

# GREENLAND

## A GRICULTURE AS A DRIVER OF INDEPENDENCE

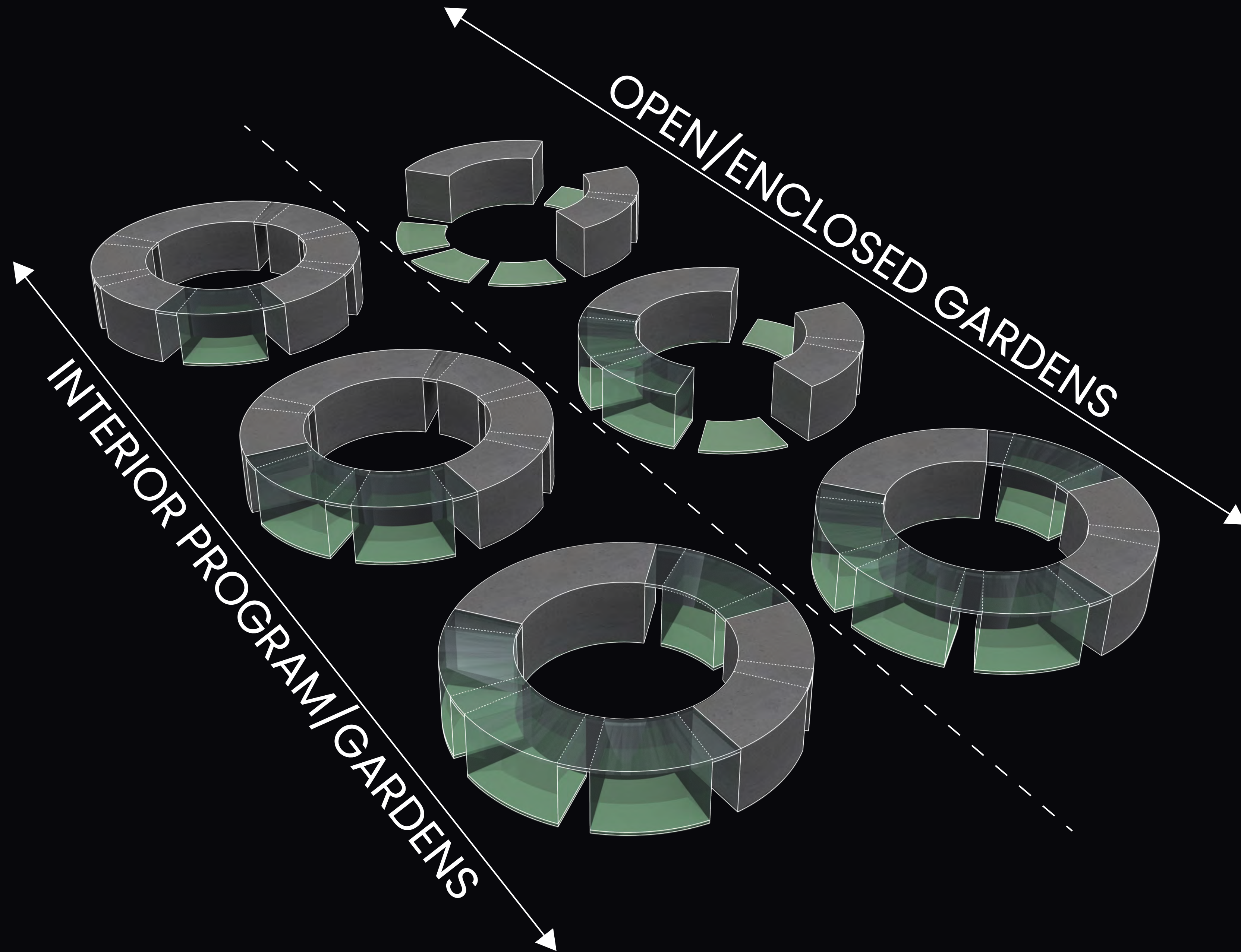
67.7% of all Greenlanders want independence from Denmark. However, economically this is not yet possible. Greenland acquires over half of their budget revenue from Denmark and relies on imports for produce. Produce in Greenland is expensive, and due to difficult winter climates, ships may not be able to enter ports for weeks during harsh freezes. Most of the available produce is frozen.

The warming of Greenland may be detrimental to other countries, but offers a greener future for Greenland. As the ice melts, and the climate warms, Greenlanders will be able to explore other sources of food and income other than hunting seal, which has become increasingly challenging due to the ice melt making hunting on foot nearly impossible. As the ice in populated seal hunting grounds is disappearing or too thin to walk on, and loud boats make it difficult for the hunters to sneak up on prey, hunters are often coming home empty handed. Mining in Greenland has piqued the interest of many as the ice melts, exposing untapped land. Instead of exploiting the earth for minerals, Greenland has a unique opportunity to develop a sustainable source of income.

Agriculture offers the ability to not only create fresh and nutrient rich food for Greenlanders, but even stimulate the economy through commerce. This project is designed to teach the people of Greenland how to sustainably grow into a self sufficient country using new efficient practices, as the climate warms and the ice melts. Agriculture is likely to become a large industry in Greenland, and exploring compact farming will help preserve the newly uncovered land. Greenland can learn from the mistakes of other countries and develop agricultural practices that minimize agricultural sprawl. This project is an educational center where locals can exchange skills, grow food in community gardens, and buy and sell produce in a fresh market. The project is designed to grow with Greenland, and be flexible with the changing needs of each town.

This project begins with a map predicting how Greenland will turn into a lush landscape based on ice melt simulations, climate warming projections, topographic information, known geology, and current agriculture patterns. Based on the generated map, the territorial scale of this project will begin in Narsaq because of the town's existing agricultural presence, and populate North along the West coast.





The form is circular and segmented to allow for modularity and entry from all sides, with a center courtyard to serve as a gathering space for the community. The modular segments allow for the building to be customized to the needs of each town it is placed in. For example, a town with a warmer climate may be able to grow successfully without controlled environments, and won't need as many covered greenhouses. That town might choose to build in more interior program spaces. A town with colder climates may want to swap out some interior program modules for extra farming modules. Modules can be changed out through time as the needs of the town changes. If a town's climate grows temperate enough to plant efficiently without needing controlled farming modules, the modules can be swapped out with an additional market module.





Narsaq, a town in southern Greenland, is the starting ground for this project because it is one of the few towns in Greenland where there is an agricultural presence currently. Outlined on this map are a few established potato farms. The experienced farmers in this unique climate have techniques and methods that can be taught to new farmers.







LATE SPRING 7AM

LATE SPRING 9AM

LATE SPRING 11AM

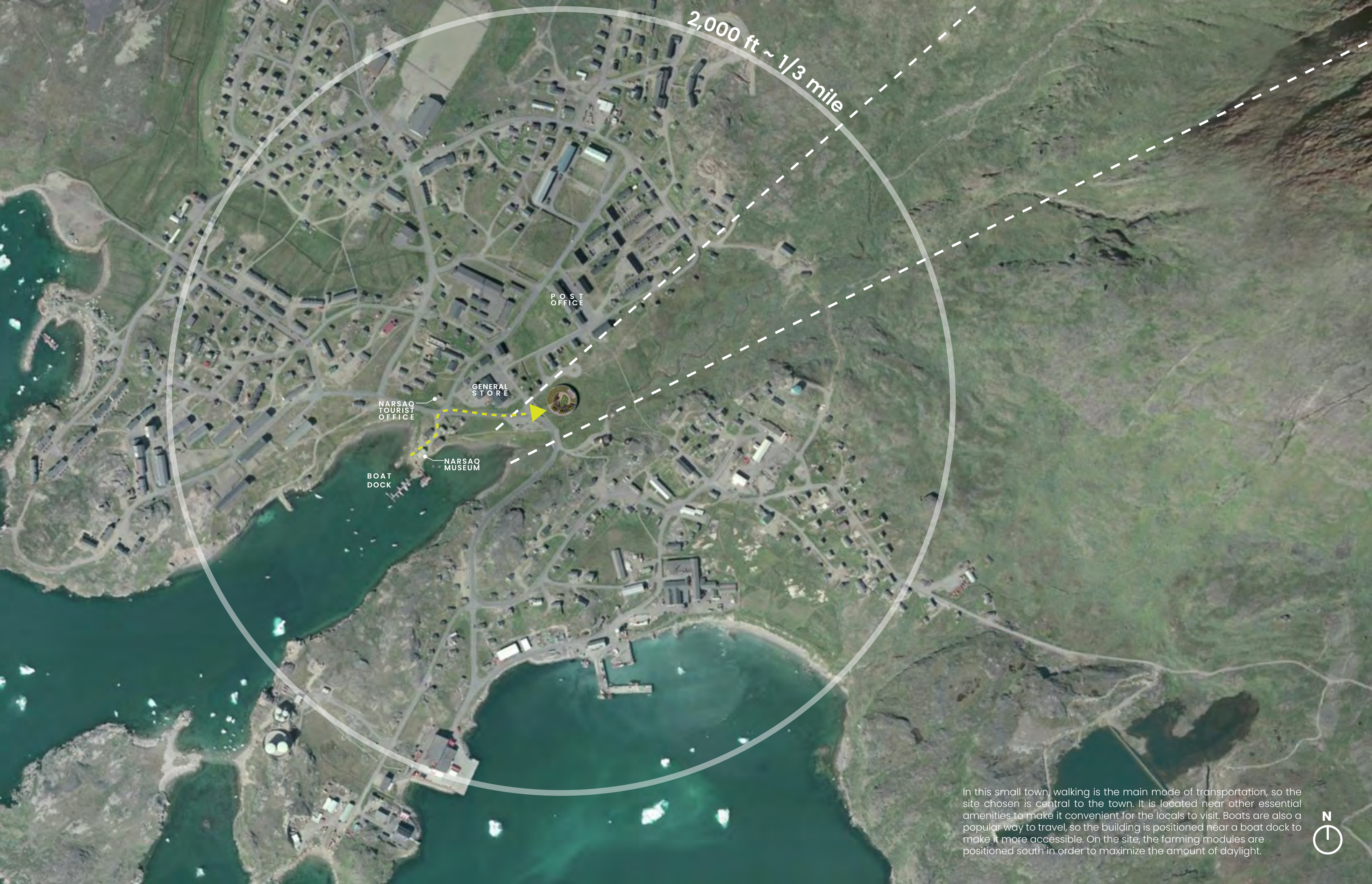
LATE SPRING 1PM

LATE SPRING 3PM

LATE SPRING 5PM

LATE SPRING 7PM

LATE SPRING 9PM



2,000 ft ~ 1/3 mile

POST OFFICE  
GENERAL STORE  
NARSAQ TOURIST OFFICE  
NARSAQ MUSEUM  
BOAT DOCK

In this small town, walking is the main mode of transportation, so the site chosen is central to the town. It is located near other essential amenities to make it convenient for the locals to visit. Boats are also a popular way to travel, so the building is positioned near a boat dock to make it more accessible. On the site, the farming modules are positioned south in order to maximize the amount of daylight.

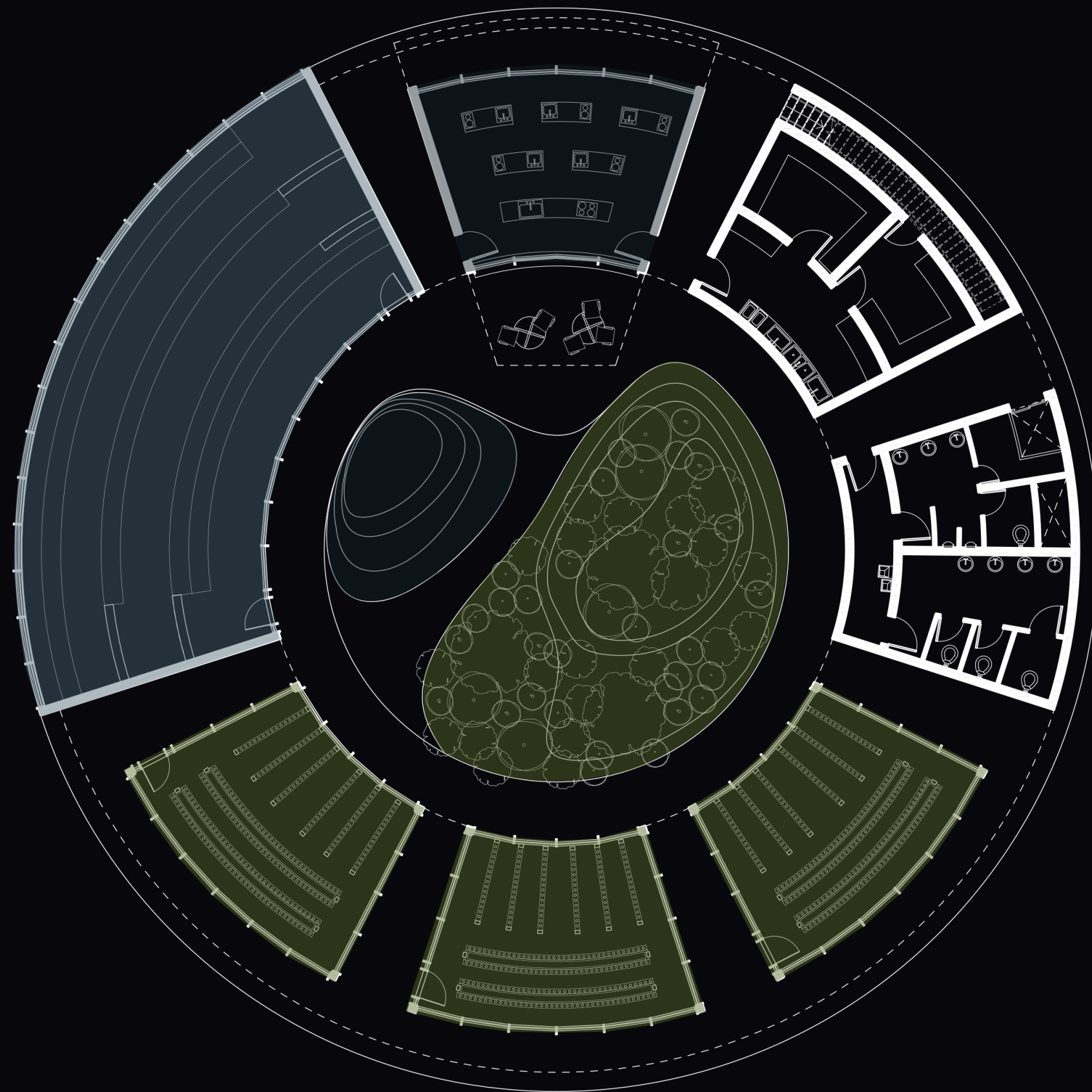




# GROW PLANTS

# TEACH LOCALS

# STIMULATE LOCAL ECONOMY



This design aims to combine sustainable agriculture with economic growth, as the community microfarms can grow year round fresh produce to sell in the local market to stimulate the local economy, and teaching spaces for sharing successful methods and skills.

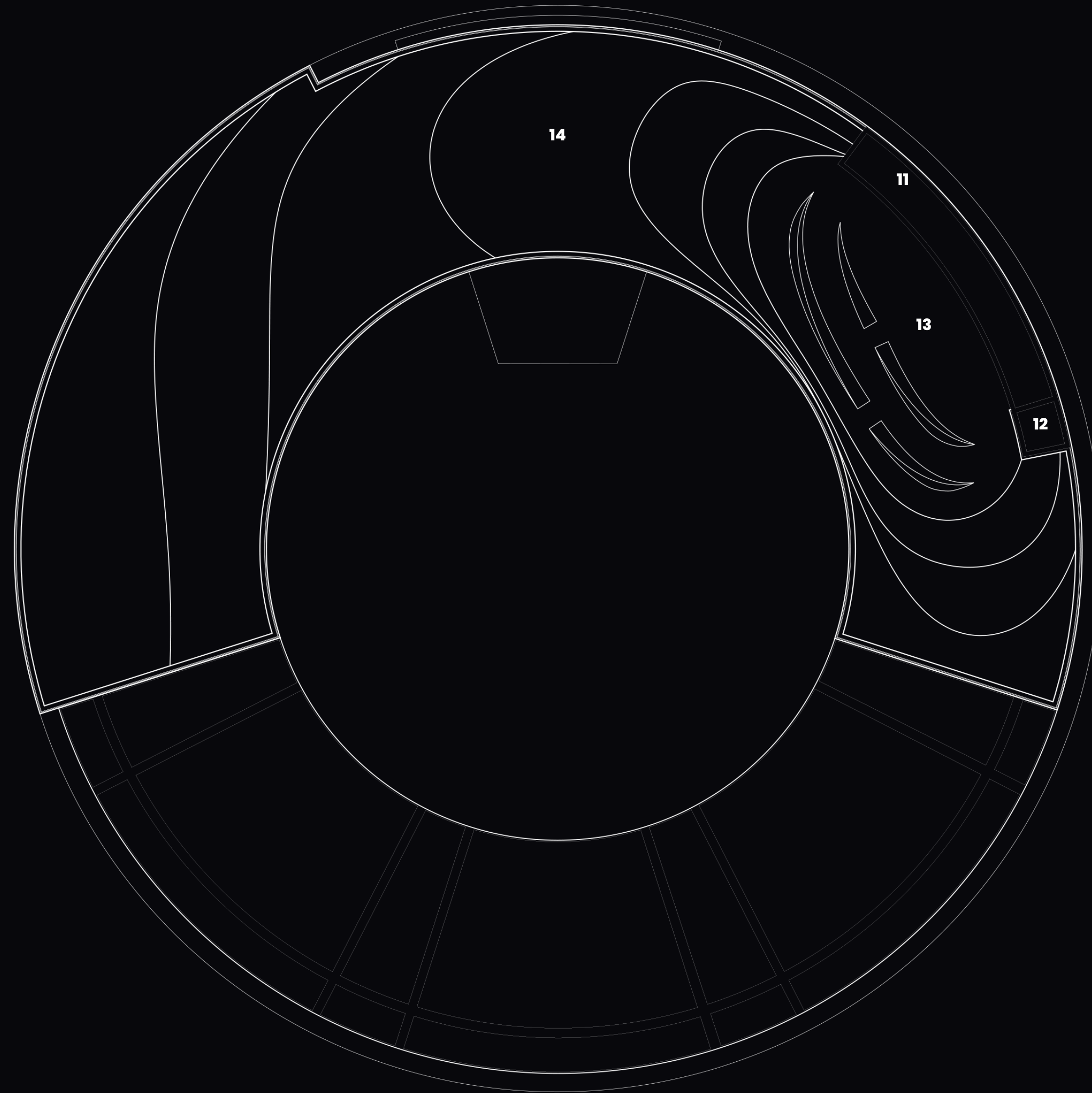




- 1 COMMUNITY GARDENS
- 2 TREE NURSERY
- 3 OUTDOOR CLASSROOM
- 4 LOCAL MARKET
- 5 TEACHING KITCHEN
- 6 PRODUCE WASH ROOM
- 7 PRODUCE STORAGE
- 8 REFRIGERATED STORAGE
- 9 MEN'S RESTROOM
- 10 WOMEN'S RESTROOM
- 11 STAIRS
- 12 ELEVATOR
- 13 VIEWING TERRACE
- 14 WILDFLOWER GARDEN







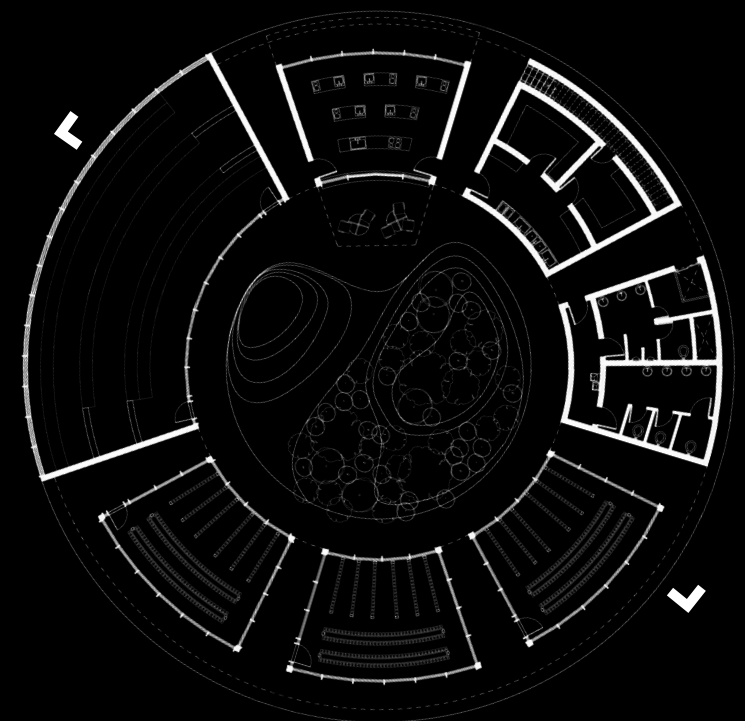
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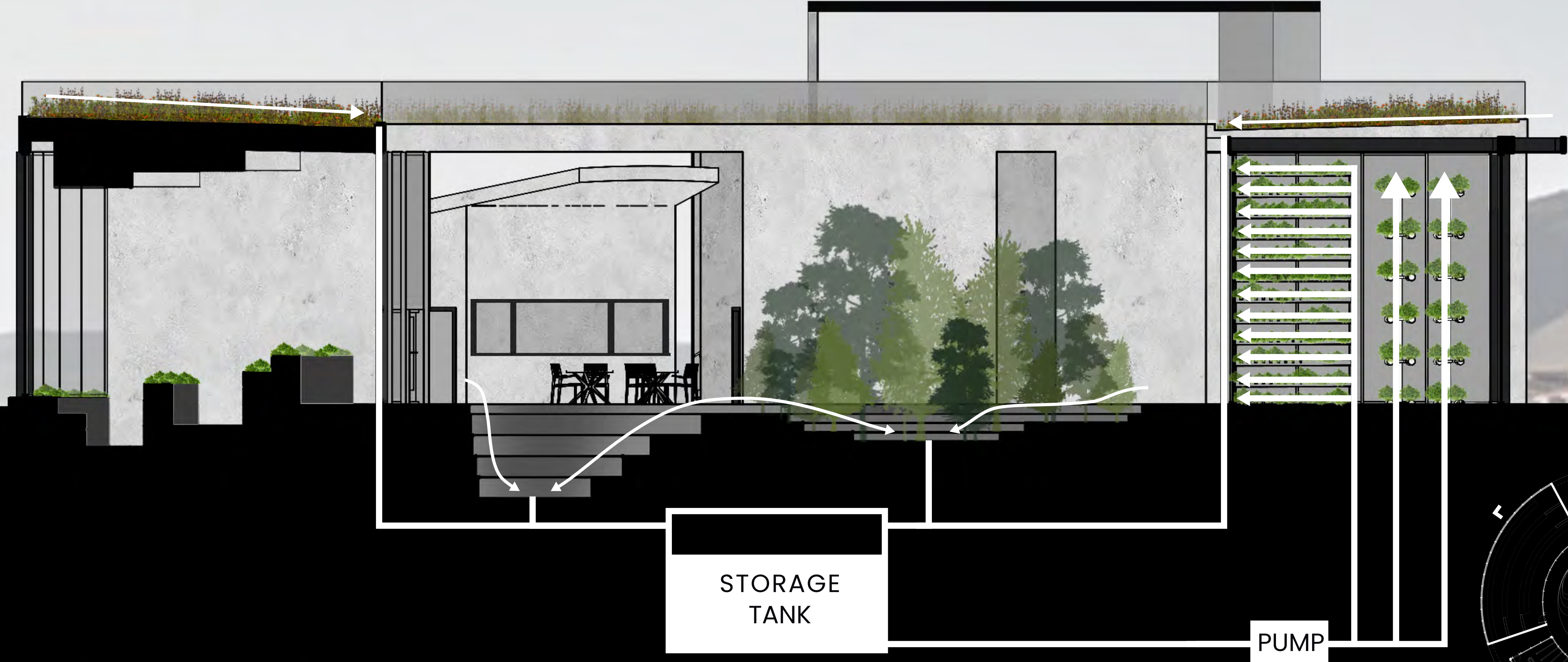


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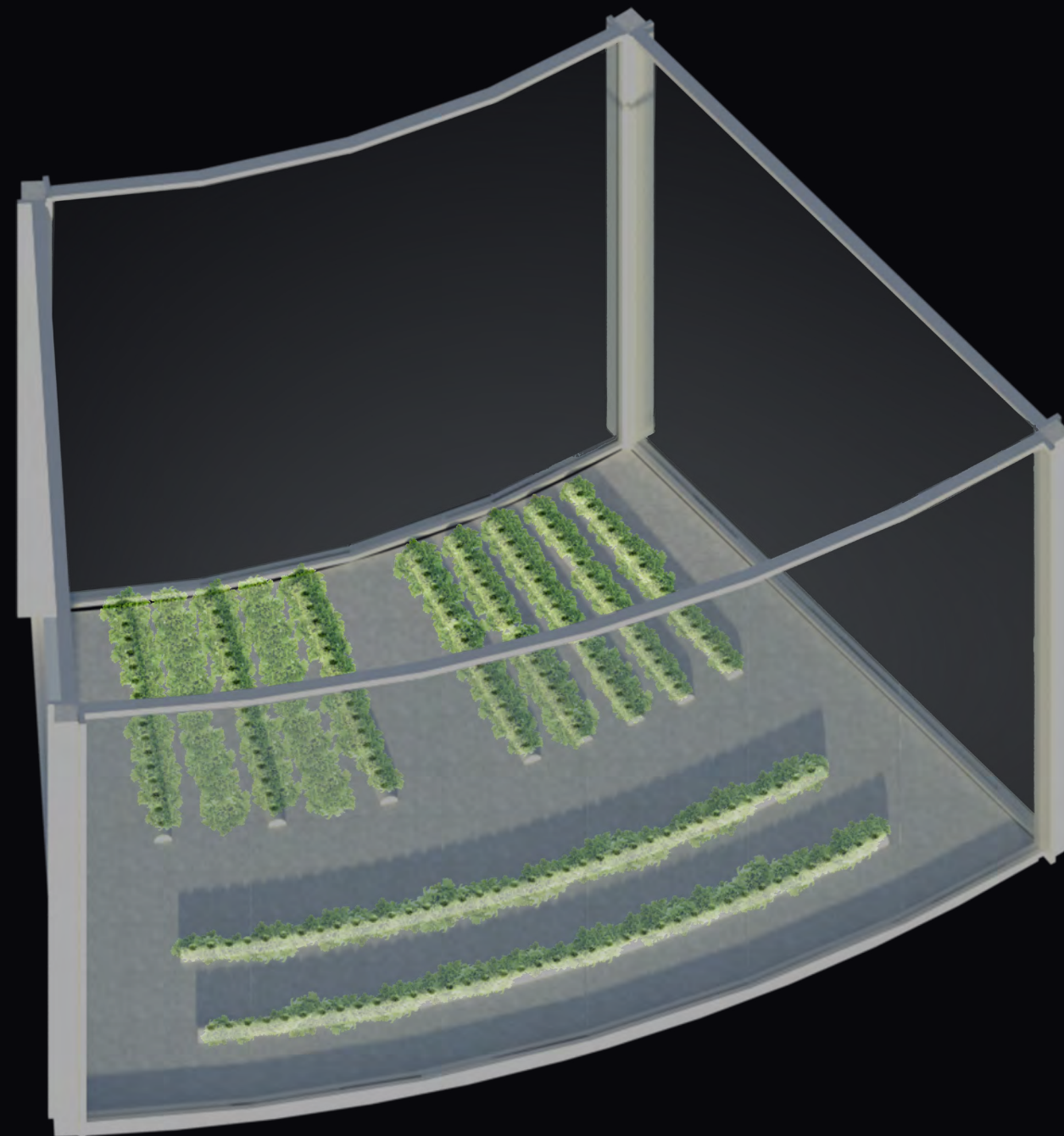




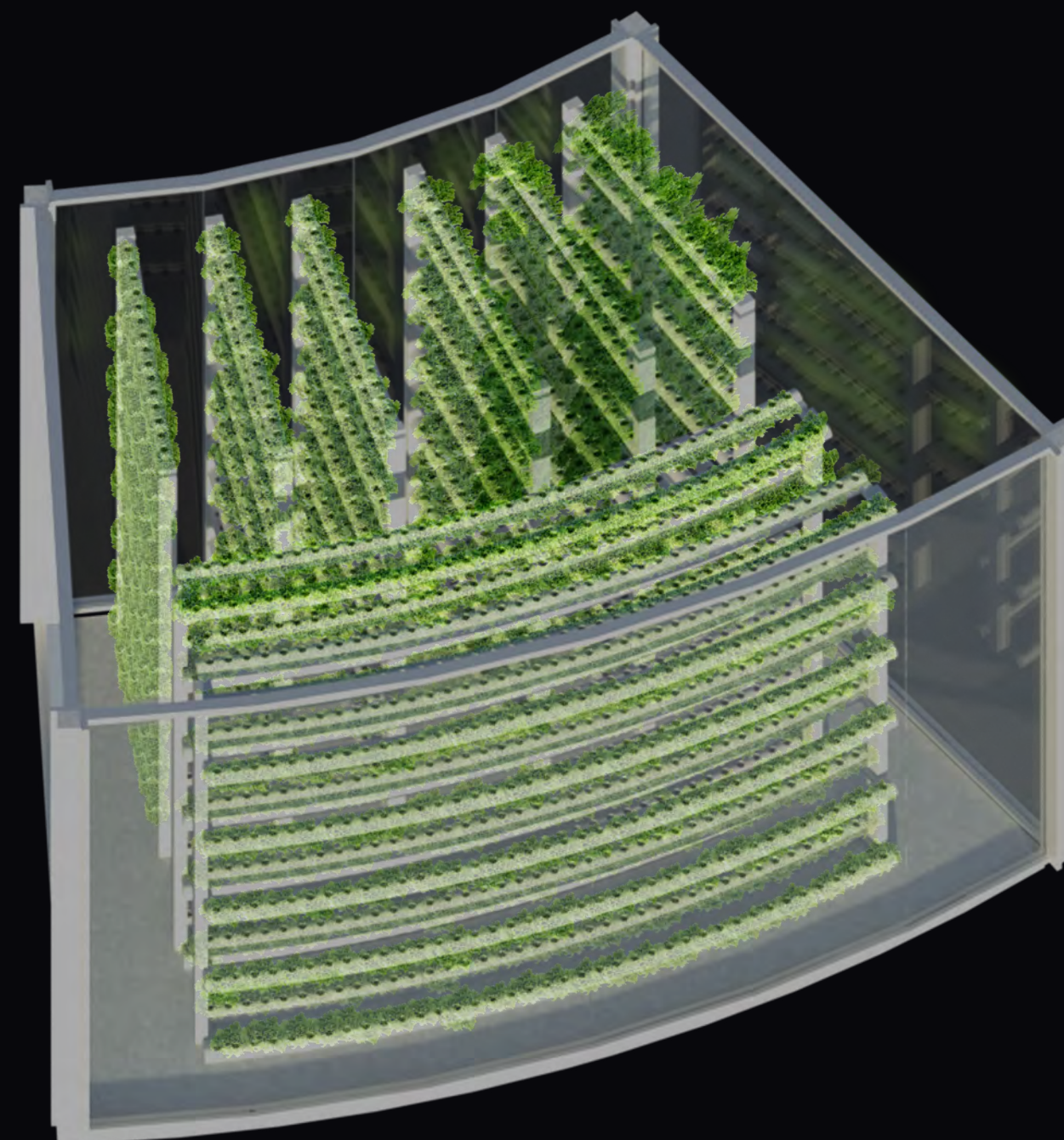
The building is designed so that rainwater and snow melt collected on the rooftop and courtyard flow into the terraced spaces and are drained into an underground storage tank. That water can then be utilized in the hydroponic systems in the microfarms year round.







**TRADITIONAL METHOD**  
PRODUCES APPROX 110 HEADS OF LETTUCE PER HARVEST

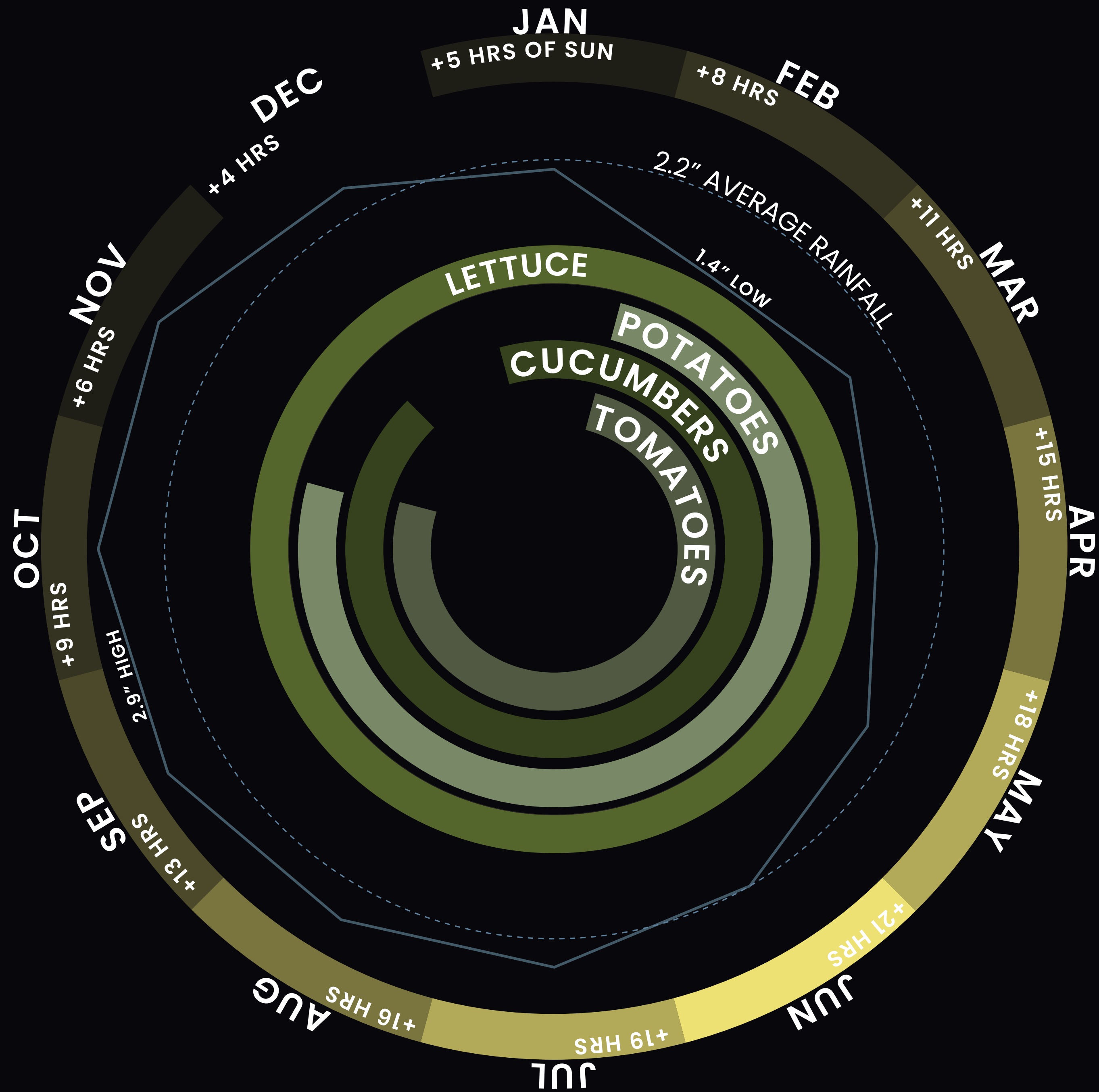


**VERTICAL GROWING + HYDROPONIC METHOD**  
PRODUCES APPROX 1,980 HEADS OF LETTUCE PER HARVEST

The microfarms utilize a combination of vertical farming and hydroponic farming to maximize production while minimizing agricultural sprawl. Hydroponic farming produces more growth in less space by feeding the plants nutrients through water instead of soil. Greenland has rocky terrain that makes it difficult to farm, but no shortage of water. By utilizing hydroponic farming methods, plants can grow closer, with more nutrients so they grow fuller, and are harvested quicker. In a controlled greenhouse, some plants can grow year round.

# MICROFARMS





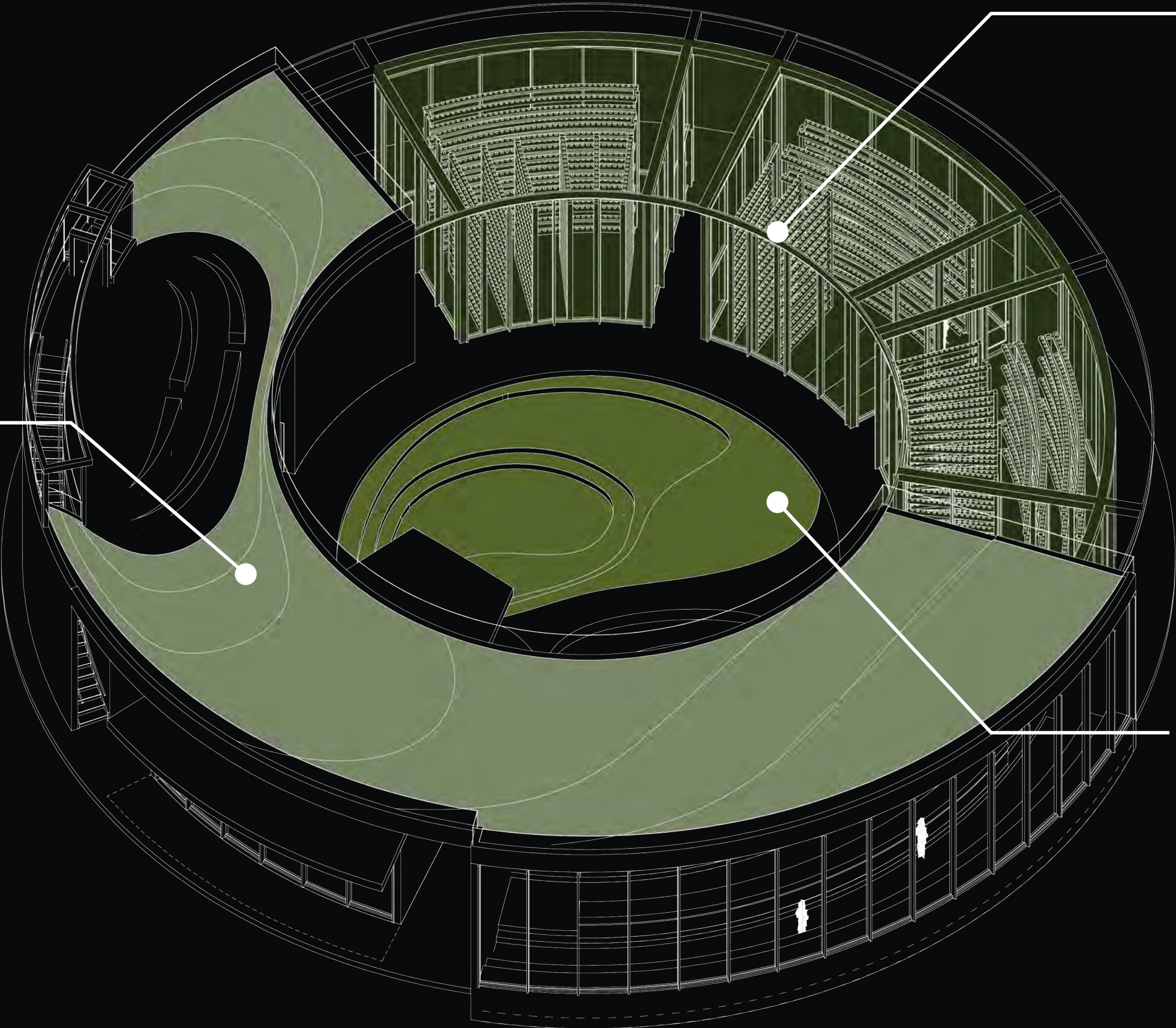
The project calendar estimates when certain plants can grow based on typical greenhouse growth plus Greenland's environmental conditions, such as the amount of sunlight each day or average monthly rainfall. The plants chosen are also selected because of their high yields and ability to grow in close proximity.

**MICROFARMS**



**WILDFLOWER GARDEN**

- ARNICA ANGUSTIFOLIA*
- CIRSIUM ARVENSE*
- CAMPANULA GIESECKEANA*
- DRABA AUREA*
- ERIGERON COMPOSITUS*
- LIGUSTICUM SCOTICUM*
- SILENE SUECICA*



**MICROFARM**

- POTATOES*
- TOMATOES*
- LETTUCE*
- CUCUMBERS*

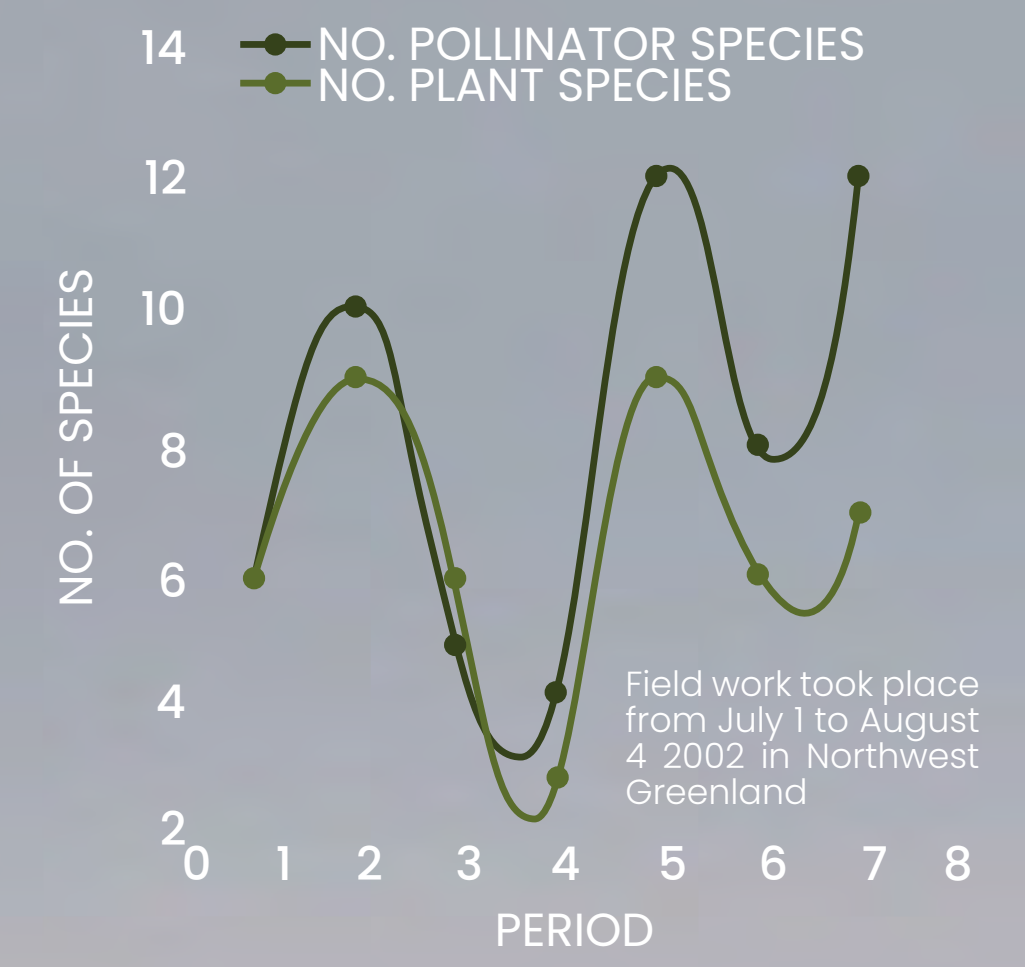
**TREE NURSERY**

- BETULA PUBESCENS*
- LARIX SIBIRICA*
- PINUS CONTORTA*
- PICEA GLAUCA*
- SORBUS GROENLANDICA*

Along with the hydroponic microfarms, this project also features experimental growing spaces such as a tree nursery and a wildflower garden to attract pollinators. While the microfarm's plant species are selected based on efficiency in controlled environments, the tree nursery and wildflower garden feature native species.



In this rooftop garden space, wildflowers can grow freely and attract pollinating insects. Currently, the main pollinating insect is a fly, *Spilogona sanctipauli*, but it is endangered due to difficulty adapting to warmer climates. However, Greenlanders have begun to raise bee colonies as an additional source of income, and this type of garden would also help stimulate that movement while also stimulating plant growth. This wild garden is meant to be a catalyst for this new kind of ecology as Greenland adapts to a more lush landscape. The more pollinator species present, the more plant diversity. The wildflower garden is not open for the public to enter, but there is a designated viewing space at the entry for people to observe without disrupting the natural process.



# WILDFLOWER



The majority of trees in Greenland are planted by people. An organization called Greenland Trees has planted approximately 20,000 trees since 2014. This tree nursery is a space where people can plant trees to experiment with growing different species, and encourage further planting throughout Greenland. When the nursery becomes overgrown, the lumber can be utilized in the community and new trees can be grown in its place.



**TREE NURSERY**





Near the tree nursery is a teaching space that acts as an outdoor auditorium, where Greenlanders can gather to teach each other successful methods. This teaching area is a flexible space that can be used for more than just sharing agricultural methods. During events it can be used for performances, speeches, and presentations. On a regular day it can simply be utilized as outdoor seating for locals to gather.



This exterior view looks into a teaching kitchen module, where Greenlanders can come to incorporate fresh produce into local cuisine and exchange recipes. For events, food can be sold through a serving window that opens to the courtyard. To the left, the stairwell leading up to the rooftop garden is visible.



SKØKKEN





A view into the market module, double the length of other modules to allow for easy flow through the selling counters. Here people growing in the community microfarms can sell their produce, and locals can purchase fresh produce that is easily accessible, affordable, and not frozen.

LOKALT MARKED





THANK YOU.



PROJECT BY SINDI MALELLI