual ecosystem degredation. Summers will become drier and winters wetter. The way we grow food will need to adapt to these changing environmental conditions. Urban agriculture has presented itself as a unique way to rethink the way we grow and eat food.

Urban Agriculture has the potential to remind us why we are human. Despite our technological advances, we cannot sustain ourselves without growing nutrients. Especially in the face of a dangerous future, we need to be reminded of our humanity and our environment more than ever.

The Yes Farm is situated directly next to I-5, in the increasingly developed Yesler Terrace neighborhood. Run by the Black Farmers Collective, the farm is meant to focus on education and community engagement. This site is the perfect opportunity to dismantle perceptions that highly industrialized agriculture is necessary to sustain society and to teach younger generations how to engage, not only with their community, but with their humanity.

The design of this site focuses on creating an ecosystem of giving and receiceiving. In order to receive nutrients from the Earth, we must first give to it. through an integrated ecosystems approach, this design promotes that ideal and acts as an adaptive measure to climate change.

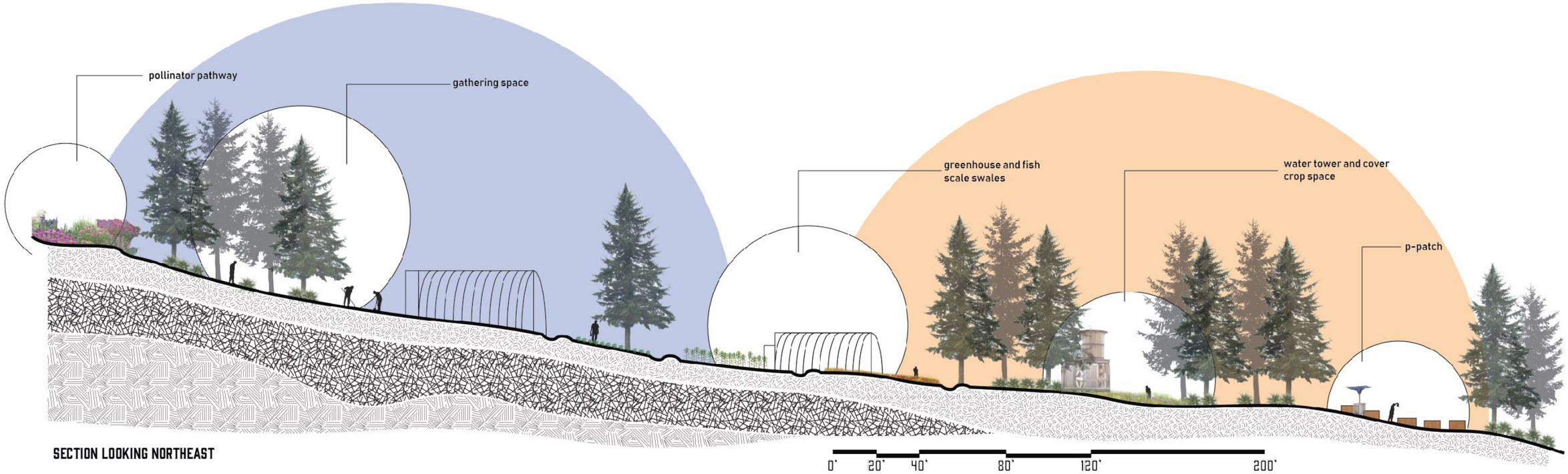
GIVING AND RECEIVING: A VISION FOR THE YES FARM



The UN Emissions Gap Report (2019) predicts the possibility of a 4 degree celsius global average temperature increase, assuming we do not reduce our greenhouse gas emissions.
https://www.unenvironment.org/resources/emissions-gap-report-2019.

Negative impacts of climate change.

Solutions to help mitigate climate change and effectively cool the planet.

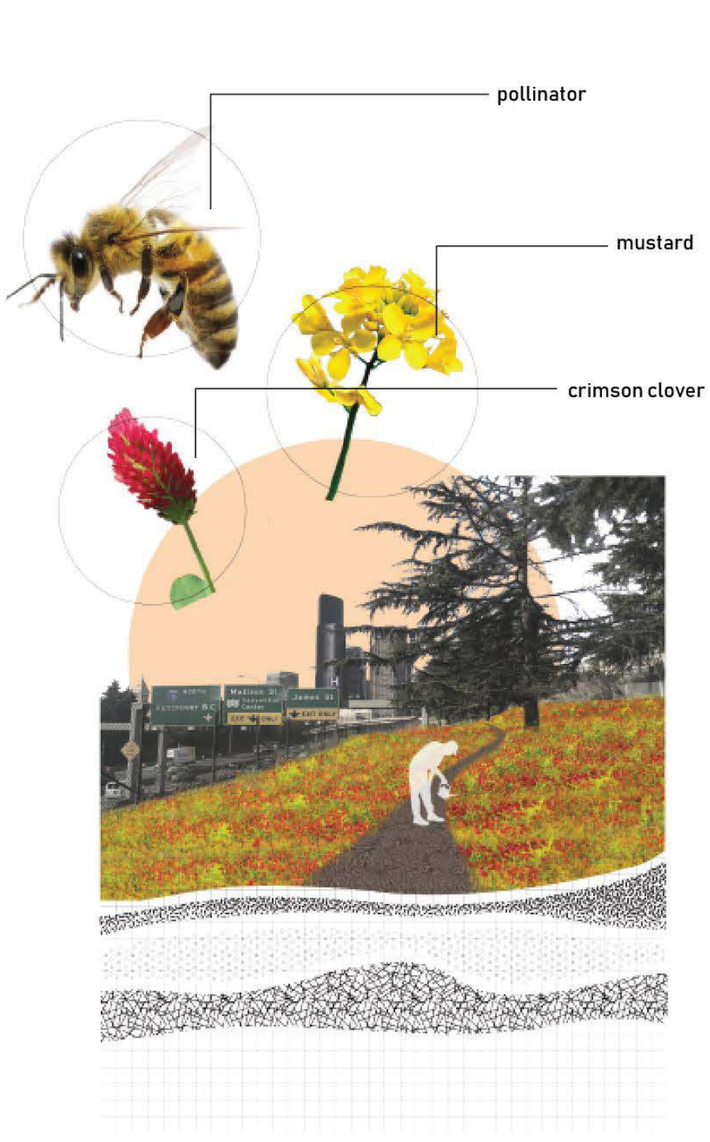


SECTION LOOKING NORTHEAST

GIVING AND RECEIVING: A VISION FOR THE YES FARM

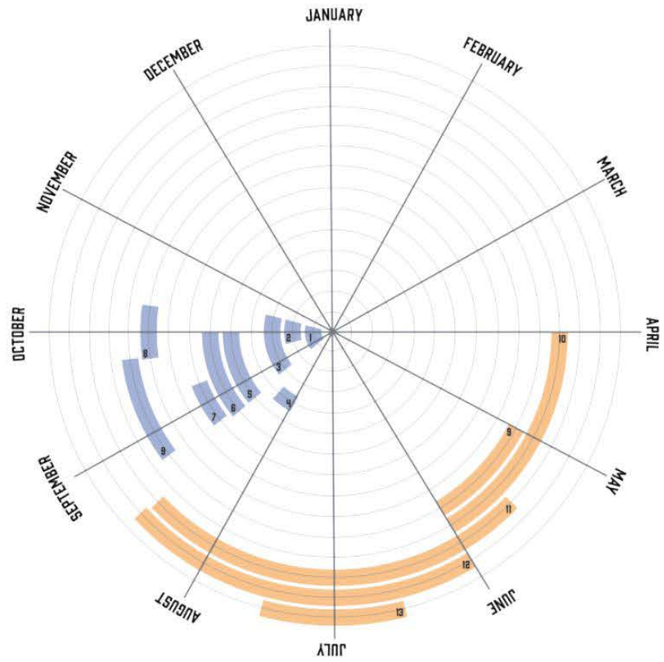
SOIL

a managed cover crop rotation system on all parts of the site not used for food production will help dilute the contaminants on site and build biomass which can in turn be used to fill the garden beds of the p-patch.



spring

autumn

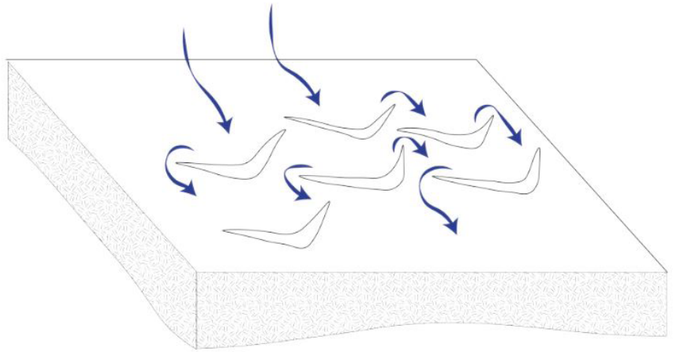


PLANTING TIMES FOR PACIFIC NORTHWEST COVER CROPS SUITED FOR WARMER AND COOLER WEATHER

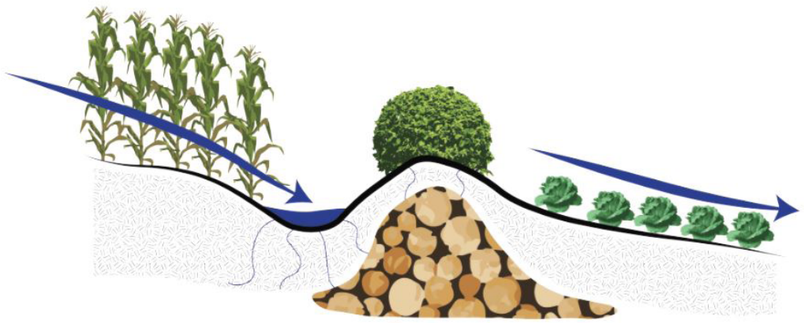
1. *SECALE CEREAL* | CEREAL RYE
2. *TRITICUM AESTIVUM* | WINTER WHEAT
3. *AVENA SATIVA* | WINTER OATS
4. *PHACELIA*
5. *VICIA VILLOSA* | HAIRY VETCH
6. *VICIA SATIVA* | COMMON VETCH
7. *TRIFOLIUM PRETENSE* | RED CLOVER
8. *HORDEUM VULGARE* | SPRING BARLEY
9. *TRIFOLIUM INCURNATUM* | CRIMSON CLOVER
10. *FAVA BEAN*
11. *FAGOPYRUM ESCULENTUM* | BUCKWHEAT
12. *BRASSICA* | MUSTARD
13. *SORGHUM BICOLOR* | SORGHUM SUDANGRASS

HYDROLOGY

the site will rely on a combination of cisterns throughout the site as well as its natural topography to create a gravity fed water system. Because the site has minimal impervious surfaces, the ground will act as a sponge to retain the water for food growth.



fish scale swales - a permaculture strategy to use berms and swales to direct water down a slope and keep it on site as long as possible - useful for scarce rain during summers.

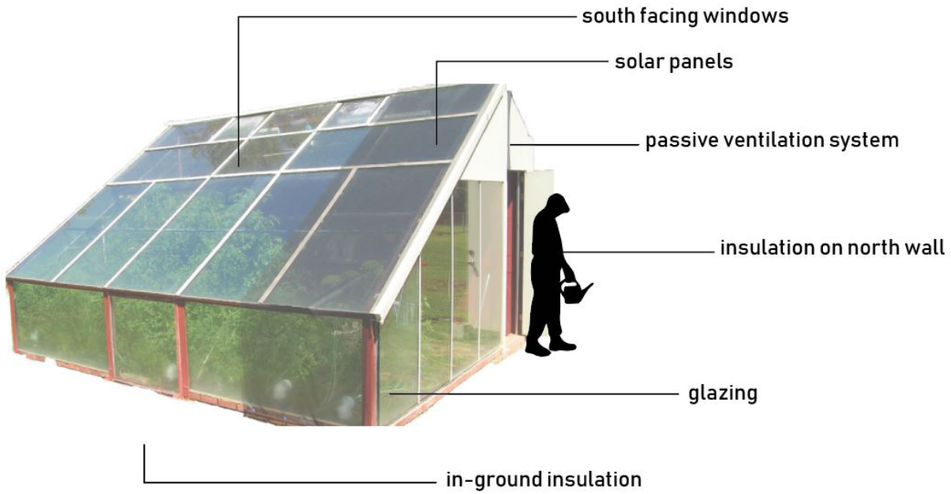


the swales and berms are mixed with hugelkultur, another permaculture practice that buries woody debris under dirt to absorb and slowly release water.

Precedents of different rainwater cathcment systems which can be used to hold water on site.

ENERGY

a managed cover crop rotation system on all parts of the site not used for food production will help dilute the contaminants on site and build biomass which can in turn be used to fill the garden beds of the p-patch.



POLLINATION

a managed cover crop rotation system on all parts of the site not used for food production will help dilute the contaminants on site and build biomass which can in turn be used to fill the garden beds of the p-patch.

perenniel flowers

Achillea millefolium | yarrow
Aquilegia formosa | cascade columbine
Aster | daisy
Delphinium | larkspur
Erigeron | fleabane
Erigonum | Buckwheat
Erythronium | fawnlily
Eschscholzia californica | california poppy
Hydrophyllum | waterleaf
Iris | iris
Lilium | lily
Lupinus | lupine
Mentha | mint
Penstemon | penstemon
Phacelia | scorpion weed
Sedum | stone crop
Solidago | golden rod
Trillium | trillium

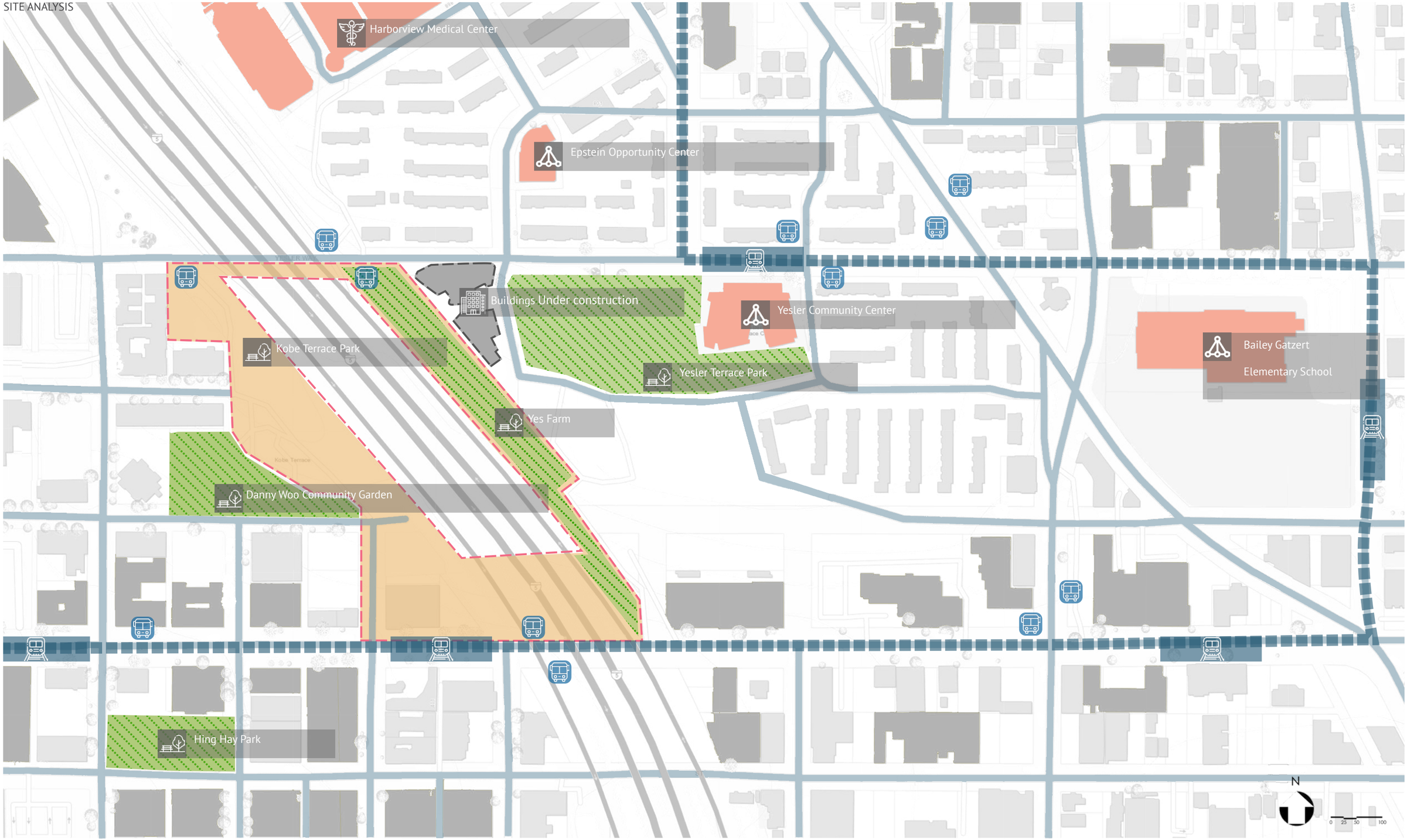
Boardwalk from Yes Farm to S Jackson St. through a rain garden.

CONNECTED URBAN AGRICULTURE

Yuqing Zhang

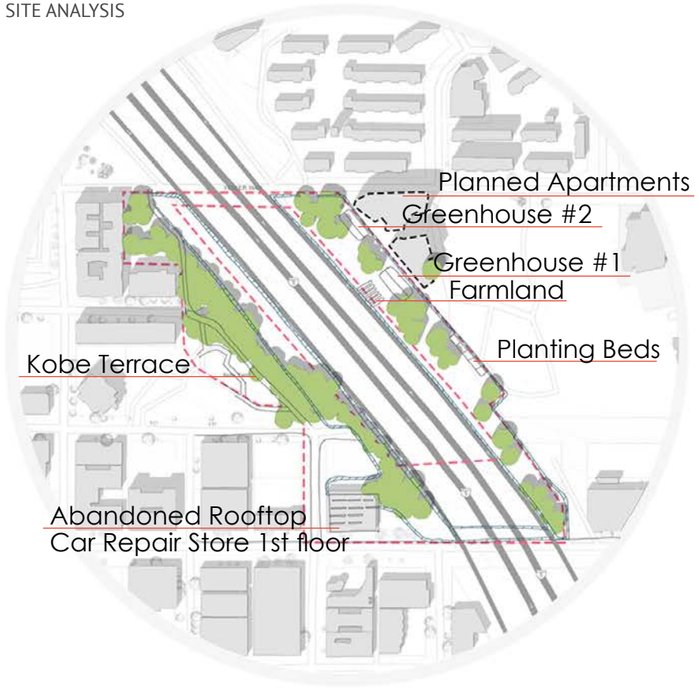
With the city sprawl, the land for food decreased. In order to cope with the climate change, I want to connect the separate open spaces in the city. The project located in central Seattle, across the I-5 highway. There are four parts of the site: Yes Farm, Kobe Terrace Park, the bridge of Yesler Way and the area under the I-5 highway. How to connect these four parts is the main focus. The connection is consisting of three parts: connection of community, connection of ecology and connection of facility. I hope the design could help build resilience and food justice among the sites and become an exemplar of reconnecting spaces.

SITE ANALYSIS

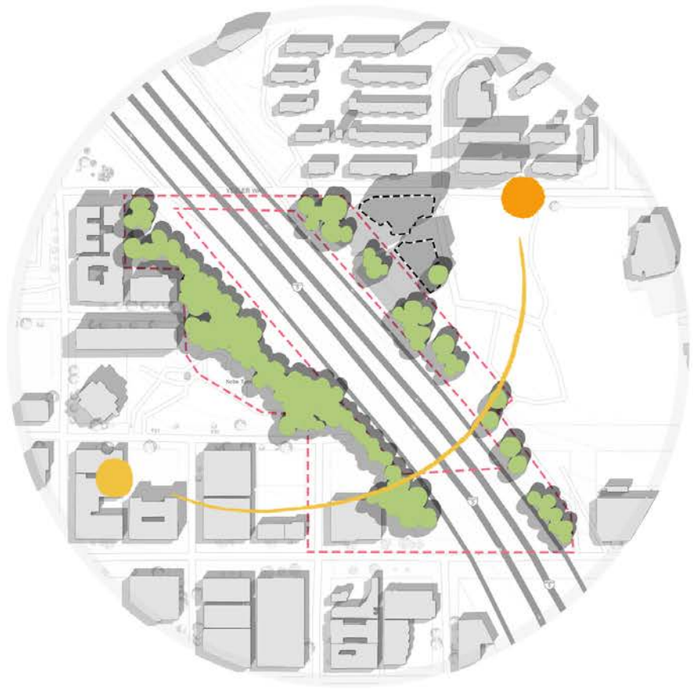


SITE ANALYSIS

Source: map from Google Maps



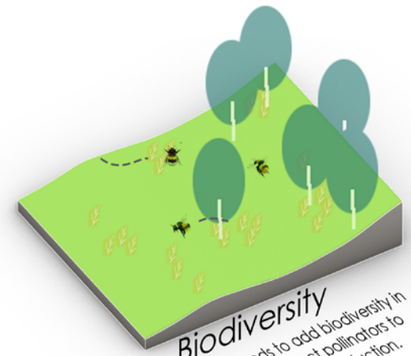
SOUNDSCAPE



SHADE ANALYSIS

Food Justice

The community garden, food forest and P-patch could co-exist to provide food not only for the whole community but also deliver to the food bank for people who need food.

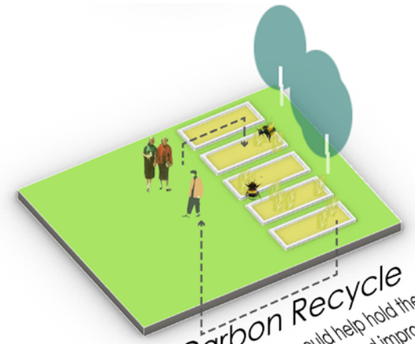


Biodiversity

Casting seeds to add bioadiversity in the site and attract pollinators to improve the food production.

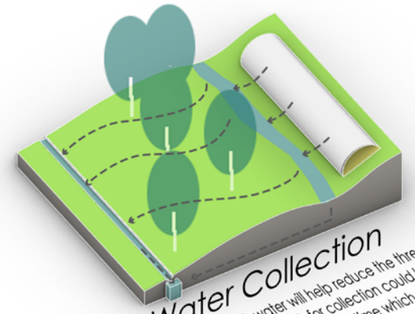
Community Resilience

Community members working together in the site could help build the relationship in coping with climate change.



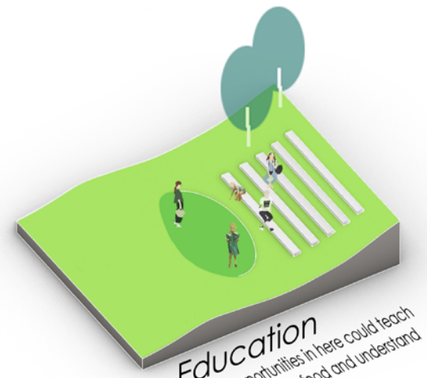
Carbon Recycle

Carbon storage could help hold the element in the ground and improve the carbon recycle systems.



Water Collection

Capturing the rainwater will help reduce the threat of flood. The water tank for collection could help irrigate the plants at the same time which could be considered as a win-win project.

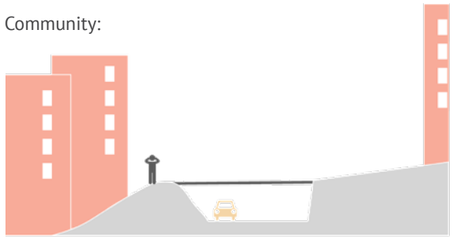


Education

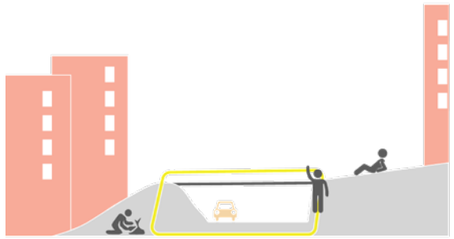
Learning opportunities in here could teach residents to grow food and understand the food system.

STRATEGY: CONNECTION

Community:

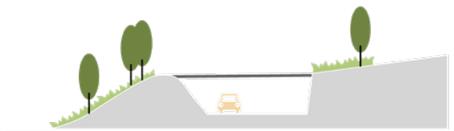


Before

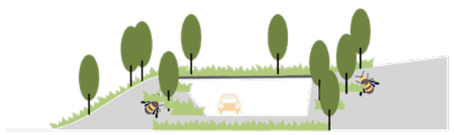


After

Ecology:



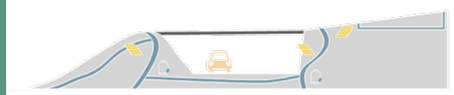
Before



After

Facility:

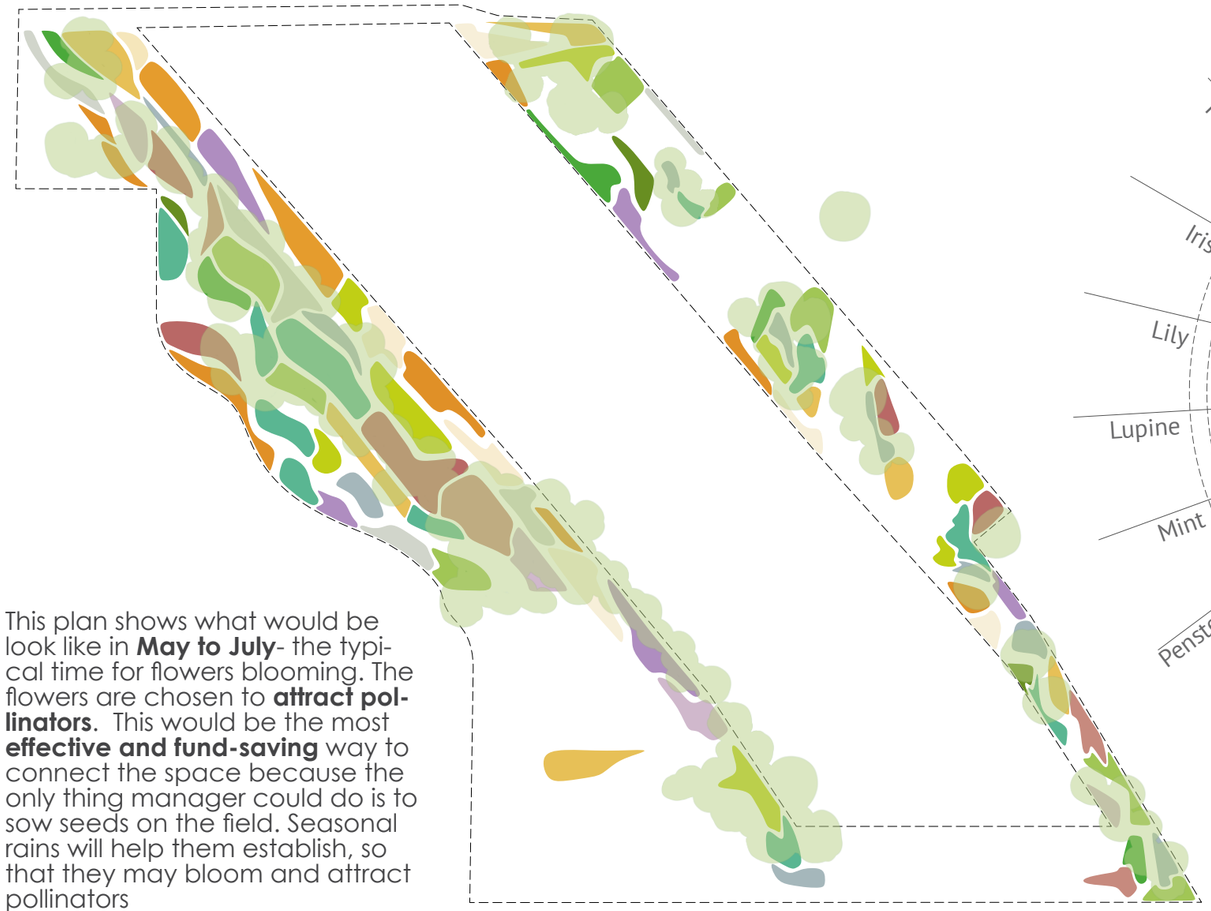
Before



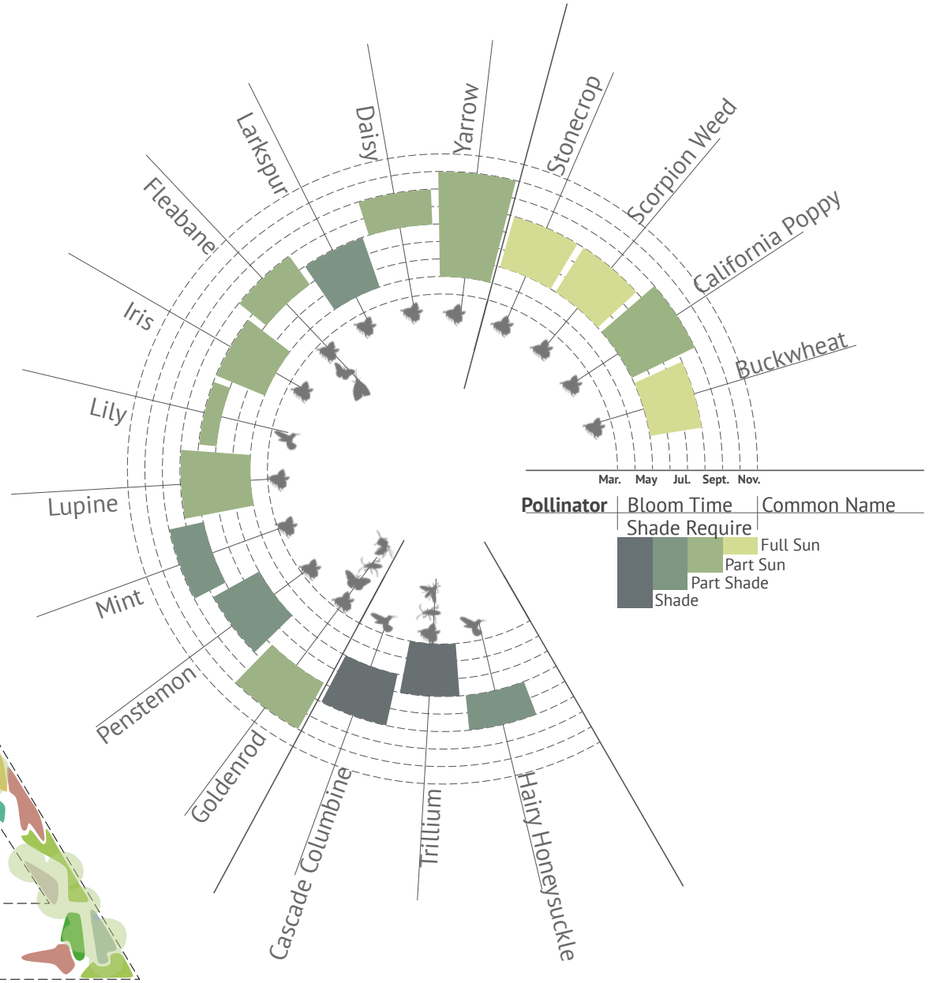
After

MASTER PLAN

Source: map from Google Maps



This plan shows what would be look like in **May to July**- the typical time for flowers blooming. The flowers are chosen to **attract pollinators**. This would be the most **effective and fund-saving** way to connect the space because the only thing manager could do is to sow seeds on the field. Seasonal rains will help them establish, so that they may bloom and attract pollinators



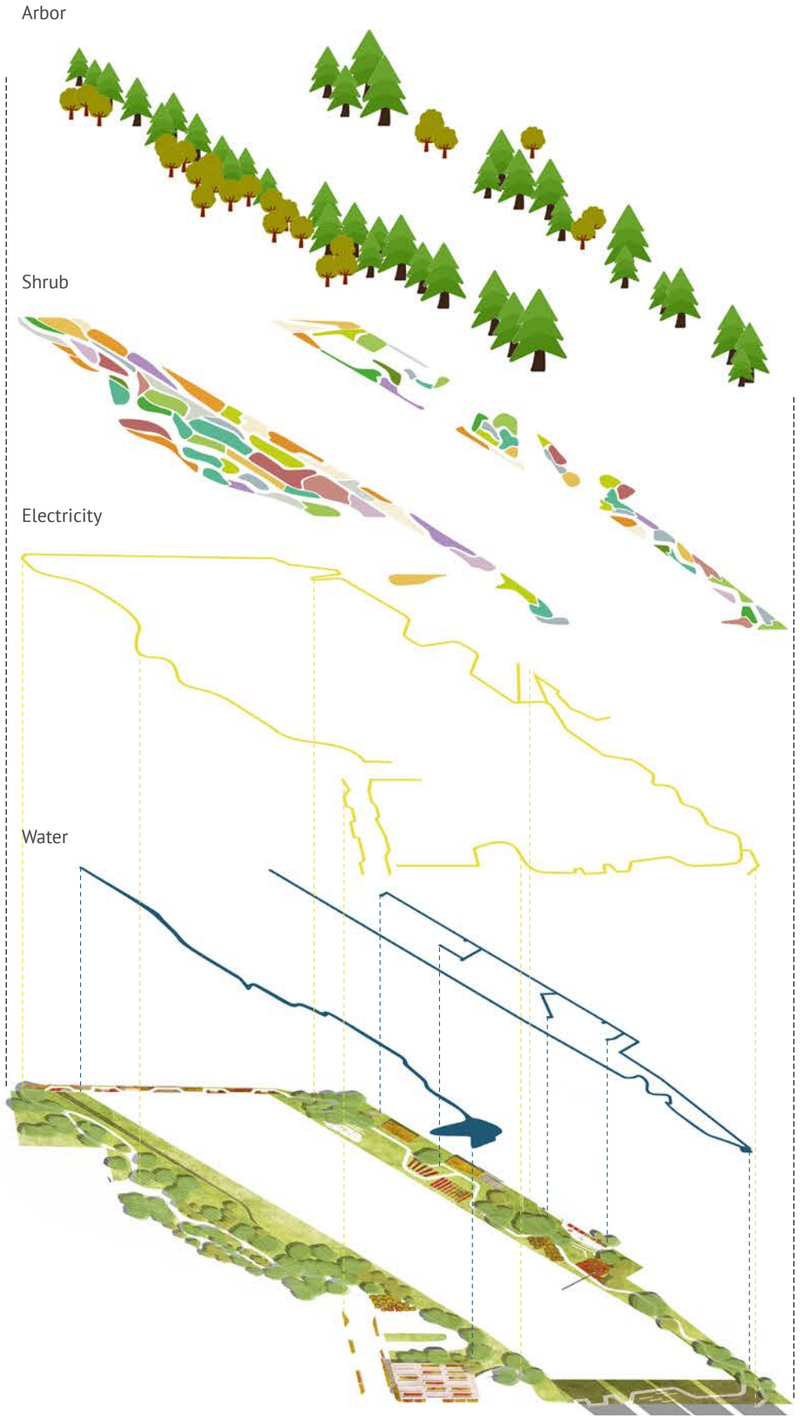
The site has **great trees** which have existed for decades and need to be preserved for ecological functions. Moreover, the northeastern part of the site are planning two **23 story apartments**.

Therefore, the flowers chosen to be sowed around the site should be **carefully distributed in response to the shade** around the trees and the upcoming buildings.

The 17 types of flowers are selected to grow in Seattle and have different tolerances of shade and sun.

The below graphic tells the height of each plants and the

EXPLODED VIEW OF THE DESIGN



PHASE PLAN

According to different situations, there are different options for managers to choose.

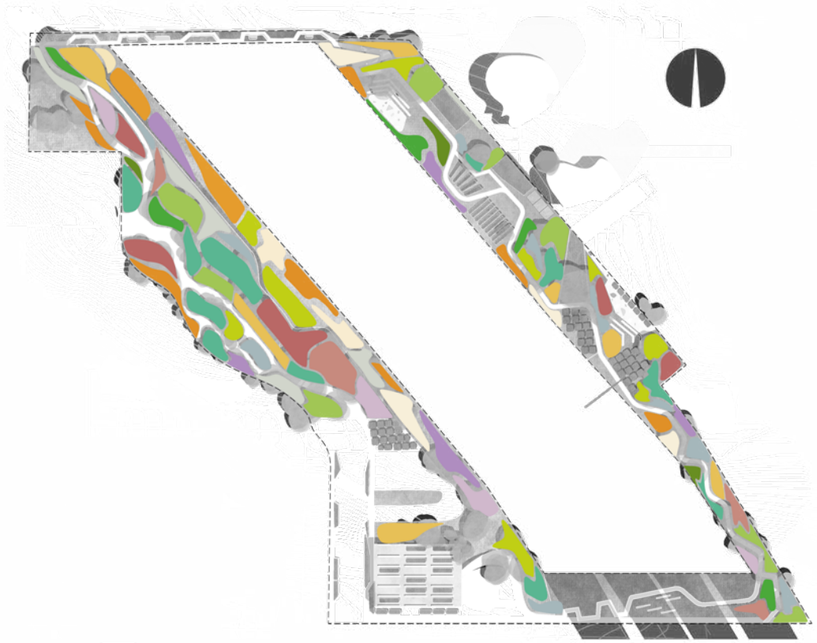
The first phase is **casting seeds to attract pollinators**. The plants are native in Seattle and self-supported. Some of them have the extent of shade tolerance. This step could help complete **the cycle of ecology** in the site. By attracting pollinators, the later phase of food production can be improved.

The second phase includes three different options. 1ST is developing possible lands to **grow food**. The first phase could bring the bee keeper and produce honey from the site. If we choose develop land to grow food, the production could provide fund for the later phase. The fund may help developing the site more.

2ND is to c**omplete the water system** in the site. It could save lots of fund since completed. And it also uses the nature resources of stormwater and runoff water reuse to cope with the climate change and help achieve the goal of **facility connection**. But the disadvantages of this option is that the investment of predesign is high.

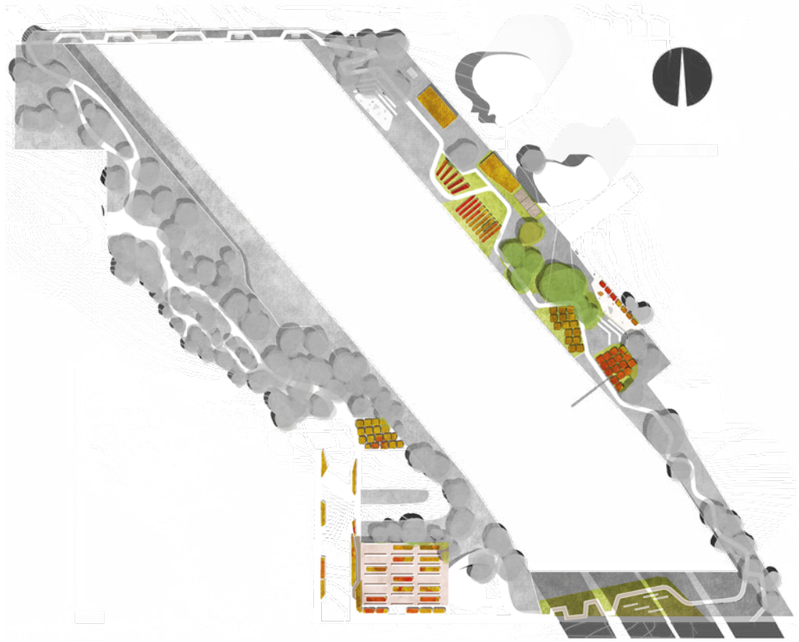
3RD option is **organizing people and improving security** around the site. The electricity system will help handle the security issues and develop the gathering place could help **attract people** to the site. The monthly events like open class and teaching classes will also be part of the story.

PHASE 1: Pollinator Attraction



Casting Seeds

PHASE 2.1 Food Production

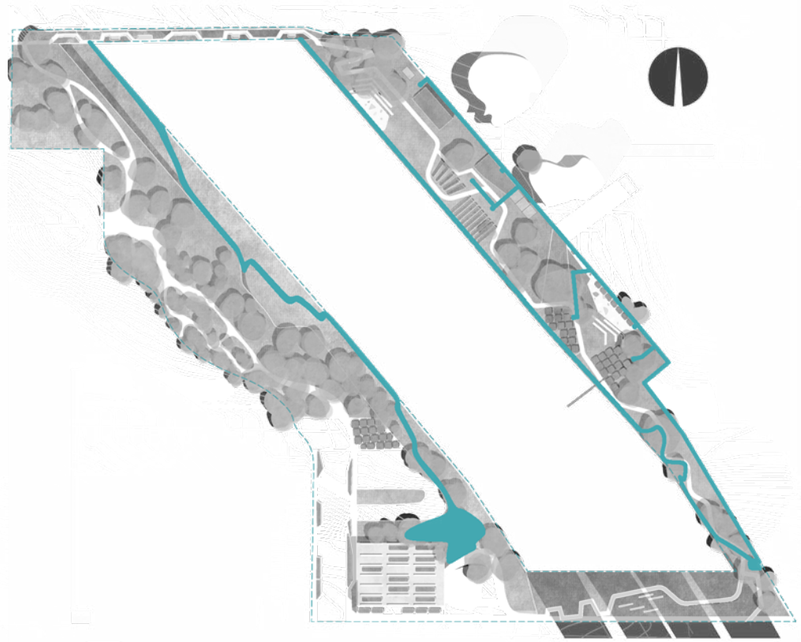


P-Patch

Plant beds

Night market

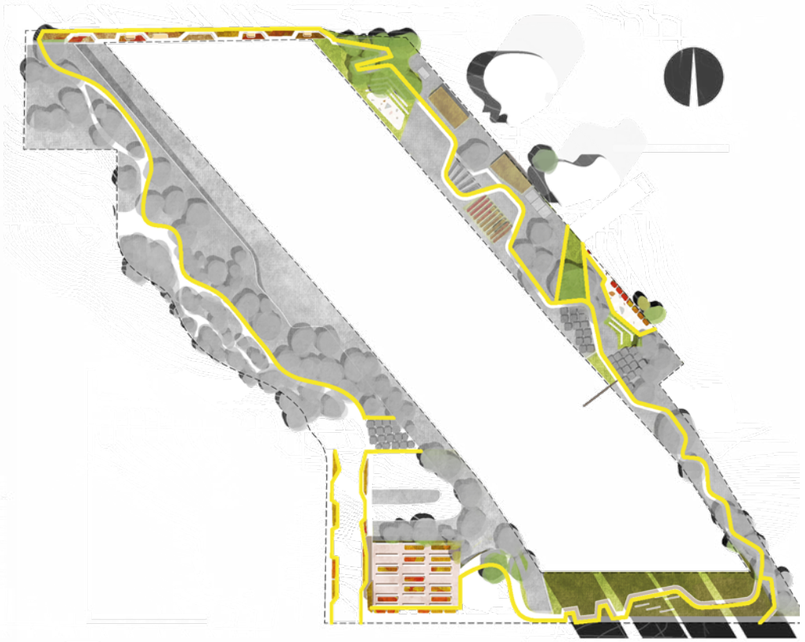
PHASE 2.2 Water Collection



Water cycle

Water collection

PHASE 2.3 Activaties & Security



Electrictity(solar panel &city light)

Educational class

Gathering space

EMBRACING COMMUNITY

Michelle Woo

EMBRACING COMMUNITY & WELLNESS IN THE FACE OF CLIMATE CHANGE

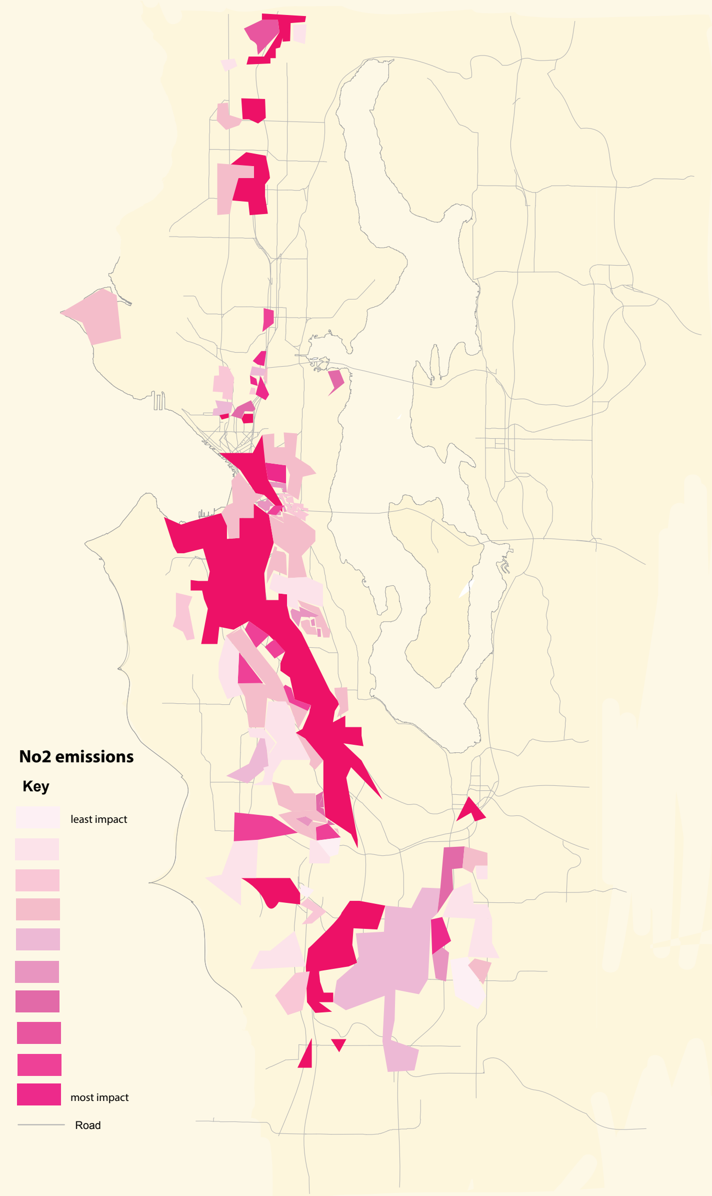
Chuco 헐sol
Chuo-hul-sol

Definition: The experience of seeing a brilliant red sunset blown up by man-made pollution and knowing you're not suppose to enjoy it but you do anyway because the colors are a brilliant bright orange red fire —intoxicating to the eyes.

Chuco (El Salavadorian) slang for dirty + 헐 (Korean) an expression of surprise, similar to 'Huh!' or "What?!" in English + Sol (Spanish) meaning sun.

https://bureauoflinguisticalreality.com/portfolio
Word Origin: Diana Chuong, Mario Rosado, Heidi Quante, Los Angeles Field Study, Art Center, March 2016.

Air pollution in a Changing Climate



Areas With The Highest Nitrogen Dioxide Emissions

Adapted from Puget Sound Clean Energy, this map highlights areas that are the most affected to the least by No2 emissions in Seattle. This data includes emission of all diesel, industrial, and on road vehicles.

https://pscleanair.gov/266/Who-is-Impacted-by-NO2-Pollution

Embracing Community through Medicinal Food

	**Goji, Box Thorn, Matrimony vine** Lycium barbarum, Solanaceae USDA hardiness: 6-9 Deciduous Shrub growing to 2.5 m (8ft) by 4 m (13ft), in flower from June- Aug seeds ripen from Aug-Oct.hermaphrodite,pollinated by bees Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil, can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic (alkaline) soils, can grow in semi-shade (light woodland) or no shade,prefers moist soil,can tolerate maritime exposure.	stabilizes blood sugar levels lowers chloresterol immune system support improves depression anxiety promotes restful sleep improves eye function nourishes liver preventative for cancer fights free radicals and inflammation energy, mood, digestive health	
	**Chrysanthemum** C. morfolium, Asteraceae USDA hardiness: 5-10 PERENNIAL growing to 5ft at a medium rate, in flower from Aug-Oct, hermaphrodite, pollinated by insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: acid, neutral and basic (alkaline) soils, cannot grow in the shade,prefers moist soil	nourishes liver treats headaches,dizziness helps with vision lowers blood pressure helps with colds and flu antibiotic, antiviral calms nerves inflammation	
	**Mongolian milkvetch** Astragalus membranaceus Family: Fabaceae or Leguminosae Hardiness: 5-9 PERENNIAL growing 0.3 m (1ft) by 0.3 m (1ft in), in flower from June-Aug, seeds ripen from July-Sept,hermaphrodite,pollinated by bees, moths & butterflies,fixes Nitrogen. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: neutral and basic (alkaline) soils,cannot grow in the shade,prefers dry soil	stimulates the immune system lowers blood pressure lowers blood sugar levels relief from seasonal allergy reduces stress promotes restful sleep hearth health	
	**Chinese Licorice** Glycyrrhiza uralensis family: USDA hardiness: PERENNIAL growing to 2ft by 1ft 4in in flower from June to Aug,seeds ripen from July-Oct, hermaphrodite, fixes Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: acid, neutral and basic (alkaline) soils,can grow in semi-shade (light woodland) or no shade,prefers moist soil	helps with sore throats helps wih fever Angina (chest pain) helps common cold symptoms helps with blood pressure	
	**Sacred Lotus** Nelumbo nucifera Family: Nelumbonaceae USDA hardiness 4-8 PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in), in flower from July-Aug, pollinated by insects, beetles Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: acid, neutral and basic (alkaline) soils,cannot grow in the shade, can grow in water	blood pressure inflammation blood circulation keeps blood vessels relaxed dietary fiber enhances absorbtion of nutrients helps with digestion respiratory conditions reduces stress and irratability	
	**Watercress** Nasturtium officinale Family:Brassicaceae or Cruciferae USDA hardiness 3-11 PERENNIAL growing to 0.5 m (1ft 8in) by 1 m (3ft 3in) fast, in flower from May -Oct, seeds ripen from July-Oct, pollinated by Bees, flies, attracts wildlife Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: acid, neutral and basic (alkaline) soils, cannot grow in the shade,prefers wet soil, can grow in water.	help with congestion, phlem, bronchitis, colds nourishes the lungs best when plant is in flower helps with fatigue, mental, and physical exhaustion Support Liver and Stomach helps capacity to clear toxins	
	**Hong Kong Lily** Lilium Brownii Family:Liliaceae USDA Hardiness: 4-8 BULB growing to 1.2 m (4ft), in flower in July,pollinated by Bees Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils,can grow in semi-shade (light woodland) or no shade,prefers moist soil	relieves coughs and dry throats respiratory conditions treats insomnia heart palpitations promotes restful sleep reduces stress and irratability	
	**Chinese Yam** Dioscorea batatas, Dioscoreaceae USDA hardiness 4-11 PERENNIAL growing to 9ft by 5ft,in flower from Sept-Oct Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils, can grow in semi-shade (light woodland) or no shade,prefers moist soil.	helps with fatigue helps with chronic cough wheezing lowers blood cholesterol lowers blood sugar relieves pain helps with nausea helps with arthritis helps relax muscles	
	**Maidenhair Tree, Ginkgo** Ginkgo biloba, Ginkgoaceae USDA hardiness 3-8 DECIDUOUS TREE growing 98ft 29ft slow rate,in flower from April -May ,dioecious, pollinated by wind,not self-fertile Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils, cannot grow in the shade, prefers dry or moist soil,an tolerate drought, can tolerate atmospheric pollution.	expels phlegm/stops wheezing: calms the lungs: wheezing, pain from coughing improves blood circulation improves brain, eye and leg circulation antibacterial and anti-fungal Antidepressant reduces stress and irratability	

https://www.whiterabbitinstituteofhealing.com/herbs/

Mapping Community Networks In The ID

Google Earth

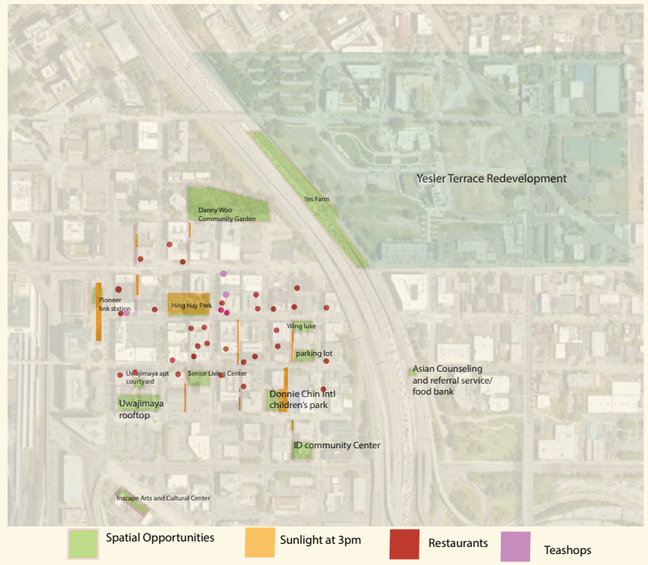
Social Resilence is Climate Resilience: Blunting the Effects of Climate Change with Medicinal Food

According to the American Lung Association, Seattle is one of the ten most polluted areas in the nation for small particle pollution. With wildfires increasing in the face of climate change and I-5 being a major highway going through the International Disctict, coming together and learning about culturally relavant, medicinal food can mitigate the impacts of airpollution on the public health of residents. It is an opportunity to connect socially at the local community centers as well as to the plants that have been taking care of people for centuries from environmental stressors. Through the sharing of cultural knowlege of food already being used in the area through this specific lens, community ties can deepen as intimate trust is built to share passed down, unique knowledge as a "climate resilence food toolkit." This can be in the form of seasonal pressed plant books and cooking classes to share personal recipes. Growing medicinal food on Danny Woo and Yes farm can spark more interest for more people to connect to natural cycles, learn to grow food, connect with self care, form intergenerational relationships, share community resources, create more community partnerships, and increase overall social resilience.

http://www.stateoftheair.org/city-rankings/most-polluted-cities.html

image sources: googlemaps.com, istockphoto.com, pinterest.com
https://www.whiterabbitinstituteofhealing.com, plant data: https://pfaf.org

Locals are able to enjoy fresh herbs to make tea as well as use single use adaptogens as a part of their daily diet to adapt to environmental stress from air pollution.



Looking Into The Future

The map above shows spatial opportunities in the future for growing medicinal food in community farms that can be sold to local restaurants and teashops. Forming community ties and partnerships can increase overall public health.

Locally grown food can be sold and enjoyed at restaurants in the community.

image sources: googlemaps.com

GOATS AT DANNY WOO

Dorothy Mulkern

Image Citation: Dorothy Mulkern

The Danny Woo Community Garden in Seattle's International District is exploring adding two Pygmy Goats to their 1.5 acre urban farm. The client's main goals in this project is to use the goats for site ***activation, ecological functions and youth education***.

Garden Manager Lizzy Baskersville is excited about the opportunity to create a closed loop waste system. Goats enjoy eating most plants. Goats at Danny Woo can be fed fresh cuttings and food scraps from plants being maintained or removed. They can also be moved into specific enclosed areas of the garden for weed control or to nearby sites like vacant lots or the Yes Farm only a five minute walk from Danny Woo. Goat manure should be composted before use in the garden. A manure processing area will be incorporated into designs for the goat habitat.

A closed loop waste system will reduce Danny Woo's carbon footprint by reducing waste moved offsite.

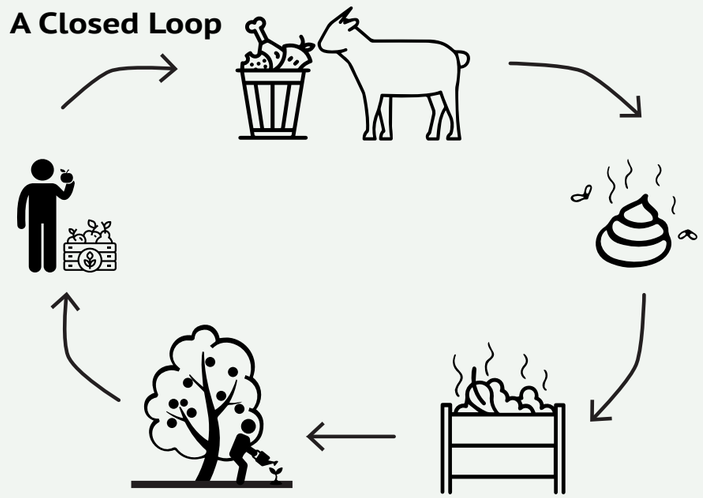


Image Citation: Dorothy Mulkern, Graphics from thenounproject.com

What is a Pygmy Goat?

The African Pygmy Goat or Pygmy Goat is a miniature domestic goat originally from central and west Africa. These goats are known for being friendly, curious, outgoing and highly adaptable to different types of environments. Pygmy goats are a type of ruminant, a cud-chewing mammal with hooves and a complicated system of stomach compartments which digests roughage by chewing, partially digesting, regurgitating and then chewing it some more.

Source: https://www.britishgoatsociety.com/services/keeping-goats/

FAQs

Scientific Name: Capra aegagrus hircus
Lifespan: 15 years
Height: 12 - 23" tall (similar to large dog)
Weight: Does 50-75 lbs, Bucks 60-85 lbs
Common Uses: Milk, Pet, Weed Control, Fertilizers
Production: 1-2 quarts of milk/day for 120-180 days
Predators: Dogs, Coyotes, Cougars, Fox, Bear, Large Birds
Toxic Plants:

- *Weeds* - Bracken fern, Buttercup,Common milkweed, Foxglove, Lantana, Locoweed, Poke weed, Spurge, St. John's Wort, Water hemlock and poison hemlock;
- *Trees* - Cyanide-producing trees such as cherry, chokecherry, elderberry, and plum (especially the wilted leaves from these trees), Ponderosa pine, Yew;
- *Cultivated plants* - Azalea, Kale, Lily of the valley, Oleander, Poppy, Potato, Rhododendron, Rhubarb

Source: City Goats by Jennie Grant

Image Citation:http://www.shorelinetimes.com/news/animal-awareness-day-in-branford-blessing-of-the-animals-pygmy/article_790fe90d-25f2-5078-b630-ed9f9ff3938f.html

What do they need?

Space. Pygmy goats require at least 200 square feet per goat to roam.

Food. Goats will forage on shrubs, weeds, herbs, and leaves. For those living in small spaces diets should be supplemented with hay and grain. Pygmies also like eating fruit and vegetable scraps which add variety to their diet.

Supplements. These are minerals goats require to maintain optimal health; selenium, zinc, copper, calcium, phosphorus, iodine, iron, manganese, and sodium.

Water. Goats need fresh, clean water.

Shelter. Keep goats warm and dry at night and during winter weather by building a shelter with at least 3 walls. The floors should be easy to clean and dry, consider using concrete. Lay wood chips or hay over floor and replace once a day. Locate a shelter away from fence so goats cannot use it to jump over and not in a low spot so it doesn't accumulate moisture.

Image Citation: https://www.kdlt.com/2017/06/19/great-plains-zoo-asking-public-input-naming-new-pygmy-goats/

Warmth. Just like humans, goats get cold during the winter. Keep them warm with an insulated but well ventilated shelter. Ensure goats have a healthy coat through brushing and providing a well rounded diet that includes supplements.

Safety. Goats should be fenced to protect them from predators and prevent them from getting lost and hurt in downtown Seattle. Fencing should be 4 - 6 feet tall and reinforced on the outside with posts no more than 8 feet apart. A woven wire fence with 2x4-inch openings is recommended as it will withstand chewing, leaning, etc.

Social. Pygmy goats are herd animals and cannot be kept individually. Keeping them with other goats, grazing animals or dogs will help them satisfy this need.

Medical. All goats need periodic hoof trimming, vaccinations and deworming.

Source: https://www.dummies.com/home-garden/hobby-farming/raising-goats/raising-goats-for-dummies-cheat-sheet/

Goat Checklist

- Fence
- House
- Food bowls (per goat)
- Water buckets (per goat)
- Hay manger
- Foliage feeder
- Mineral feeder
- Flooring: wood chips, permeable matting for interaction areas
- Security Lights
- Tree protection
- Play elements
- Manure composting area
- Storage for hay, feed, other supplies
- Hand wash station

Source: https://www.wikihow.com/Care-for-a-Goat

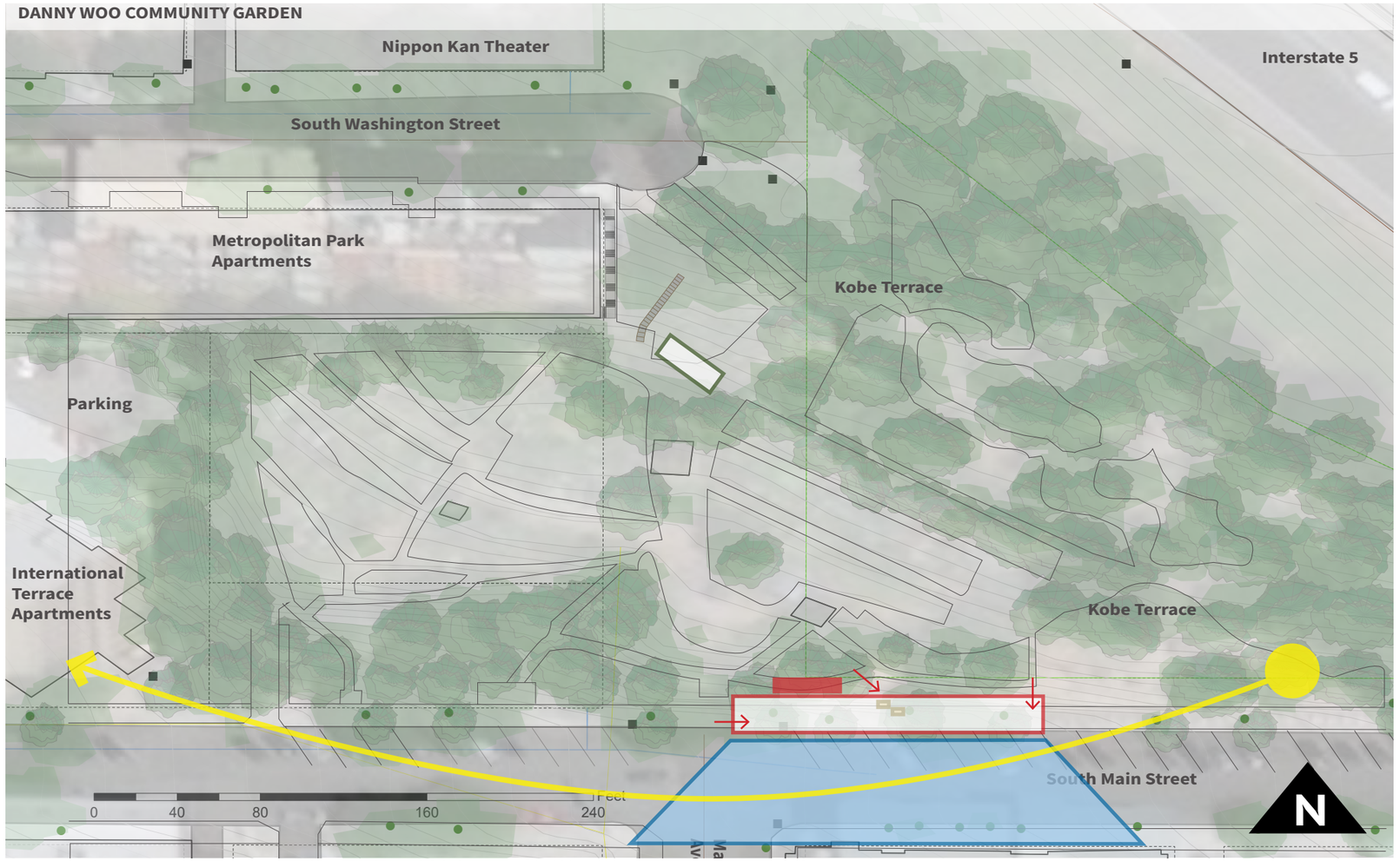


Image Citation: Dorothy Mulkern, Base Map from King County GIS & Google Imagery 2015

Legend

- Goat Habitat Area
- Plot Relocation Site
- Public Viewshed
- Current Animal Areas
- Flat Ground
- Sun Movement
- Access Points

Site Analysis

The proposed goat habitat area is outlined in red on the map, including two patches of flat ground that could accommodate a structure for the goats. For a cohesive user experience I recommend keeping the proposed goat structure close to chickens and feral cats already existing on site.

Three main access points exist for the proposed goat habitat area indicated by arrows. The western most arrow indicates an existing path that has been closed off. The central access point will be the middle arrow which is off a heavily used path. The eastern most access point connects to another existing pathway.

Potential goat human interaction areas will be placed where level areas and access points exist together.

Visual access to the site can be consistent as the proposed location abuts a public street. To keep the goats viewable it will be essential to regularly maintain the trees located in the goat habitat area. This will benefit tree health as well as goat health. The most sun and air circulation in the area means a drier habitat and will reduce the risk of hoof disease common to goats.

Current Conditions

The area proposed for goat relocation is currently overgrown with a variety of plants but does contain 6 healthy mature fruit trees.

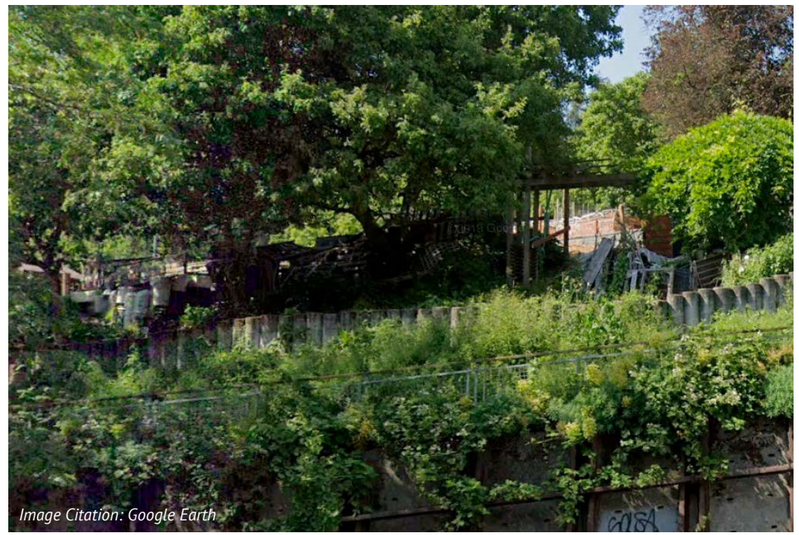


Image Citation: Google Earth

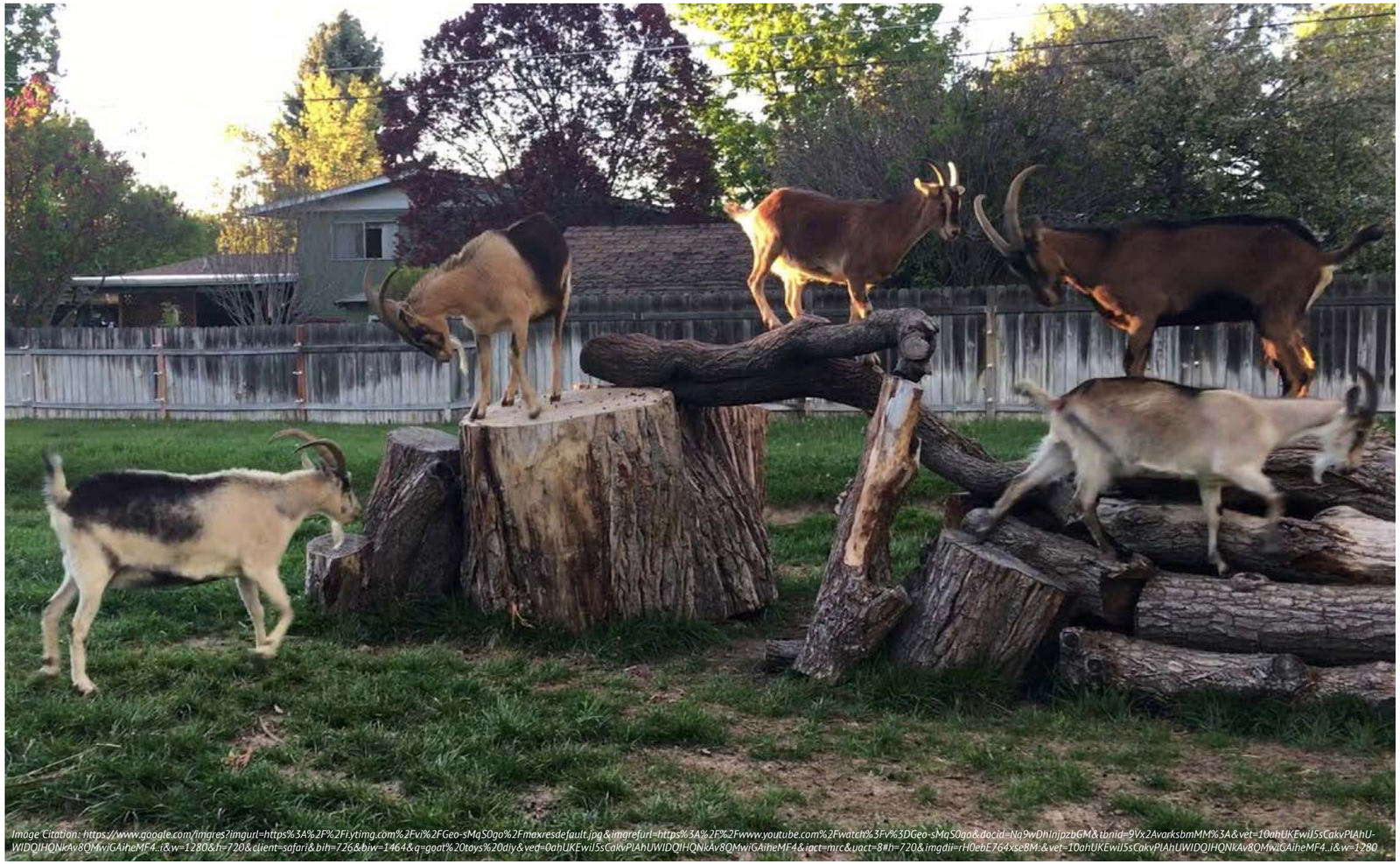


Image Citation: https://www.google.com/imgres?imgurl=https%3A%2F%2Fi.ytimg.com%2Fvi%2FGeo-sMqS0go%2Fmaxresdefault.jpg&imgrefurl=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DGeo-sMqS0go&docid=Nq9wDhInjpzbGM&tbnid=9Vx2AvarksbmMM%3A&vet=10ahUKEwiI5sCakvPlAhUWIDQIHQNkAv8QMwiGAiheMF4..i&w=1280&h=720&client=safari&bih=726&biw=1464&q=goat%20toys%20diy&ved=0ahUKEwiI5sCakvPlAhUWIDQIHQNkAv8QMwiGAiheMF4.iact=mrc&uact=8#h=720&imgdii=rH0ebE764xse8M:&vet=10ahUKEwiI5sCakvPlAhUWIDQIHQNkAv8QMwiGAiheMF4..i&w=1280

Play Elements

Goats are less likely to escape their habitat when there are interesting things going on within it. Installing play elements for goats is a great way to keep them entertained. The following images are play elements which feature reused materials and could be found for no or low cost.

Reused materials:

- Logs
- Tires
- Shipping palette
- Wooden storage spools

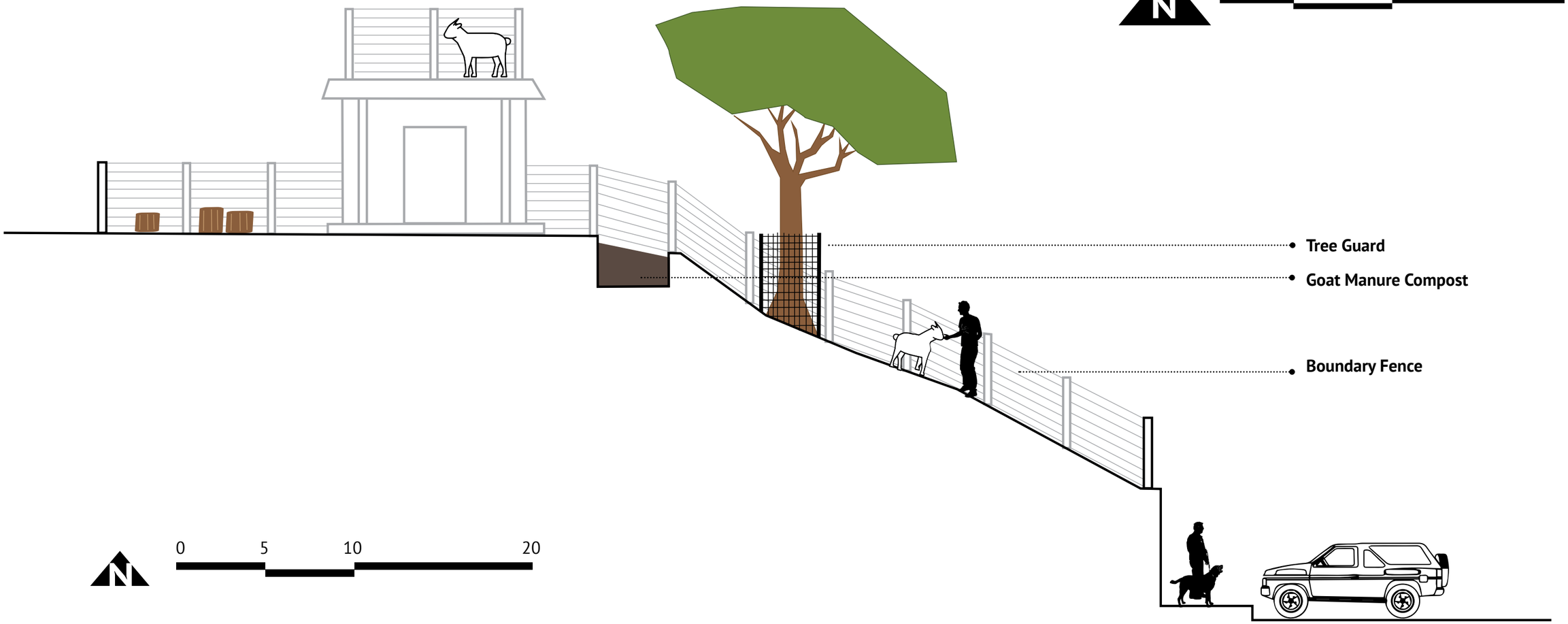
Image Citation: https://www.wideopenpets.com/10-goat-playgrounds-will-make-kids-jealous/

Image Citation: https://www.pinterest.com/pin/460141286898311582/

Image Citation: https://www.pinterest.com/pin/127156389457169904/

Site Design


Fence line
Interaction Area
Goat Structure 1
Gost Structure 2
Entrance
Existing Stone Pilings
Image Citation: Google Maps
N
0
10
25
50


Tree Guard
Goat Manure Compost
Boundary Fence
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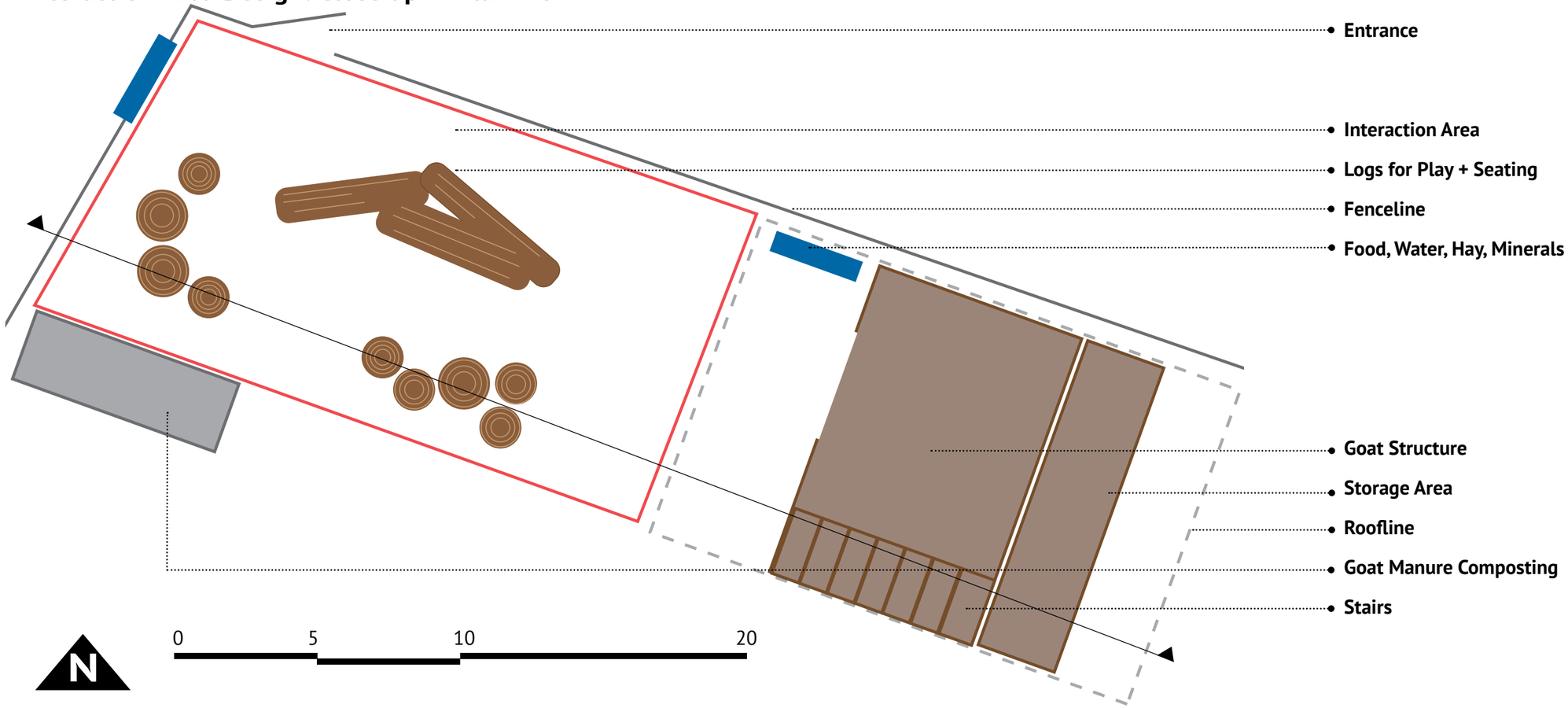
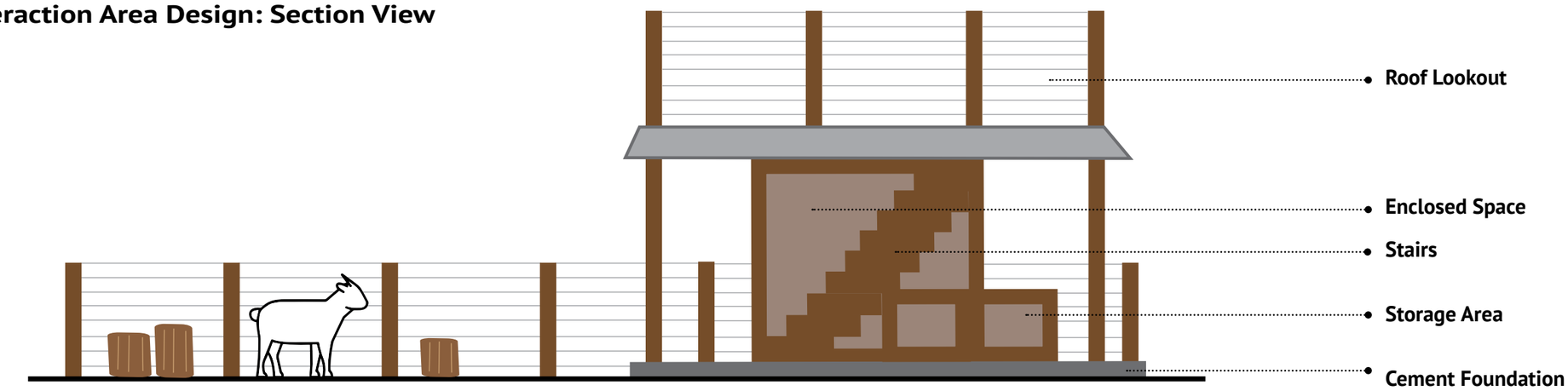
5
10
20

Interaction Area Design: Close up in Plan View



Interaction Area Design: Section View



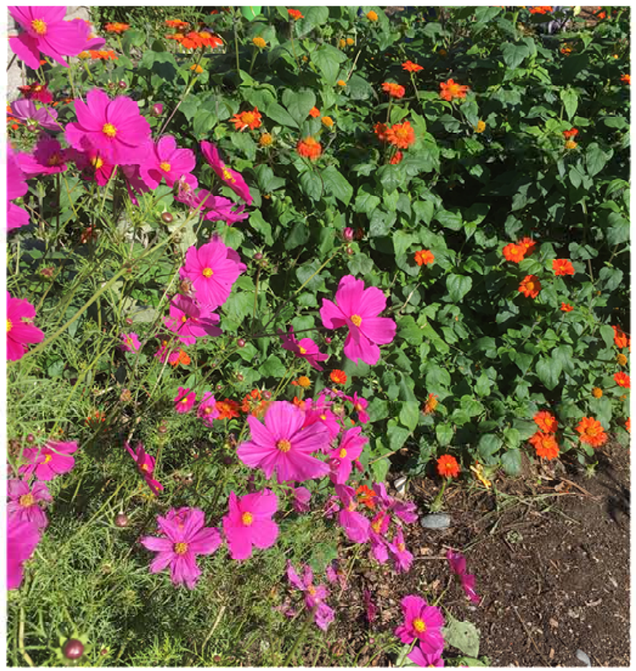

Interaction Site

DANNY WOO COMMUNITY GARDEN POLLINATOR GARDEN

Stuart Johnson

This project explores how to use ongoing maintenance to generate opportunity for habitat provision and youth education. By targeting the many trees of Danny Woo Community Garden and Orchard trees for much needed pruning the garden elevates its production and meets safety goals through increasing visibility across the site. The wood generated can be fabricated into practical pollinator nesting sites. These objects provide opportunity for learning and can export habitat provision concepts across the city, expanding floral abundance for all.

AT THE NORTHERN GARDEN ENTRANCE, FIRE DESTROYED THE KOBE TERRACE VIEWPOINT DECK. THE RECENTLY CLEARED SITE HAS BEEN DESIGNATED TO BE A POLLINATOR GARDEN.



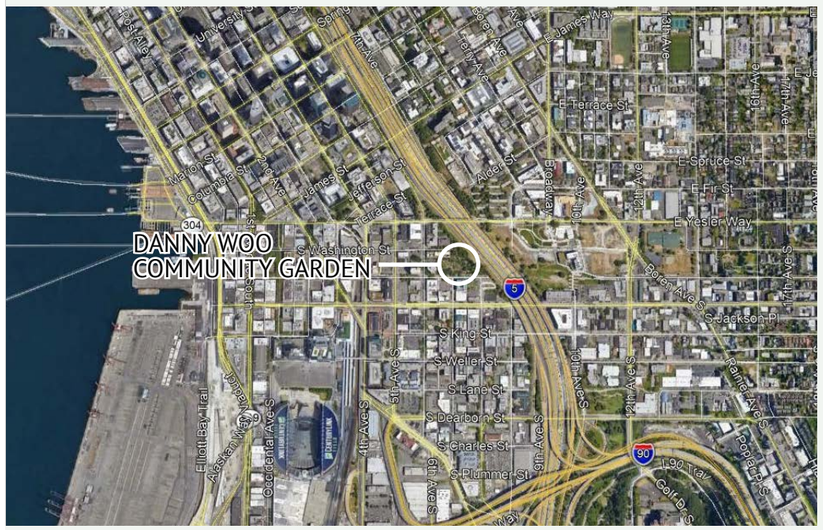
DANNY WOO COMMUNITY GARDEN
FOUNDED IN 1975
SEATLE'S CHINATOWN–INTERNATIONAL DISTRICT
620 SOUTH MAIN STREET

MANAGED BY INTERIM CDA A NON–PROFIT COMMUNITY DEVELOPMENT ORGANIZATION

1.5 ACRE SITE
88 INDIVIDUAL GARDEN PLOTS
CARED FOR BY RESIDENTS OF THE NEIGHBORHOOD, A MOSTLY IMMIGRANT AND ELDERLY POPULATION
EXPRESS THEIR CONNECTIONS BACK TO THEIR ROOTS BY PRACTICING AGRICULTURE AND SUSTAINABLE GARDENING

THE CHILDREN'S GARDEN SERVES LOCAL SCHOOLS WITH OUTDOOR LEARNING OPPORTUNITIES AND COMMUNITY EVENTS LIKE THIS YEAR'S 44TH ANNUAL PIG ROAST.

SITE FEATURES;
CHILDRENS GARDEN
CHICKEN COOP
PYGMY GOATS (COMING SOON!)
WORM BINS
PUBLIC VIEWPOINTS
STORAGE/GATHERING SPACE




DI PU (5)
DE CE (10)
AQ FO (SEED)
AN JA (14)
RU PA (6)
REBUILT WOOD FENCE
EXISTING PRUNUS
HE CA (14)
AL CE (9)
BAT HOUSE
CE GL (12)
EC WS (7)
WOOD CAVITY NEST
FE RO (9)
EC PU (9)
AC MI (7)
CL AM (SEED)
DOWN WOOD
RU FU (12)
EXISTING TIMBER STEPS, GRAVEL
SY HA (5)
EXPOSED CLAY SOIL
PROPOSED ROCKERY
CA OF (SEED)
AS TU (3)
NE FA (5)
VI AD (6)
KN UV (3)
EC PU (5)
KN UV (3)
GA AR (3)
HE ST (6)
HE AU (3)
FE RO (12)
SMALL PLATFORM
CA RO (SEED)
PO MU (21)
ER KA (7)
MA RE (5)
MA RE (5)
PA RU (SEED)
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AC TC (8)
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RI SA (3)
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0
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Pollinator Plant List

Image Sources:
www.greatplantpicks.com
www.americanmeadows.com
www.wildflower.org
www.ptlawnseed.com
www.calflora.org
www.wnps.org
www.green2.kingcounty.org
www.psp.wa.gov
www.nwcb.wa.gov

WOOD NESTING BEES

Many bees nest in standing wood or hollow plant parts. Wood bee houses provide safe nesting sites for Mason bees, Carpenter bees, and Leafcutter beees. Often the holes used are from other primary excavator insects such as beetles. Carpenter bees drill their own holes in wood. Holes 8" deep allow bees greater control of the temperature of the eggs and therefore the ability to control the sex of their offspring.

GROUND NESTING BEES

Many native bees nest in the ground, including Digger bees, Platerer bees, and Sweat bees. Bare patches of soil are hard to maintain in the garden but should be a priority for supporting pollinators.
In addition, mason bees require mud or clay to seal their nest holes after depositing their eggs.

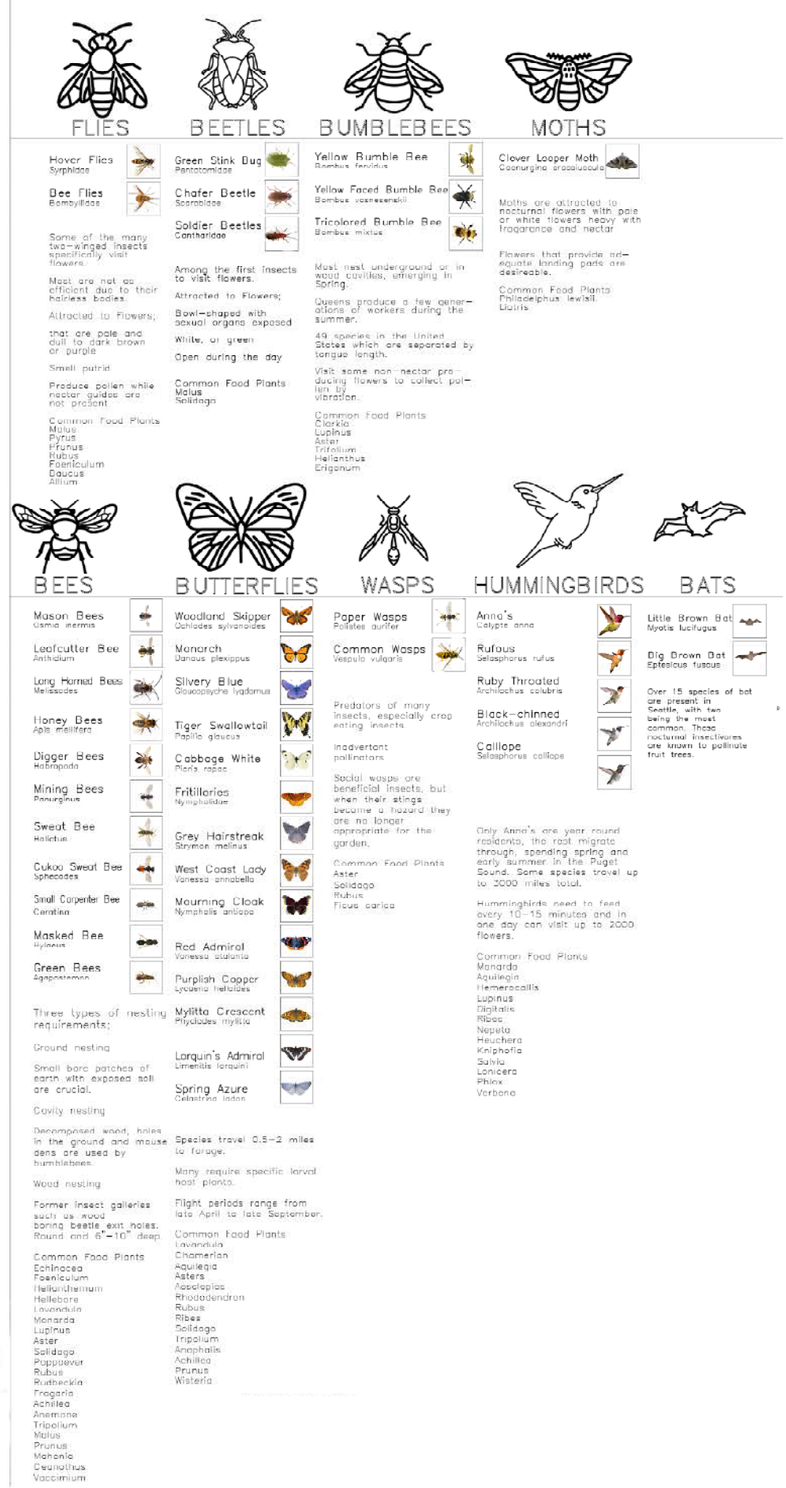
RE-USE EXISTING SITE MATERIALS

By performing ongoing maintenance of the existing 65+ tree orchard, branches and stems of druable hardwood is produced.

These resources are cut and drilled to produce simple and effective bee habitat that engages visitors in the garden experience.

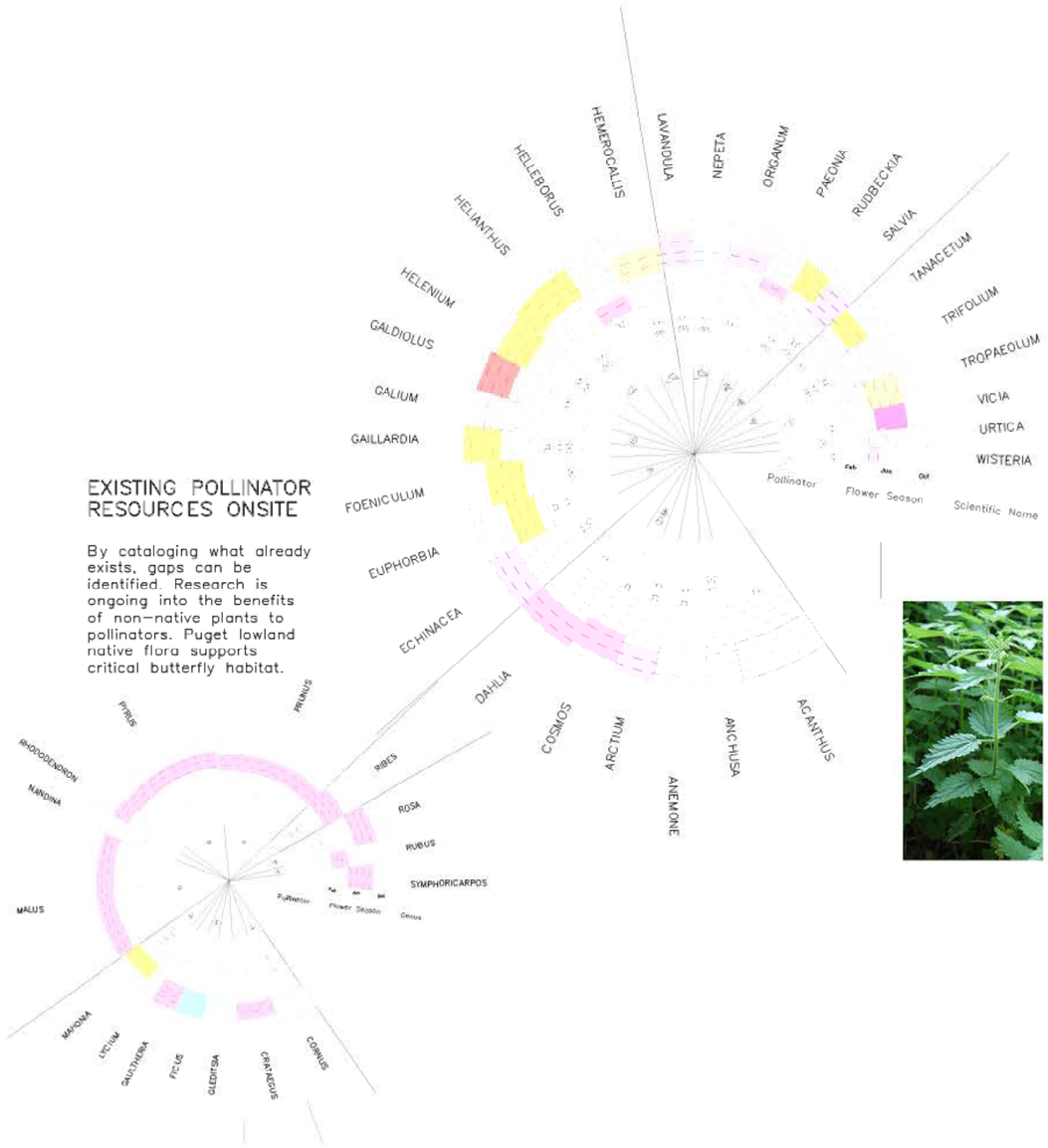
With only saws and drills required, kids can fabricate nests for use at Danny Woo as well as spread them elsewhere.

This strategy allows for training in arboriculture, pomology and ecology.



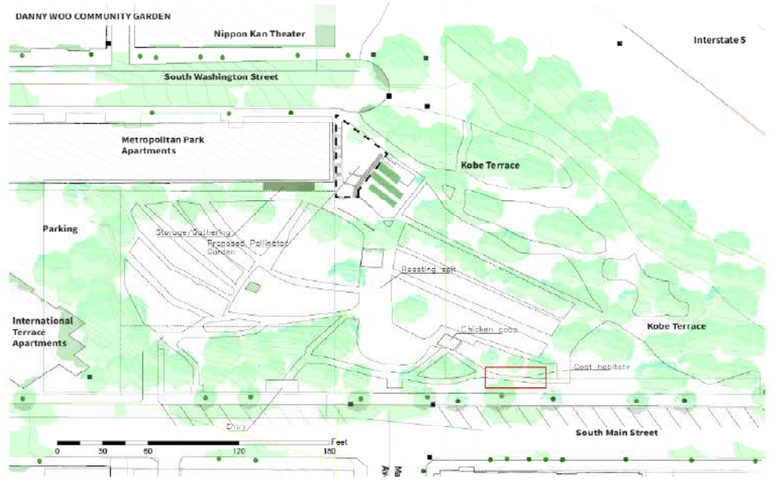
EXISTING POLLINATOR RESOURCES ONSITE

By cataloging what already exists, gaps can be identified. Research is ongoing into the benefits of non-native plants to pollinators. Puget lowland native flora supports critical butterfly habitat.



CLIMATE CHANGE WILL CONTINUE TO CHANGE PUGET SOUND BUTTERFLY HABITAT

Many native butterflies are dependent on plant species that will be increasingly stressed by future droughts and high temperatures. A drought resistant planting design that increases the resources available to pollinators across as many months as possible will help mitigate future habitat loss.



BAT HOUSE
12'-18'

Summer roosting
Wood construction
Southern exposure

MASON BEE HOUSE
3'-8'

Wood, paper or bamboo

SOURCES

Common Butterflies of the Puget Sound Region and Their Food Plants – By David Droppers

Some of the Most Common Butterflies of the Pacific Northwest – By Arthur L. Antonelli Washington State University Extension

Bumble Bees of the Western United States – by Jonathan Koch USFS and the Pollinator Partnership

An Introduction to Cavity-Nesting Bees in The Puget Sound Region – Elias Bloom Washington State University Extension

A Field Guide to Common Puget Sound Native Bees: Southern Region – Elias Bloom Washington State University

A Region Specific Guide to Butterflies of South Puget Sound, Washington – Rod Gilbert and Ann Potter

The Pollination of Native Plants – Heather Holm

SPACE FOR THE NEXT GENERATION
TO LEARN AND GROW

THANK YOU FOR VIEWING