



OF LAND, EARTH + SEA

A Remastered Beach Resort



PROJECT TYPOLOGY: RESORT & HOSPITALITY

1. WHAT DOES IT MEAN TO BE AN ECO-TOURIST RESORT?

PRESERVATION • RESTORATION • SUSTAINABLE



2. EXAMPLES OF ECO-TOURIST RESORTS

PLAYA VIVA MEXICO • TRISARA THAILAND • SIX SENSE FIJI



3. WHAT DOES IT MEAN TO BE SUSTAINABLE FOR OF LAND, EARTH + SEA?

FARM-TO-TABLE • EDIBLE LANDSCAPES • URBAN AGRICULTURE • SOLAR ENERGY • RAIN WATER HARVESTING • MANGROVE PRESERVATION



SITE LOCATION



EXISTING SITE



THESIS PREMISE

1. WILL THIS PROPOSED ECO-TOURIST RESORT BE SUSTAINABLE THROUGH URBAN AGRICULTURE AND EDIBLE LANDSCAPES?
2. IS THIS A VIABLE PROPOSAL TOWARDS EXPLORING SUSTAINABLE RESORTS IN ORDER TO ALLEVIATE THE COST OF PRODUCE IMPORTATION IN THE BAHAMAS?
3. WILL THIS PROPOSAL BE A START FOR THE BAHAMAS TO INVEST IN SUSTAINABLE RESORT DESIGN?
4. WILL THE METHODS OF EDIBLE LANDSCAPE, FOOD-SCAPE AND URBAN AGRICULTURE BECOME A VIABLE SOLUTION?
5. WILL URBAN AGRICULTURE AND EDIBLE LANDSCAPES PRODUCE ENOUGH RESOURCES TO MEET 25% OF THE DAILY RECOMMENDED CALORIES

THESIS NARRATIVE

This thesis project serves as an initiative towards to developing a sustainable resort that will account for micro climate while also incorporating a self-sustaining landscape that will provide the necessary resources for the resort. Nonetheless, this project will focus on answering questions related to how the resort will be able to generate revenue in order to sustain new programmed activities to promote interest. Proposed housing will also address mitigation and provide the necessary shelter to endure the wet season of the Bahamas.



PROJECT JUSTIFICATION

ECONOMIC JUSTIFICATION

- Tourist driven economy
- Over \$20 Million usd spent on importing fruits and vegetables
- Bahamas Backyard Farming Initiative

SITE JUSTIFICATION

- Mangrove swamp
- Personal
- Owner interest towards sustainability
- Located by Dead Mans Reef
- Remote Location





"Currently I'm trying ways to attract more local business. Also looking at shifting to a more Eco-tourism approach. I'm currently working with someone cultivating wellness and health activities and yoga retreats. Also working to expand the snorkeling, kayaking and paddles boards to include turtle viewing and interaction. Currently working with environmental groups like Reef ball foundation, no shoes reef, Reef institute." (Smith, 2022)

PROJECT GOALS

1.0 EDIBLE LANDSCAPE

1.1 To develop spaces that will feature a variety of native and non-native plant species that are edible and are designed to be utilized for the proposed resort restaurant that will be in alignment with the idea of farm-to-table.

(E.g. Potato (Non-Native) | Sea Grape (Native))

2.0 PRODUCTIVITY

2.1 To generate produce in order to meet 25% of the daily recommend intake of fruits and vegetable for both adult men and women.
(Calories | Cups)

E.g. Recommended daily consumption

2 To 2 1/2 cups of fruit for men

1 1/2 To 2 cups of fruits for women

E.g. Resort to produce daily intake of 1/2 cup of fruit for men and women

2.2 To generate produce in order to accommodate 25% of the daily Recommended intake of fruits and vegetable for a maximum of 100 guest

E.g. 60 total seats for resort reservation restaurant

60 Resort guest

40 Daily non-resort guest (Smith, 2022)

3.0 LAYOUT

3.1 Provide an on-site community garden to allow locals from the community to gather and explore the opportunities of growing their own produce

3.2 Establish a restaurant within the main resort building that will utilize the surrounding edible landscape and hydroponic farm

3.3 Develop a main resort building that will be a central location for activities

3.4 Provide a participatory garden for guest in order to engage with research

3.5 Connect edible landscapes and east farm with resort guest

3.6 Program both leisure and active spaces throughout the site in order to enhance guest experience

3.7 Enable sustainable practices throughout the site such as rain harvesting

LED motion sensor

technology, utilizing solar energy and preserving the native mangrove swamps on

PROJECT ELEMENTS

1.0 EDIBLE LANDSCAPES



2.0 PRODUCTIVITY



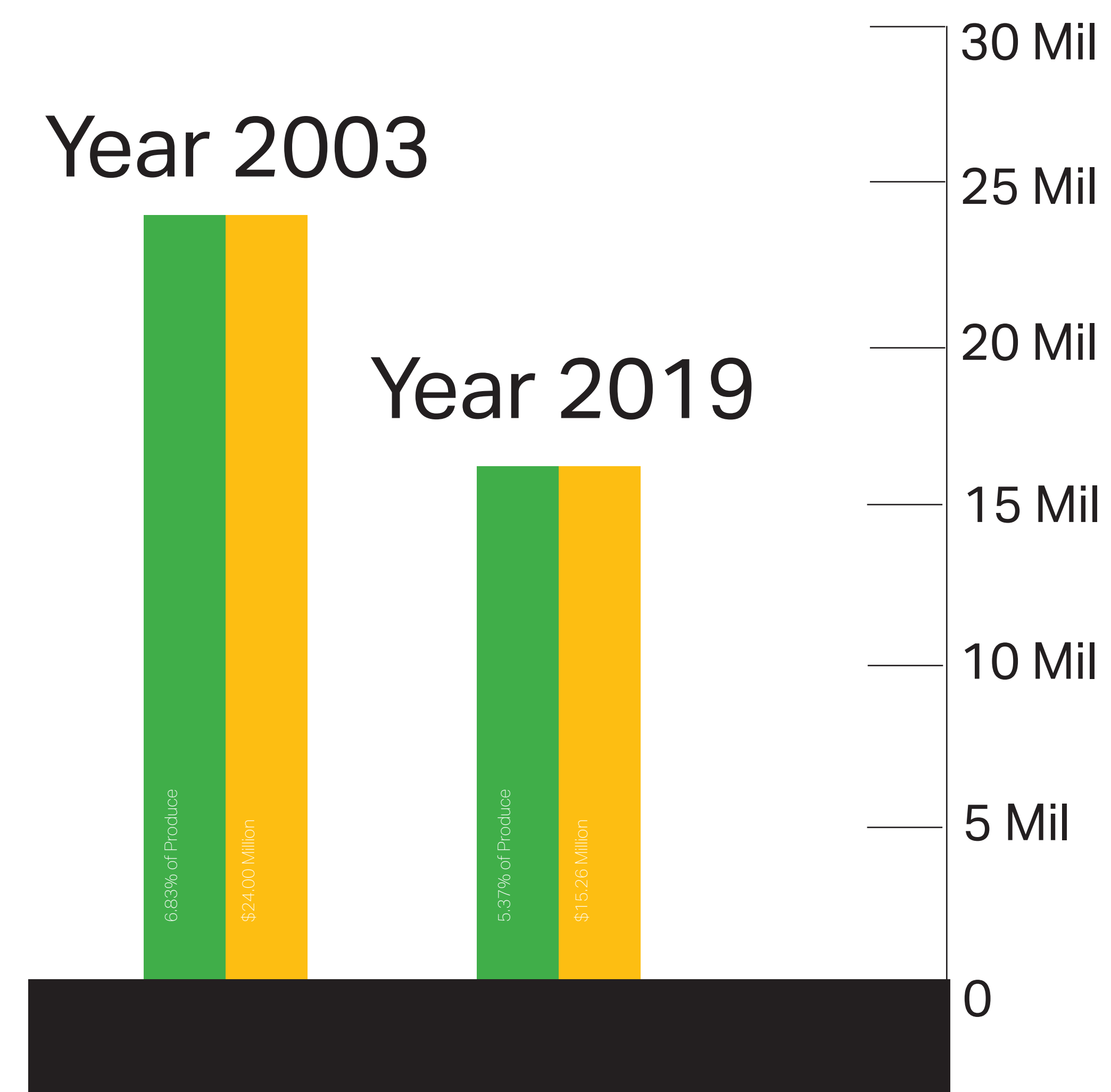
3.0 LAYOUT



RESEARCH: COMPARATIVE ANALYSIS

	Techniques	Procedures	Benefits	Restraints
Amish	<ul style="list-style-type: none"> • Intense manual labor • Crop Rotation • Meadow Culture • Green Manure liquids • Natural fertilizers • Biological control of insects • Nutrient cycling • Diversity in crops 	<p>The Amish used natural and organic materials in order to fertilize their soils. In order to achieve such quality soil, they would dedicate over 12 hours a day to maintain their land. They valued their relationship between them and their farms. Nevertheless, they also had strong emphasis on strong cultural traditions.</p>	<ul style="list-style-type: none"> • Natural and organic materials • Higher yields of energy ratios compared to Non-Amish farms • Consumed less energy • Utilized old practice with new ideas 	<ul style="list-style-type: none"> • Lack of technology • Absence of electricity • Small scale • Reliance of manual labor • Commitment to lifestyle • Utilization of animals
Biosphere 2	<ul style="list-style-type: none"> • Intensive farming of diverse crops • Implementation of large volumes of soil beds • Animal system to minimize plant waste • Wastewater system • Lagoon wetland farming • Water management system • Air duct system 	<p>Biosphere 2 utilizes internal lighting, soil high in nutrition, climate control, aquaponics, water system management, and a diverse selection of crops in order to achieve the most optimal agricultural production.</p>	<ul style="list-style-type: none"> • Controlled environment • Increases in crop yield and production • Diverse selection of crops and cultivars • Aquaponics • Olla Irrigation system • Recycling material 	<ul style="list-style-type: none"> • Cost of production • High maintenance • Over 1 million to maintain • Limited staff members
Bahamas	<ul style="list-style-type: none"> • Utilization of compost and peat moss • Stagger of planting • Square or rectangular planting beds • Domestic plants, fruits and vegetation • Intensive plowing 	<p>The residents of the Bahamas do intensive plowing with the addition of nutrients and natural compost in order to increase the quality of the soil. They also utilize a very diverse plant pallet for their gardens while also using a calendar for their vegetation.</p>	<ul style="list-style-type: none"> • Natural and organic materials • Diverse plant list • Subtropical climate for citrus fruits • Optimal for native and non-native plantings 	<ul style="list-style-type: none"> • Limestone in nature • Intensive plowing • Pest • Vulnerable to tropical storms • Lack of access to freshwater
Take away	<p>One thing in common for all methods is that they all use traditional practices with innovative ideas that benefit their own community. However, the different the the access of resources via fundings, land and personnel.</p>	<p>All societies emphasize natural and organic materials to ensure the highest quality for their soils. The key difference between them all is the location of their agricultural production.</p>	<p>Benefits for all societies include the diversification of compost, soil techniques and plant selection. IBD and the Amish however have seen higher production with their methods.</p>	<p>Each society face different challenges on different levels, however, they all face insects, pest and environmental issues. Access to resources and technology is a key restraints for all.</p>

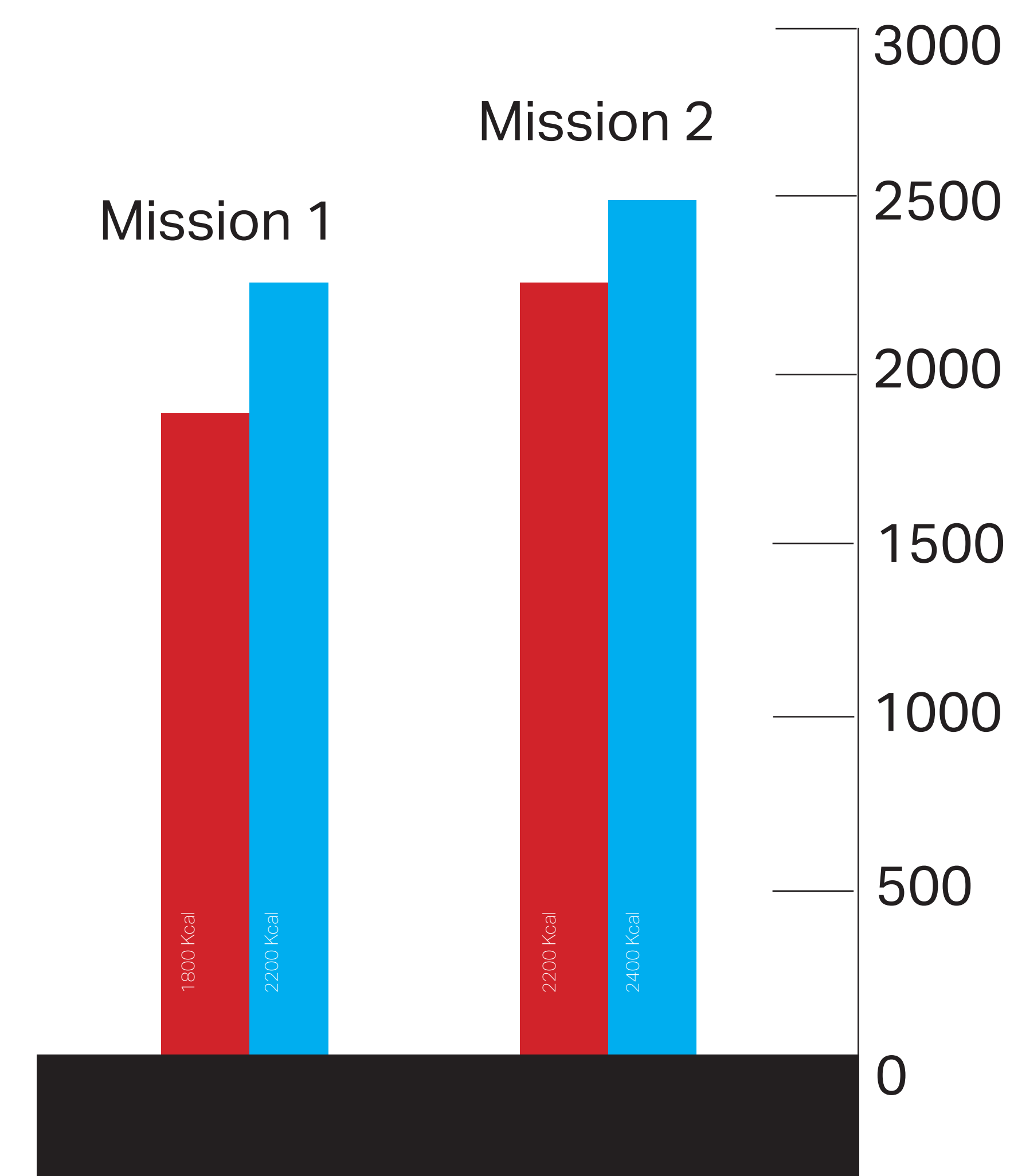
RESEARCH: COMPARATIVE ANALYSIS



Value of Imported Vegetables & Fruits
In millions (USD)

Takeaway: Since 2003, the government of the Bahamas has expressed their interest in decreasing the importation of fruits and vegetables. Backyard Farming in the Bahamas, by Deborah Abang-Ntuen, states that in over \$24 million dollars worth of fruits and vegetables have been imported to the Bahamas. In this article, it is highly encouraged towards Bahamians that they should grow their own produce. The graph above shows the steady decrease in importation of fruits and vegetables from 2003 to 2019.

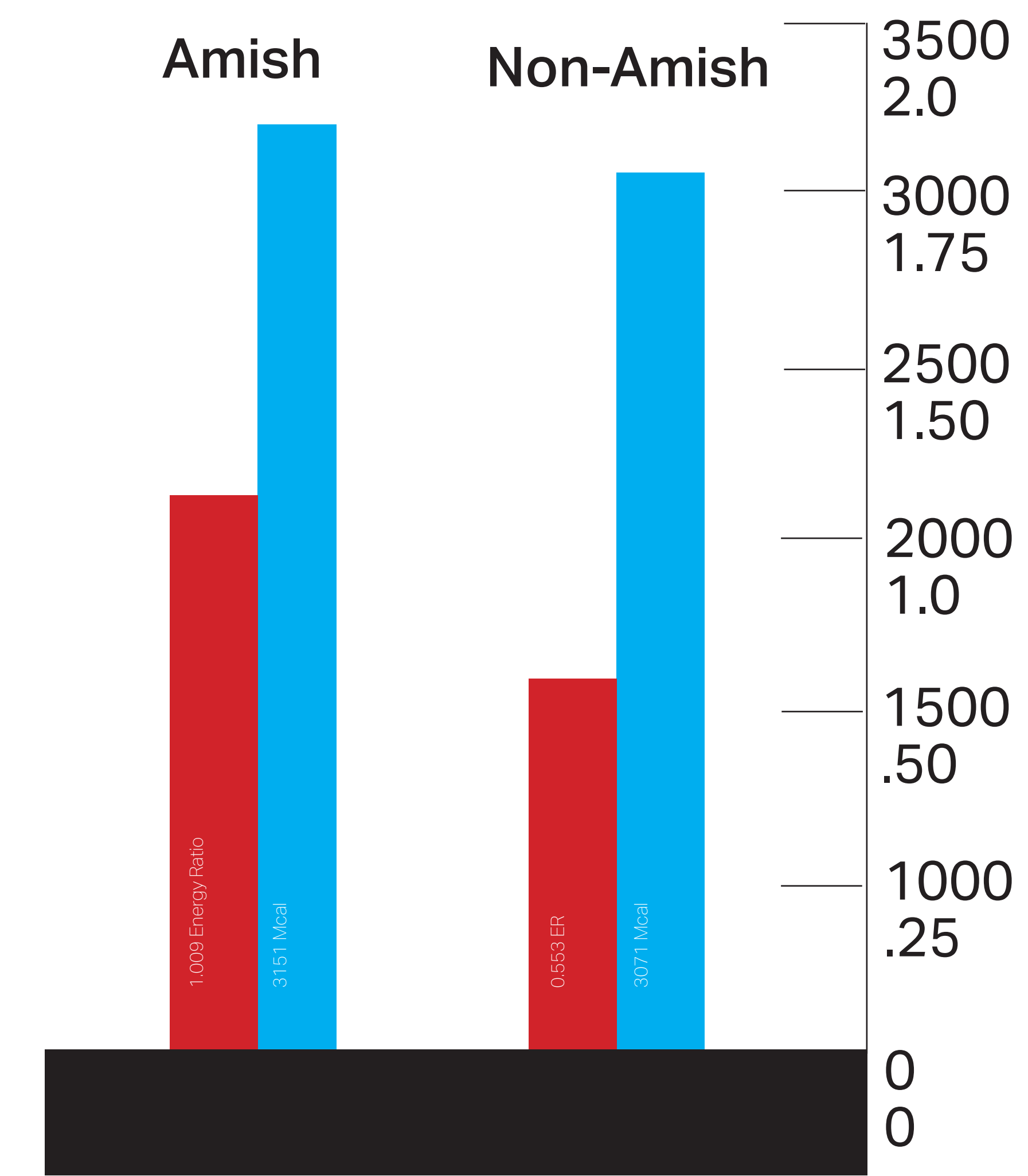
Bahamas



Crop yield
Kcal a day

Takeaway: Although Biosphere 2 failed its mission to achieve a sustainable bio-dome for the better future, the project showed promise with its methods of agriculture. By recycling waste, utilizing aquaponics, and a olla water system, they were able to demonstrate new innovative ways to program sustainability. The graph above shows how they improved the production of produce grown within the biosphere and displays the average consumed amount of calories for each person who participated in this experiment.

Biosphere 2

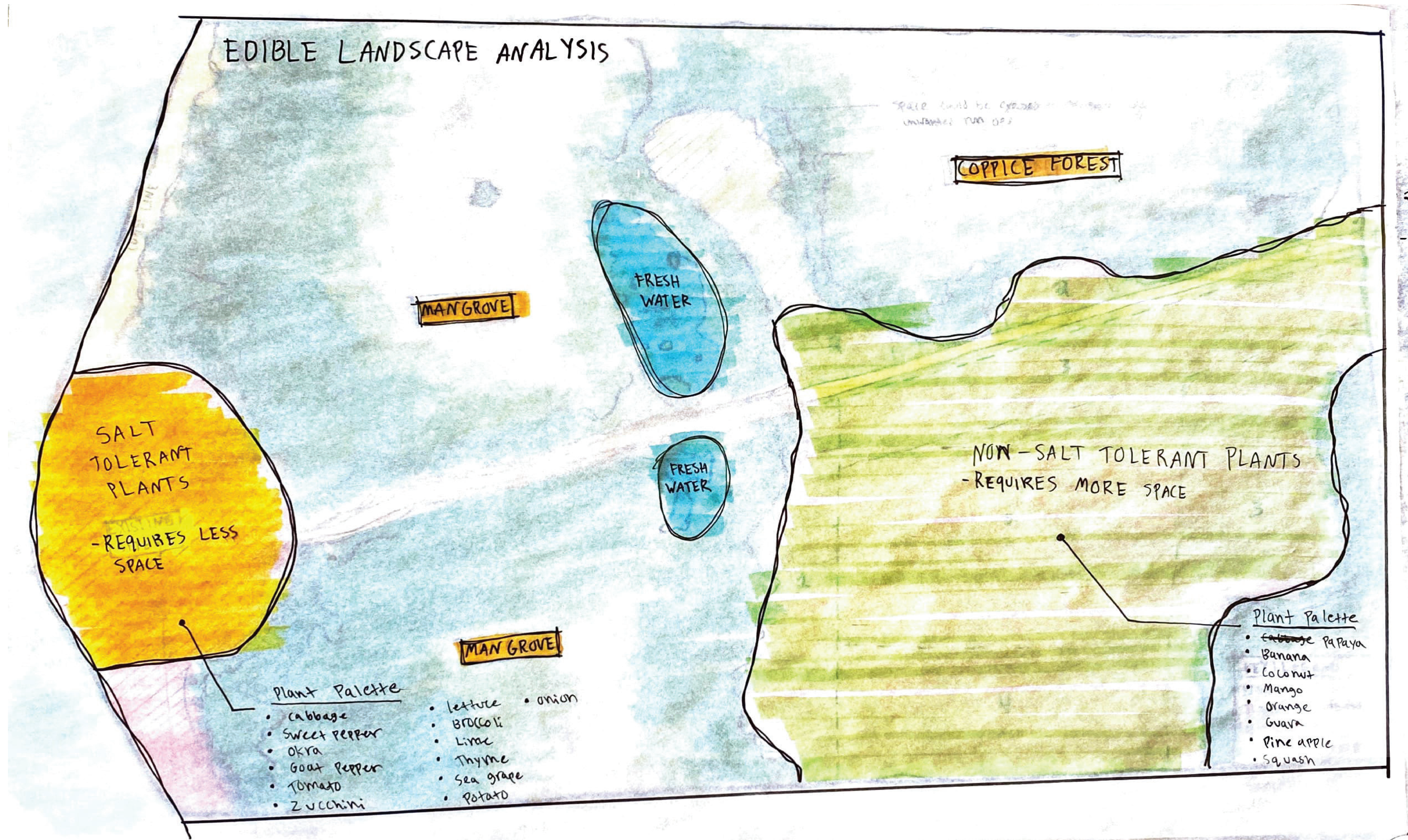


Crop yield & Energy Ratio
Mcal | Energy outputs to inputs

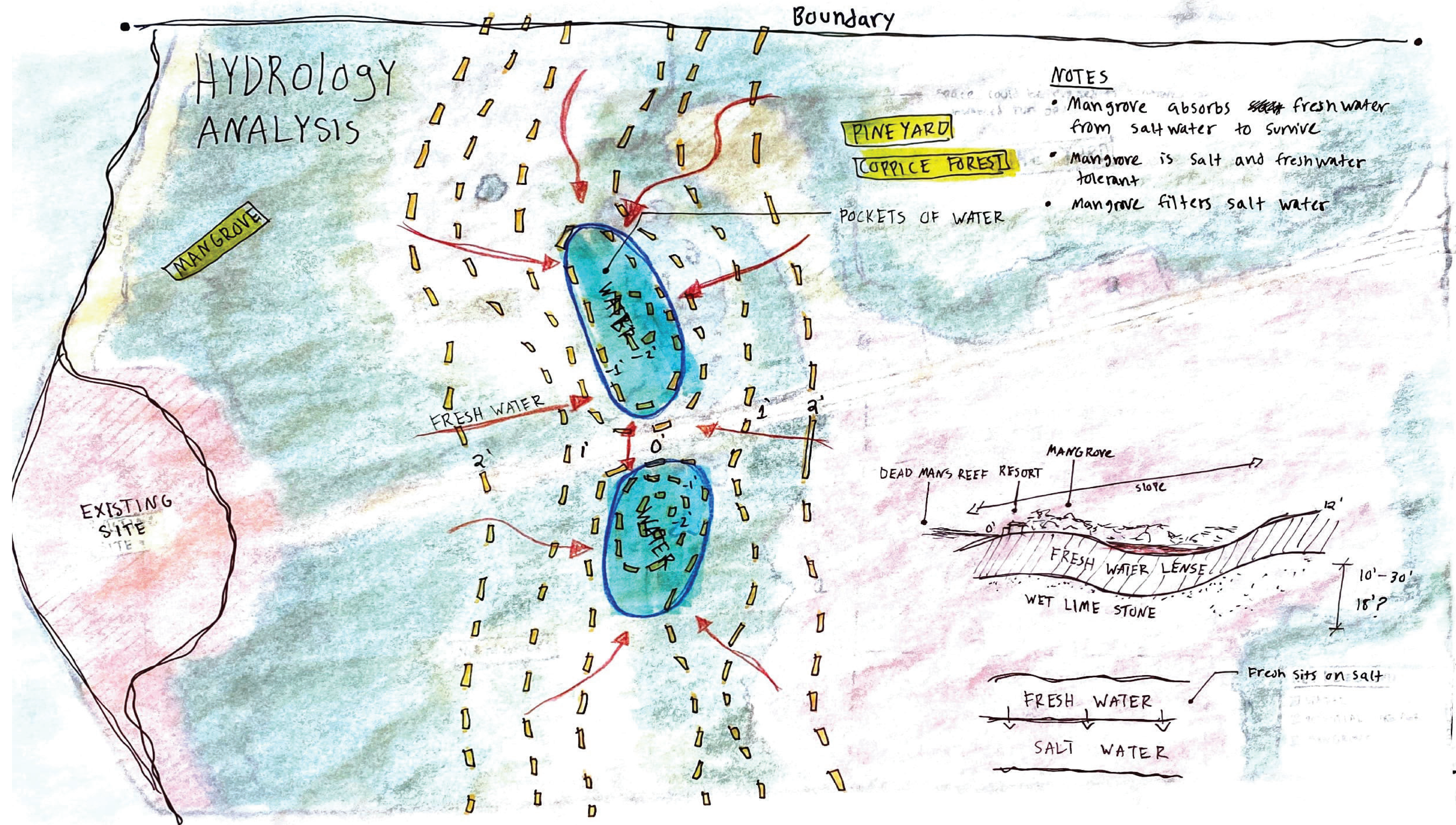
Takeaway: Based off on central Pennsylvania, Amish farms had an overall higher energy ratio compared to their non-Amish counterparts. This was primarily due to the fact that the Amish did not use electricity nor modern technology at the time. However, it is also shown that the crop yield is also at a slightly higher rate than non-Amish farmer in the area. Despite Amish farmers being 5 times smaller than other farms, they were able to generate slightly more crops in the region.

Amish

SITE ANALYSIS



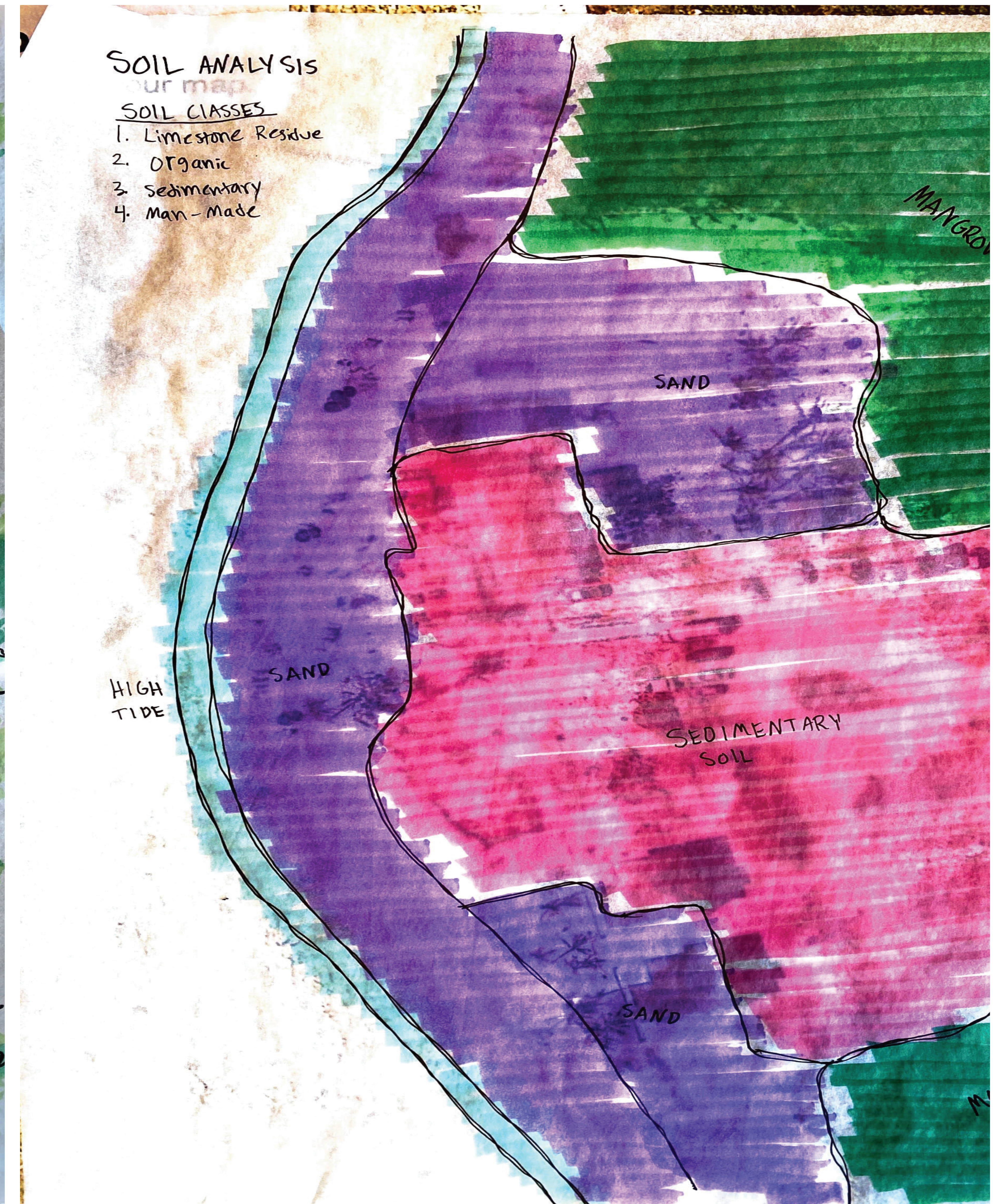
SITE ANALYSIS



SITE ANALYSIS

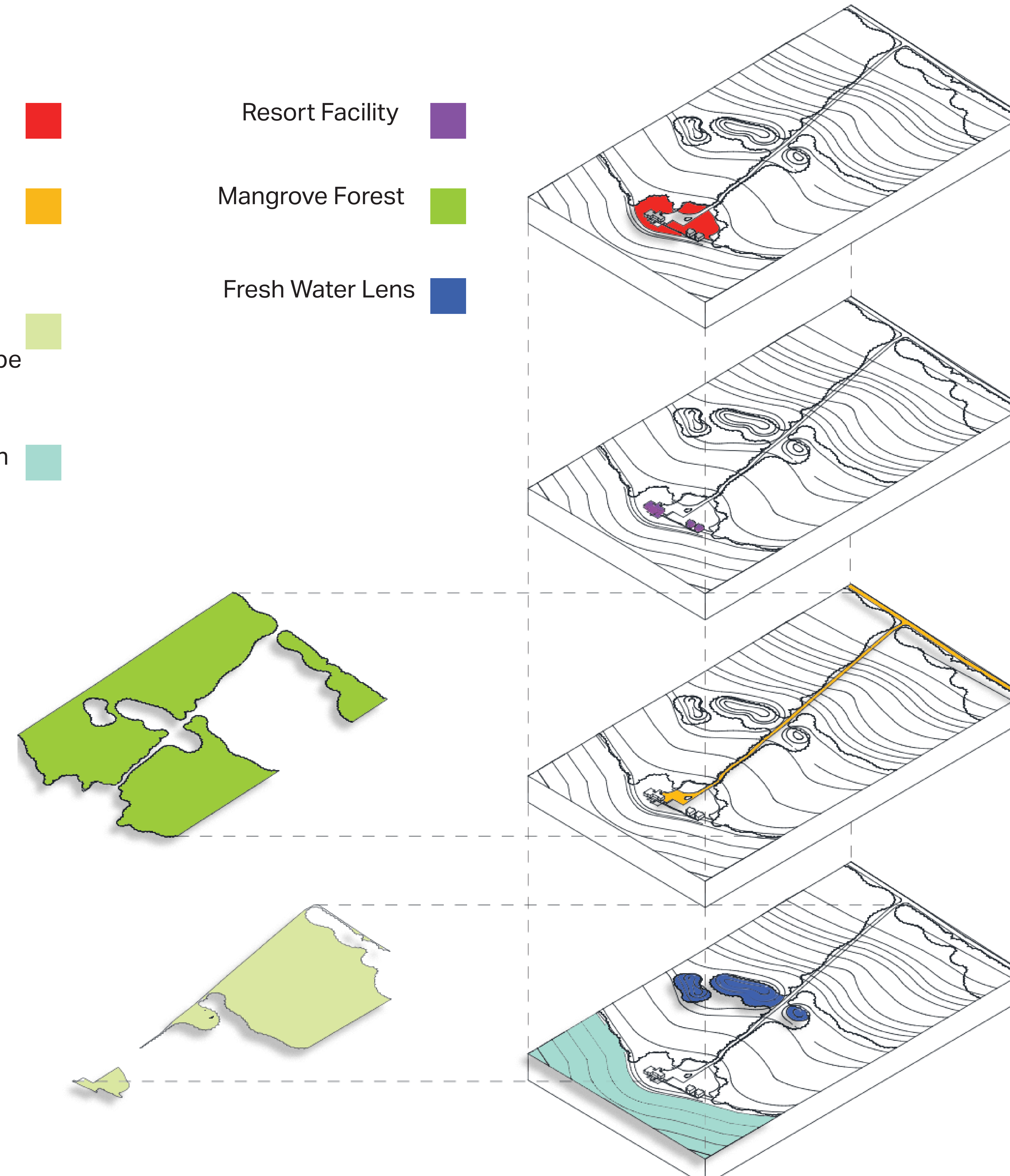


SITE ANALYSIS

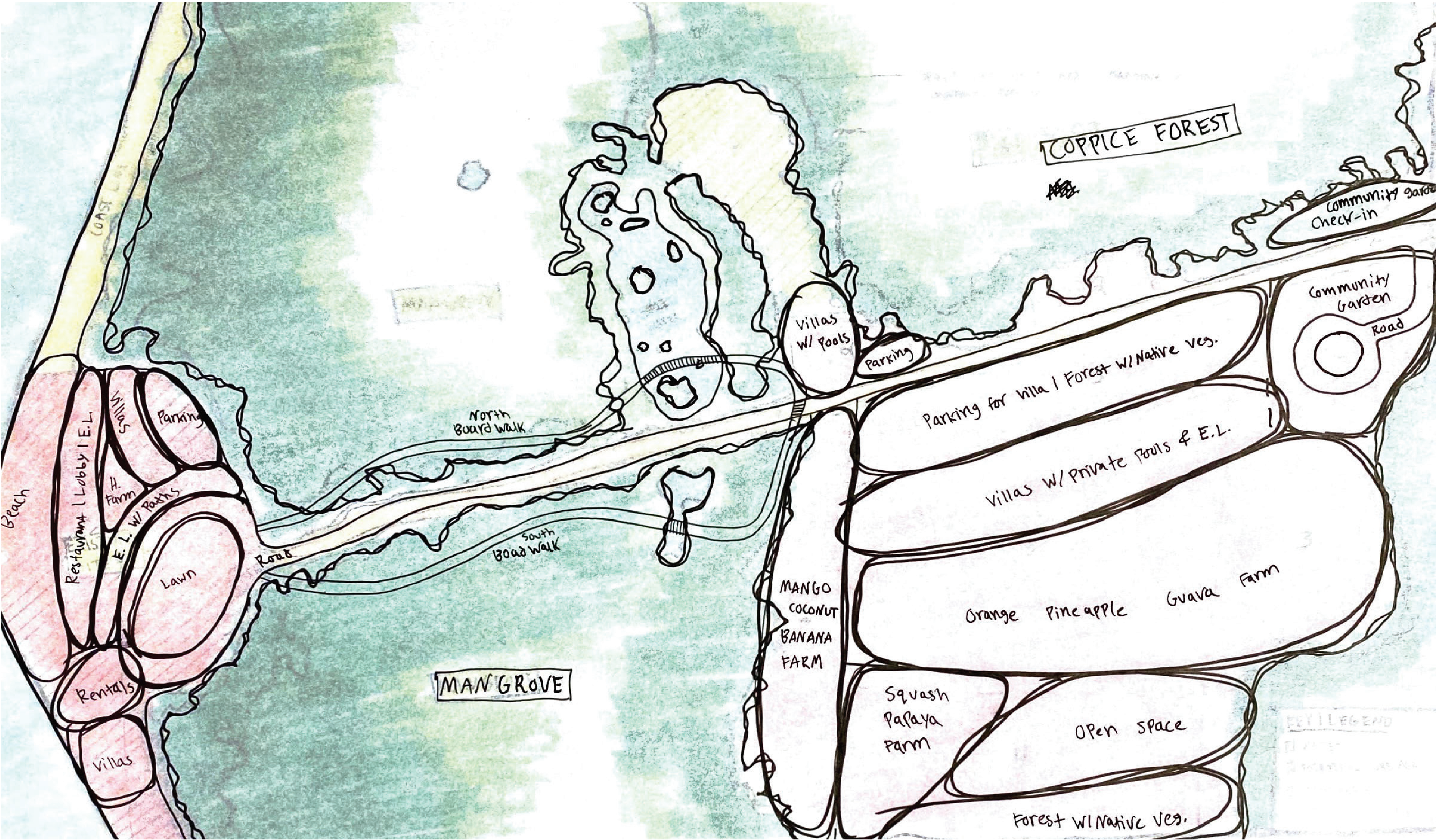


SITE ANALYSIS

- Resort Site ■
- Resort Facility ■
- Infrastructure ■
- Mangrove Forest ■
- Potential Urban Agriculture Edible Landscape ■
- Fresh Water Lens ■
- Ocean ■



MASTER PLAN VISION



LANDSCAPE ARCH VISUALIZATION

Beach Front
Contemporary | Luxury Inspired



Beach Front
Tropical | Indigenous Inspired



Farmstead Front
Non-Tropical | Organic



Farmstead Front
Indigenous | Tropical Material



ARCHITECTURE VISUALIZATION

Beach Villa
Historical & Indigenous Inspired



Beach Villa
Modern | Tiny Home Inspired



Farmstead Villa
Modern | Luxury



Farmstead Villa
Indigenous | Natural Material



PRODUCE VISUALIZATION

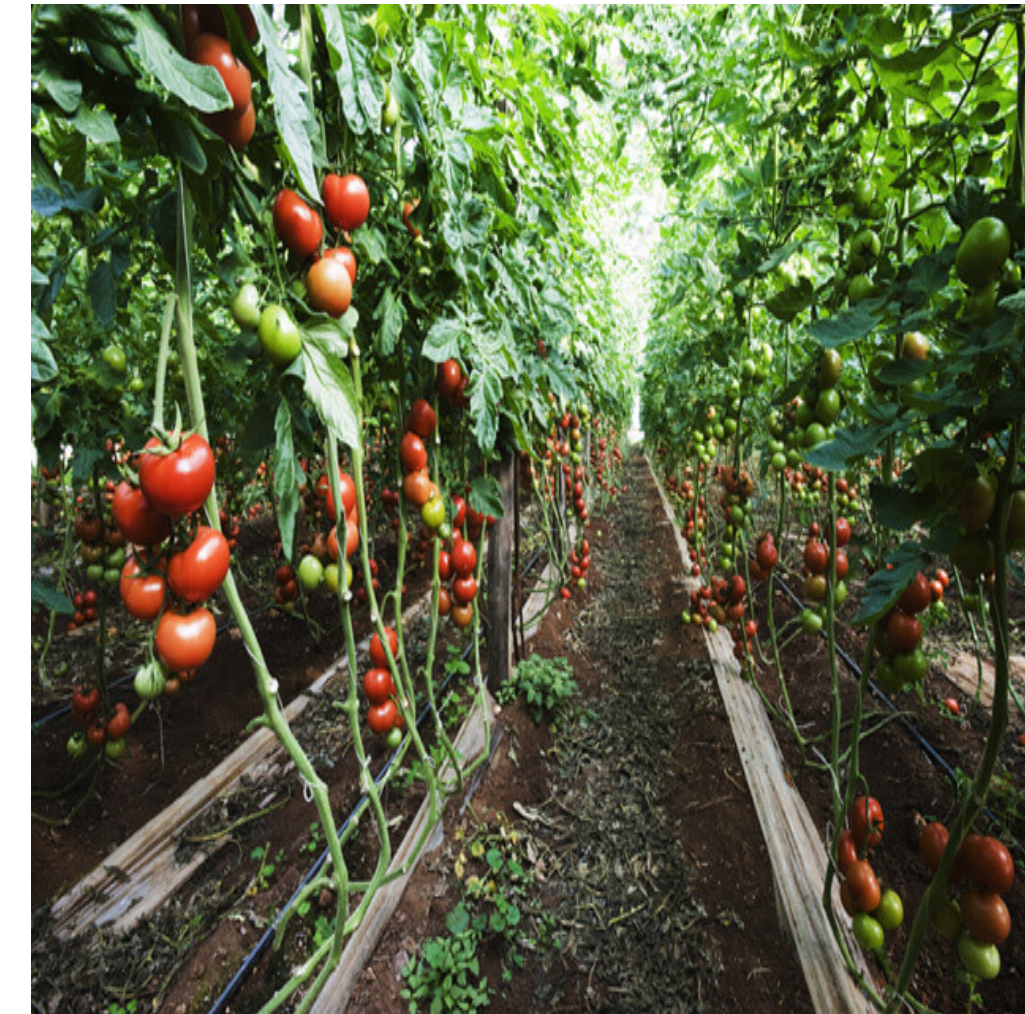
SEA GRAPE



CABBAGE



TOMATO



BROCCOLI



LIME



ORANGE



THYME



SWEET PEPPER



ZUCCHINI



PAPAYA



MANGO



ONION



POTATO



OKRA



LETTUCE



BANANA



PINEAPPLE



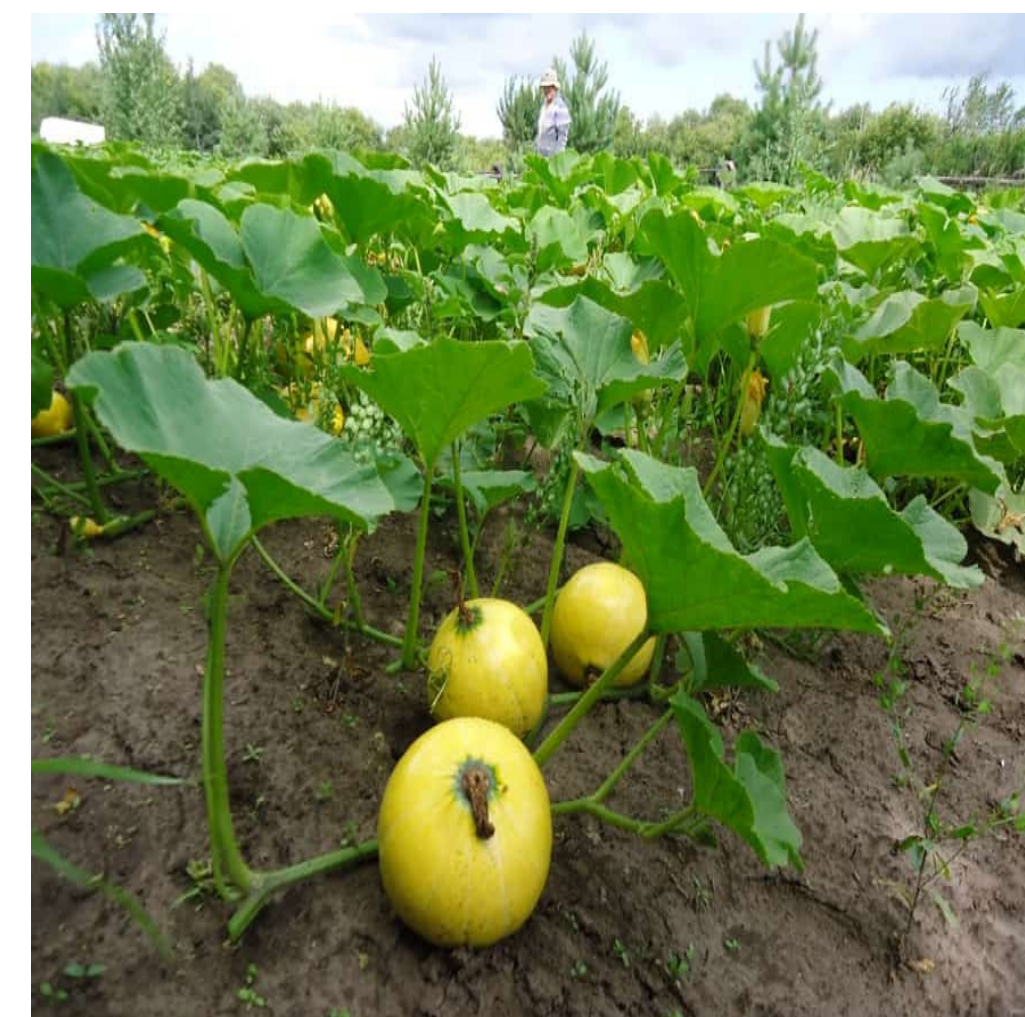
GUAVA



GOAT PEPPER



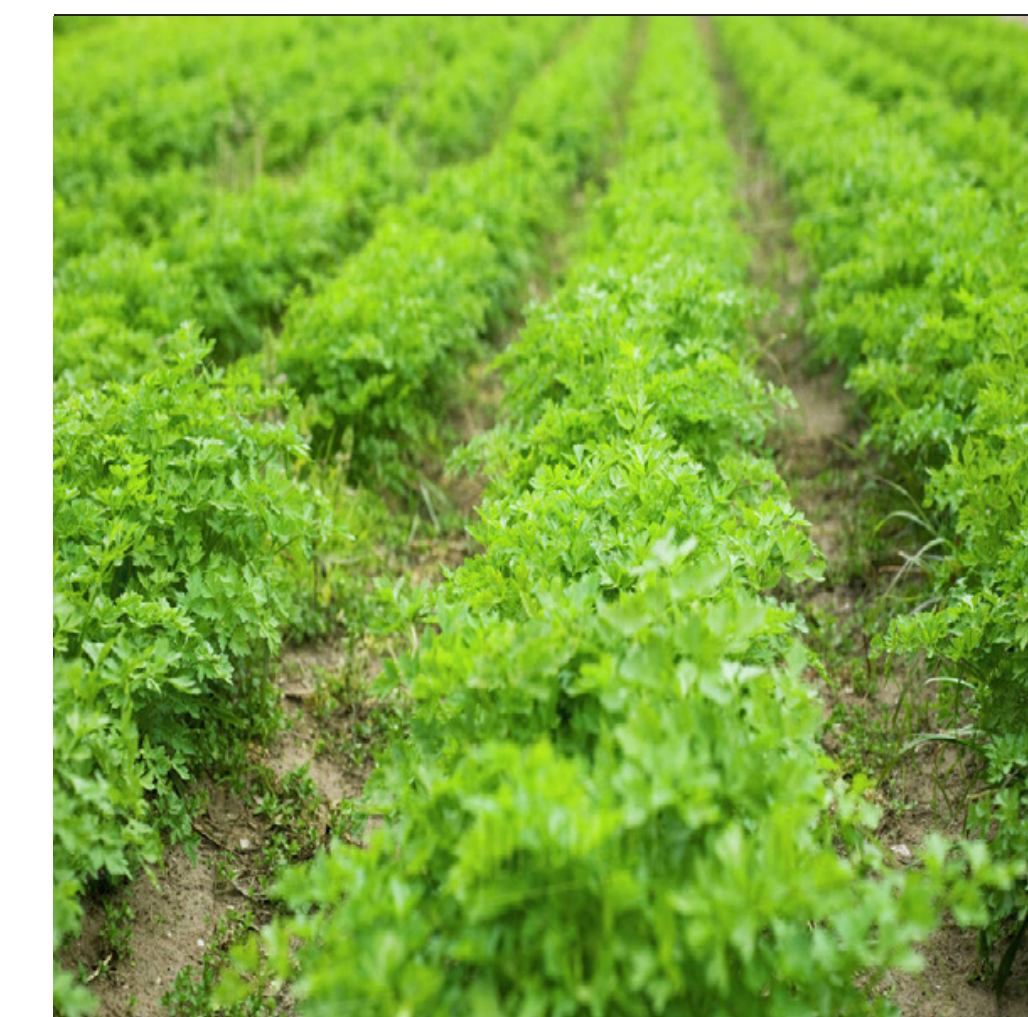
SQUASH



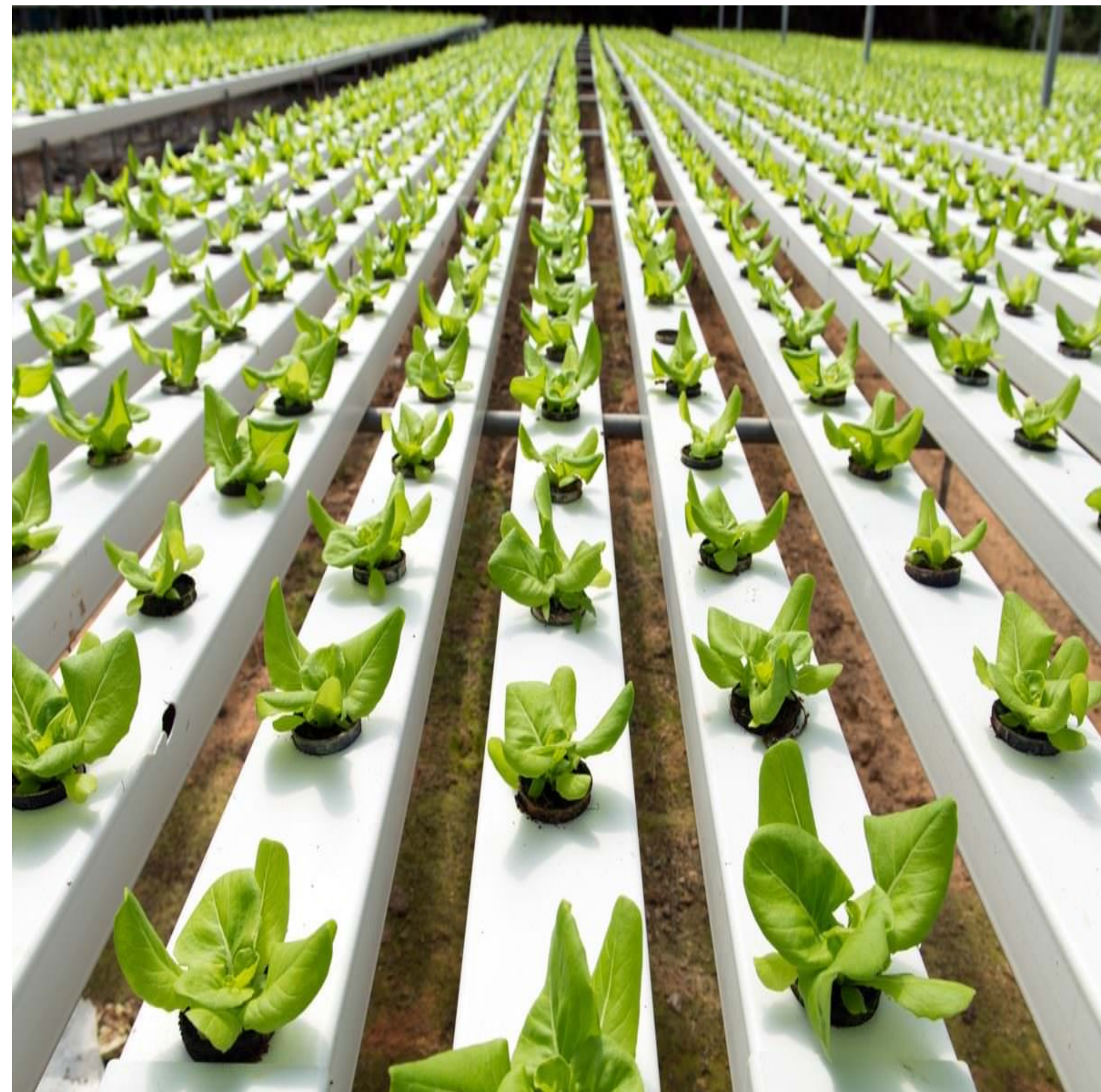
COCONUT



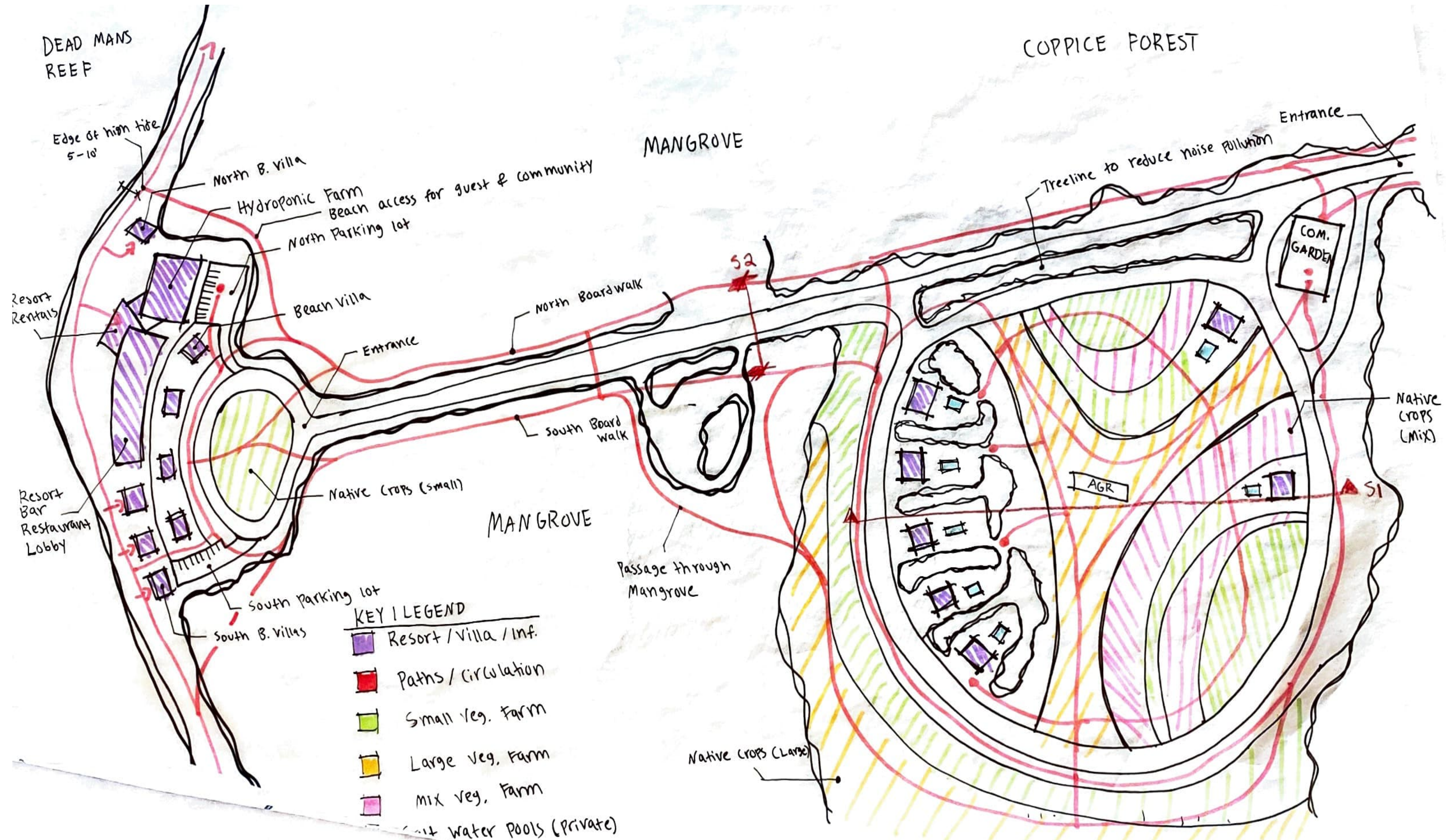
PARSLEY



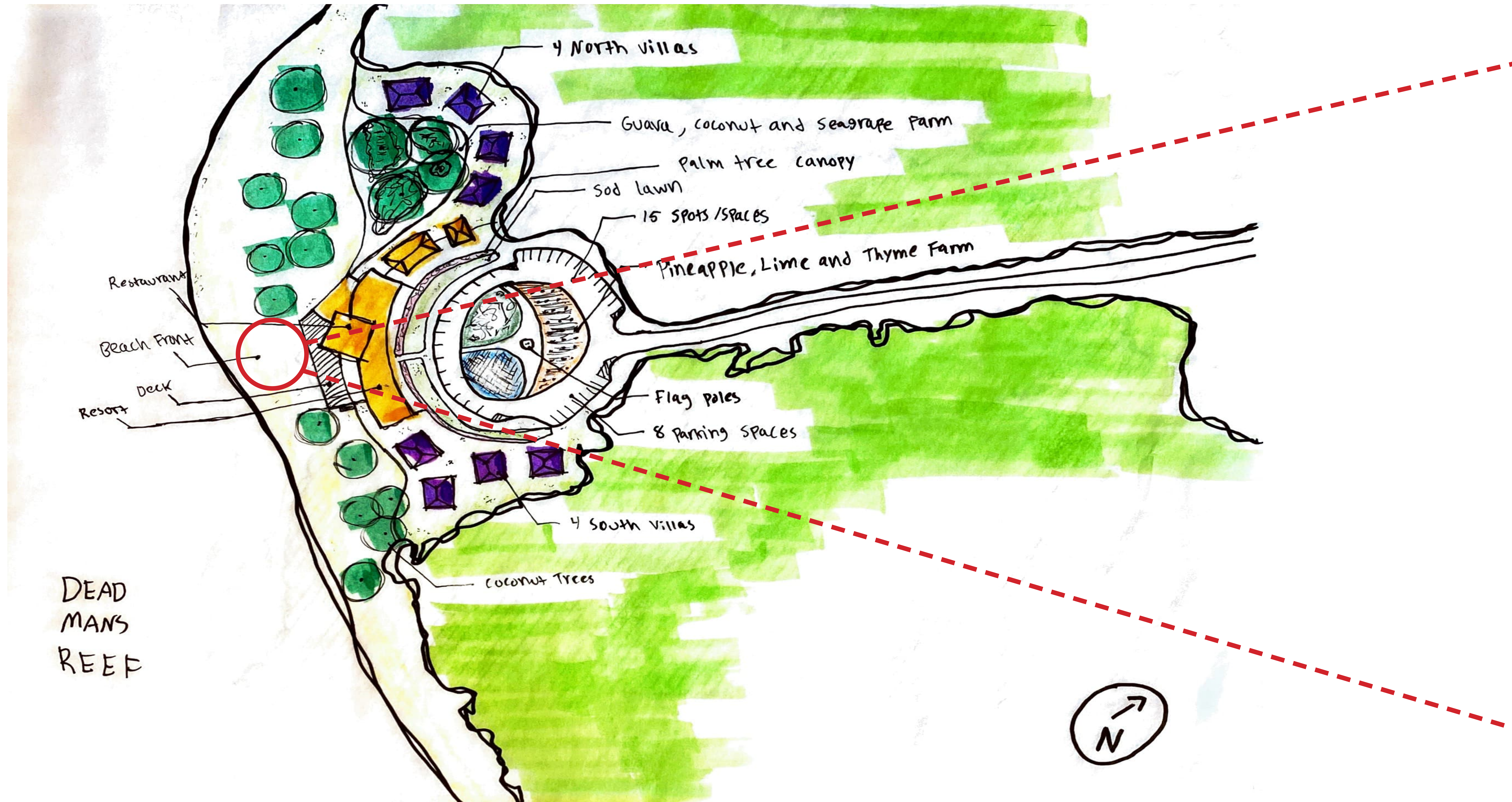
HP FARM VISUALIZATION



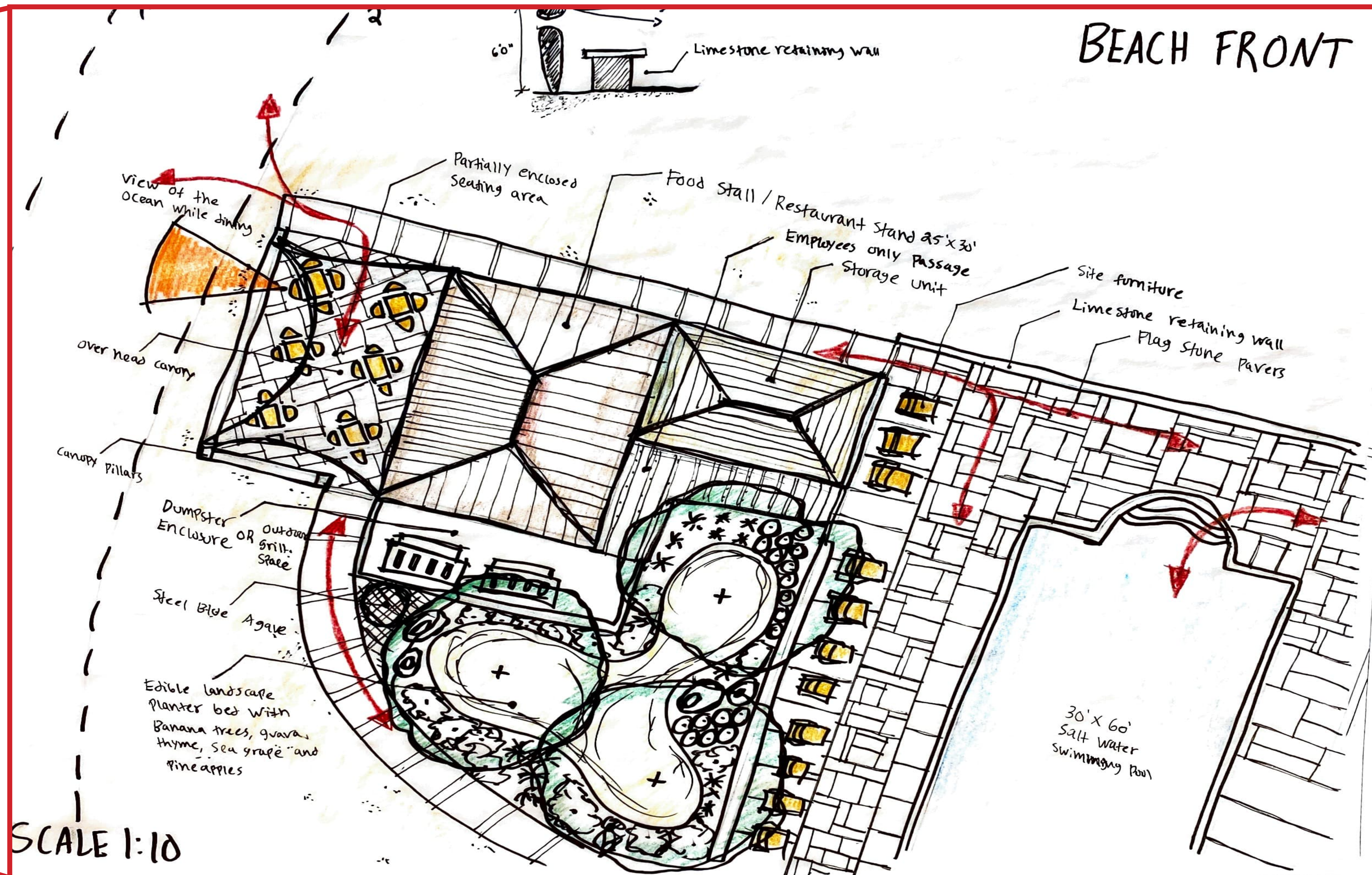
PRELIMINARY CONCEPT



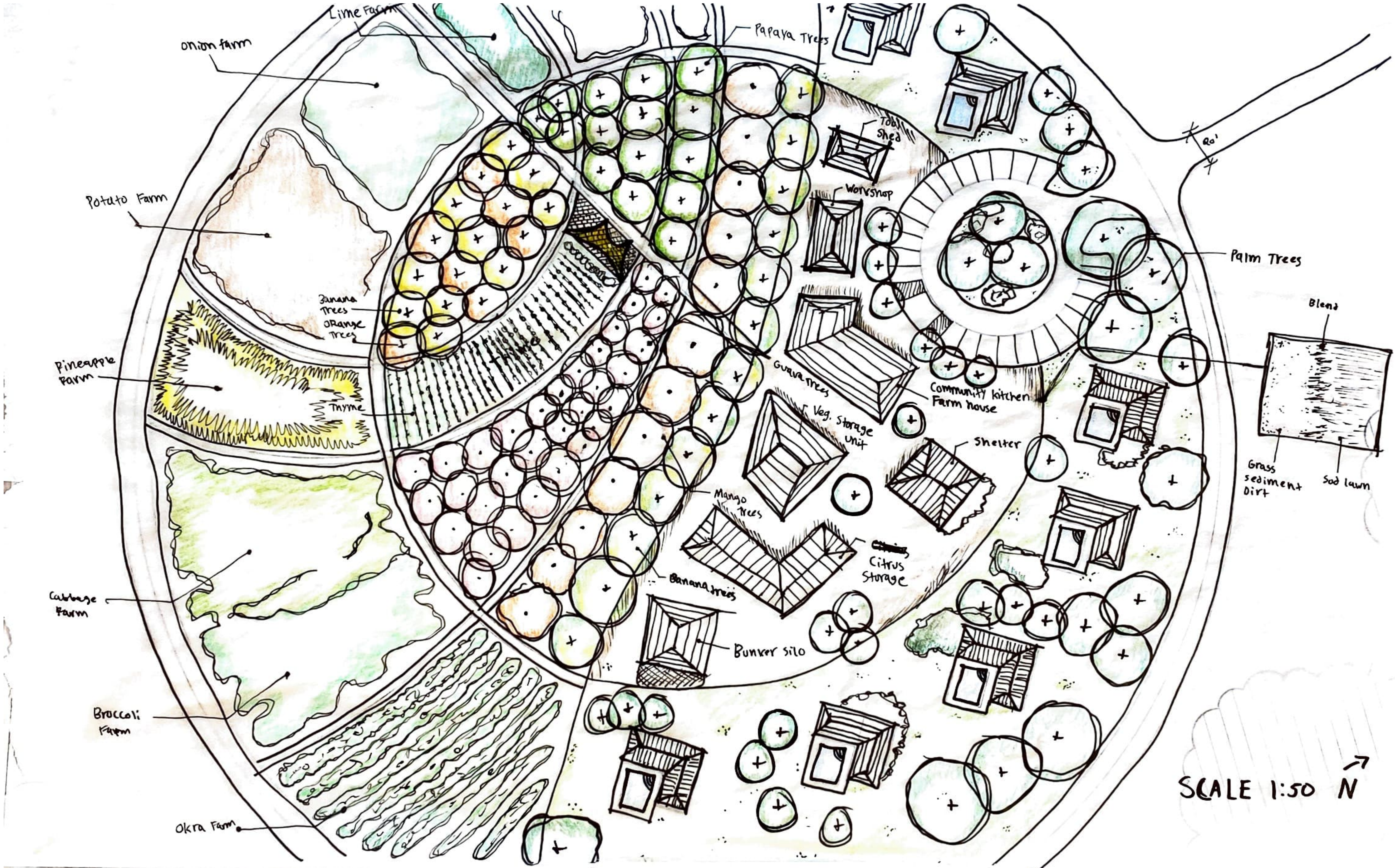
EARLY BEACH FRONT CONCEPTS



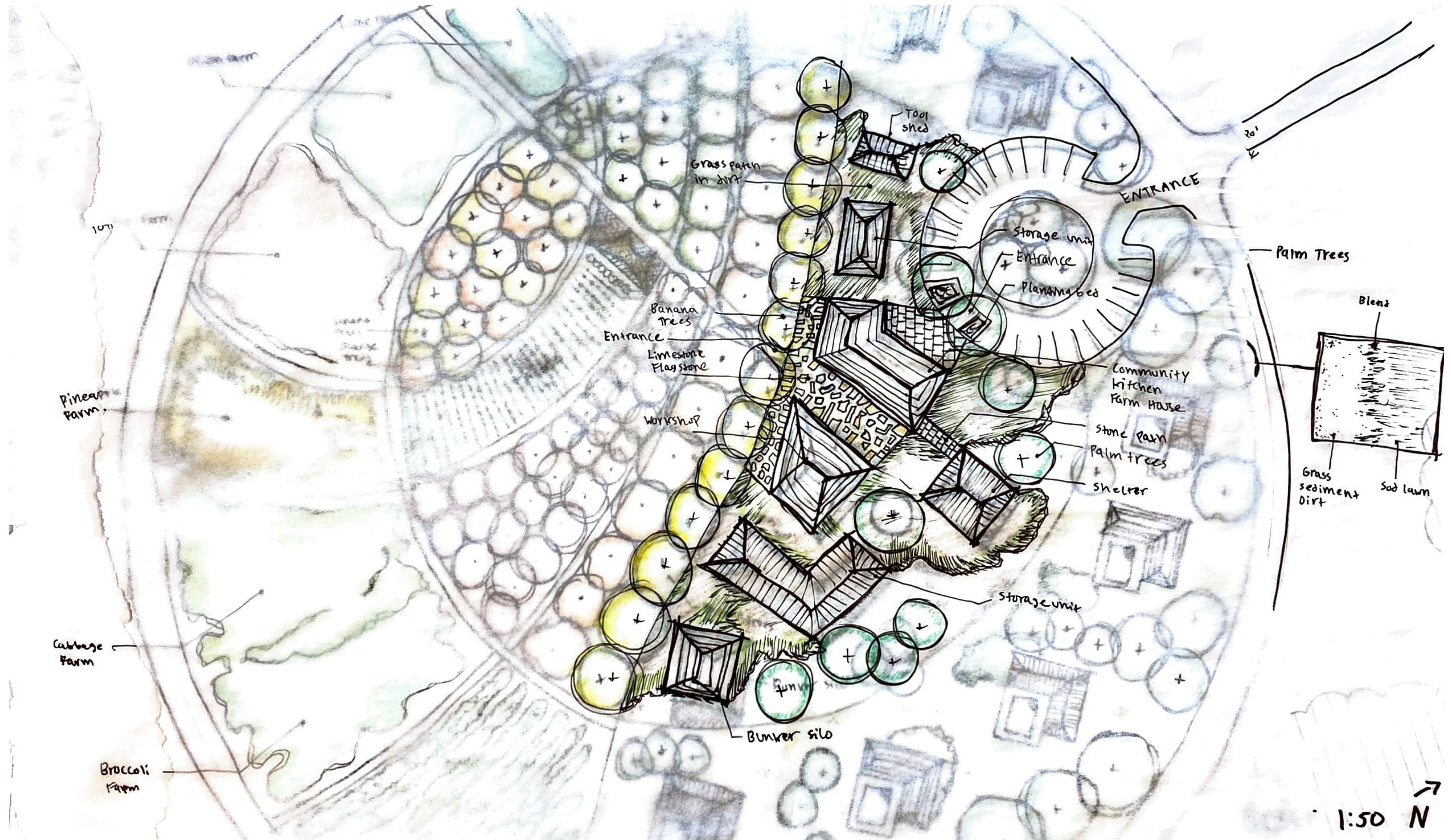
EARLY BEACH FRONT CONCEPTS



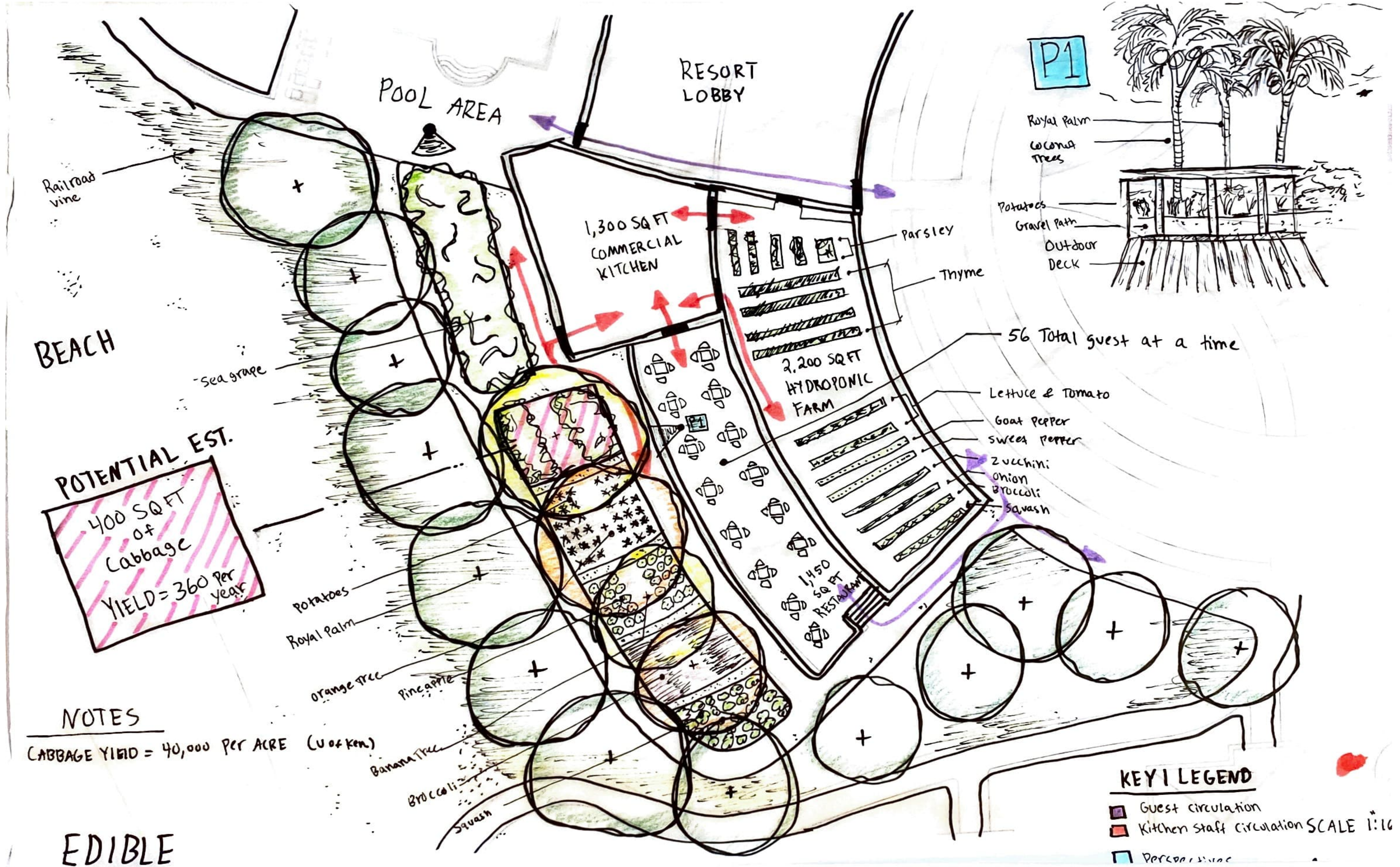
EARLY FARMSTEAD CONCEPTS



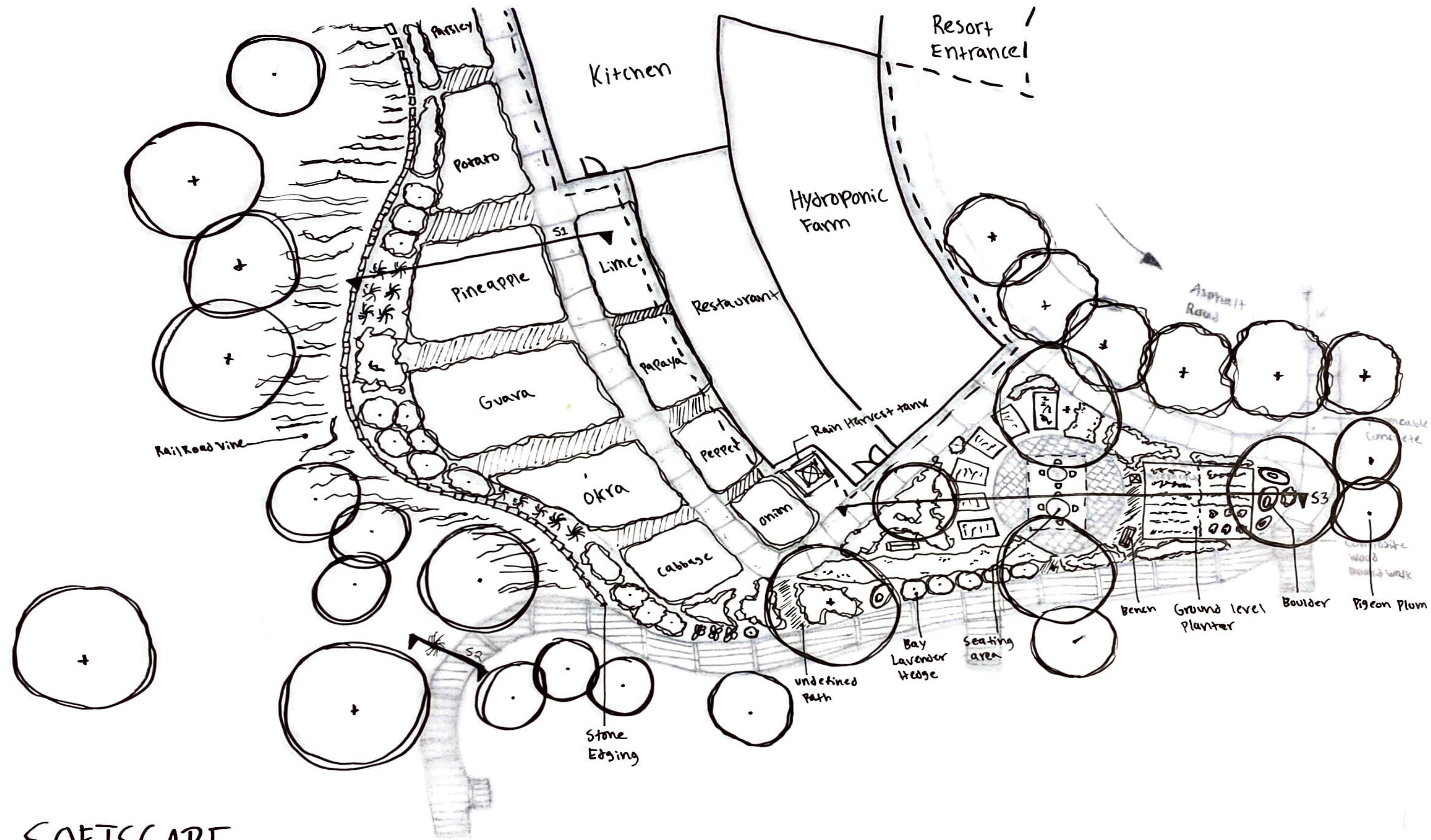
EARLY FARMSTEAD CONCEPTS



EARLY EDIBLE GARDEN CONCEPTS



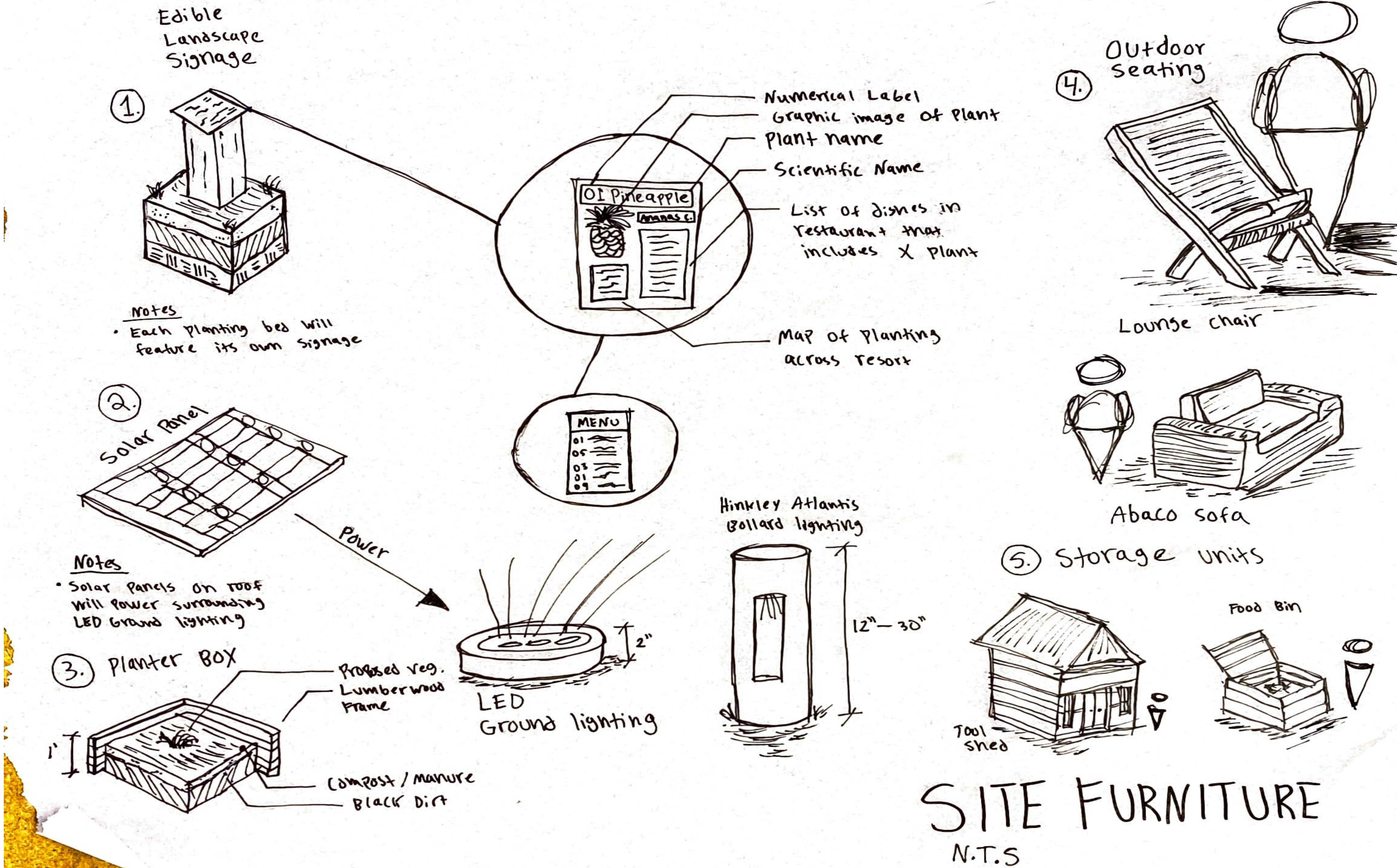
EARLY EDIBLE GARDEN CONCEPTS



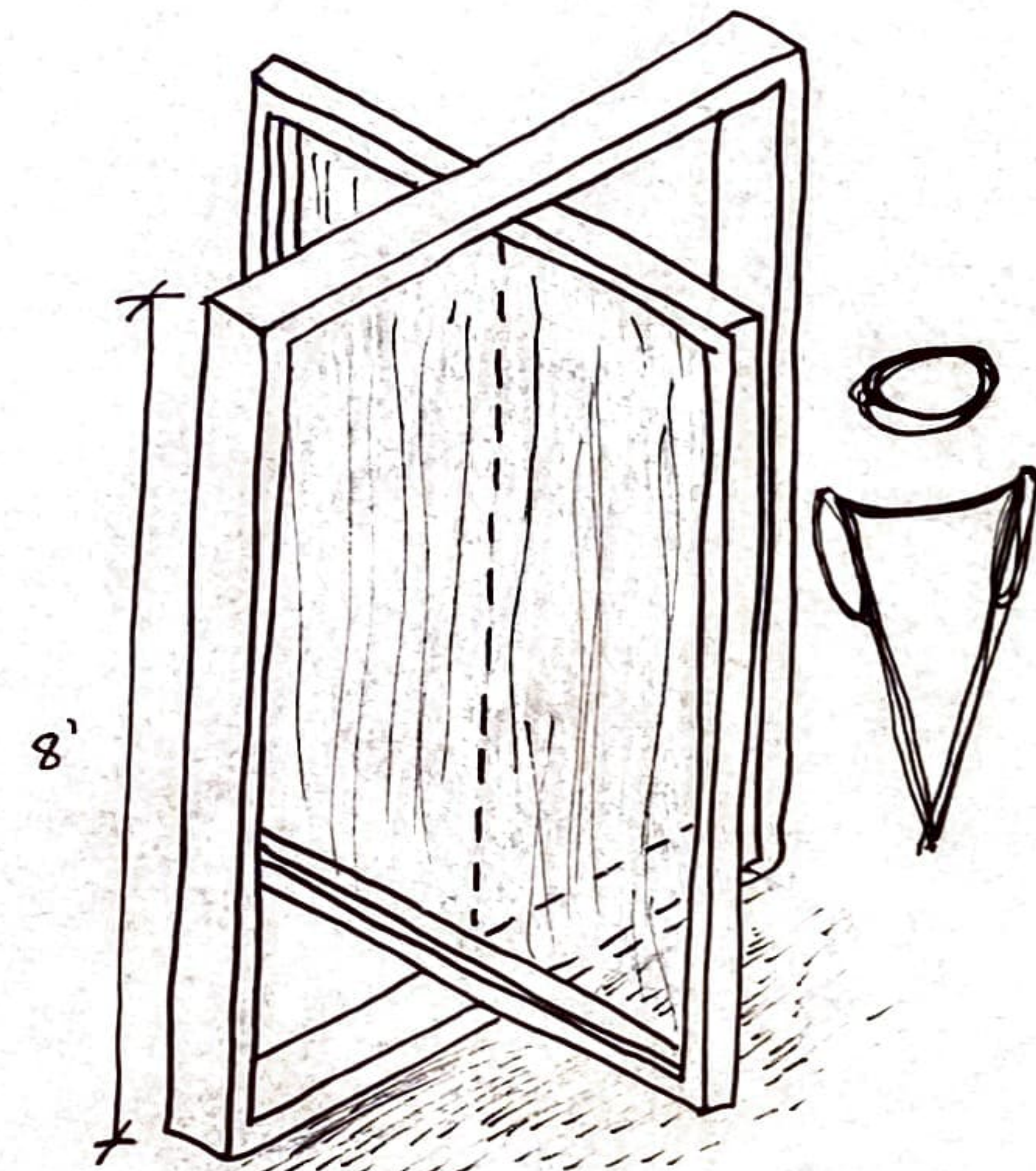
SOFTSCAPE

SCALE 1:20

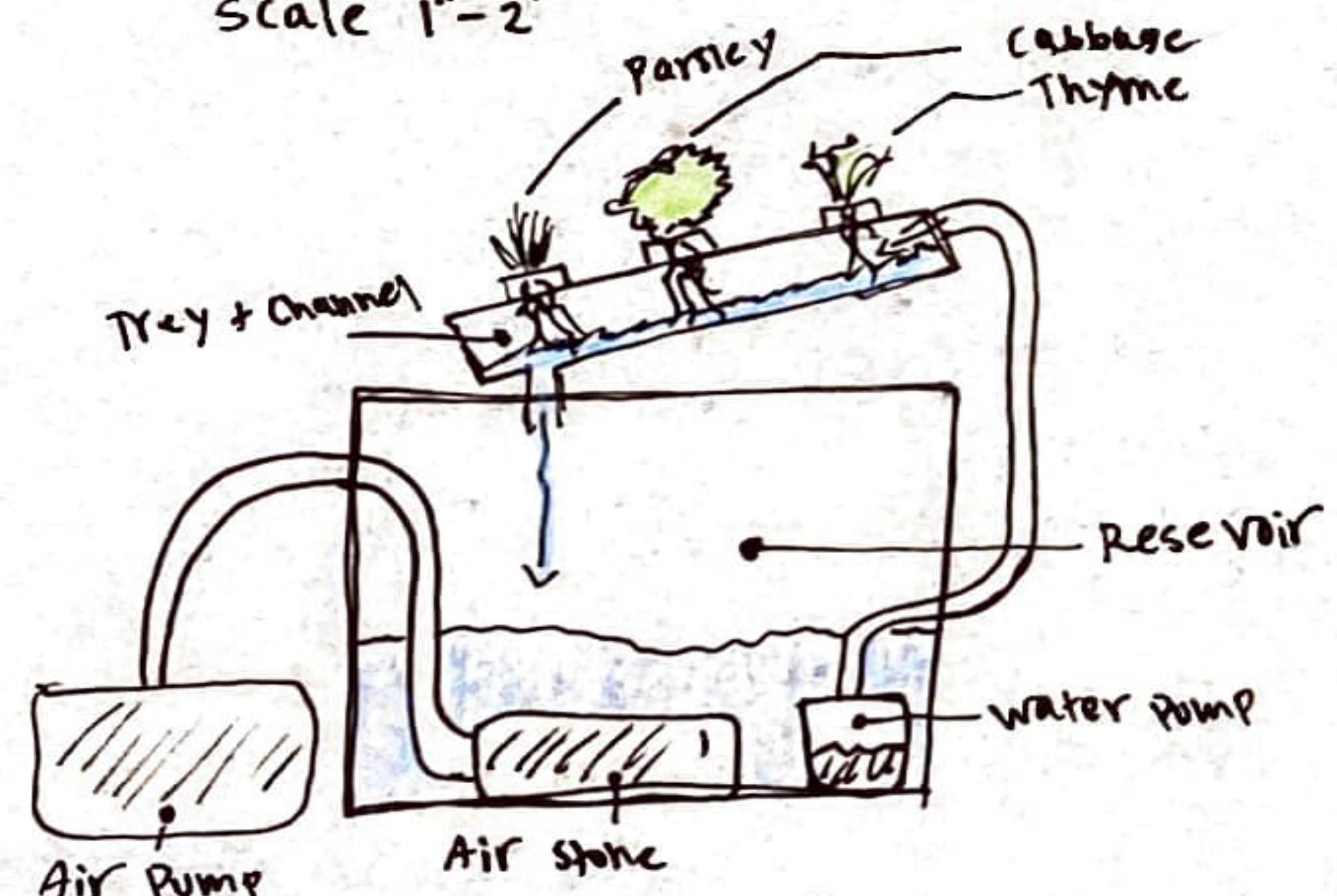
SITE COMPONENTS CONCEPTS



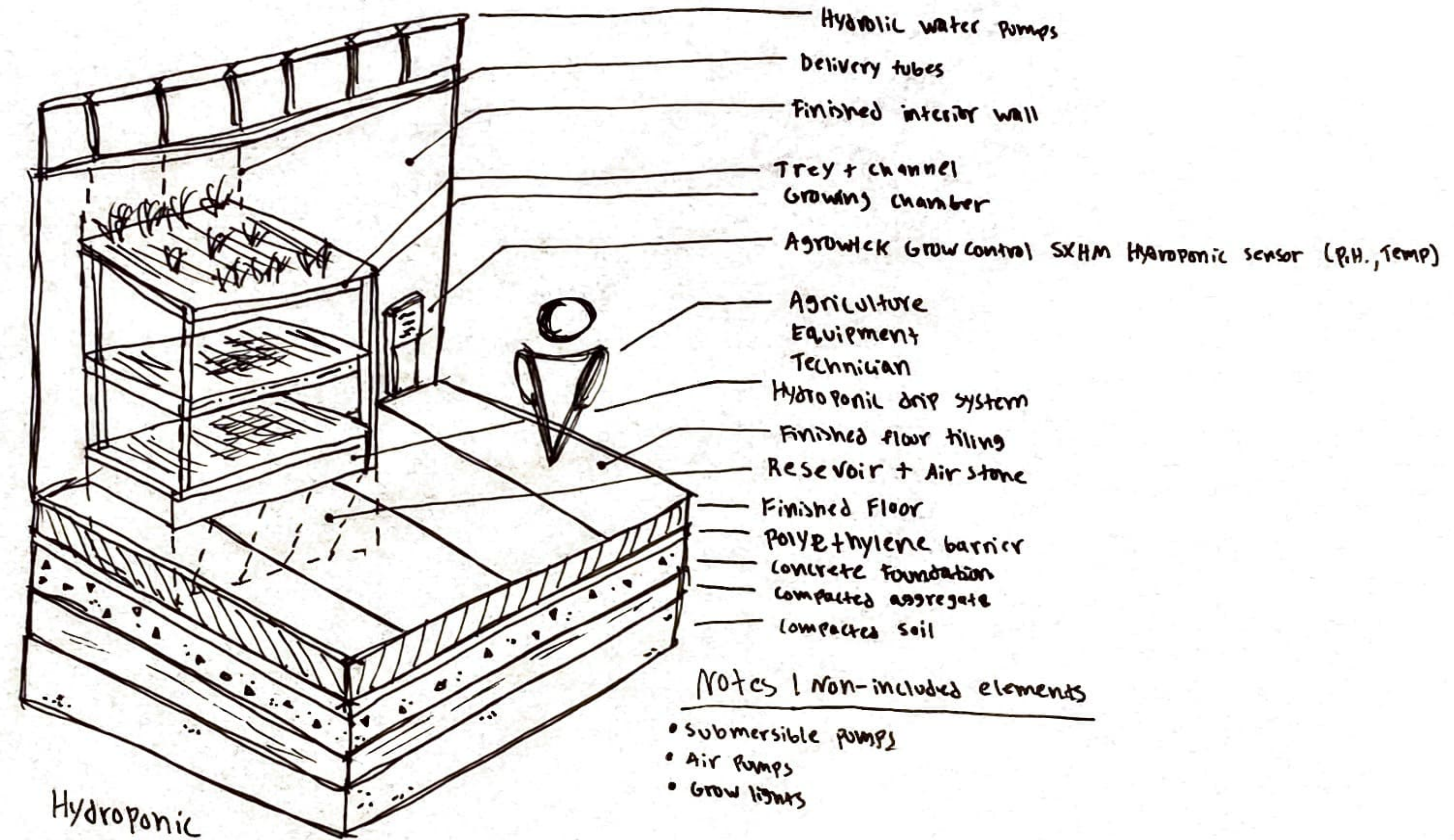
SITE COMPONENTS CONCEPTS



Pivoting Window
Scale 1"=2'



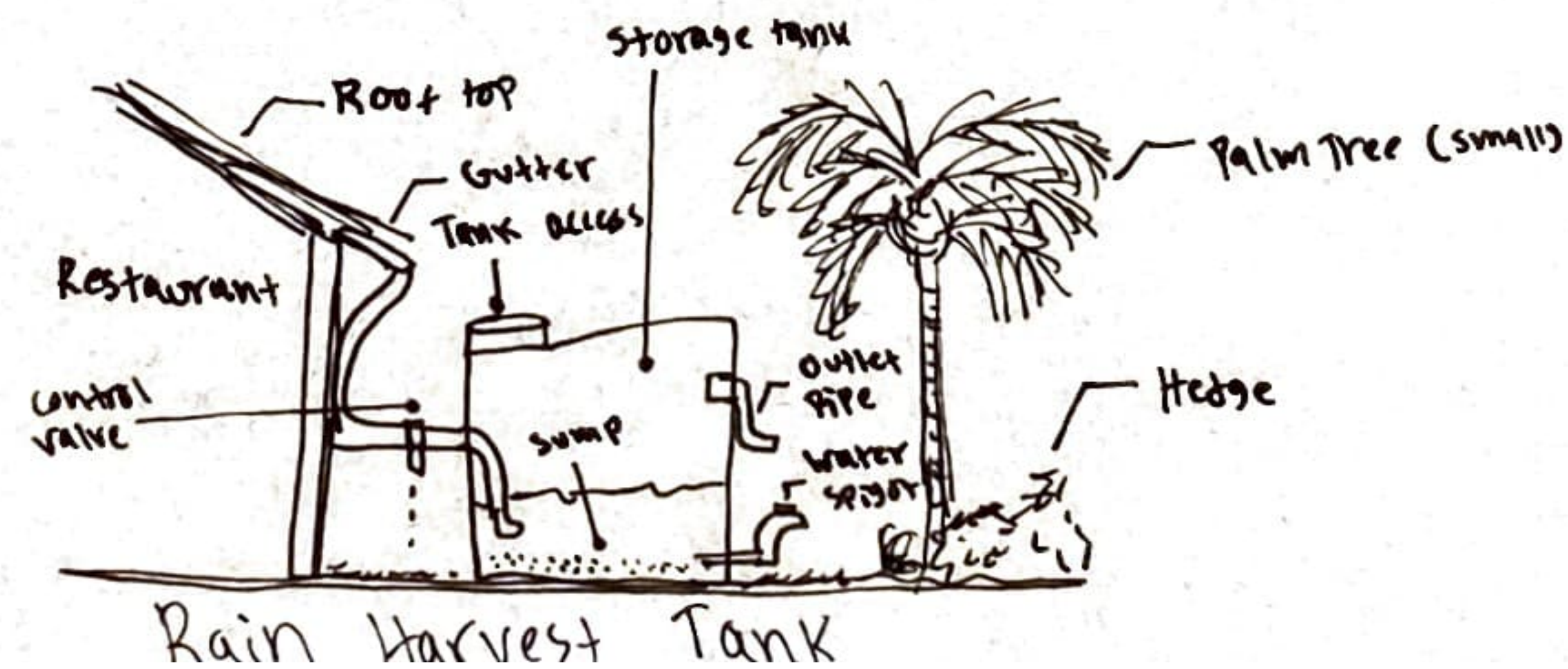
Nutrient Hydroponic System



Notes / Non-included elements

- Submersible pumps
- Air Pumps
- Grow lights

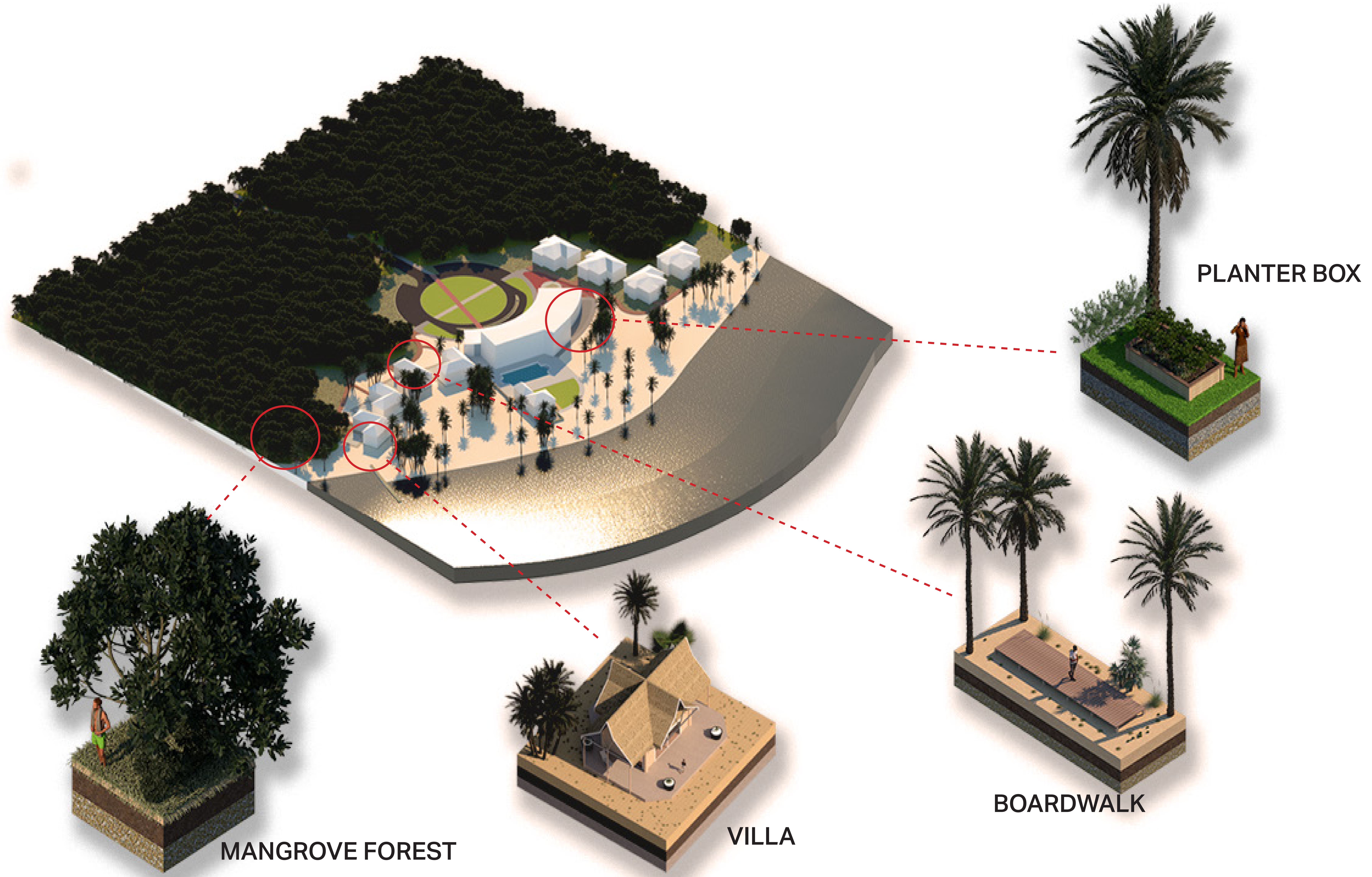
Hydroponic Farm Interior



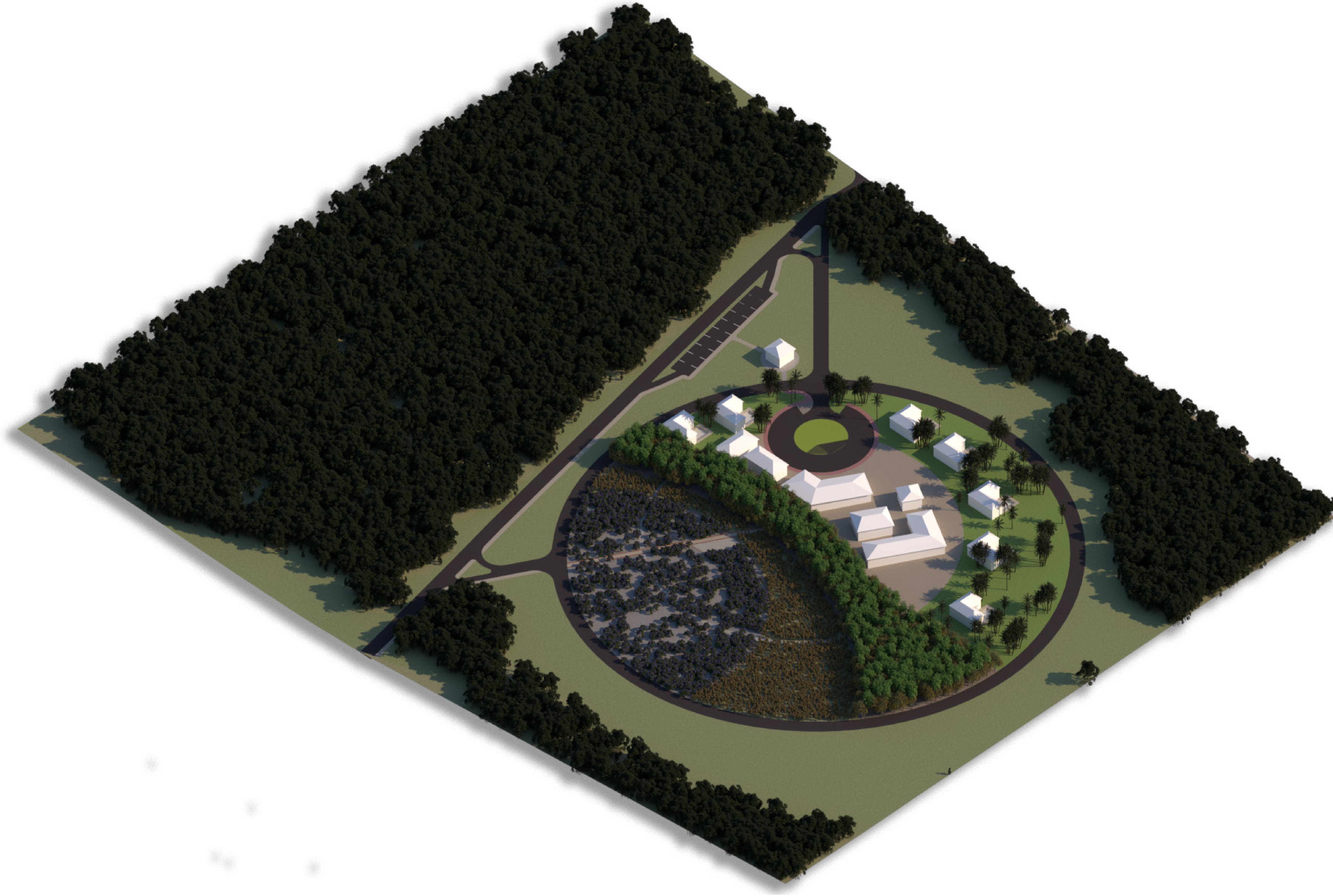
Rain Harvest Tank

SITE FEATURES AND COMPONENTS

EARLY 3D VISUALIZATIONS



EARLY 3D VISUALIZATIONS



OF EARTH, LAND + SEA MASTER PLAN

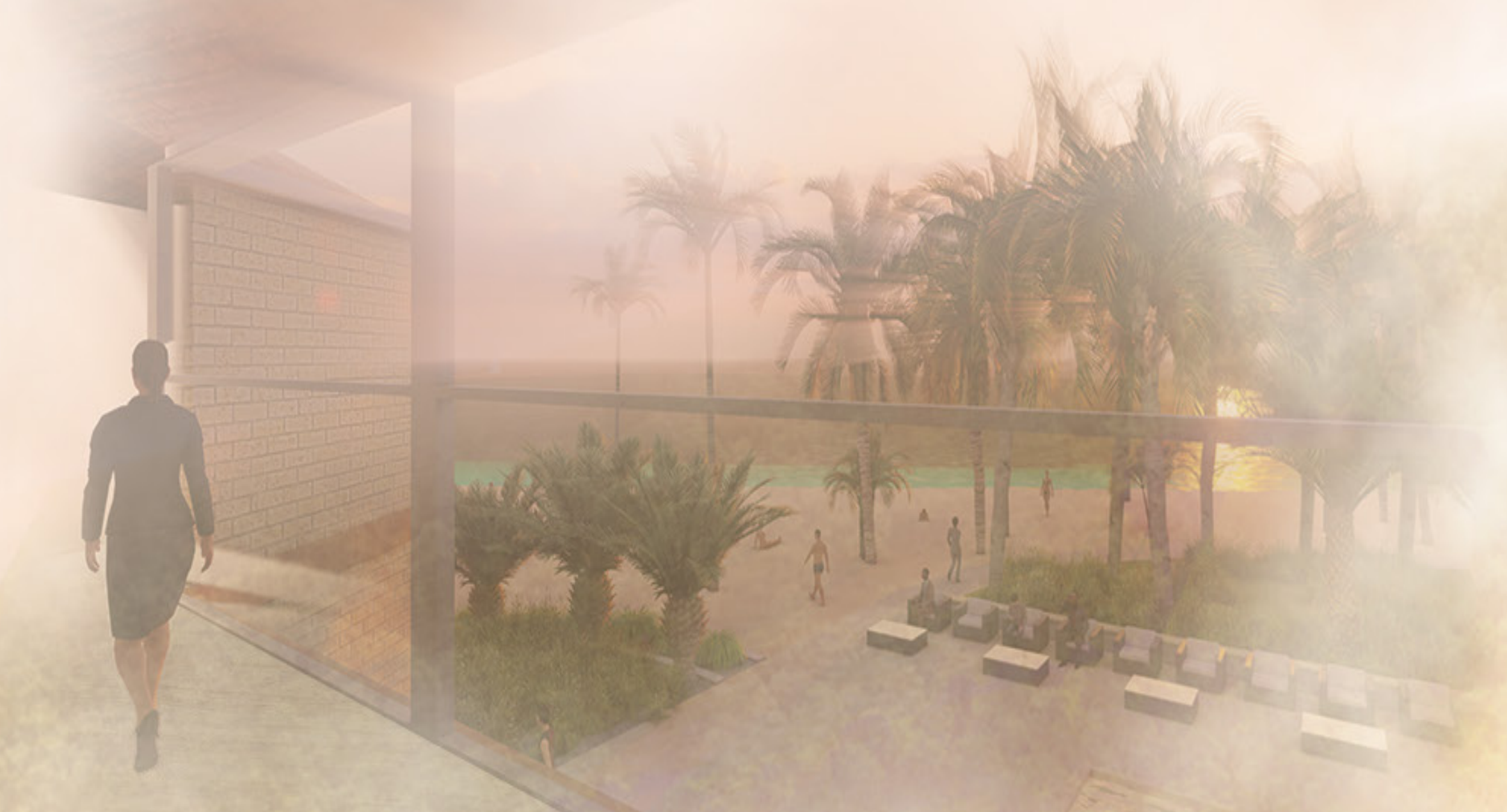


KEY | LEGEND

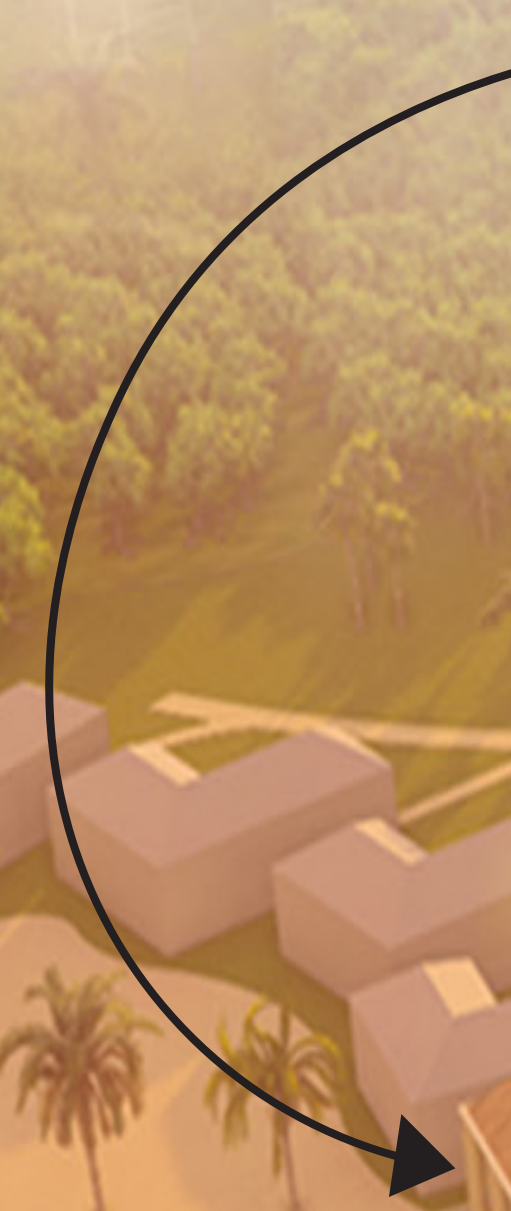
- A Dead Man's Reef | Atlantic Ocean
- B1 Of Earth, Land + Sea Resort | The Cove | Gardens by the Cove
- B2 Dead Man's Reef Beach Villas
- B3 The Reef's Edible Garden | Edible Landscape
- B4 Helping Hand Garden | Participatory Garden
- C1 Queen's Community Garden
- F1 Urban Agriculture | Small vegetables + Fruits
- F2 Urban Agriculture | Medium vegetables + Fruits
- F3 Urban Agriculture | Large vegetables + Fruits
- F4 Earth by Sea Farmstead
- F5 Earth by Sea Villas

Queens Hwy

OF LAND, EARTH + SEA OVERVIEW



INTERIOR OVERVIEW



OUTDOOR FOOD STALL



EARTH BY THE SEA SHELTER

GARDENS BY THE COVE PRODUCTIVITY

PROJECT GOAL 1.1

To develop spaces that will feature a variety of native and non-native plant species that are edible and are designed to be utilized for the proposed resort restaurant

E.g. Potato (Non-Native) | Sea Grape (Native)

PROJECT GOAL 2.2

To generate 25% of recommended daily fruit and vegetable intake.

E.g. Recommendation = 2 Cups
Proposal = 1/2 Cup

I.e. 2 Cups of sliced Banana's = 266 Calories
1/2 Cup of sliced Banana's = 66.5 Calories










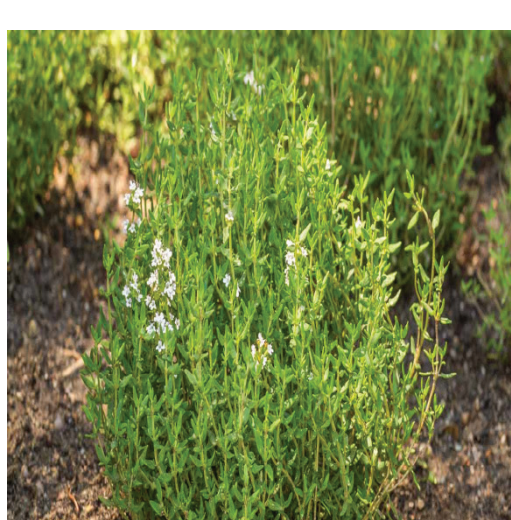
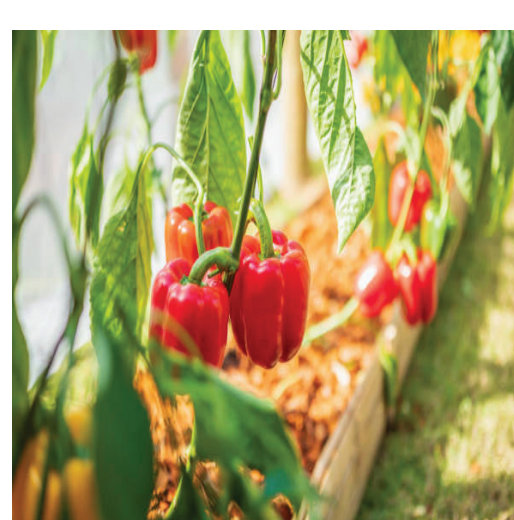





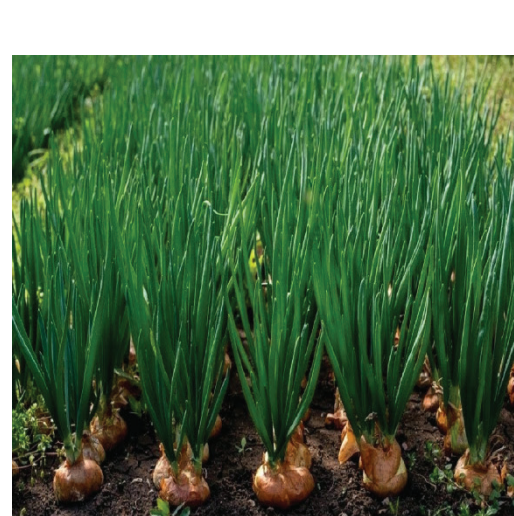

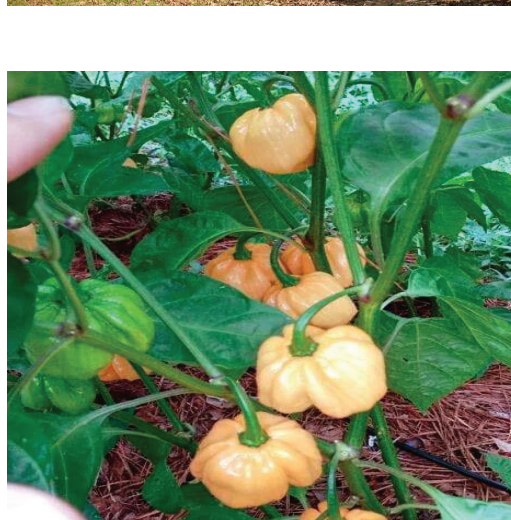
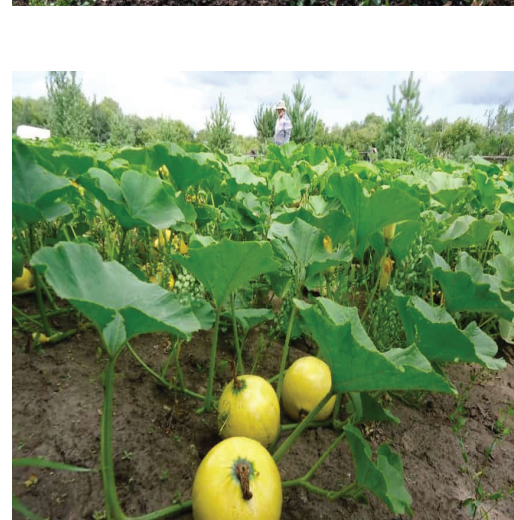


GARDENS BY THE COVE KEY | LEGEND

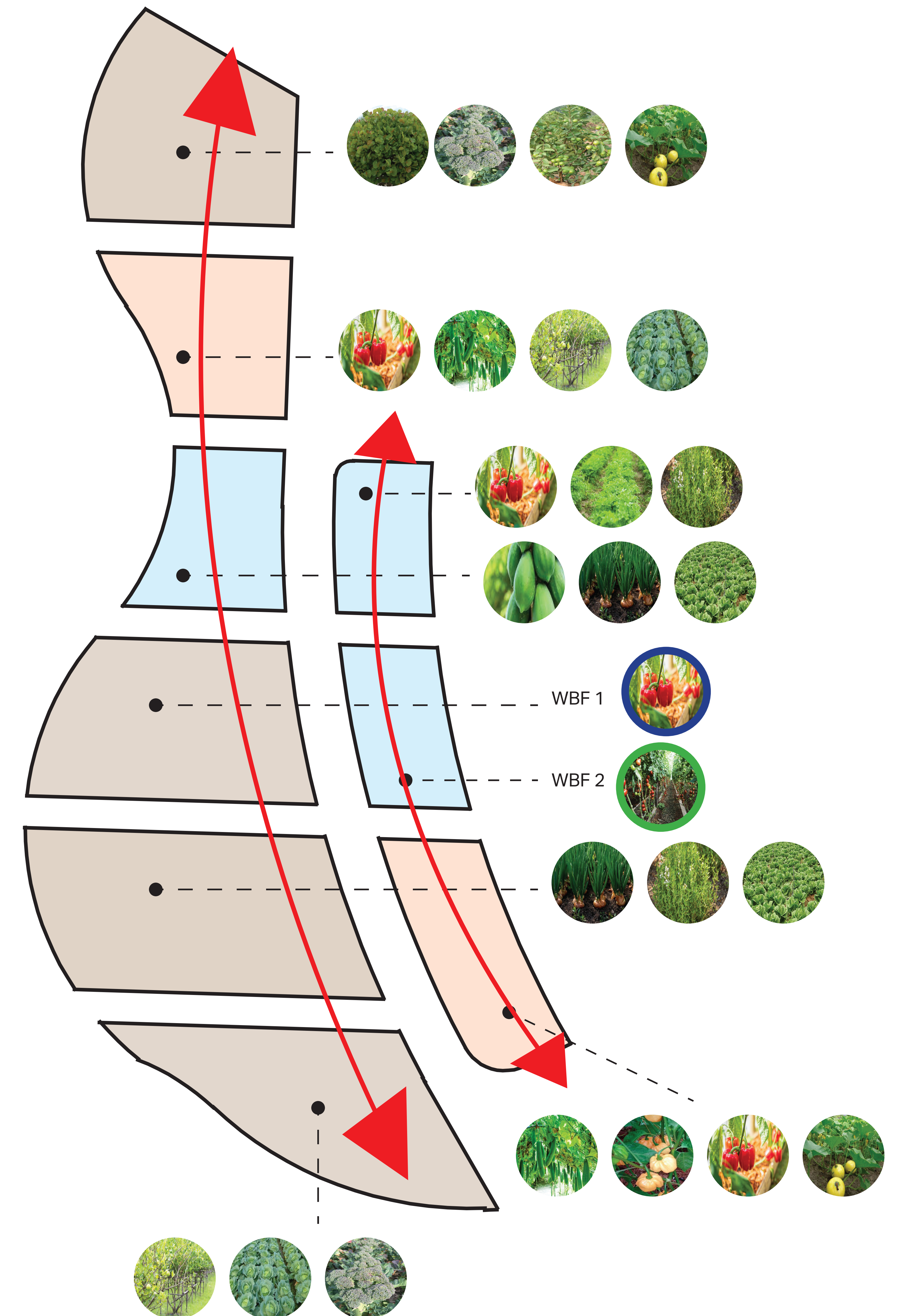
- Less than 100 Sq Ft
- 100 - 200 Sq Ft
- 200 - 300 Sq Ft
- 300 - 400 Sq Ft
- 400 - 500 Sq Ft
- More than 500 Sq Ft

CDC RECOMMENDATIONS

CDC guidelines suggests that the average adult male and female consume a daily intake of 2 to 2 1/2 cups of fruits and vegetables a day. Females ages 19 through 30 require about 1,800 to 2,400 calories a day. Males in this age group have higher calorie needs of about 2,400 to 3,000 a day. Calorie needs for adults ages 31 through 59 are generally lower; most females require about 1,600 to 2,200 calories a day and males require about 2,200 to 3,000 calories a day.

(p.95 | Dietary Guidelines for Americans, 2020-2025)

SEA GRAPE		CABBAGE		POTATO	
TOMATO		BROCCOLI		OKRA	
LIME		PEPPER ORANGE		LETTUCE	
THYME		SWEET PEPPER		BANANA	
ZUCCHINI		PAPAYA		PINEAPPLE	
MANGO		ONION		GUAVA	
GOAT PEPPER		SQUASH		COCONUT	
PARSLEY					



EARTH BY SEA PRODUCTIVITY

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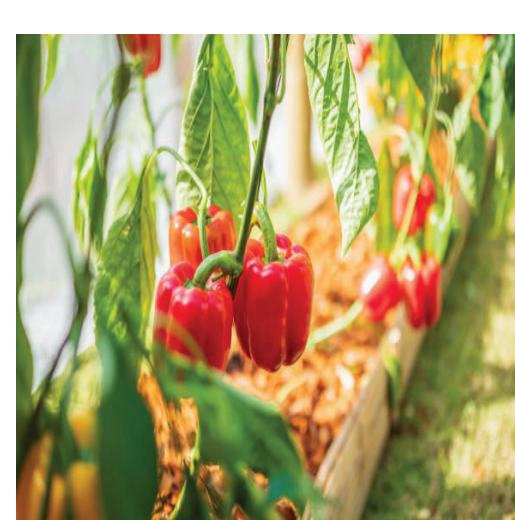





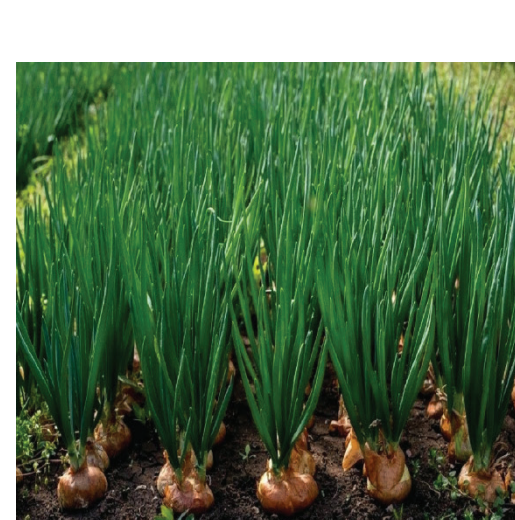
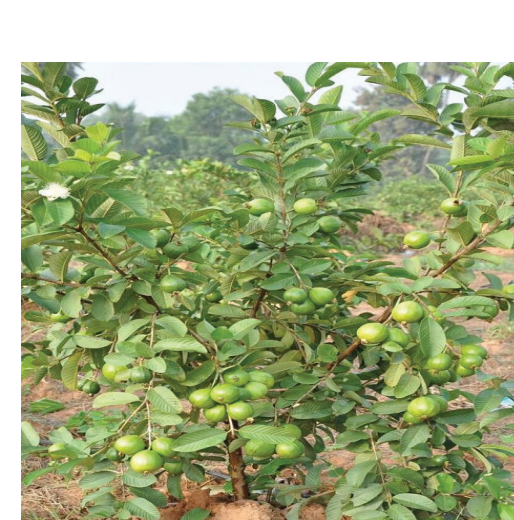

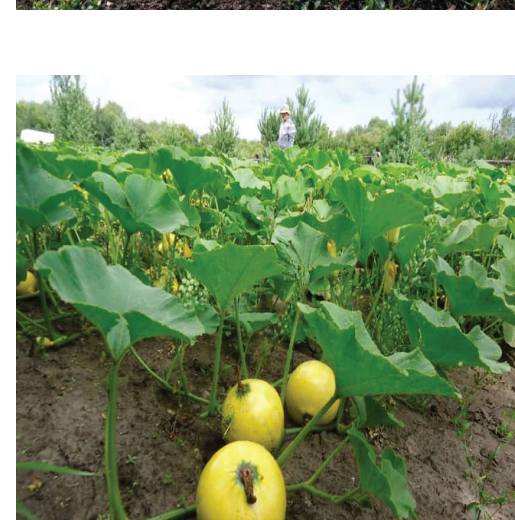


EARTH BY THE SEA KEY | LEGEND

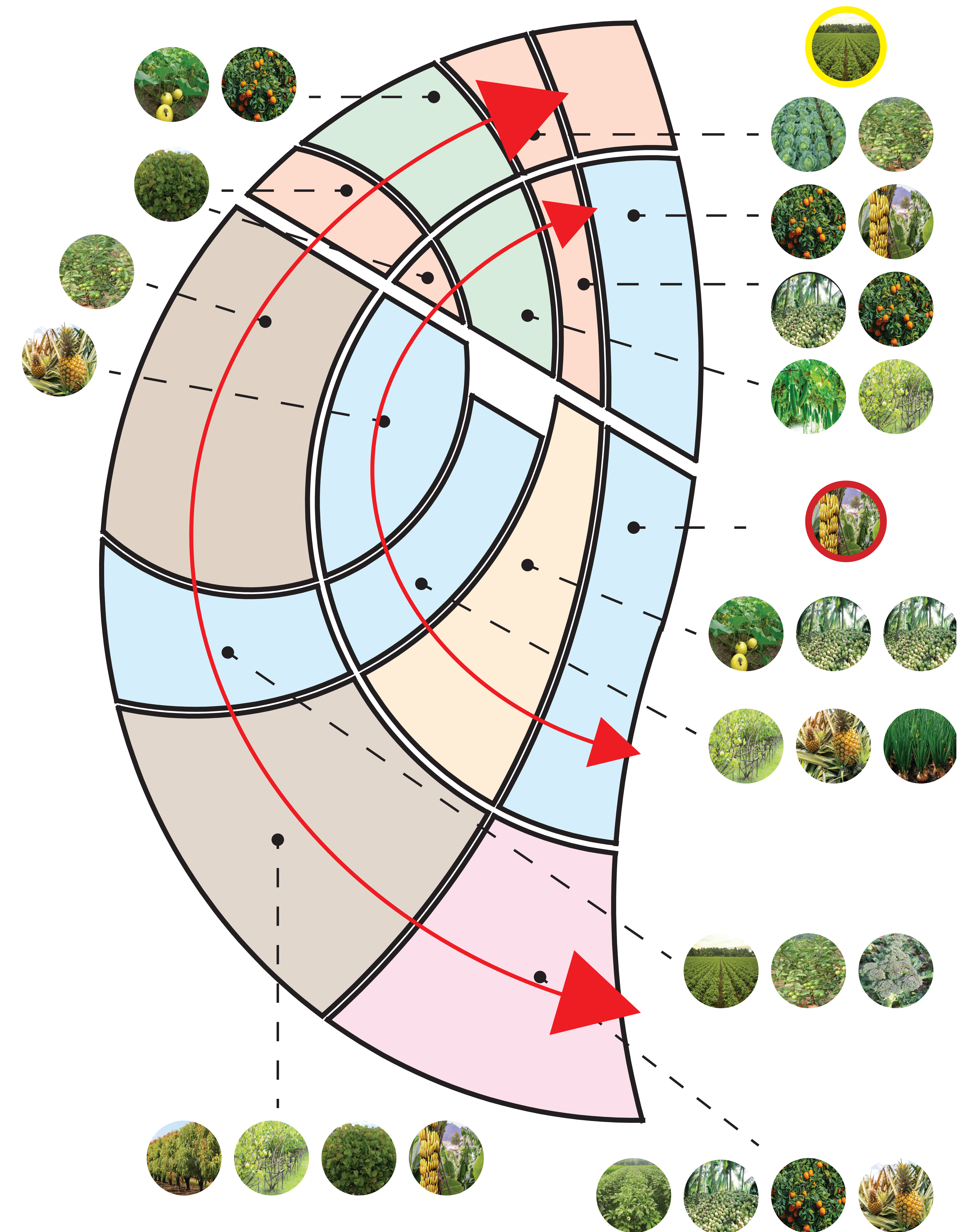
- Less than 4,356 Sq Ft
- 4,356 - 8,712 Sq Ft
- 8,712 - 13,068 Sq Ft
- 13,068 - 17,424 Sq Ft
- 17,424 - 21,780 Sq Ft
- More than 21,780 Sq Ft

CDC RECOMMENDATIONS





CDC guidelines suggests that the average adult male and female consume a daily intake of 2 to 2 1/2 cups of fruits and vegetables a day. Females ages 19 through 30 require about 1,800 to 2,400 calories a day. Males in this age group have higher calorie needs of about 2,400 to 3,000 a day. Calorie needs for adults ages 31 through 59 are generally lower; most females require about 1,600 to 2,200 calories a day and males require about 2,200 to 3,000 calories a day.

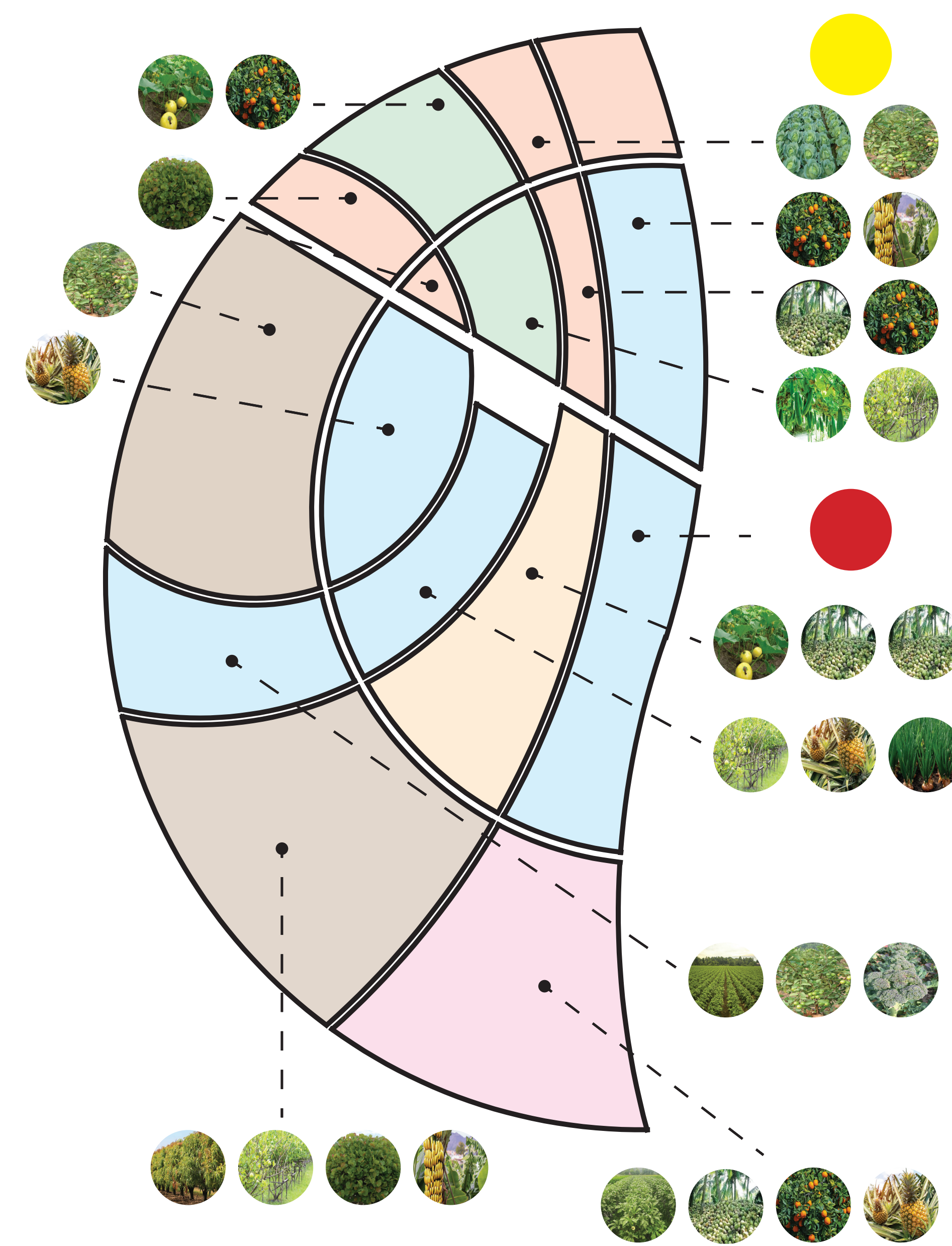
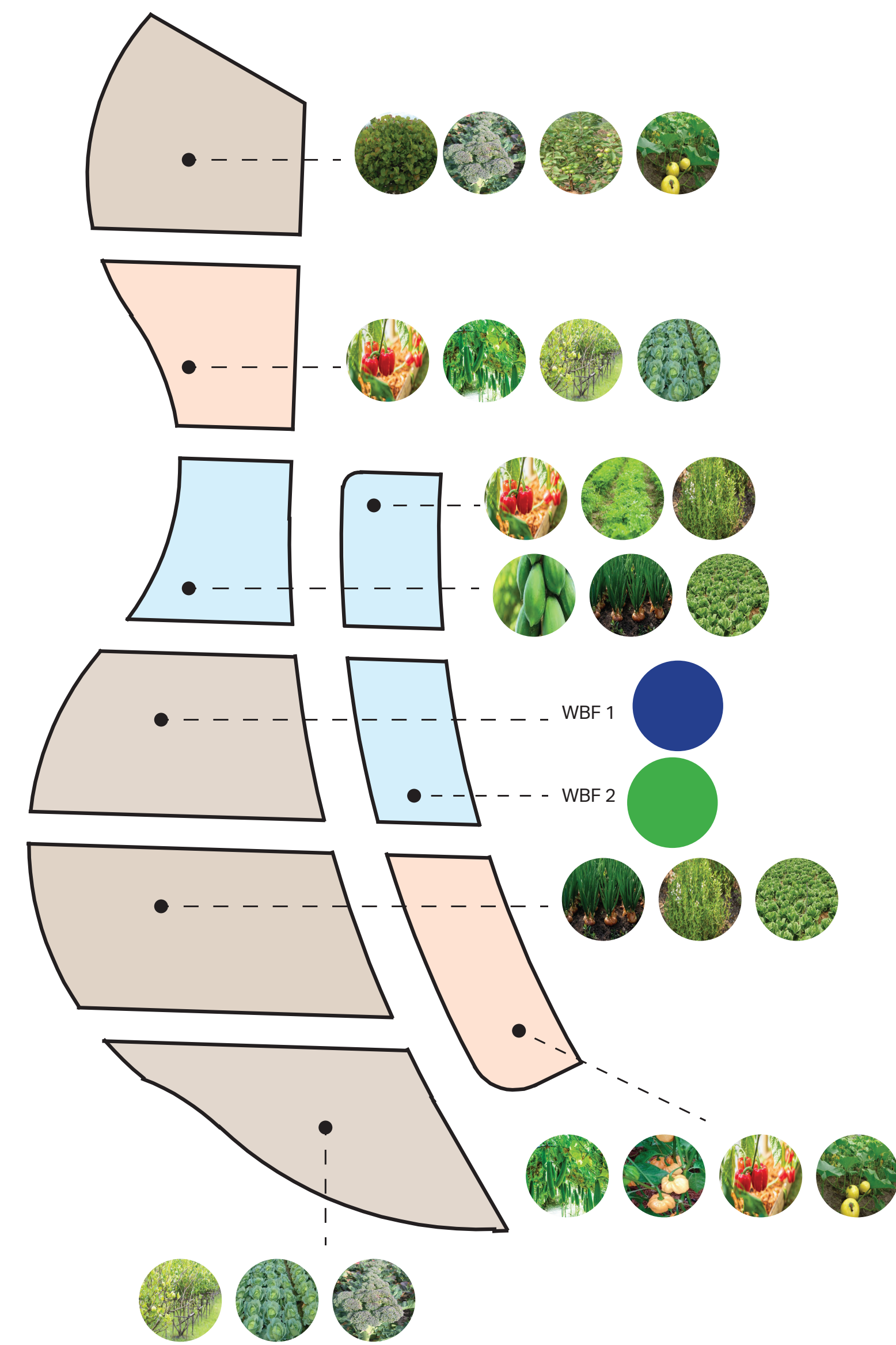
(p.95 | Dietary Guidelines for Americans, 2020-2025)

SEA GRAPE		CABBAGE		POTATO	
TOMATO		BROCCOLI		OKRA	
LIME		PEPPER ORANGE		LETTUCE	
THYME		SWEET PEPPER		BANANA	
ZUCCHINI		PAPAYA		PINEAPPLE	
MANGO		ONION		GUAVA	
GOAT PEPPER		SQUASH		COCONUT	
PARSLEY					



PRODUCTIVITY CHART

POTENTIAL PLANTINGS	AREA SELECTION	AREA SQ FT	PLANT PALETTE	PRODUCTION (YR)	DAYS TO MATURE	DAILY CALORIES (100)
WBF 1		570	180 Sweet Peppers	525 Sweet Pepper	105 - 125 Days	53 Calories
WBF 2		225	91 Tomatoes	302 Tomatoes	85 - 110 Days	18 Calories
EF 1		4,611	1,500 Potatoes	6,843 Potatoes	74 - 80 Days	3,055 Calories 18.6 Potatoes
EF 2		12,776	90 Banana Trees	21,600 Bananas	300 - 450 Days	6,195 Calories 50 Cups



PLANT LIST + CALENDAR

Plant Species	Salt Tolerant	Drought Tolerant	Large Scale	Small Scale	Availability	Hydroponic Capability	Space Needed Apart		No. Running Feet of Row (56)		Total RfOR (96)	Seed & Plant Guide		Days to Mature	Sq Ft for 56	Sq Ft for 96	Total Sq Ft	Total Nu
Cabbage	N			x	Nov-June		24-36"	12-14" R	60' per 5	672	1152	50 Plants	560 Plants	80-115	722	1202		
Sweet Pepper	N			x	Oct-Aug	x	18"	30-36" R	20' per 5	224	384	12 Plants	134. Plants	105-125	274	434		
Okra	N			x	May-Dec		3'		75' per 5	840	1440	2 Oz	22.4 Oz	60	890	1490		
Goat Pepper	N			x	May-March	x	18-24"		20' per 5	224	384	12 Plants	134. Plants	105-125	274	434		
Tomato	M			x	Nov-June		18-24"		150' per 5	1680	2880	48 Plants	537.6 Plants	85-110	1730	2930		
Zucchini	M			x	Nov-March	x	36"											
Lettuce ®	M	M		x	Dec-May	x	12-18"		150' per 5	1680	2880	1 Oz	11.2 Oz	60-90	1730	2930		
Squash (Y)	Y			x	Jan-July	x	3-6'		12 Hills pe	134.4	230.4	1 Oz	11.2 Oz	42-52	184.4	280.4		
Broccoli	Y			x	Nov-May	x	18-24"	36" R	40' per 5	448	768	1/2 Oz	5.6 Oz	115	498	818		
Papaya	N		x		Year-Round		7-10'											
Banana	N		x		Year-Round		12'							300 - 450				
Coconut	Y	Y	x		Year-Round		20'											
Lime (p)	M			x	June-Mar		12'											
Mango	N		x		Feb-Sept		25-30'											
Pineapple	M	N		x	Nov-July		5'											
Thyme	N	Y		x	Year-Round	x	12-24"											
Guava	M	Y		x	Year-Round		10-15'											
Sea Grape (H)	Y		x		July-Sep		3-4'											
Potato (I)	M			x	Mar-May		12"	3' R	200' per 5	2240	3840	25 lbs	280 lbs	75-80	2290	3890		
Parsley				x	Nov-June	x	6-8"											
Orange (OJ)	N		x		Oct-July		12-25'								N/A	N/A	37,228	4
Onion	N			x	Mar-June	x	2-4"	12-18" R	80' per 5	896	1536	1 Oz	11.2 Oz	42-45	946	1586		

N = Not Tolerant
M = Moderately Tolerant
Y = Tolerant

PLANTING CALENDAR	January	February	March	April	May	June	July	August	September	October	November	December
Cabbage	X	X						X		X	X	X
Sweet Pepper	X	X					X					X
Okra	X	X	X	X	X	X	X					
Goat Pepper	X	X						X		X	X	X
Tomato	X	X	X	X	X		X	X				
Zucchini												
Lettuce ®	X	X	X					X				
Squash (Y)	X	X										
Broccoli								X			X	X
Papaya	X	X	X	X	X	X	X	X	X	X	X	X
Banana	X	X	X	X	X	X	X	X	X	X	X	X
Coconut	X	X	X	X	X	X	X	X	X	X	X	X
Lime (p)												
Mango												
Pineapple	X	X	X	X	X	X	X				X	X
Thyme	X	X	X	X	X	X	X	X	X	X	X	X
Guava	X	X	X	X	X	X	X	X	X	X	X	X
Sea Grape (H)												
Potato (I)	X	X	X					X		X	X	
Parsley	X	X								X	X	X
Orange (OJ)												
Onion	X	X	X							X	X	

Ornamental Plant List	Type	Height	Spread	Salt tolerant
Pigeon Plum	Tree	25'-30'	20'	Yes
Lignum Vitae	Tree Shrub	8'-12'	8'-12'	Yes
Railroad Vine	Vine	16"	N/A	Yes
Silver Buttonwood	Tree Shrub	15'-20'		Yes
Bav Lavender	Shrub	24"	24"	Yes
Allspice	Shrub	10'	12'	Moderate
Royal Palm	Tree	50'-75'	20'-25'	Moderate
Queen Palm	Tree	50'	20-25'	Moderate

THE COVE: RESTAURANT



GARDENS BY THE COVE



THE COVE AND THE GARDENS OVERVIEW



OF LAND, EARTH + SEA SECTION

KEY | LEGEND

- A Dead Man's Reef | Atlantic Ocean
- B Mangrove Forest
- C Edible Garden
- D The Cove Restaurant
- E Hydroponic Farm
- F One Way Street

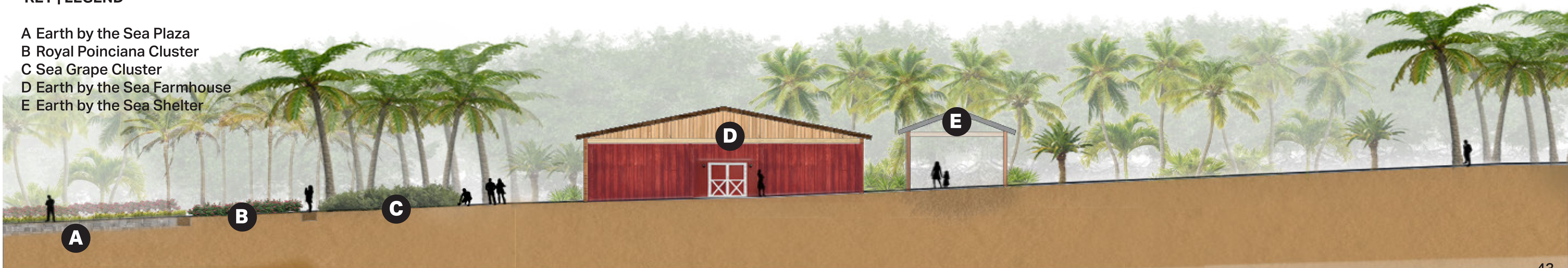


EARTH BY SEA SECTION

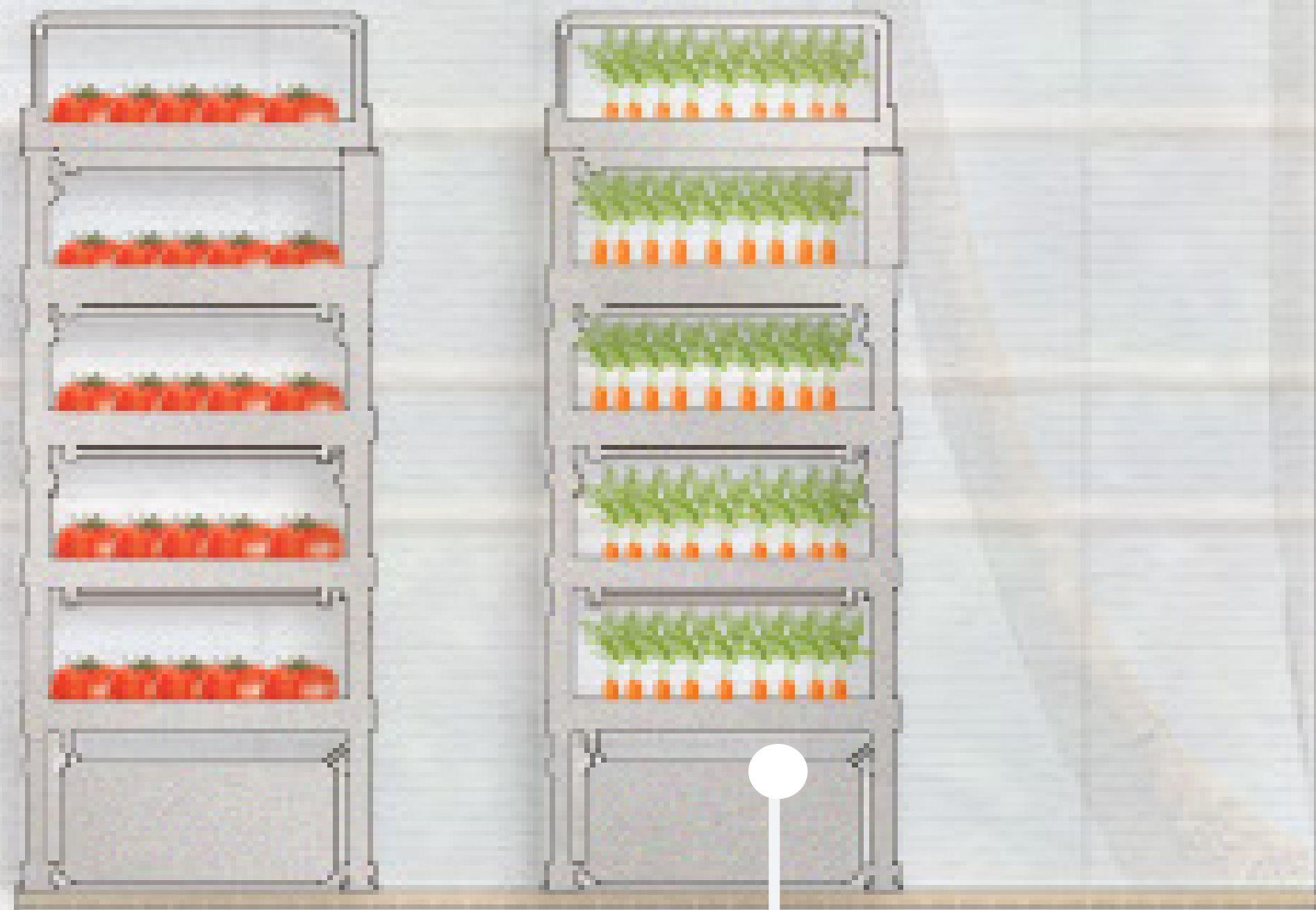
SCALE 1:15

KEY | LEGEND

- A Earth by the Sea Plaza
- B Royal Poinciana Cluster
- C Sea Grape Cluster
- D Earth by the Sea Farmhouse
- E Earth by the Sea Shelter



HELPING HAND GARDEN + HYDROPONIC FARM



Finished Floor Elevation
 Finished Floor Foundation
 Hydroponic Farm
 Sub grade



6" Class II Aggregate
 6" Compact Soil (typ.)
 2" x 1' Stone Slabs (typ.)
 Lettuce
 2" x 4" x 5" Cedar Planter box
 6" Compact Black Soil
 6" Permeable Paver
 Undisturbed Soil
 6" Sub grade
 Shelter
 Cardboard Palm Shrubs
 2" x 4" x 5" Cedar Planter box
 Queen Palm Tree
 Cabbage
 Royal Poinciana Shrub
 2" x 4" x 6" White Composite Boardwalk

EARTH BY SEA OVERVIEW

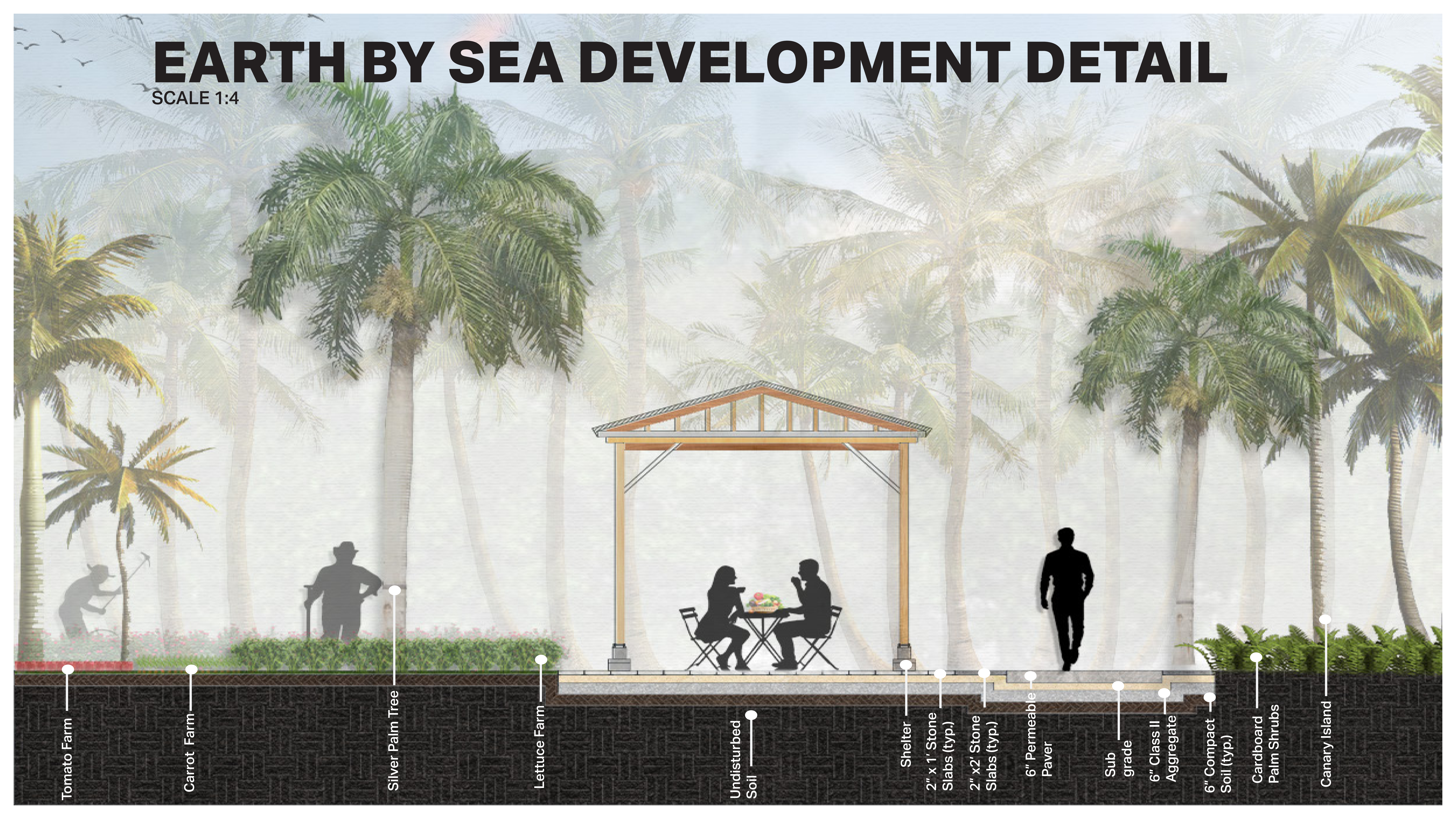


EARTH BY SEA URBAN AGRICULTURE



EARTH BY SEA DEVELOPMENT DETAIL

SCALE 1:4



Tomato Farm

Carrot Farm

Silver Palm Tree

Lettuce Farm

Undisturbed Soil

Shelter

2" x 1' Stone Slabs (typ.)

2" x 2' Stone Slabs (typ.)

6" Permeable Paver

Sub grade

6" Class II Aggregate

6" Compact Soil (typ.)

Cardboard Palm Shrubs

Canary Island

THESIS RECAP

1. WILL THIS PROPOSED ECO-TOURIST RESORT BE SUSTAINABLE THROUGH URBAN AGRICULTURE AND EDIBLE LANDSCAPES?
2. IS THIS A VIABLE PROPOSAL TOWARDS EXPLORING SUSTAINABLE RESORTS IN ORDER TO ALLEVIATE THE COST OF PRODUCE IMPORTATION IN THE BAHAMAS?
3. WILL THIS PROPOSAL BE A START FOR THE BAHAMAS TO INVEST IN SUSTAINABLE RESORT DESIGN?
4. WILL THE METHODS OF EDIBLE LANDSCAPE, FOOD-SCAPE AND URBAN AGRICULTURE BECOME A VIABLE SOLUTION?
5. WILL URBAN AGRICULTURE AND EDIBLE LANDSCAPES PRODUCE ENOUGH RESOURCES TO MEET 25% OF THE DAILY RECOMMENDED CALORIES?

QUESTIONS?

