



# MEECHIM FARM

## KISTIGANWACHEENG

PERMACULTURE DESIGN 2017

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THANK YOU **IVAN HARPER, JOSHUA HARPER AND LARRY WOOD** FOR  
SHARING YOUR KNOWLEDGE AND EXPERIENCES WITH US. WE COULD NOT  
HAVE ASKED FOR A MORE INFORMATIVE AND ENRICHING EXPERIENCE.

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**“EVERYTHING** COMES FROM THE GROUND, **WE** COME FROM  
THE GROUND” (L. WOOD, PERSONAL COMMUNICATION, 2017).



# INTRODUCTION

Meechim Farm is community owned and operated by members of the Garden Hill First Nation. Here, they raise chickens and other birds, while growing a range of crop vegetables and fruits. This farm has been creating jobs, teaching skills and offering a gathering spot for the community. As the farm has begun to expand, permaculture ethics and principles have become a valuable asset.

Permaculture ethics include:

**CARE OF THE EARTH**

**CARE OF PEOPLE**

**FAIR SHARE**

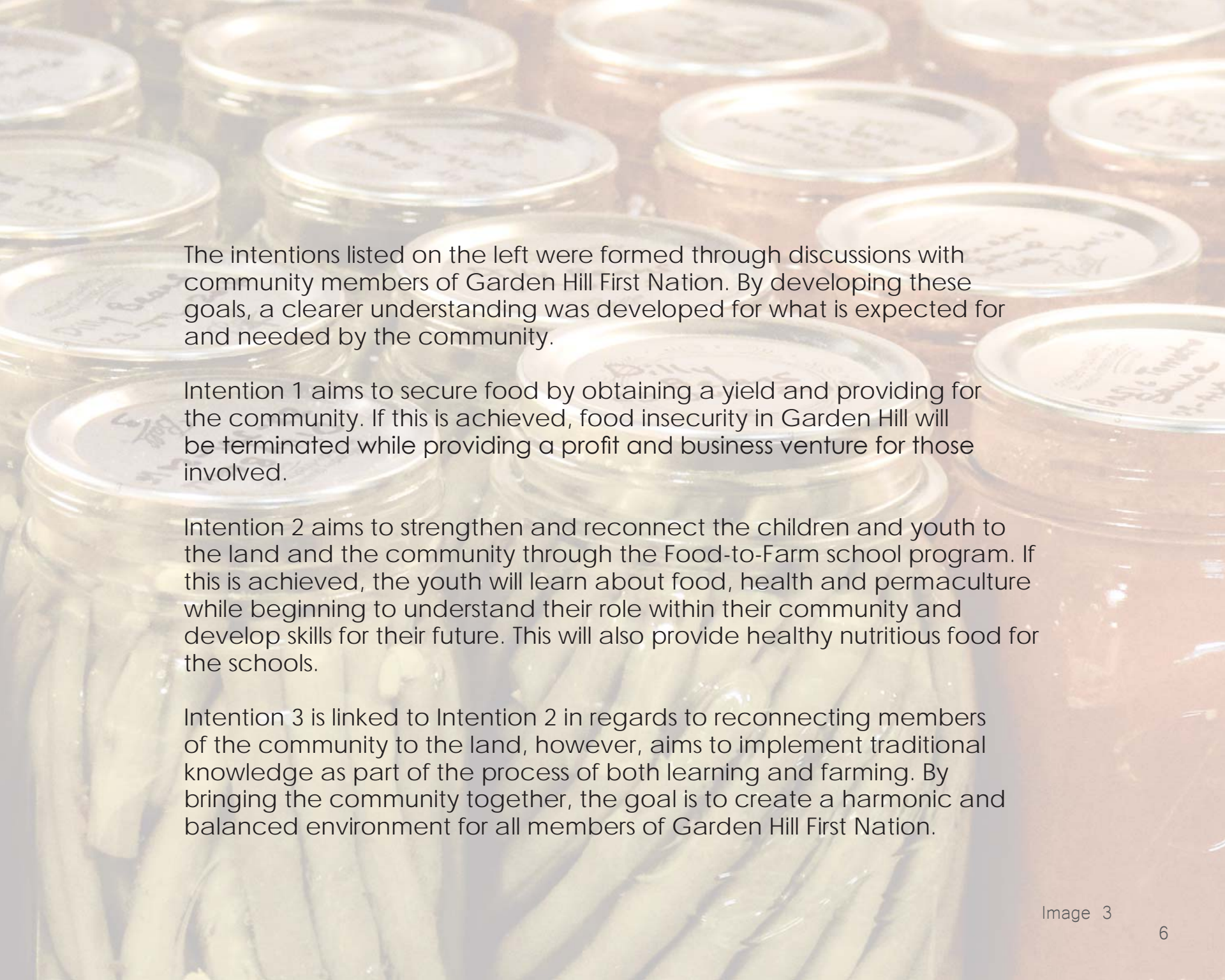
Meechim Farm's goals similarly fall within these ethics, while the principles could be applied more considerately. Permaculture is about bringing people together and creating a healthy and happy community that thrives off food security and well-being. By applying the permaculture principles and redesigning Meechim Farm, Garden Hill First Nation will secure its food and become a healthier and happier community.



1. CREATE **SOCIAL ENTERPRISE** THROUGH GROWING OUR **OWN FOOD** IN ORDER TO ACHIEVE **HEALTHY FOOD SOVEREIGNTY AND SECURITY.**

2. STRENGTHEN THE **FOOD-TO-FARM** PROGRAM.

3. STRENGTHEN **TRADITIONAL KNOWLEDGE,**  
PROMOTE LIVING IN **HARMONY** AND CREATE A **BALANCE**  
THROUGH **CONNECTING TO THE LAND.**

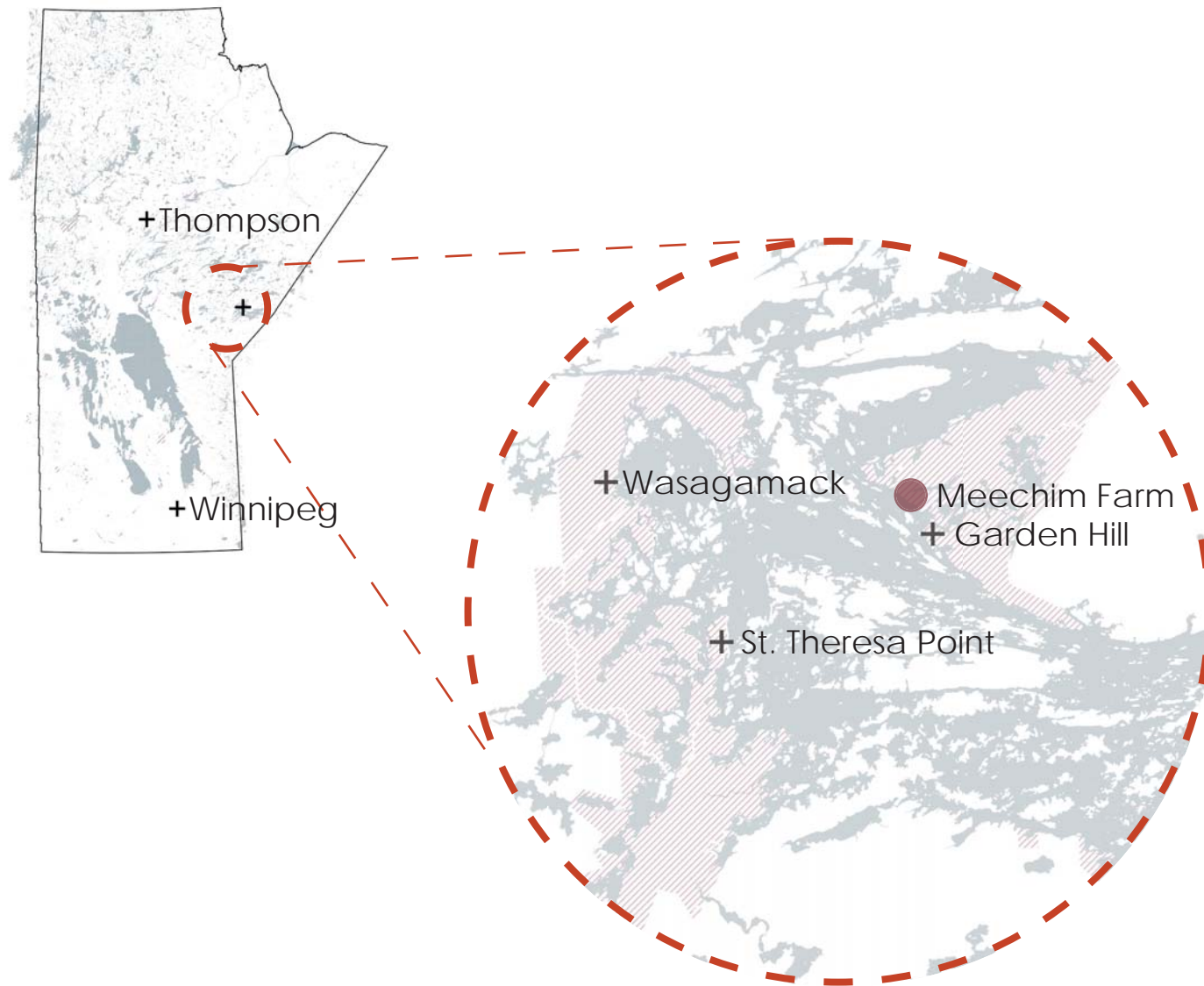


The intentions listed on the left were formed through discussions with community members of Garden Hill First Nation. By developing these goals, a clearer understanding was developed for what is expected for and needed by the community.

Intention 1 aims to secure food by obtaining a yield and providing for the community. If this is achieved, food insecurity in Garden Hill will be terminated while providing a profit and business venture for those involved.

Intention 2 aims to strengthen and reconnect the children and youth to the land and the community through the Food-to-Farm school program. If this is achieved, the youth will learn about food, health and permaculture while beginning to understand their role within their community and develop skills for their future. This will also provide healthy nutritious food for the schools.

Intention 3 is linked to Intention 2 in regards to reconnecting members of the community to the land, however, aims to implement traditional knowledge as part of the process of both learning and farming. By bringing the community together, the goal is to create a harmonic and balanced environment for all members of Garden Hill First Nation.

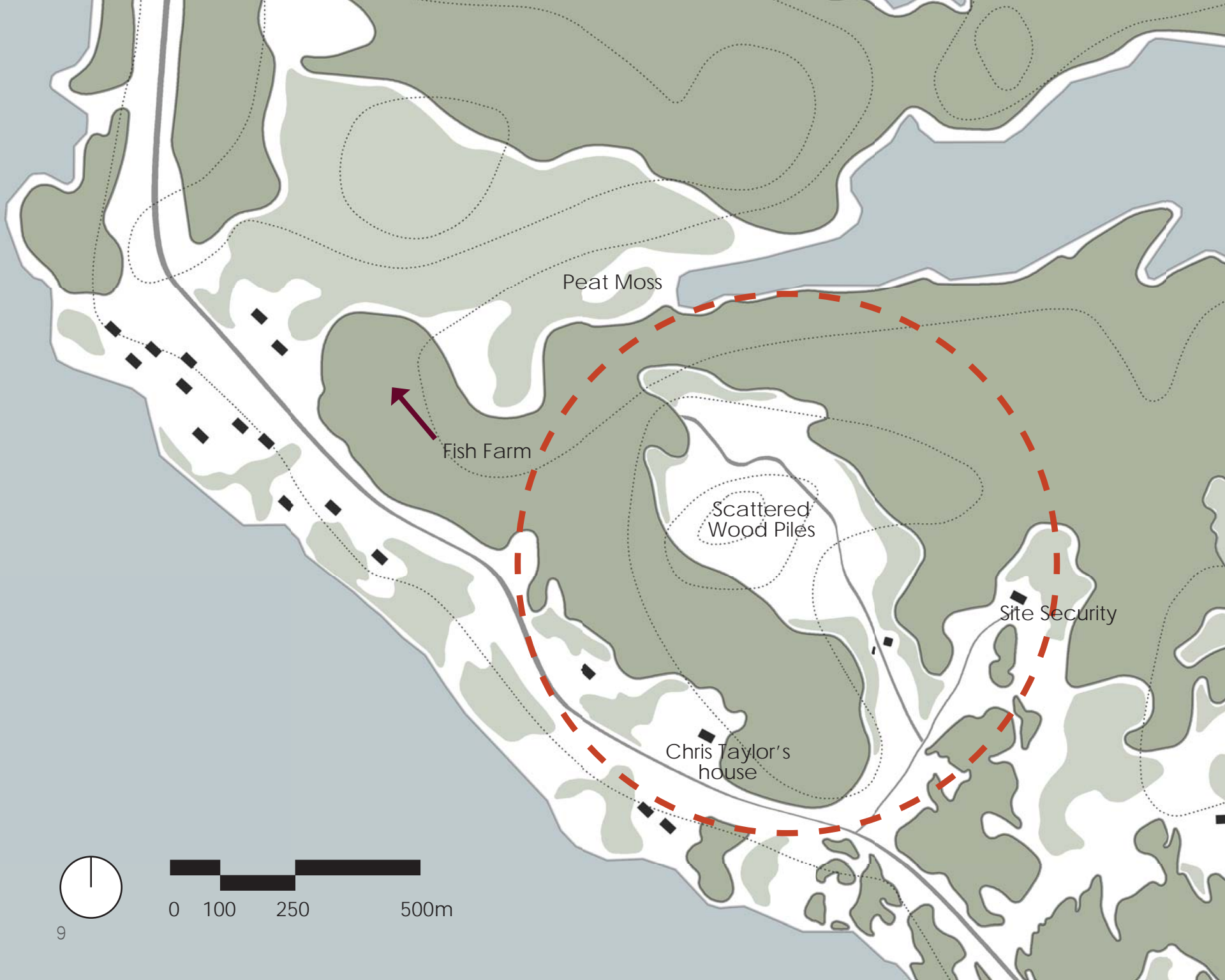


# GARDEN HILL FIRST NATION

Garden Hill First Nation is located in the Island Lake region of Northern Manitoba. These isolated communities only have winter road access, making travel difficult. Between the three communities of Wasagamack, Garden Hill and St. Theresa Point there are 3 grocery stores available; The Northern Store. The community members of Garden Hill must travel to Stevenson Island to buy any groceries and must pay for a ferry ride and often a car to get there and back. The food available in the Northern Store is often over priced as it must be flown in and the affordable food is often unhealthy.

Garden Hill First Nation is one of many communities in Northern Manitoba that are facing food insecurity issues due to government negligence. By implementing permaculture principles to the Meechim Farm, an example will be set for other communities within Northern Manitoba to promote food security and healthy living.

Meechim Farm is located on the Northern side of Garden Hill First Nation. There are no zoning issues as stated through consultation with the community.



Peat Moss

Fish Farm

Scattered  
Wood Piles

Chris Taylor's  
house

Site Security



## LEGEND

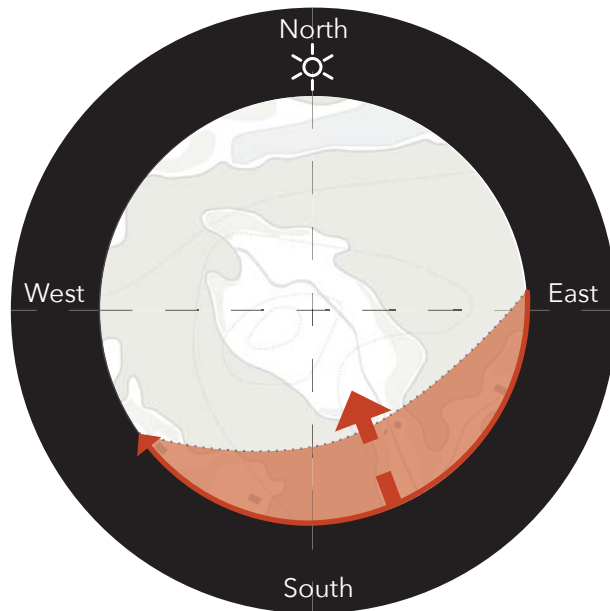
-  Houses + Buildings
-  Roads
-  Water
-  Low-Lying Vegetation
-  Forest
-  Contours
-  Site

## SITE CONTEXT

Meechim Farm is located in a clearing caused by a fire on the Northern side of Garden Hill. There is currently a dirt road running through the middle of the site which connects to the main road. Chris Taylor is a neighbour that has shown a keen interest in the Meechim Farm. He advocates on behalf of the farm and shows his continual support. Located on the site are scattered wood piles which could potentially be utilized in fertilizing the soil. A fish farm is located to the West of the farm and peat moss is accessible to the North. There is a hill located on the West of the dirt road and slopes down to a low point to the Southeast.

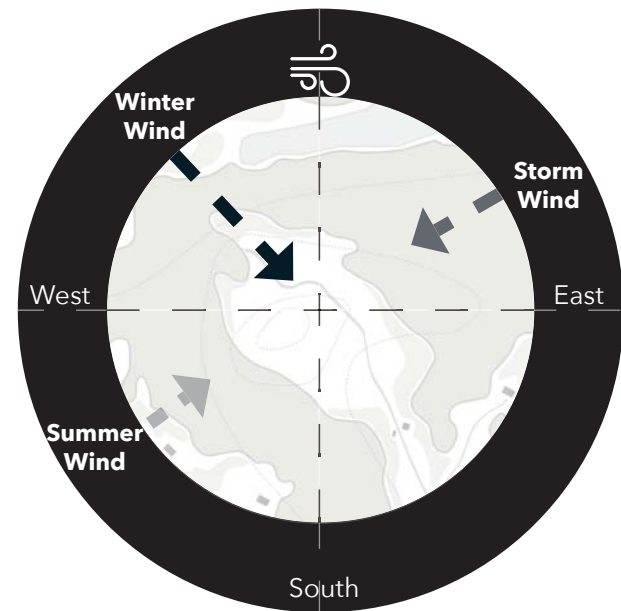
# SITE CONDITIONS

## SUN



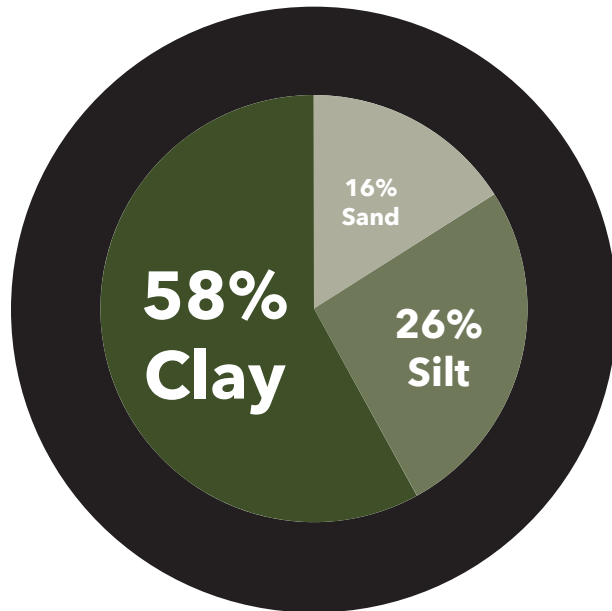
The data that is reflected in these graphics were formed through consultation with community members of Garden Hill. The sun diagram displays where the sun is moving and where the Mid day

## WIND

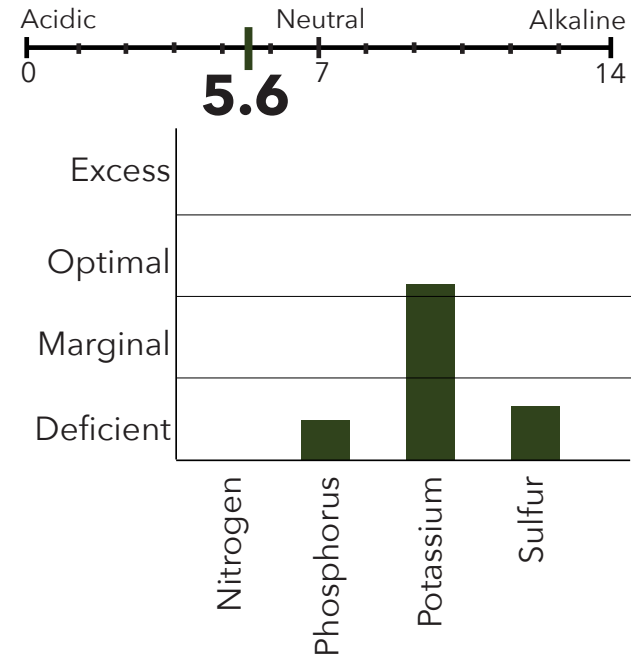


heat is coming from. The wind diagram displays the direction, types, and harshness depending on the season or if there is a storm. The bolder arrows represent the prominence of that type of wind.

## SOIL



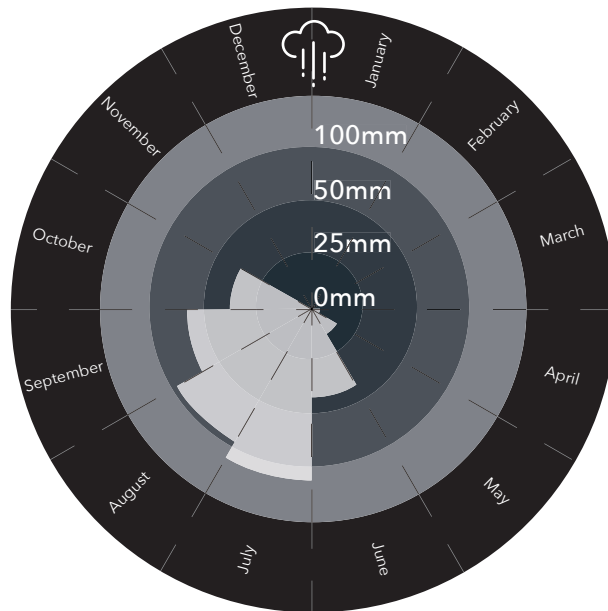
Soil can be characterized as the foundation of life. The soil in Garden hill is acidic and clay, which means that plants must be adaptable to these characteristics, which can limit some choices. The nutrient chart displays that the soil is



primarily lacking nitrogen. This means that the soil must be fertilized and the nutrients must be brought in to allow the plants to survive and thrive. The data shown was taken from a soil sample provided by Farmers Edge, 2014.

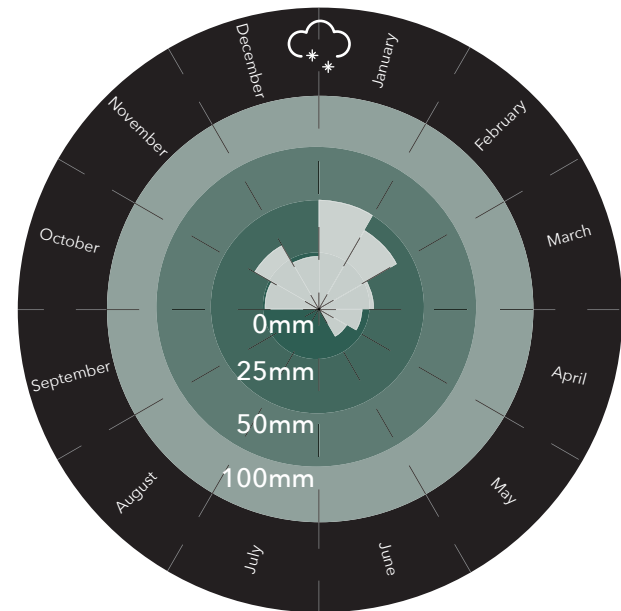
# SITE CONDITIONS

## RAIN



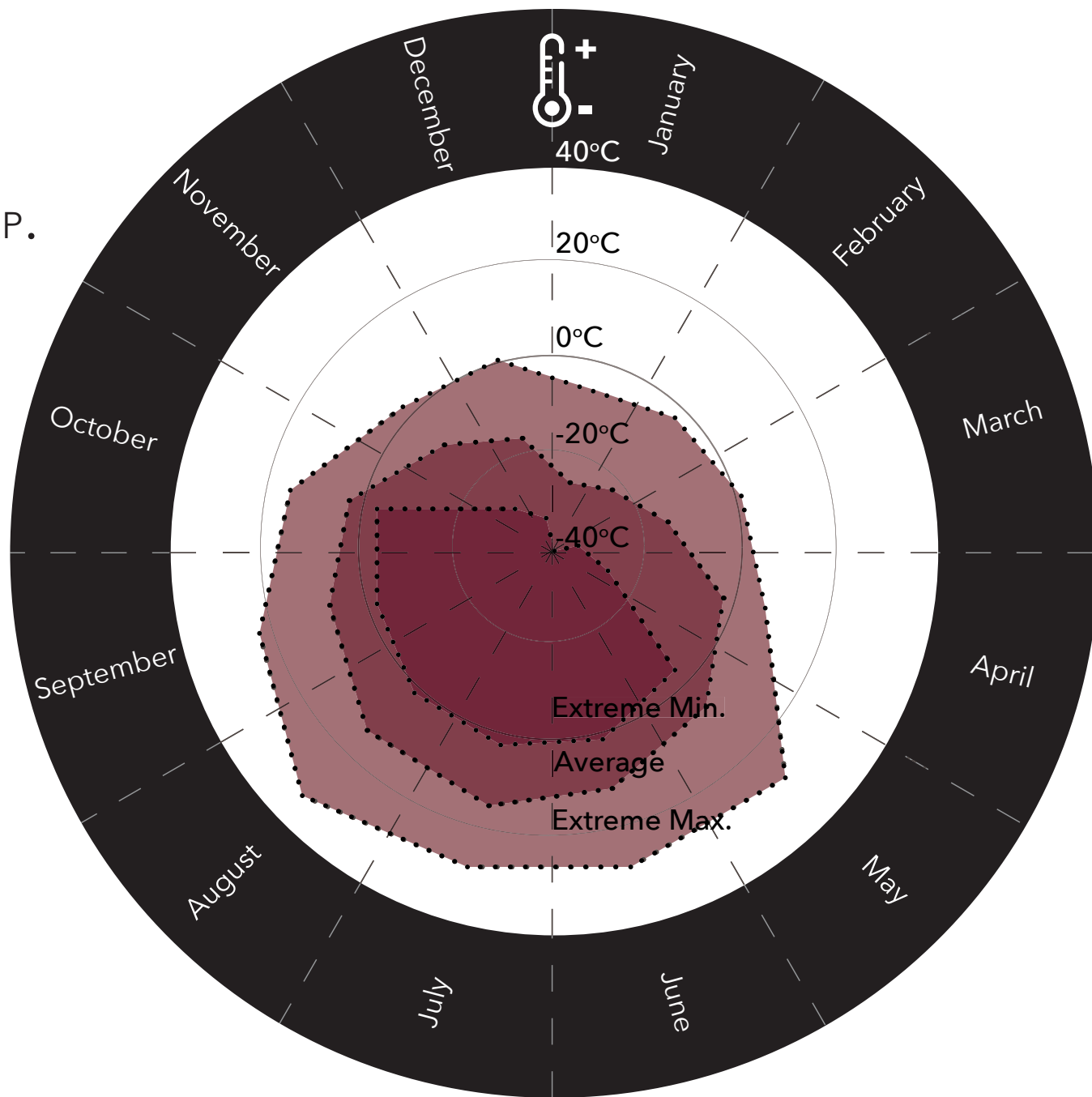
The data that is reflected in these graphics were taken from the Government of Canada's Historical Data on Climate and Weather for the years of 2010 - 2014, which average to the results

## SNOW



displayed. By visually representing the data, the goal is to show when it will rain and snow the most. The graphic to the right shows the range of temperature that each month will experience.

TEMP.



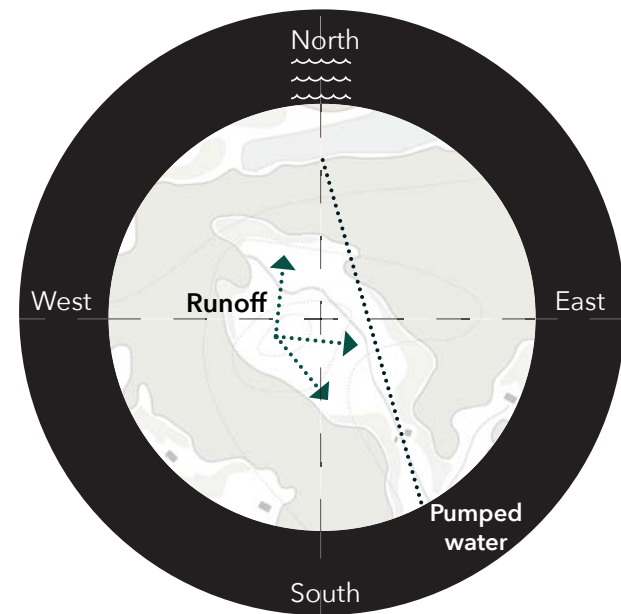
# SITE CONDITIONS

## FIRE



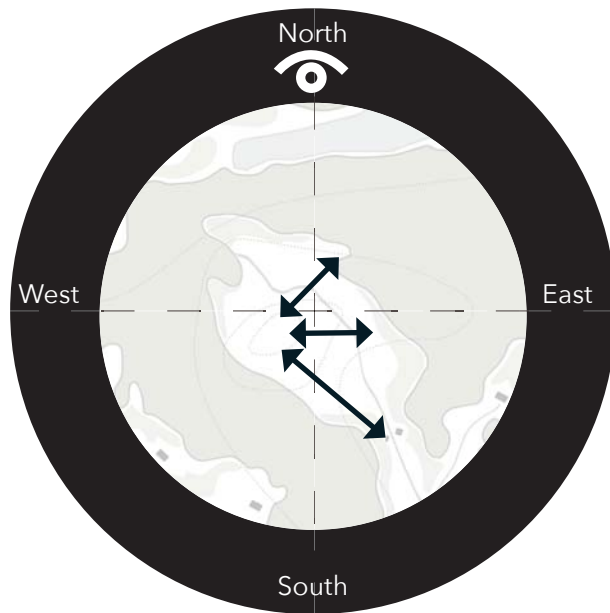
Meechim Farm's site was created as a result of a forest fire. The extents of the fire became the boundaries of the farm. The topography of the site which is displayed on page 9, shows that there is a hill located on the center of the site.

## WATER



This hill causes water to run off when it rains causing the topsoil to erode and creates a muddy environment. The water body located to the North of the site is used to pump water to the farm every 2 days.

## VIEWS



The views onto and in the site are quite pleasant. From the top of the hill that is located in the center of the farm, you get an overarching view of the entire site, while from the entrance of the farm you get a view of the undulating landscape.

## HUSBANDRY | WILDLIFE



Chickens



Rabbits



Goats



Bees



Bears



Dogs



Eagles



Minks | Marten

Chickens are currently the only animal being raised on the farm, however, this could change over time to include other small animals. Wild dogs are the biggest threat as they hunt the chickens and dig up the fish fertilizer that is used.

# RESOURCES + CHALLENGES

Permaculture principles discuss the 8 types of capital or resources available to an area. Through consultation with community members of Garden Hill, these resources were identified:

**Experiential Capital** through Oral Teachings.

**Natural Capital** including water, forest, peat moss, landform, fish.

**Material Capital** including timber and treated posts.

**Financial Capital** through grants and funding.

**Social Capital** including local networks and outside networks (Aki Energy, University of Manitoba).

**Spiritual/Cultural Capital** through language and teaching.

**Intellectual Capital** through oral teachings and observation.

Some of the main challenges that have been identified through the analysis of the site conditions include:

**Soil** fertility and nutrients.

**Water** management and erosion.

**Financial** issues.

# STRATEGIES

The strategies that were developed and applied into the design are a reflection of the challenges that were identified. The following strategies became an overarching theme and approach on how to design for Meechim Farm.

## **1. WATER MANAGEMENT**

- Swales - Berms - Ponds

## **2. BUILD SOIL**

- Hügelkultur - Plant Guilds - Companion Planting - Mulching

## **3. COMMUNITY ENGAGEMENT**

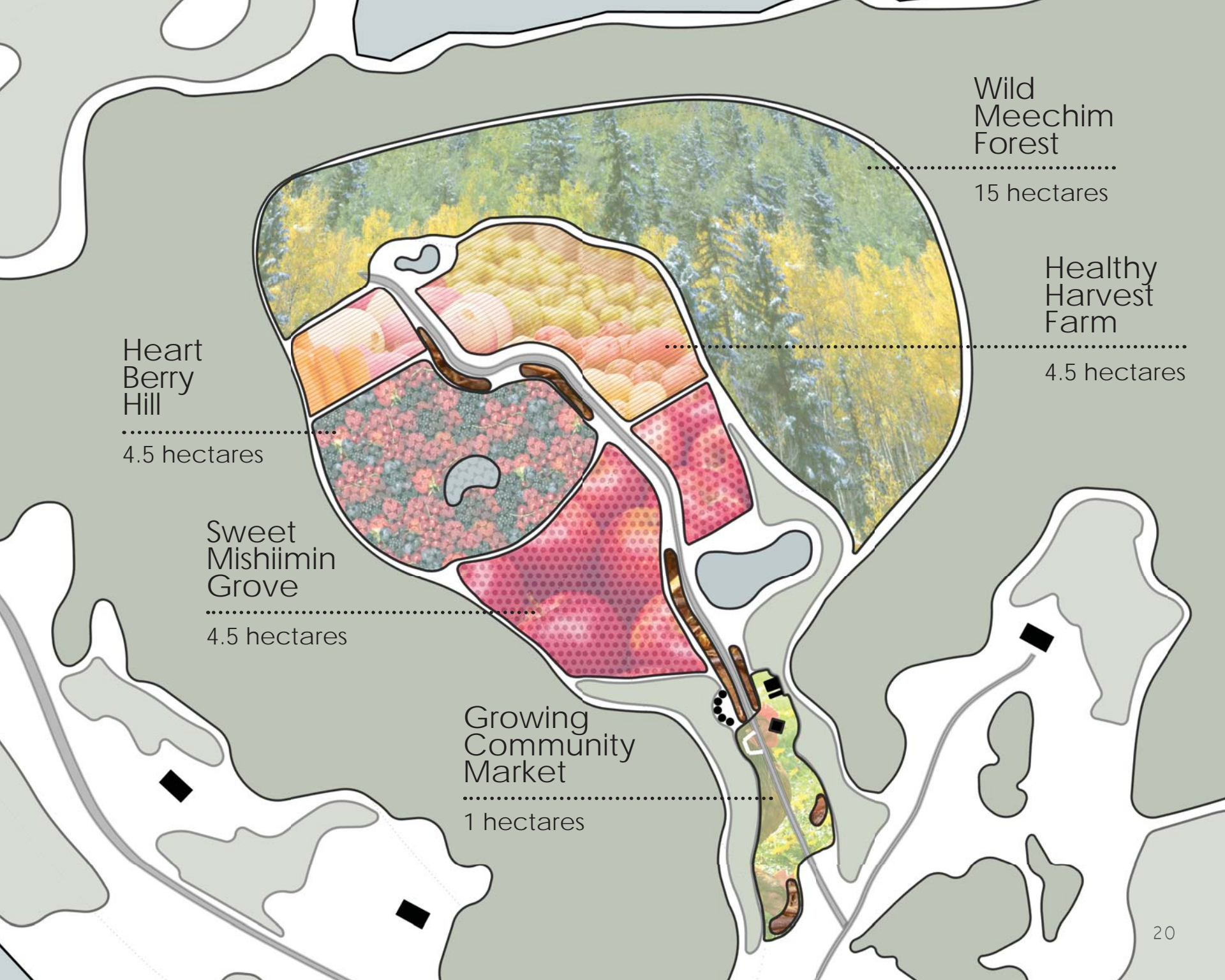
- Gathering Points - Trails - Arches - Signage

# PROPOSAL

In order to achieve a productive, sustainable and healthy farm that is a reflection of the community, many production techniques are set in place. The goal is to provide the community with the resources to reach food security through production on the farm. This will give rise to numerous employment, training and business opportunities. As Meechim Farm develops, it will offer a variety of activities and become a gathering place for the community.

The five main areas are designed to be accessible for farming equipment. A mulch trail will link the main areas and allows the public to engage directly with the farm, promoting harmony and balance while connecting to the land.





Wild  
Meechim  
Forest

15 hectares

Healthy  
Harvest  
Farm

4.5 hectares

Heart  
Berry  
Hill

4.5 hectares

Sweet  
Mishiimin  
Grove

4.5 hectares

Growing  
Community  
Market

1 hectares



PERENNIAL PLANTINGS

CHICKEN RUN

APPLE TREES

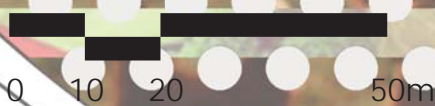
PLUM TREES

CARAGANA TREES

CHICKEN RUN

PERENNIAL PLANTINGS

corn  
alfalfa  
saskatoon  
raspberries  
fireweed  
redcurrent  
comfrey  
clover  
strawberries  
sunchokes  
daylily  
ostrich fern  
watercress  
mountain sorrel  
rhubarb  
arrowhead



# SWEET MISHIIMIN GROVE

Sweet Mishiimin Grove is encompassed by rows of apple trees, plum trees [other fruit] and Caragana trees [nitrogen fixing plant with edible green pods] which are alternating to encourage healthy disease resistant trees and nutrient rich soil. In between each of these rows, one of two activities alternate. Chickens and other birds are invited to graze between the fruit-bearing trees while food-bearing plants are grown in every other row. These 3 elements contribute to a well managed, self-sufficient and sustainable environment.

## FRUIT TREES

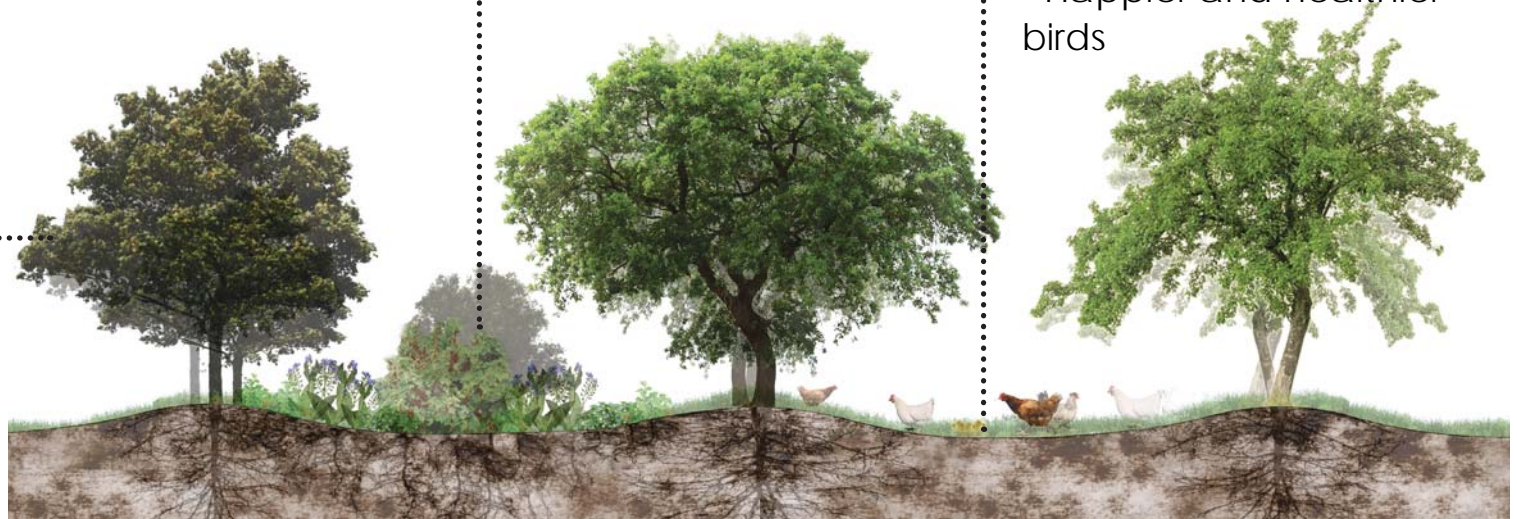
- Creates an inviting environment - used in cider, pie, fruit, juice, etc.

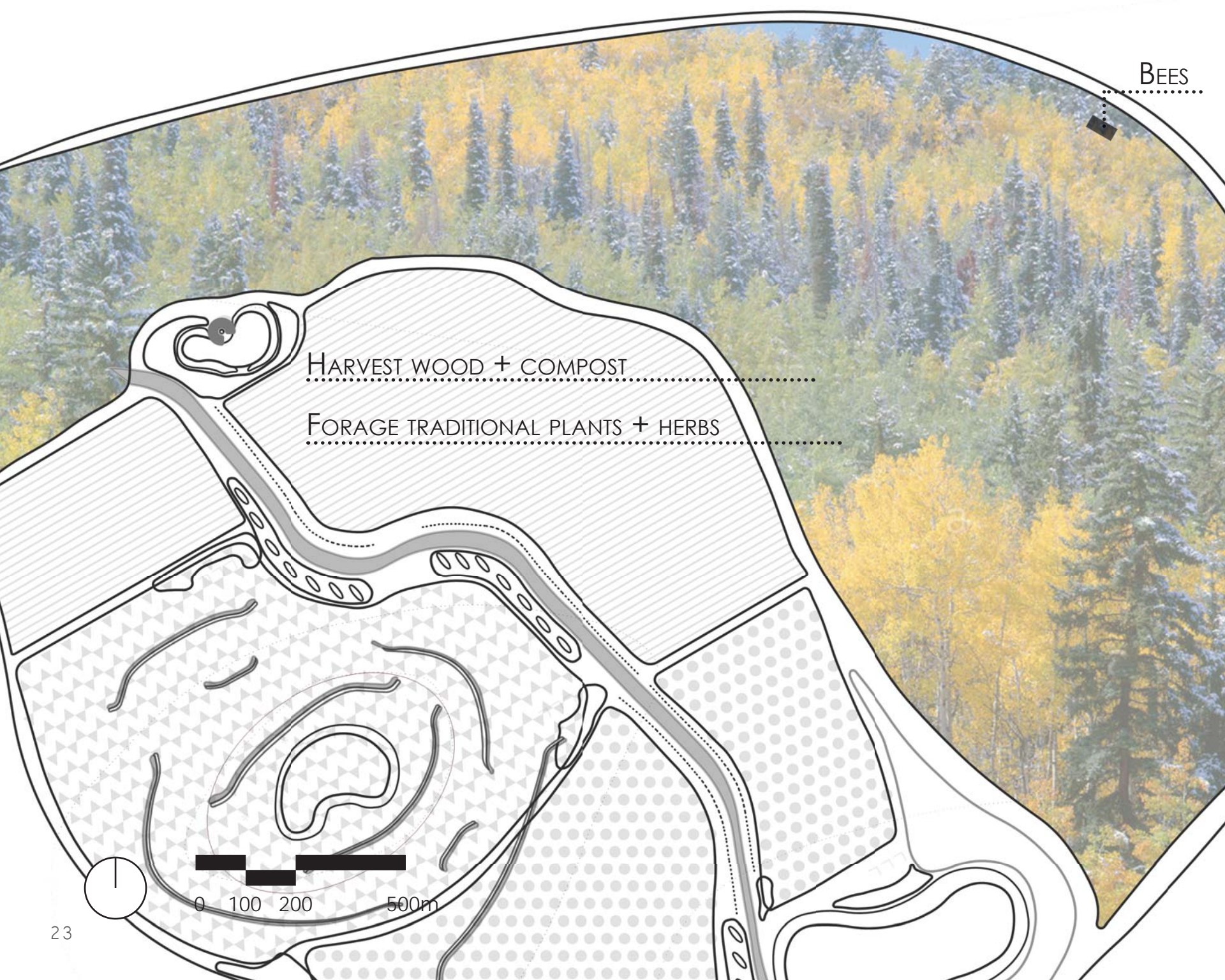
## CROPS

- Increases yield - nitrogen-fixing plants will promote nutrient rich soil

## CHICKENS

- Fertilizes crops and trees
- creates more yield - cleans up weeds
- Happier and healthier birds





BEEES

HARVEST WOOD + COMPOST

FORAGE TRADITIONAL PLANTS + HERBS

0 100 200 500m

# WILD MEECHIM FOREST

Wild Meechim Forest extends the boundary of Meechim Farm promoting further expansion. Wild vegetation may be encouraged through engagement and transplanting to enable more diversity, variety and healthy plants for foraging. Lumber and other goods will be thoughtfully utilized from this area so as to maintain a healthy environment that could one day house bees.

## WOOD

- Harvested lumber used as building material - hügelkultur material

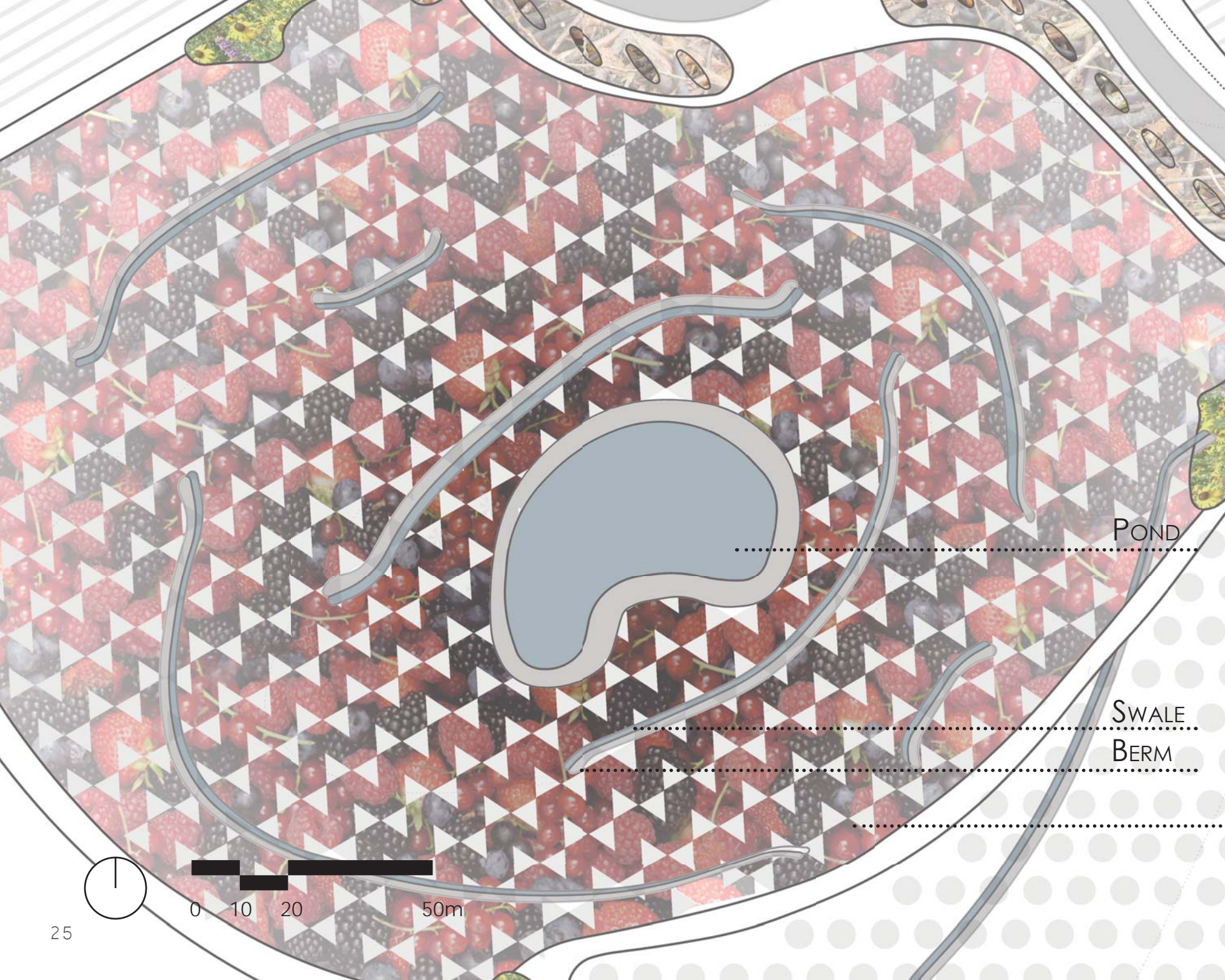
## FORAGE

- Sustainable foraging - berries, bark, sap, etc.
- Leaves can be used for compost

## BEEES

- Pollinates plants and promote a higher yield
- Produce honey, royal jelly and beeswax
- Placed here as it is ideal for the health of the hive





POND

SWALE  
BERM



0 10 20 50m



# HEART BERRY HILL

Heart Berry Hill takes the existing topography and enhances its growing condition. A pond with swales and berms will aid in preventing erosion as they slow the waters movement and stabilize the soil. This will allow the surrounding crops and the rest of the site to receive a more evenly distributed amount of water and promote greater food production.

## POND

- Holds water and allows a slow release onto the surrounding area

## SWALES

- Moves water around the site - berms allow for water collection

## BERRIES

- Offers community activities - berry picking
- Used in - pies, juices, berries, etc.

## PERENNIAL PLANTS

corn - alfalfa - saskatoon - raspberries - fireweed - redcurrent - comfrey  
- clover - strawberries - sunchoke - daylily - ostrich fern - watercress -  
mountain sorrel - rhubarb - arrowhead

## ANNUAL PLANTS

potato - corn - peas - turnips - parsnips - cabbage  
- asperigius - broccoli - cauliflower - sunchokes  
- pumpkins - squash - beans - tomato - peas -  
cucumber - spinach - swiss chard - brussel sprouts

COVERED DECK

FIRE PIT

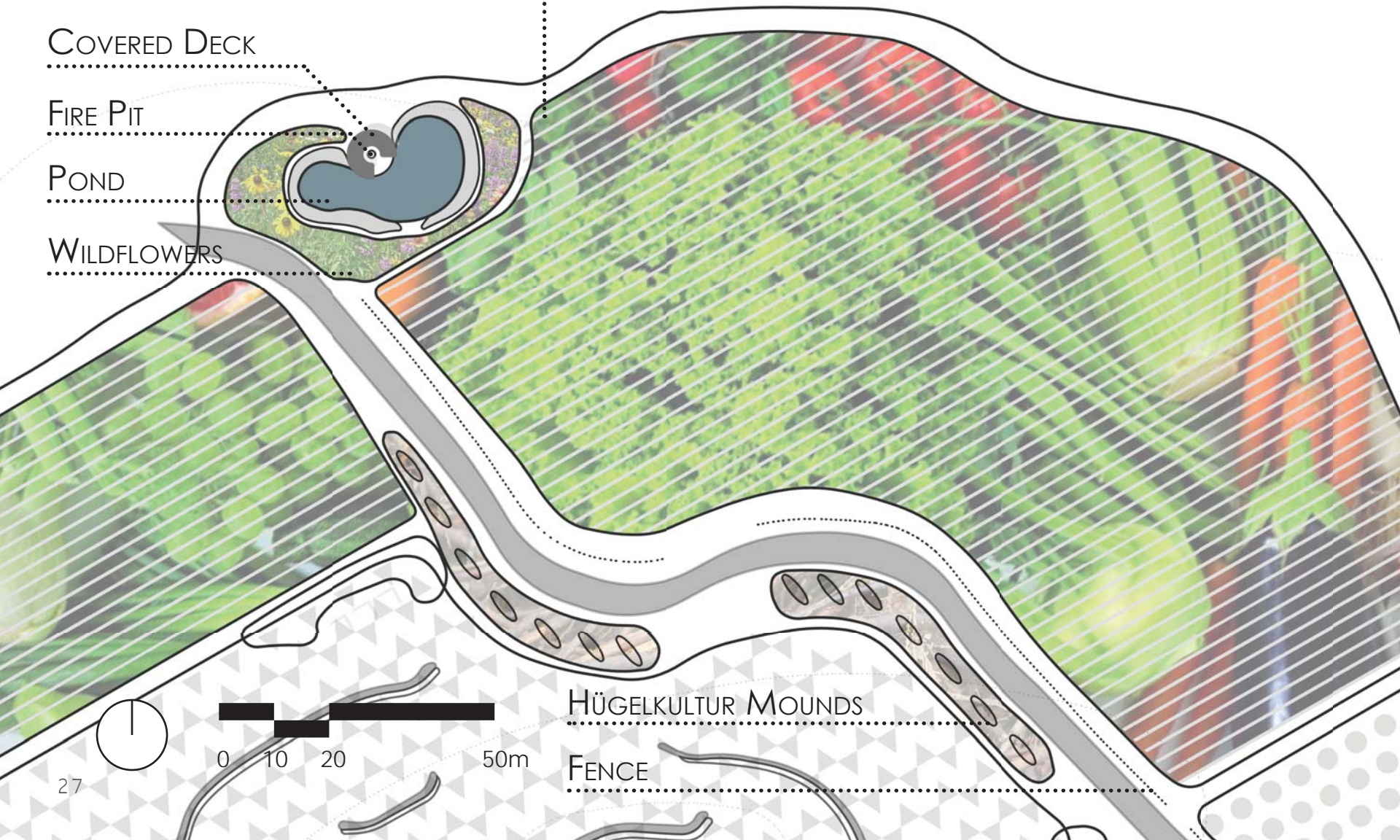
POND

WILDFLOWERS

HÜGELKULTUR MOUNDS

FENCE

0 10 20 50m



# HEALTHY HARVEST FARM

Healthy Harvest Farm allows for a large-scale harvest through rows of crops. This will allow for Meechim Farm to thrive and expand in food production and yield output. In doing so, Meechim Farm will be able to produce enough food for the community, and a profit that can be re-invested into the farm and community. The goal is to ultimately provide food security in Garden Hill First Nation. The pond and fire pit promote movement further into the site acting as a potential hub and learning space, when further expansion occurs.

## CROPS

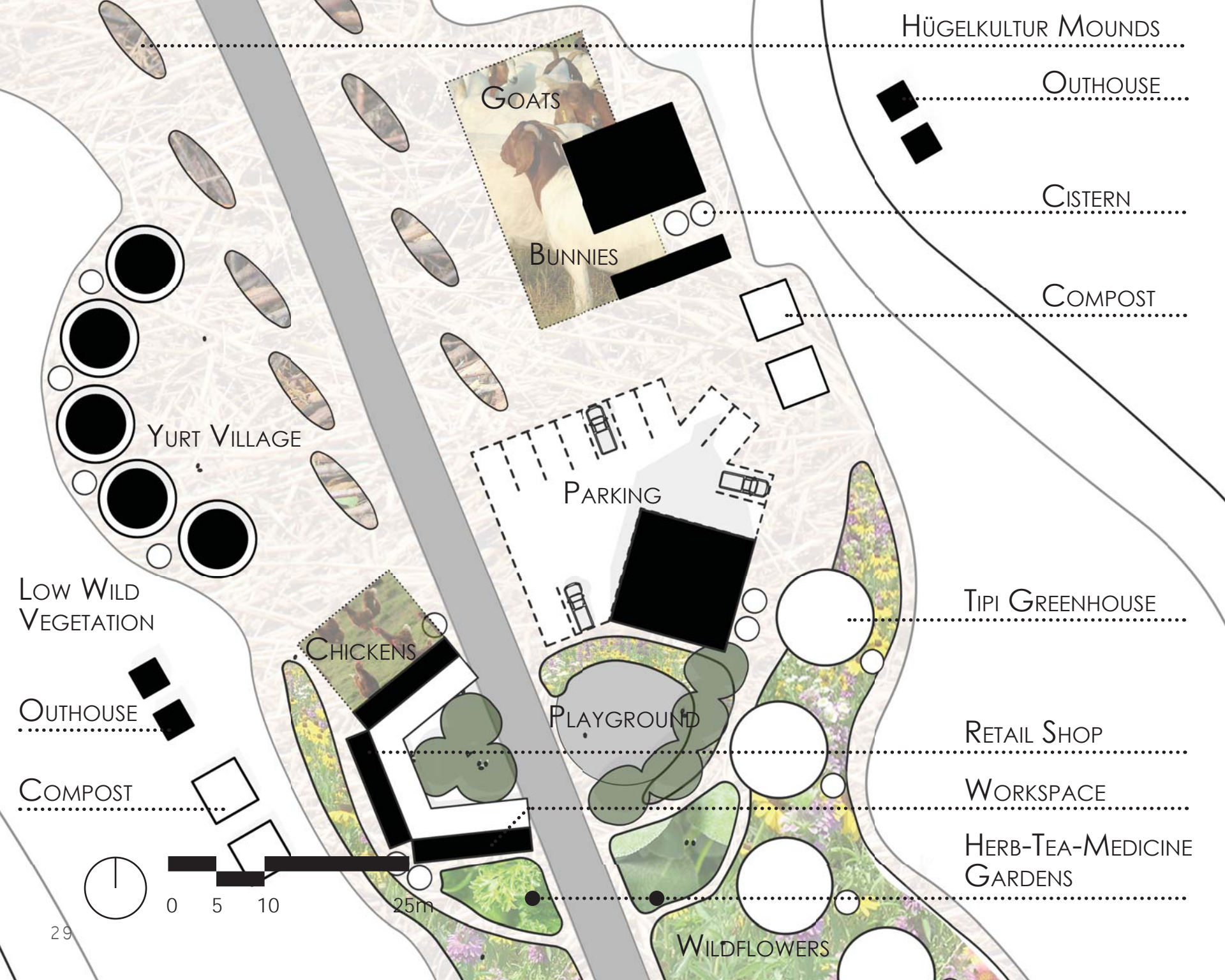
- Produce a high yield - Hügelkultur fertilizes and provides nutrients
- Provide crops to community and for profit

## FIRE PIT

- Engages community and acts as a gathering spot

## HÜGELKULTUR

- Promotes a higher yield - fertilizes the soil
- Adds nutrients to the soil



HÜGELKULTUR MOUNDS

OUTHOUSE

CISTERN

COMPOST

GOATS

BUNNIES

YURT VILLAGE

PARKING

TIPI GREENHOUSE

LOW WILD  
VEGETATION

OUTHOUSE

COMPOST

CHICKENS

PLAYGROUND

RETAIL SHOP

WORKSPACE

HERB-TEA-MEDICINE  
GARDENS

WILDFLOWERS

0 5 10

25m

# GROWING COMMUNITY MARKET

The Growing Community Market acts as a community hub and gathering spot for Garden Hill First Nation. By offering a wide variety of activities including a playground, retail shop, greenhouses, yurts, and petting farm, the community is invited to engage with Meechim Farm at a more intimate level.

## ANIMALS

- Offers a high yield - milk, eggs, fur, meat etc.
- Fertilizes soil - cleans up weeds - promotes community involvement

## COMMUNITY

- Involved community through activities - playground - retail shops
- Engages public through experience - visiting yurts - tipi greenhouses

## PLANTS

- Everyday plants - Herbal, tea and medicine gardens
- Wildflowers and hügelkultur improve pollination and soil nutrients



LOW WILD  
VEGETATION

COMMUNITY GARDEN

FRUIT TREE ALLY

WINDMILLS

MEMORIAL GARDEN

FARM GARDEN

WELCOME SIGN

WILDFLOWERS

HÜGELKULTUR MOUNDS



# GROWING COMMUNITY MARKET

The Growing Community Market entry into the farm will offer community engagement activities as well as beautiful and welcoming views into the farm. The area is surrounded by gardens and wildflowers. Windmills are in place to help move water in from the north. A memorial garden planted with medicinal and healing plants remembers the loss of a community member.

## FARM GARDEN

- Displays yield to the public upon entrance
- Additional yield - close in proximity

## COMMUNITY GARDEN

- Involves the community through direct engagement with the farm
- Allows the community to grow their own farm and develop skills

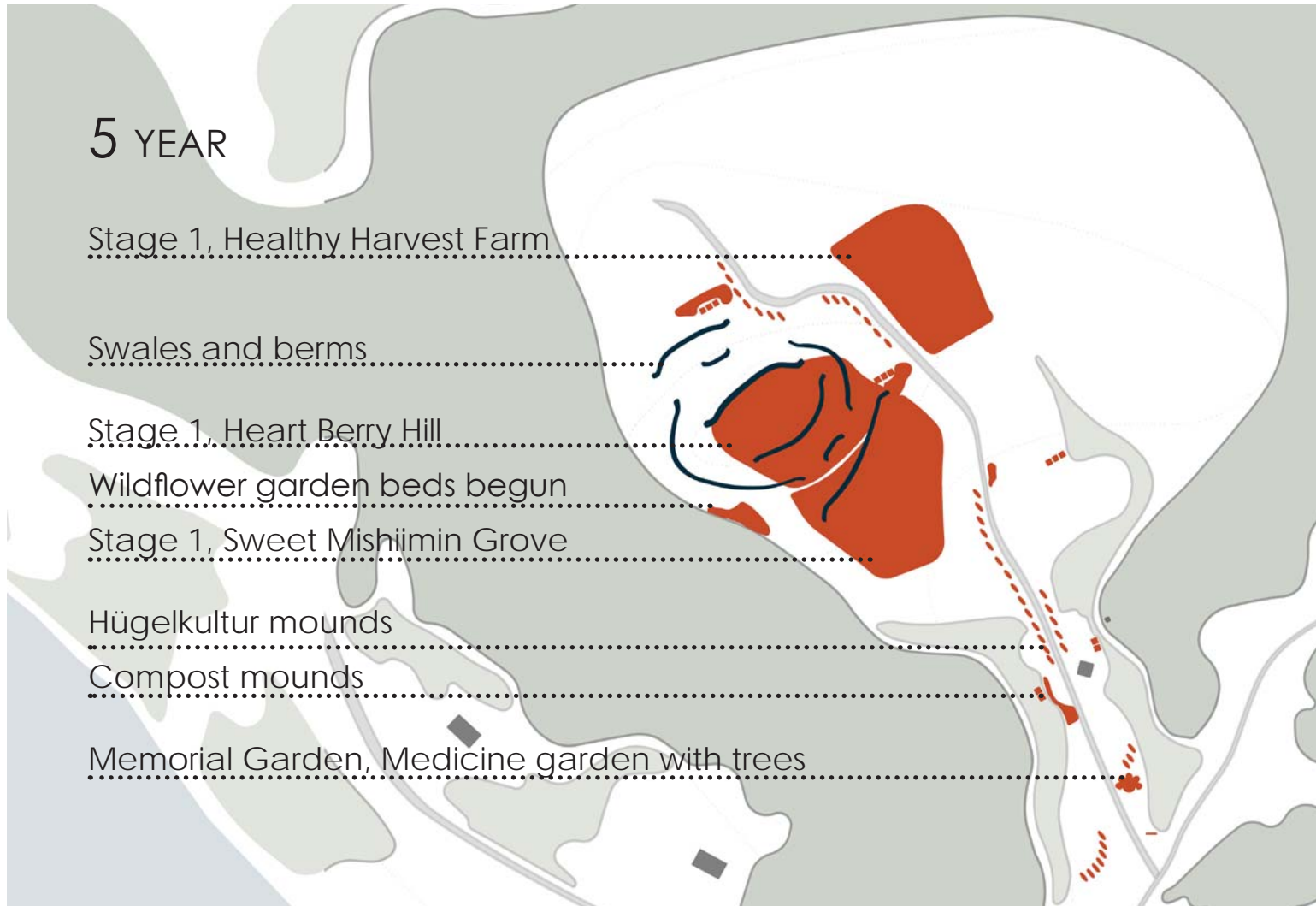
## WILDFLOWERS

- Invites pollinators - increases yield - adds nutrients to the soil



# IMPLEMENTATION

Meechim Farm's strategy for success includes a slow and steady development over the next 20 years. Development will utilize the available capital, spread out over time in order to not exhaust resources. This plan is flexible and should be adjusted based on capital and opportunity.



10 YEAR

Wild Meechim Forest

Stage 2, Healthy Harvest Farm

Stage 2, Heart Berry Hill

Ponds cut and water plants

Stage 2, Sweet Mishiimin Grove

Parking area constructed

Cisterns and windmills working

Entrance trees, wildflowers, and gardens thriving

15 YEAR

Wildflower Gardens extended

Stage 3, Healthy Harvest Farm

Stage 3, Heart Berry Hill

Stage 3, Sweet Mishiimin Grove

Bees, goats and rabbits

Decks, shelters, buildings completed



## 20 YEAR

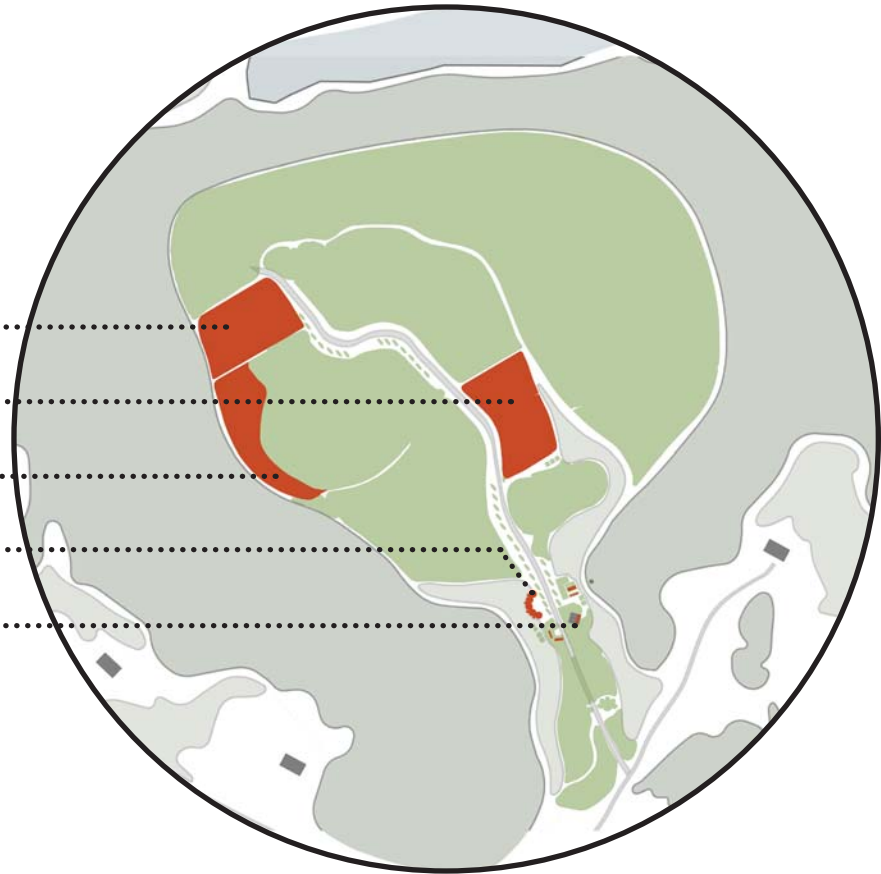
Stage 4, Healthy Harvest Farm.....

Stage 4, Sweet Mishiimin Grove.....

Stage 4, Heart Berry Hill.....

Yurt guest houses.....

Solar power.....



## FURTHER

In this time a new set of goals can be established. The farm can be extended to other sites, to homes through the community and to other communities in need. In addition, countless businesses can be developed to enhance the productivity and economy of Meechim Farm and Kistiganwacheeng.

# CONCLUSIONS

A NEW FUTURE IS SET IN MOTION WITH THE PROPOSED SITE DEVELOPMENT. A HEALTHY FUTURE WILL BE CULTIVATED BY SHARING KNOWLEDGE, INVOLVING THE COMMUNITY AND **CONNECTING TO THE LAND**. IN PROMOTING **FOOD SECURITY**, AND A SELF SUSTAINING AND HARMONIC COMMUNITY FOR GARDEN HILL FIRST NATION, **MEECHIM FARM WILL CONTINUE TO GROW AND THRIVE.**

THE FARM, GROVE, HÜGELKULTUR AND BERRY HILL PRODUCE:

Low calorie source of vitamins and minerals such as calcium, fiber, folate, Iron, Magnesium, Potassium, Sodium, Vitamin A, Vitamin C, and micro-nutrients.

THE ANIMAL HUSBANDRY PRODUCE:

Low chemical and additive source of protein, B vitamins (niacin, thiamine, riboflavin, and B6), vitamin E, iron, zinc, and magnesium.

Examples of future products, jobs, industry and self supportive economy that will grow from Meechim Farm, Kistiganwacheeng.

## PRODUCTS



Jams, Jellies + Pies



Honey, Royal Jelly + Beeswax



Milk, Yarn + Body Products



Eggs + Meat



Meat + Fur



Herbs, Medicines + teas



Seeds + greenhouse plants for sale for personal gardens

## TRAINING

Farming

Animal Husbandry

Business development

Business management

Human resource management

Food and product development

Marketing

# IMAGE LIST

Cover image.

Farmers market. [Online image]. (2011). Retrieved May 24, 2017 from <http://transitionvoice.com/2011/11/food-hubs-restoring-historical-practice/>

1. Garden Hill First Nation replaces unhealthy food at arena with trail mix, soup. [Online image]. (2015). Retrieved May 24, 2017 from <http://www.cbc.ca/news/canada/manitoba/garden-hill-arena-no-junk-food-1.3289117>

2. Farmers markets in Muskoka - Muskoka vacation rentals. [Online image]. (2015). Retrieved May 24, 2017 from <http://www.muskokavacationrentals.ca/farmers-markets/>

3. Market musing: on preserving – Ambler Farmers Market. [Online image]. (2015). Retrieved May 24, 2017 from <https://amblerfarmersmarket.wordpress.com/2016/08/19/market-musing-on-preserving/>

# REFERENCES

Farmers Edge. (2014). *Garden Hill FN*. Winnipeg: Farmers Edge.

Government of Canada. (2017). [Graph illustration of climatic data for Garden Hill First Nation] *Temperature and Precipitation Graph for 1981 to 2010 Canadian Climate Normals Island Lake A*. Retrieved from [http://climate.weather.gc.ca/climate\\_normals/results\\_1981\\_2010\\_e.html?stnID=3880&autofwd=1](http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=3880&autofwd=1).

Government of Canada. (2017). [Graph illustration of precipitation data for Garden Hill First Nation] *Monthly Data Report for 2010*. Retrieved from [http://climate.weather.gc.ca/climate\\_data/monthly\\_data\\_e.html?timeframe=3&Year=2010&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=\\_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB](http://climate.weather.gc.ca/climate_data/monthly_data_e.html?timeframe=3&Year=2010&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB).

Government of Canada. (2017). [Graph illustration of precipitation data for Garden Hill First Nation] *Monthly Data Report for 2011*. Retrieved from [http://climate.weather.gc.ca/climate\\_data/monthly\\_data\\_e.html?timeframe=3&Year=2011&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=\\_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB](http://climate.weather.gc.ca/climate_data/monthly_data_e.html?timeframe=3&Year=2011&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB).

Government of Canada. (2017). [Graph illustration of precipitation data for Garden Hill First Nation] *Monthly Data Report for 2012*. Retrieved from [http://climate.weather.gc.ca/climate\\_data/monthly\\_data\\_e.html?timeframe=3&Year=2012&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=\\_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB](http://climate.weather.gc.ca/climate_data/monthly_data_e.html?timeframe=3&Year=2012&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB).

Government of Canada. (2017). [Graph illustration of precipitation data for Garden Hill First Nation] *Monthly Data Report for 2013*. Retrieved from [http://climate.weather.gc.ca/climate\\_data/monthly\\_data\\_e.html?timeframe=3&Year=2013&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=\\_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB](http://climate.weather.gc.ca/climate_data/monthly_data_e.html?timeframe=3&Year=2013&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB).

Government of Canada. (2017). [Graph illustration of precipitation data for Garden Hill First Nation] *Monthly Data Report for 2014*. Retrieved from [http://climate.weather.gc.ca/climate\\_data/monthly\\_data\\_e.html?timeframe=3&Year=2014&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=\\_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB](http://climate.weather.gc.ca/climate_data/monthly_data_e.html?timeframe=3&Year=2014&Month=5&Day=31&hlyRange=1970-12-01%7C2015-01-15&dlyRange=1970-12-01%7C2015-01-14&mlyRange=1970-01-01%7C2014-12-01&StationID=3880&Prov=MB&urlExtension=_e.html&searchType=stnProv&optLimit=yearRange&StartYear=2010&EndYear=2015&selRowPerPage=25&Line=58&lstProvince=MB).

Michnik, K. and Thapa, K. (2016). *Meechim Farm: A Case Study of Applying an Environmental Farm Plan*. Winnipeg: University of Manitoba.

Morrow, R. (2006). *Earth User's Guide to Permaculture*. Hampshire: United Kingdom: Permanent Publications.