**St. Thomas University**

# Final Report

*Food Forest Design for Site #54*

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ENVS 3133: Sustainable Food Systems

Presented to Professor Mathis

Due April 9th, 2025

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## 1. Vision

Community is an important part of connecting with others. However, we often have limited spaces that people can share, without having to spend money to have a right to it. Moreover, people have different social, cultural, and nutritional needs that are often ignored by traditional parks and open spaces. Hence, these parks and open spaces often lack design, which limit functions and potential to provide for human and ecological needs. This is why food forests inspired by permaculture design, are becoming increasingly popular as a sustainable alternative to traditional parks and open spaces.

By offering a diverse range of plants, food forests create a sense of purpose for open spaces to mimic the natural functions of ecosystems. Additionally, food forests can provide for the community, by offering edible, medicinal, and useful plants for diverse groups of people. Finally, they act as spaces for communities to learn, engage, and exist without having to pay money.

As a result, a St. Thomas University food forest first and foremost should provide for human and ecological needs. Thus, a food forest should serve as many functions as possible through natural functions that mimic ecosystems in nature, through a need and yields analysis. For example, plants should benefit one another and offer edible and medicinal byproducts for people and wildlife. Moreover, a community food forest should be inclusive, accessible, and open for all members of the community to come and learn, engage, and exist. Therefore, this guiding vision will help us design a community food forest that serves people and planet.

**2. Site Analysis and Assessment**

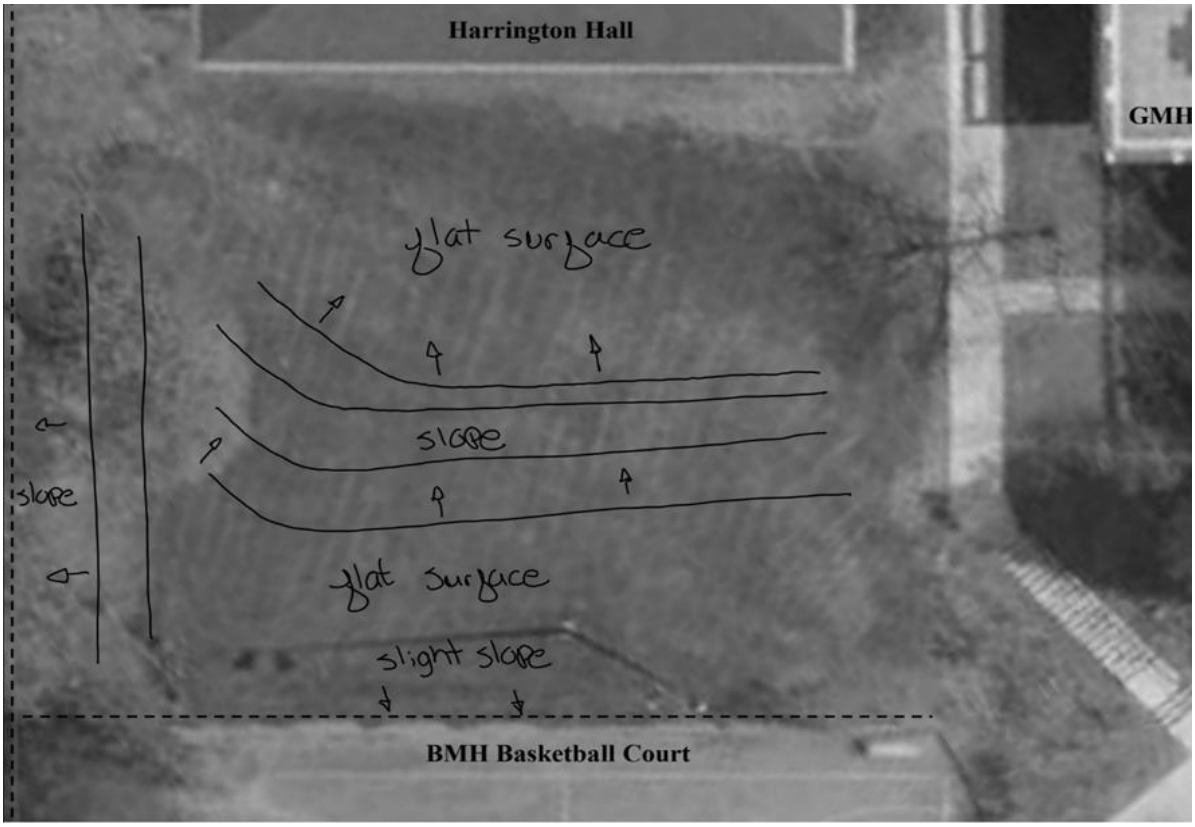
The following is an overview of the site's geography, water, accessibility, vegetation and soil, wildlife, microclimate, buildings and infrastructure, zones of use, and aesthetic and experience of place, with an added summary map of all these formal observations

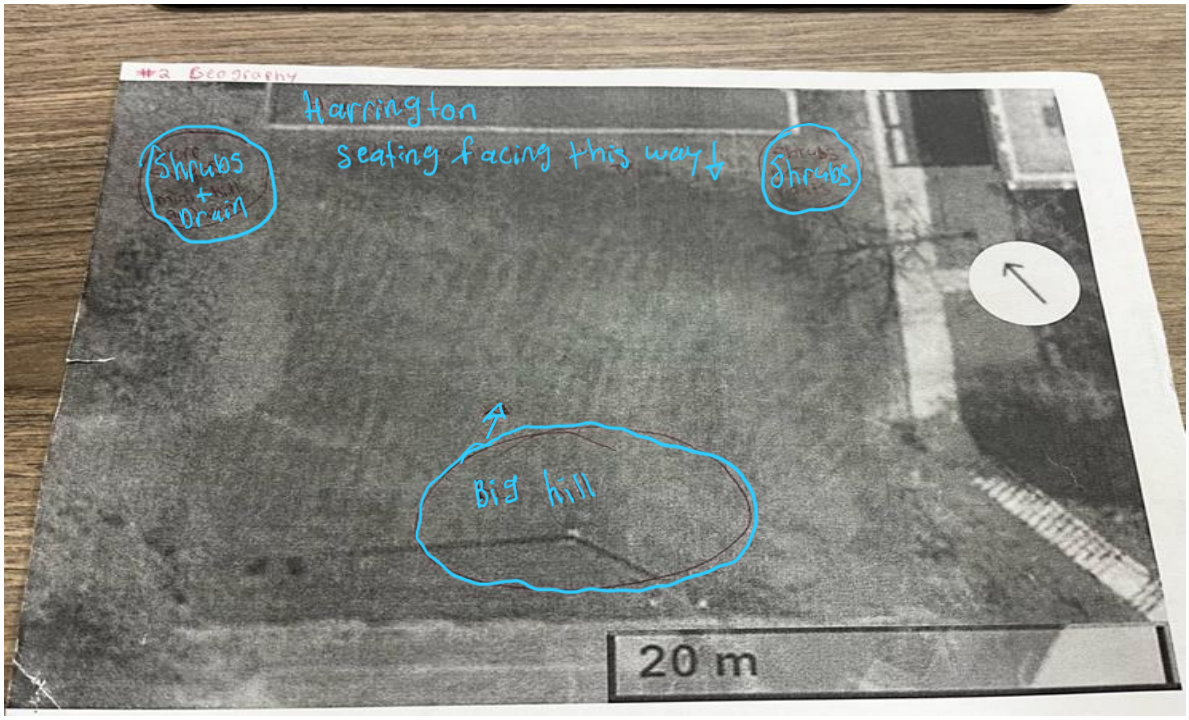
As identified, the area features a steep slope, with flat areas at the base and top of the hill. Because of the slope, water will have a downwards flow effect, which will cause potential wet spots to form at the base. However, excess water is mitigated by a gravel strip and a stormwater drain.

Additionally, sun and wind are presented by their respective icons. For example, we can see southern wind pushing against the building, which might cause frost pockets to form at the base of the hill. Moreover, sun will rise towards ECH, with the evening sun setting on the treeline in the direction of Windsor Street. As a result, sunlight will peak during the midday summer season, whereas it will be unobstructed by buildings (e.g. Harrington and ECH) and the treeline. As such, plants will benefit from the most sunlight between the hours of 11AM to 6PM during the summer.

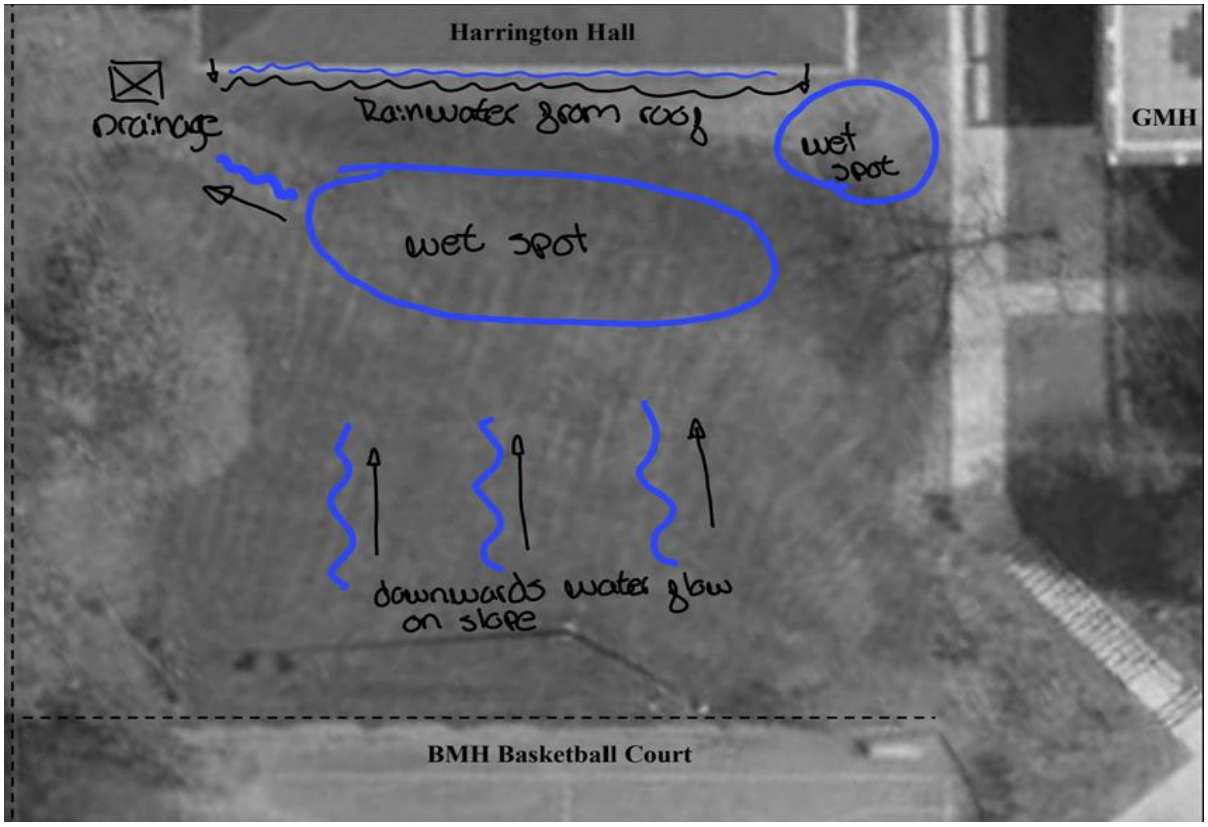
Based on the *STU Campus Vegetation Assessment*, the most common trees in the area are maple, crab apple, Manitoba maple, and maple trees. For shrubs and vines, grape vines, multiflora rose, oriental bittersweet, and buckthorn can be found in the patch periphery. As well, you can find wild strawberries, clover, dandelion, selfheal, hawkbit, plantains, and asters throughout the slope and patch.

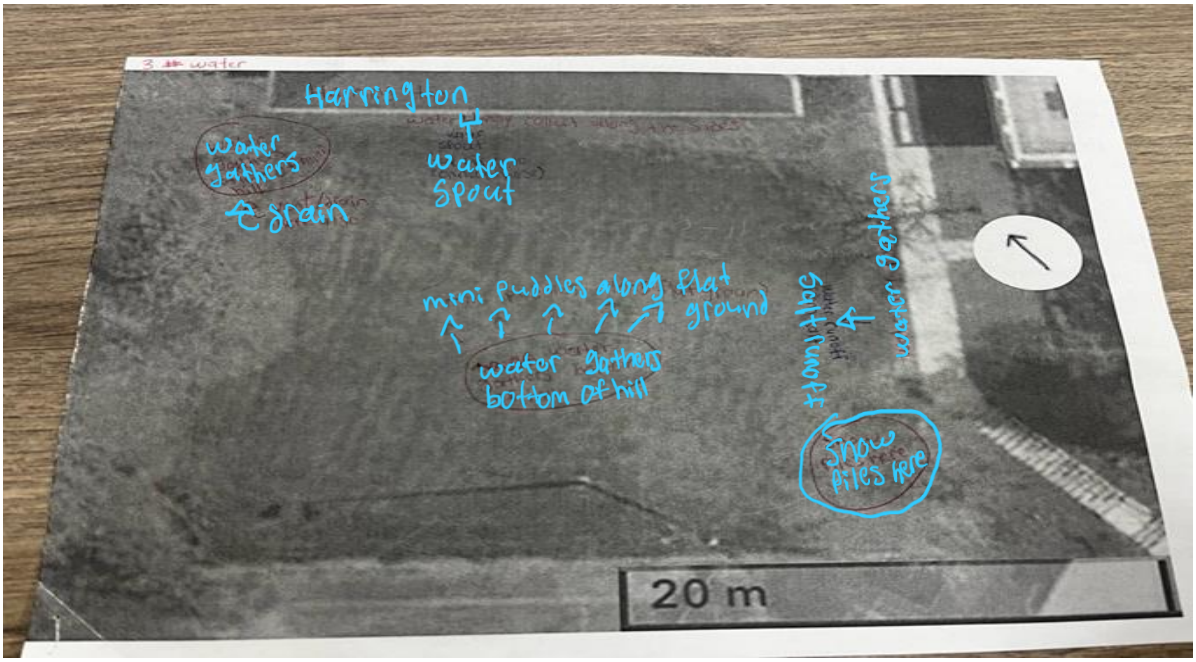
1. Geography


Harrington Hall
GMH
flat surface
slope
slope
flat surface
slight slope
BMH Basketball Court

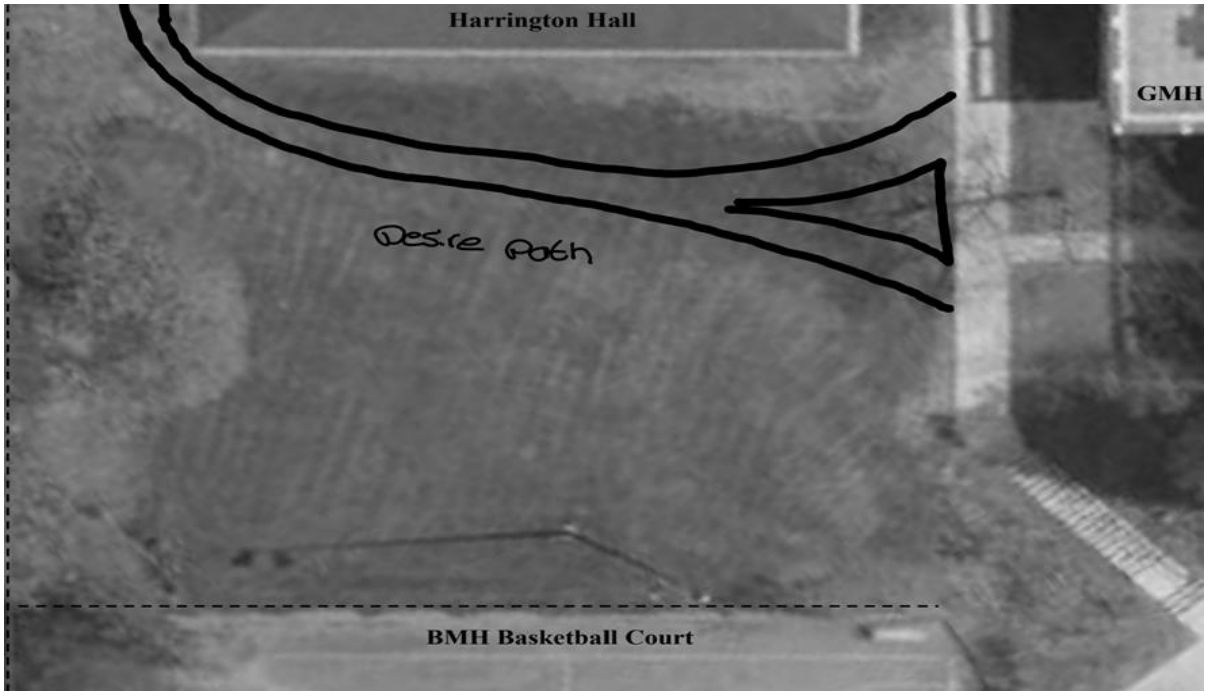

#2 Geography
Harrington
seating facing this way
Shrubs + Drain
Shrubs
Big hill
20 m

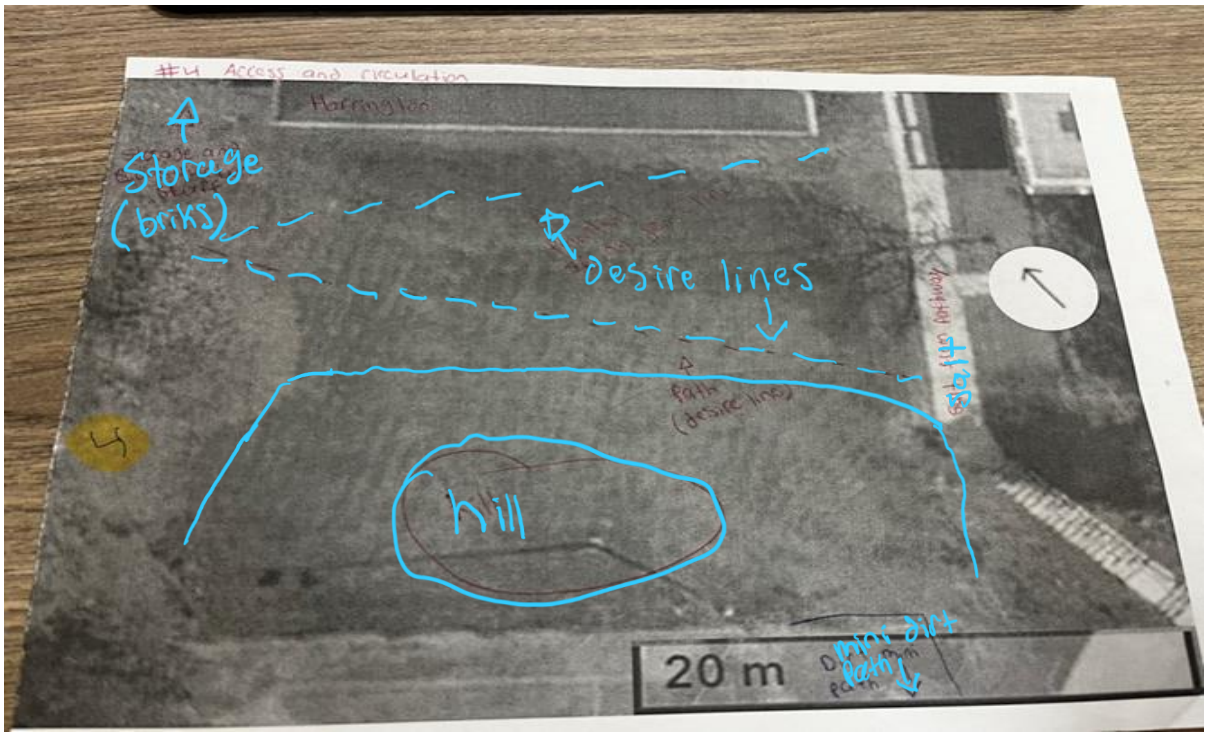
2. Water


Harrington Hall
drainage
Rainwater from roof
wet spot
GMH
wet spot
downwards water flow on slope
BMH Basketball Court

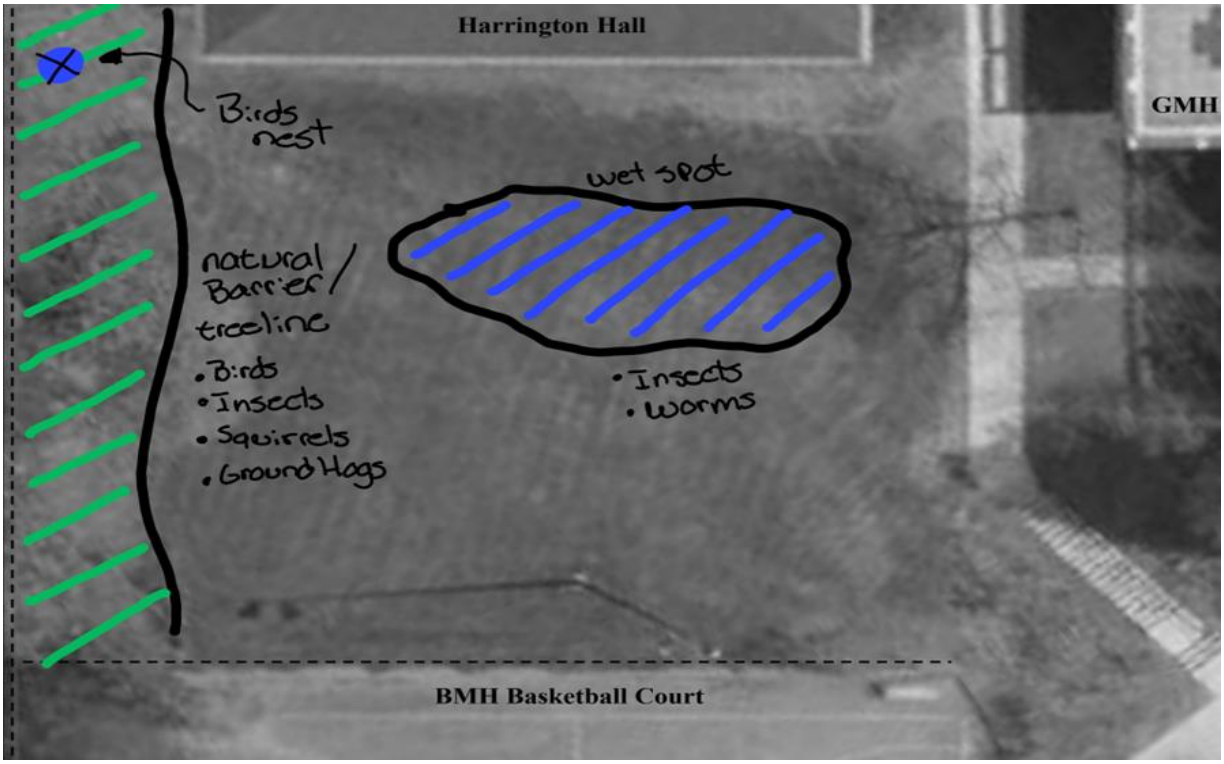

Harrington
water gathers
drain
water spout
mini puddles along flat ground
water gathers bottom of hill
gathering
water gathers
snow piles here
20 m

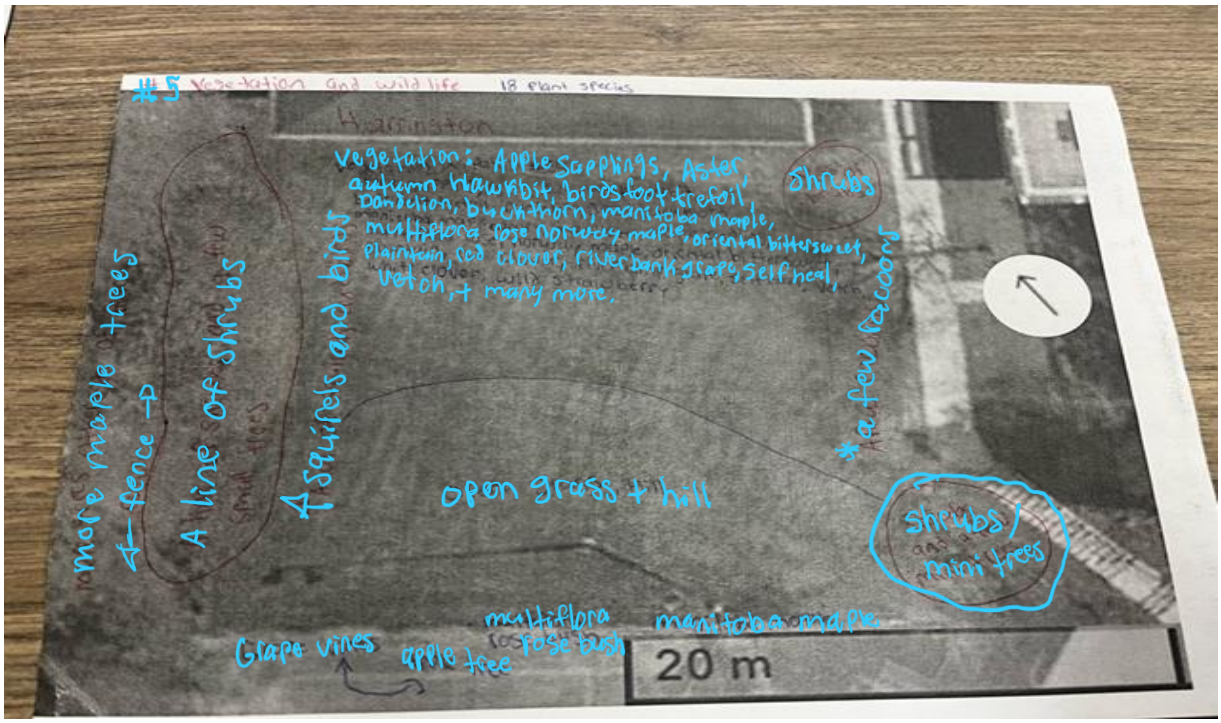
3. Access and Circulation



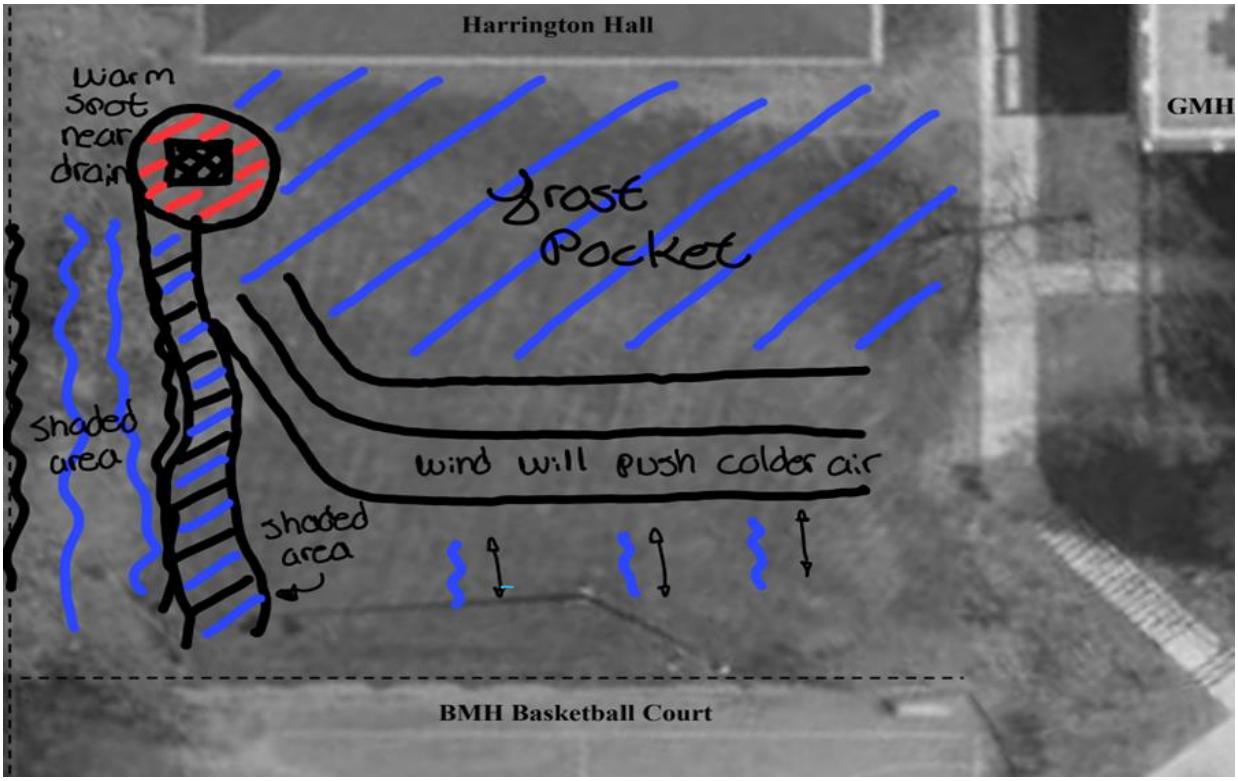



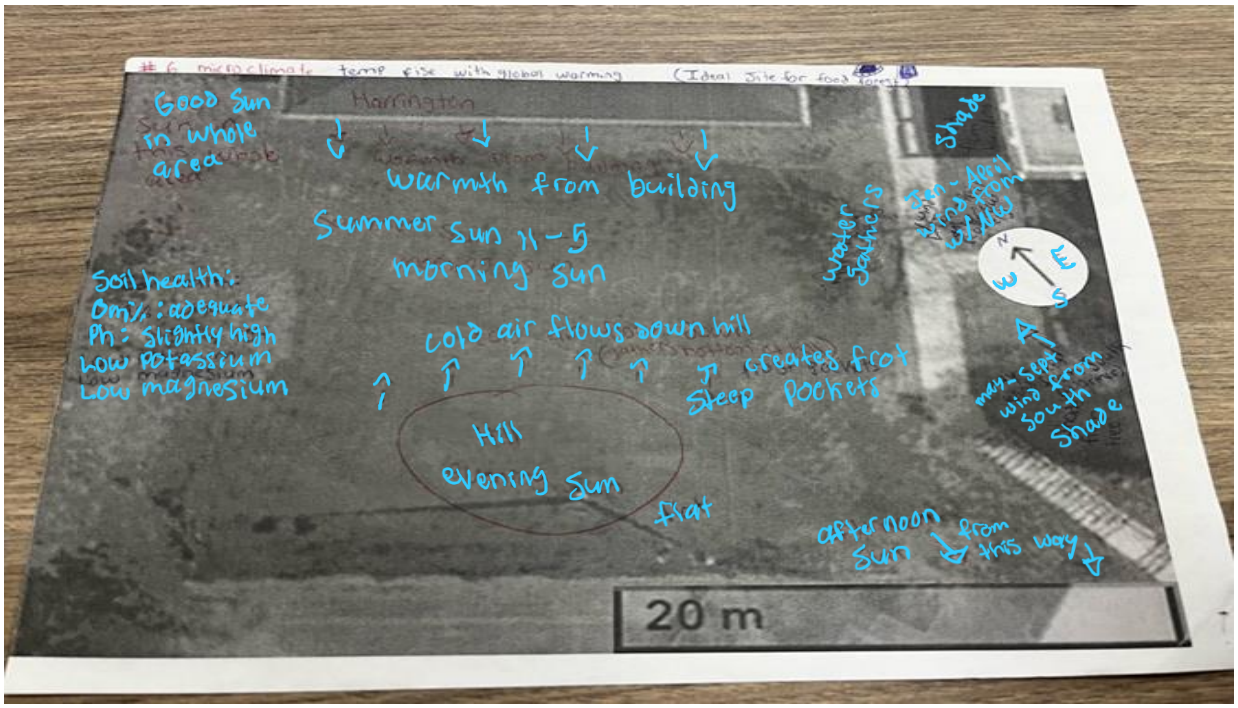
4. Vegetation and Wildlife



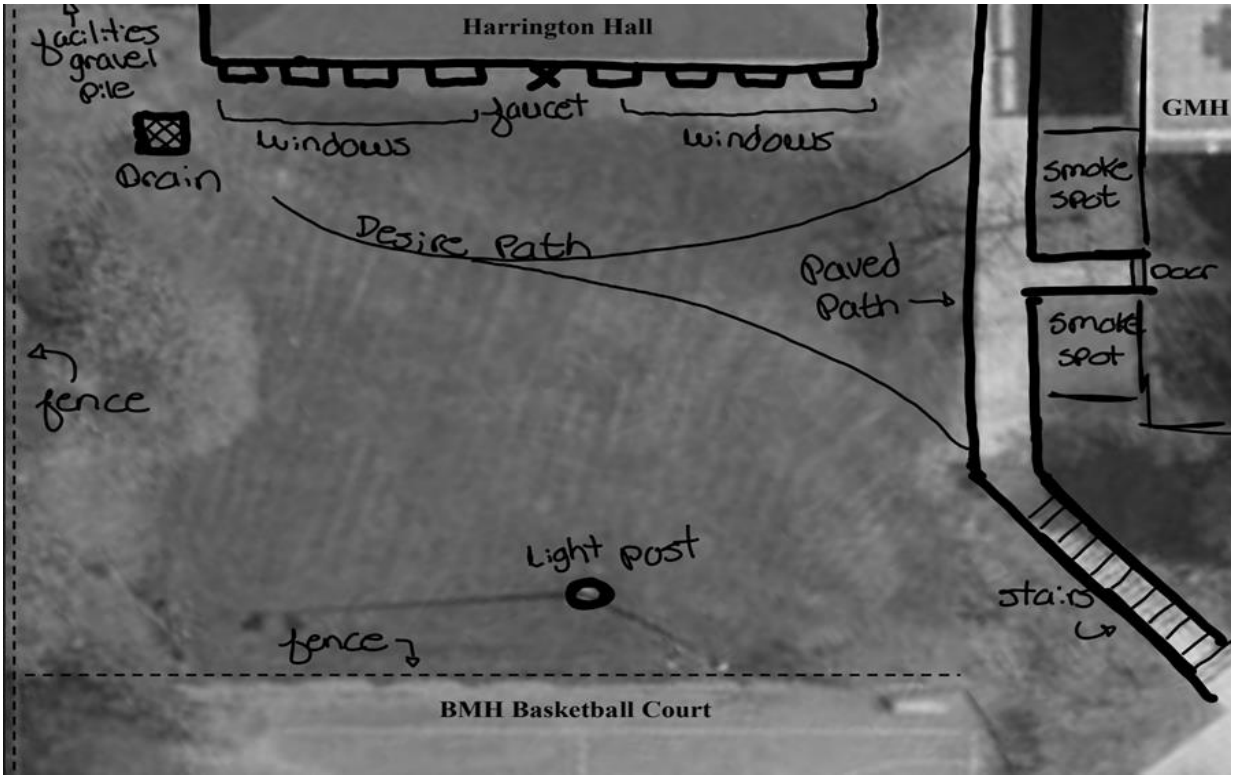



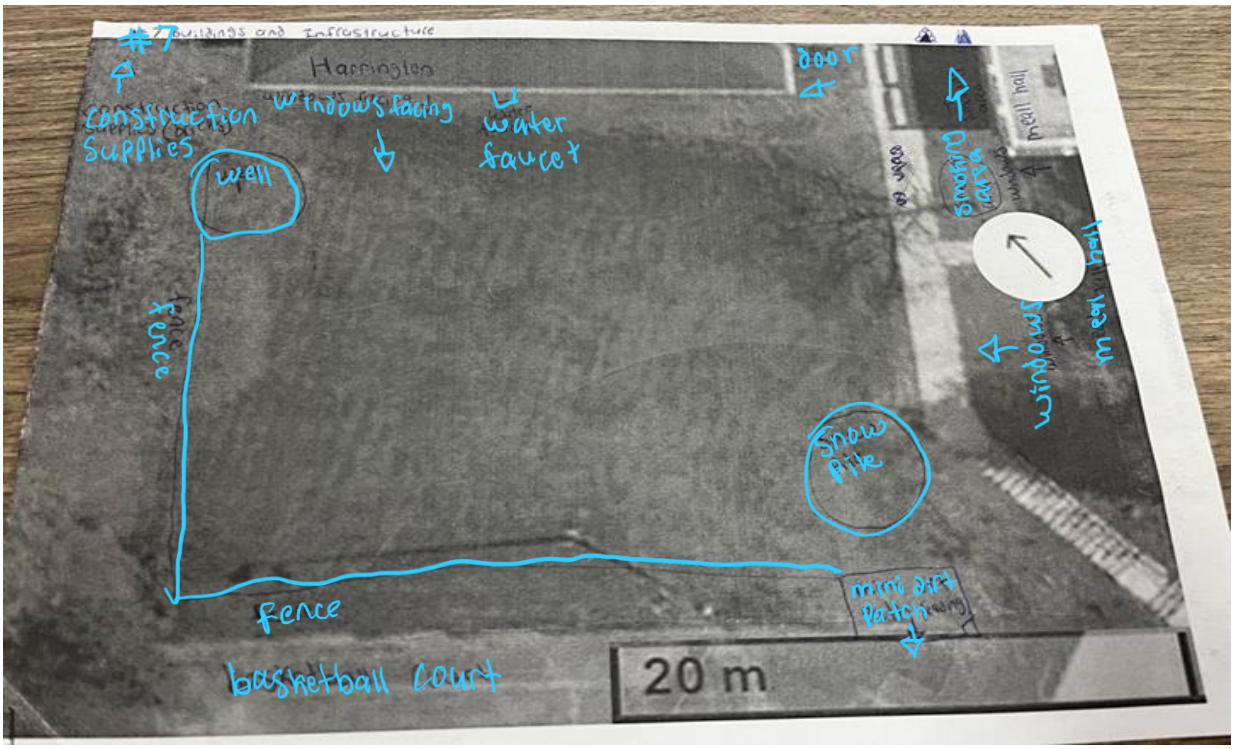
5. Microclimate



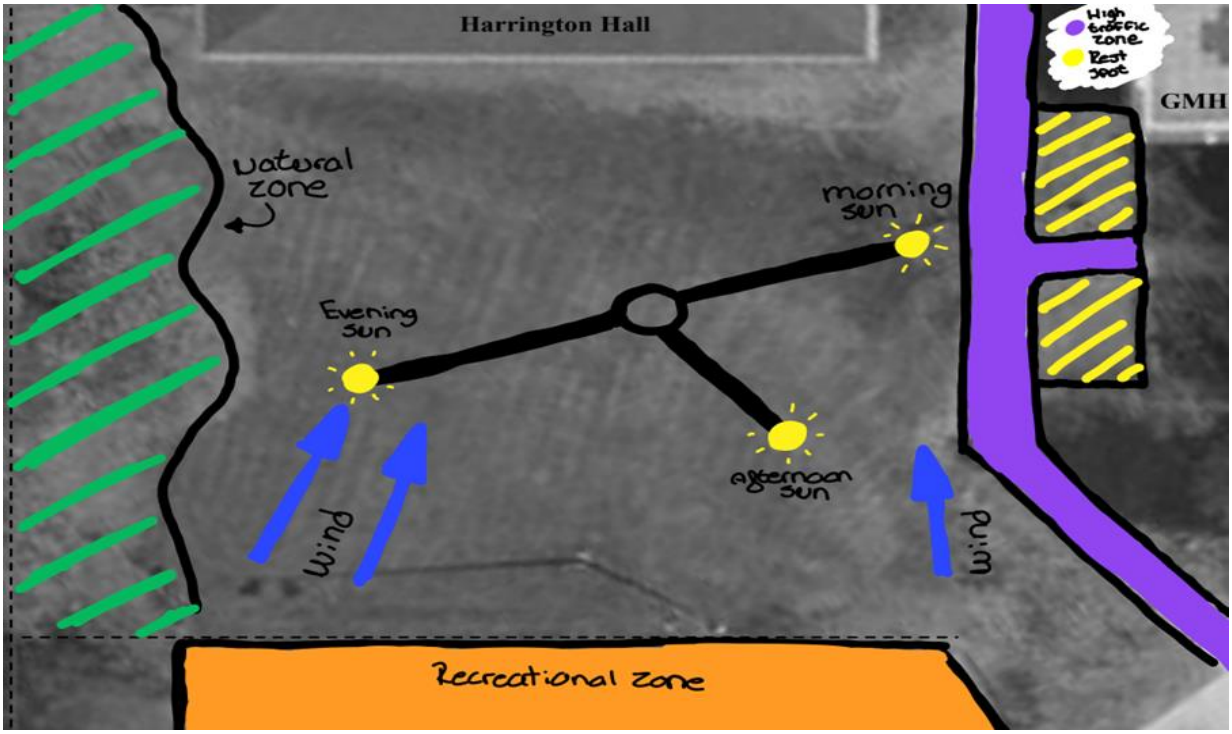



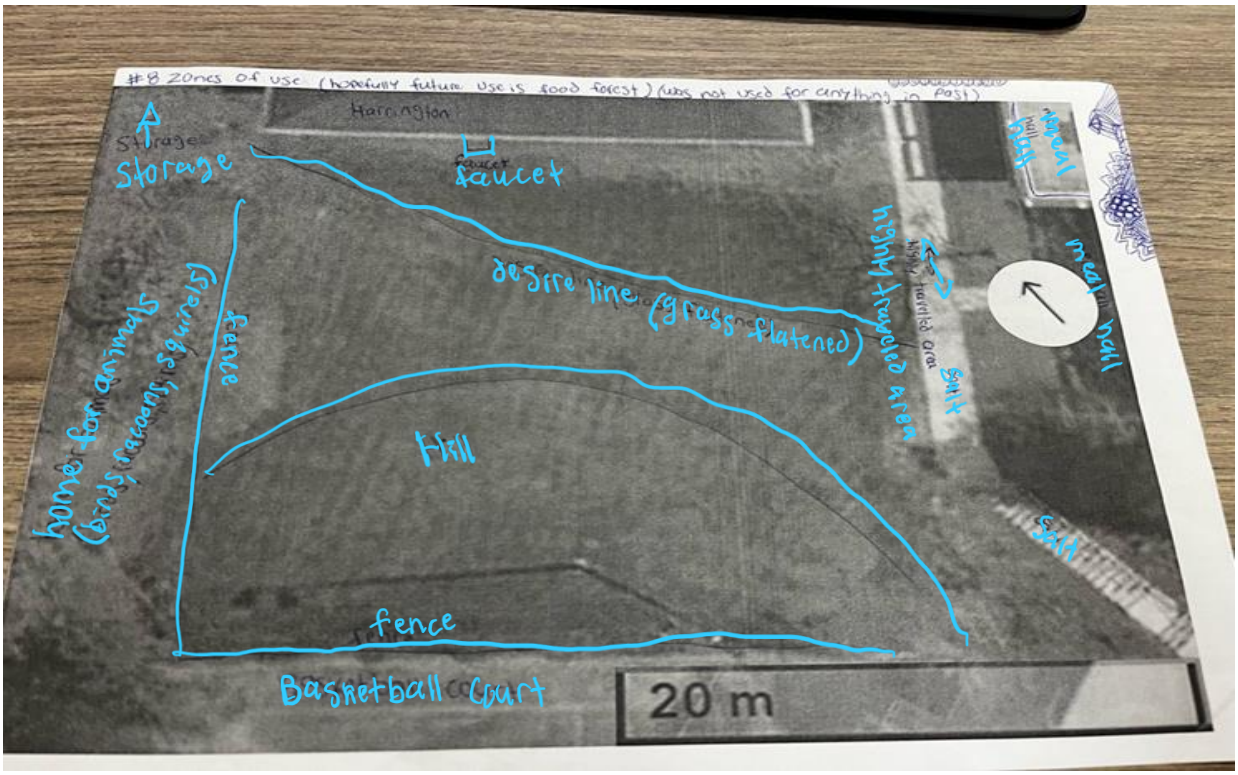
6. Buildings and Infrastructure



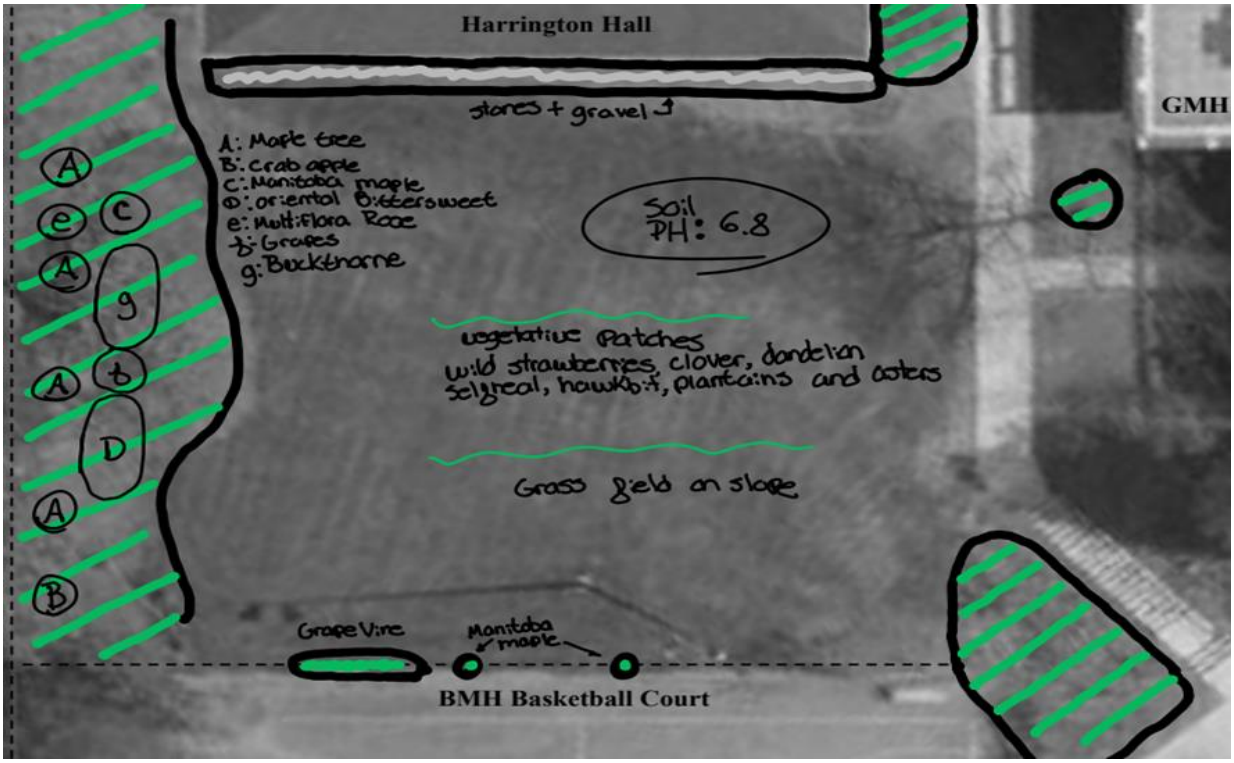



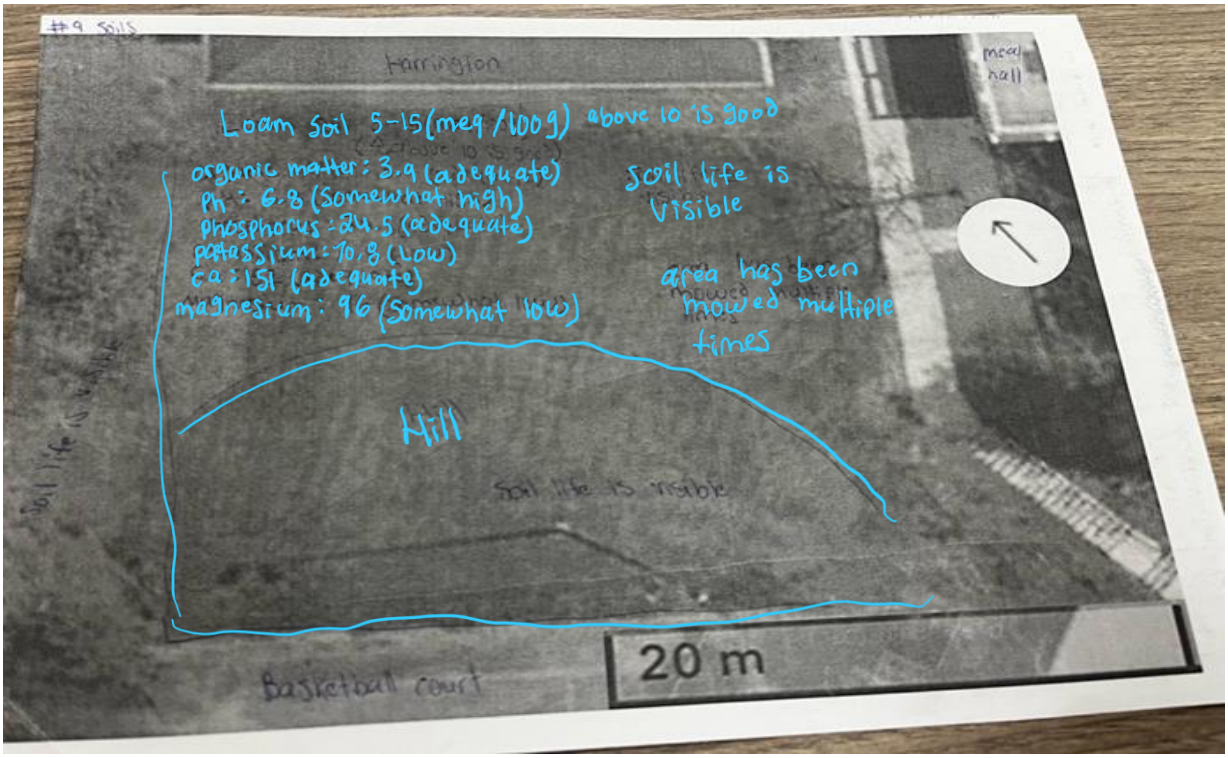
7. Zones of Use



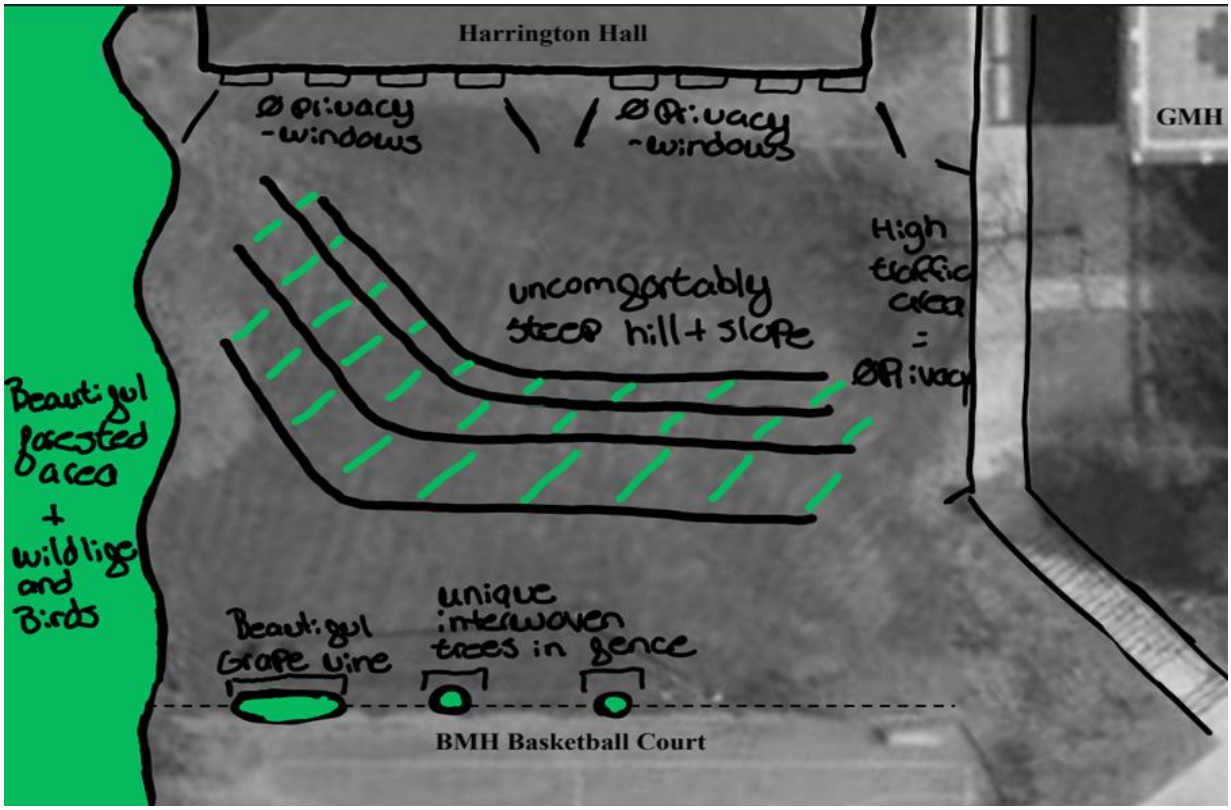



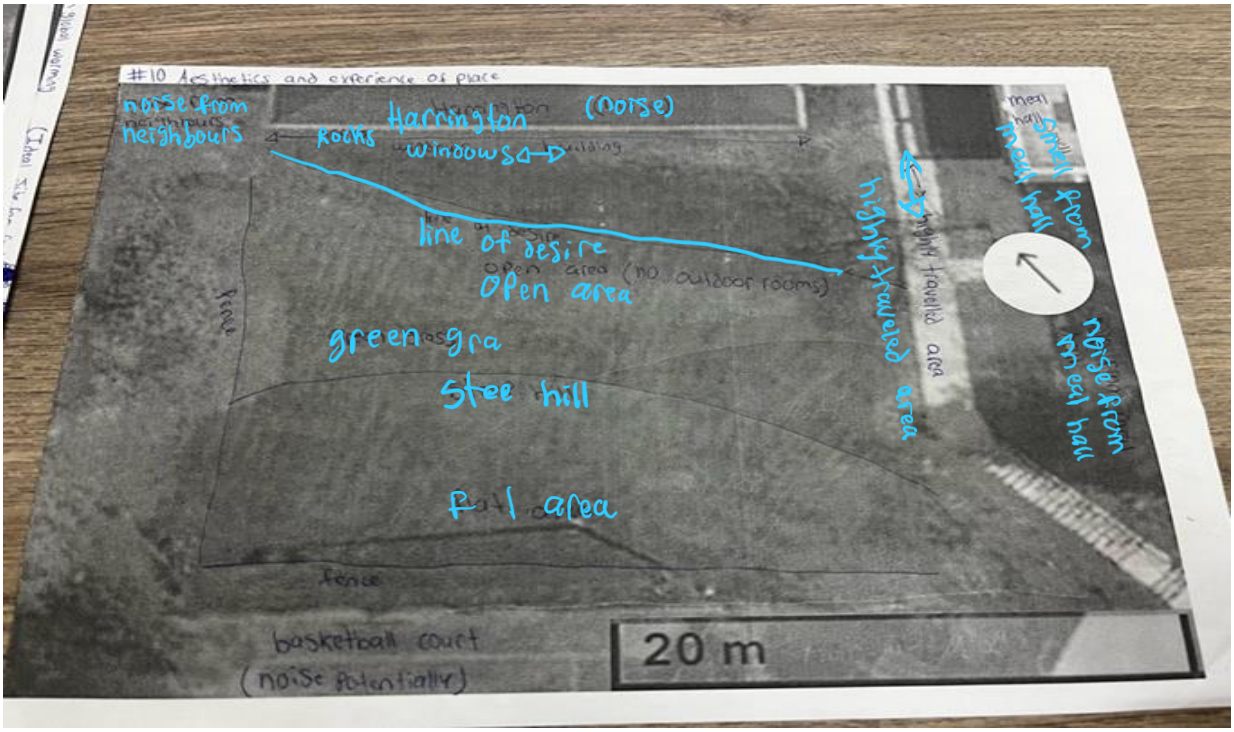
8. Soils


Harrington Hall
stones + gravel
GMH
A: Maple tree
B: crab apple
C: Manitoba maple
D: oriental Bittersweet
e: Multiflora Rose
f: Grapes
g: Buckthorne
Soil PH: 6.8
vegetative patches
wild strawberries, clover, dandelion
selgreal, hawkbit, plantains and asters
Grass field on slope
Grape Vine
Manitoba maple
BMH Basketball Court

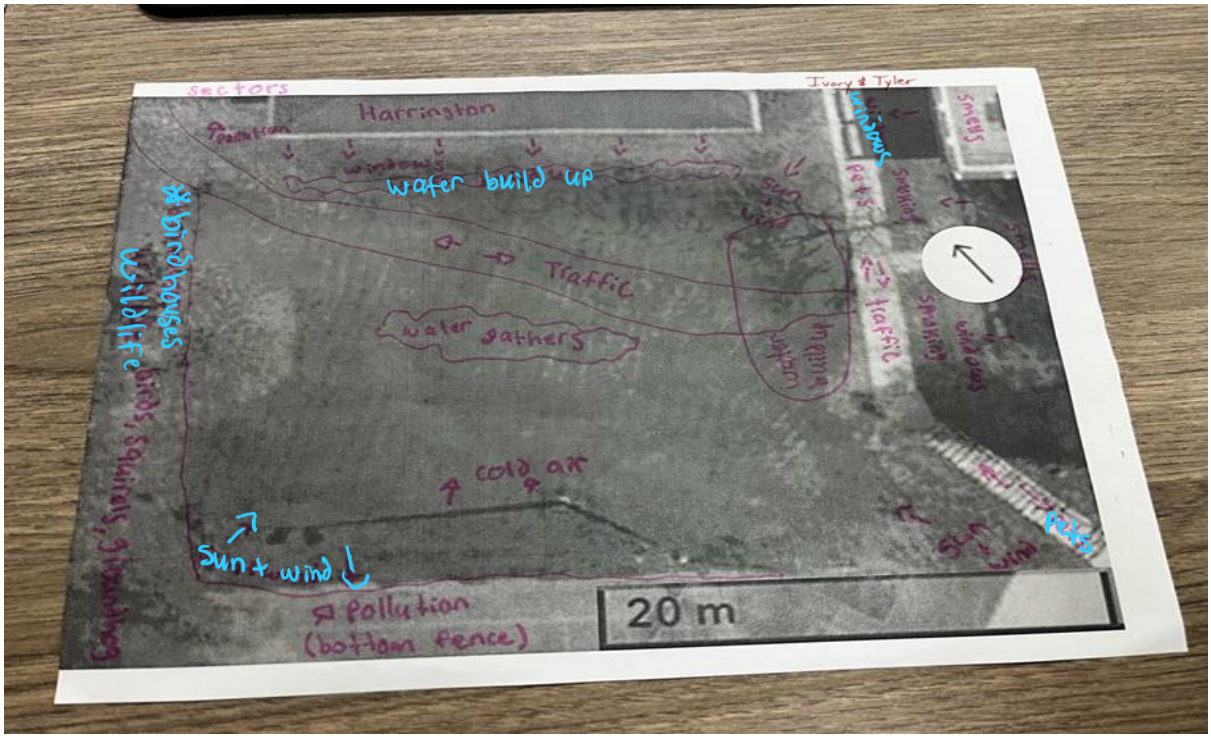

#9 Soils
Harrington
meal hall
Loam soil 5-15(meq/100g) above 10 is good
organic matter: 3.9 (adequate)
Ph: 6.8 (somewhat high)
phosphorus: 24.5 (adequate)
potassium: 70.8 (Low)
Ca: 151 (adequate)
magnesium: 96 (Somewhat low)
soil life is visible
area has been mowed multiple times
Hill
soil life is visible
Basketball court
20 m

9. Aesthetic and Experience of Place

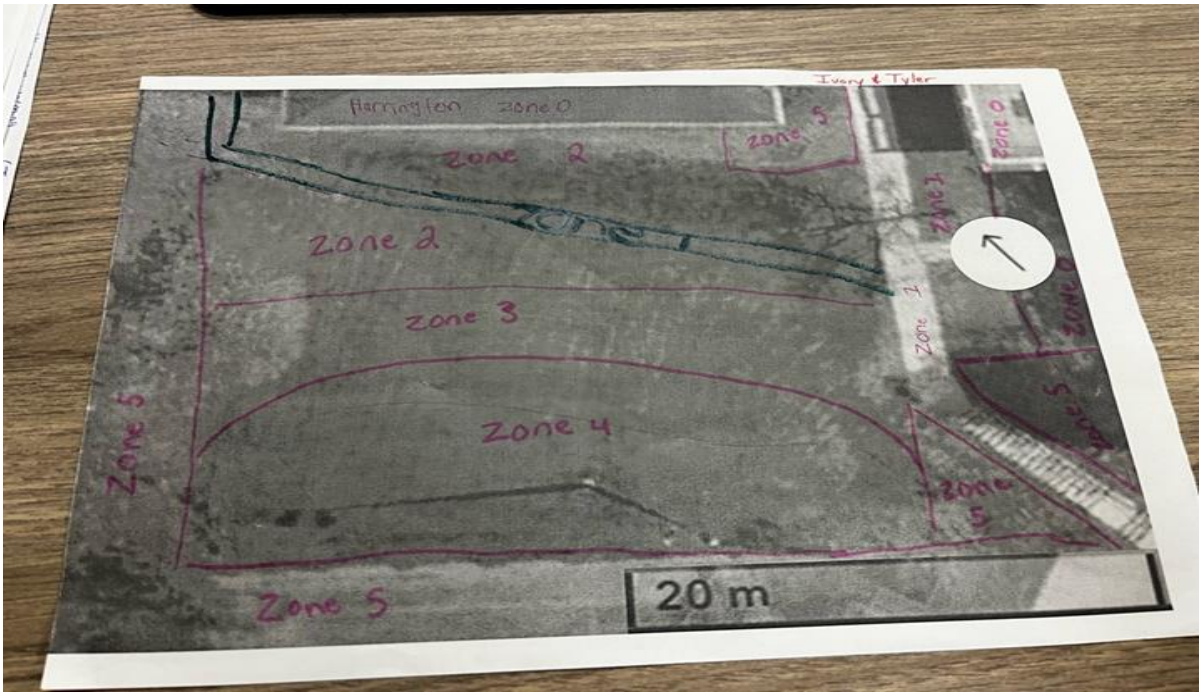


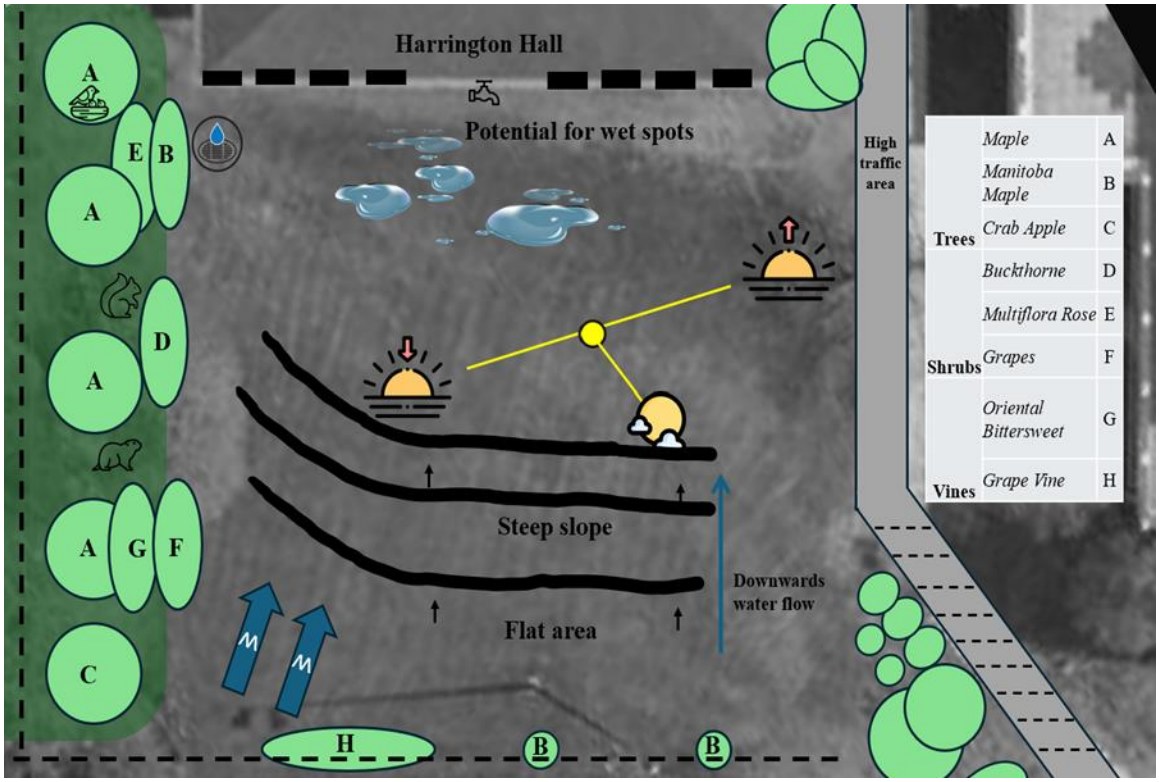
10. Sectors

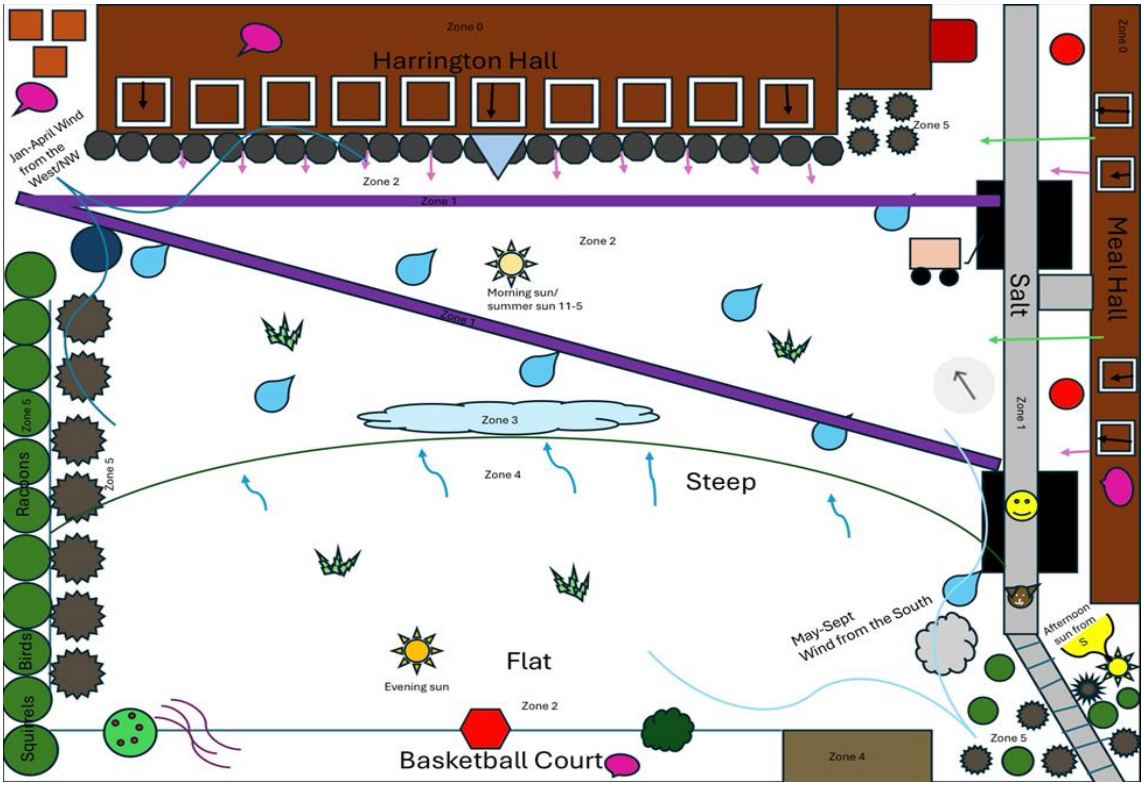



11. Zones



12. Summary of Formal Observations



## 3. Design

### 3.1. Design Concept

Based on the site analysis and assessment maps, we can form a design concept to reflect our desired vision of site 54.

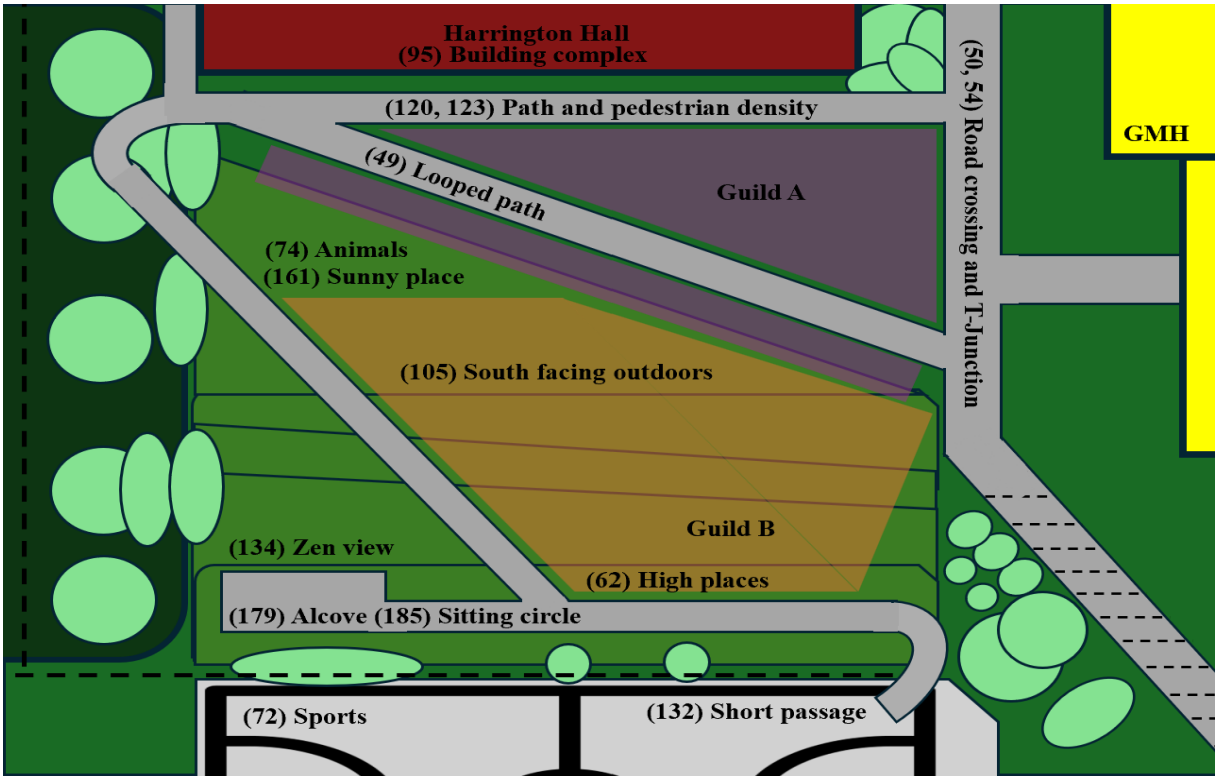
Because of an abundance of wildlife and vegetation, our design concept will preserve and expand on what is already there. For example, existing plants such as grape vine and Manitoba maple saplings that are interwoven in the fence will be preserved, whereas they're unique and create a barrier between the BMH basketball court and site. In addition, our design concept will prioritize wildlife by adding birdhouses, and edible plants that can be used by both humans and animals.

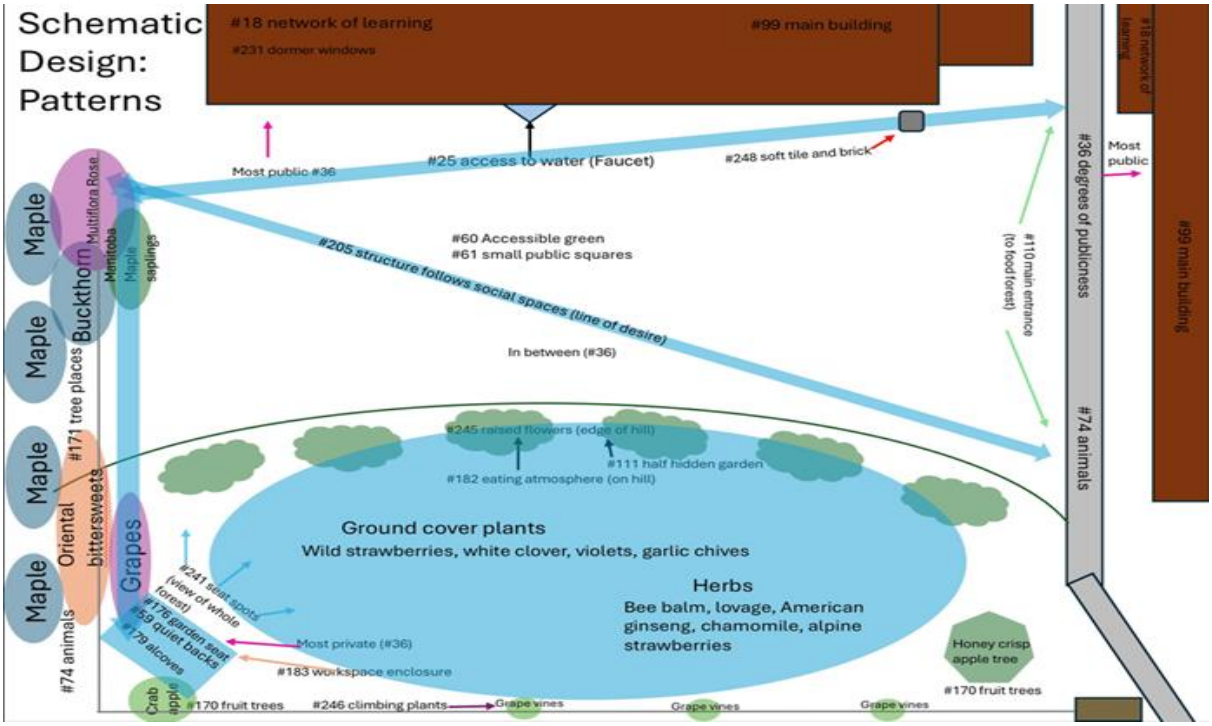
The assessment and analysis maps show that the site is in view of Harrington Hall windows and a busy main path. To create a sense of place for introverts and extroverts, the design concept will include public areas with seating, and private areas blocked by shrubs and trees. Moreover, our design concept will formalize desire paths by making them multi-directional and accessible.

### 3.2 Schematic Design

The following is the schematic design, which includes selected patterns, a need and yields analysis, and bubble diagram for patch 54. Based on formal observations and the site analysis and assessment, it highlights key features, trends, and functions.

## Natural and Human Patterns



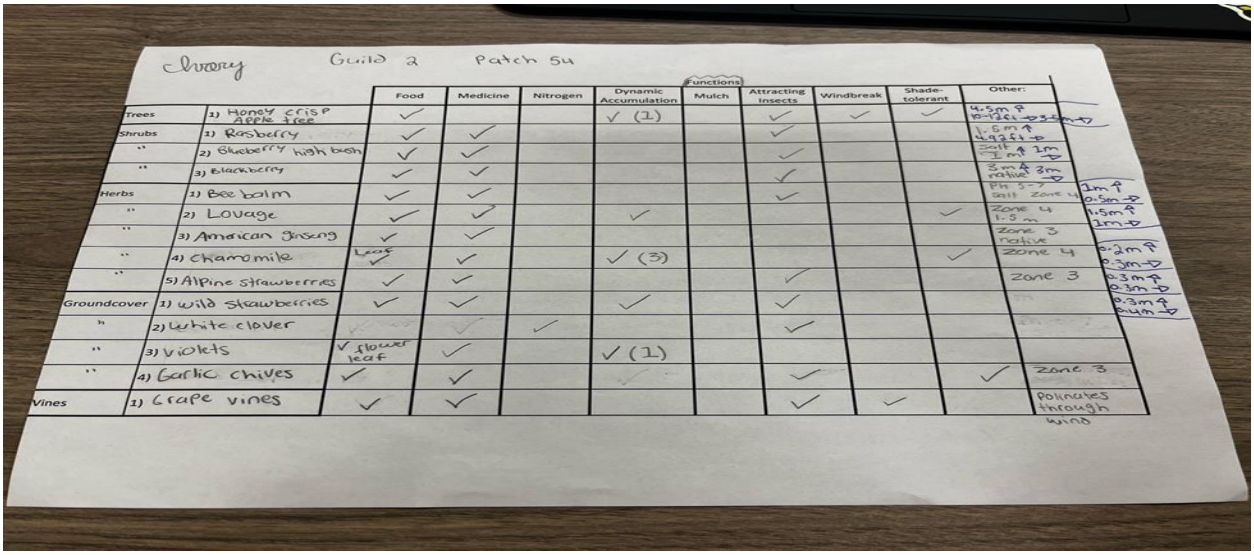
### 3.3. Needs & Yields Analysis

The following needs and yields analysis will consider the guild design, placement, and size of plants. Moreover, a functions list will be added for each individual plant, to offer insight into how needs and yields were assessed for this guild.

**Needs and Yields Guild A**

| | | Food | Medicine | Nitrogen | Dynamic Accumulation | Mulch | Attracting Insects | Windbreak | Shade-tolerant | Other: |
|---|---|---|---|---|---|---|---|---|---|---|
| Trees | 1) Serviceberry | Fruit | Y | - | - | - | Pollinators | Y | Excellent | Native |
| Shrubs | 1) Fragrant Sumac | Fruit | Y | - | - | - | Pollinators and wildlife | - | Moderate | |
| | 2) Highbush Cranberry | Fruit | Y | - | - | - | - | Y | Excellent | Native |
| | 3) Beaked Hazelnut | Fruit | Y | - | - | - | Pollinators | Y | Excellent | Native |
| Herbs | 1) American Ginseng | Root | Y | - | - | - | - | - | Excellent | Native |
| | 2) Ground Ivy | Fruit, flower, and leaf | Y | - | Excellent | - | Pollinators | - | Excellent | |
| | 3) Comfrey | - | Y | - | Excellent | Y | Pollinators | - | Moderate | |
| | 4) Sunchokes | Root | Y | - | - | Y | Pollinators and wildlife | Y | Low | |
| | 5) Common Mallow | Fruit and leaf | Y | - | Excellent | - | Pollinators and wildlife | - | Moderate | |
| Groundcover | 1) Wild strawberries | Fruit | - | - | - | - | Pollinators and wildlife | - | Moderate | Native |
| | 2) Crowberry | Fruit | - | - | - | - | Pollinators and wildlife | - | Excellent | |
| | 3) Yellow Daylily | Flower and young shoot stem | - | - | Excellent | - | Pollinators and wildlife | - | Moderate | |
| | 4) Dutch White Clover | Flower, leaf, and stem | - | Y | Fair | - | Pollinators and wildlife | - | Excellent | |
| Vines | 1) Groundnut | Root | - | Y | - | - | Pollinators | - | Excellent | Native |

**Needs and Yields Guild B**

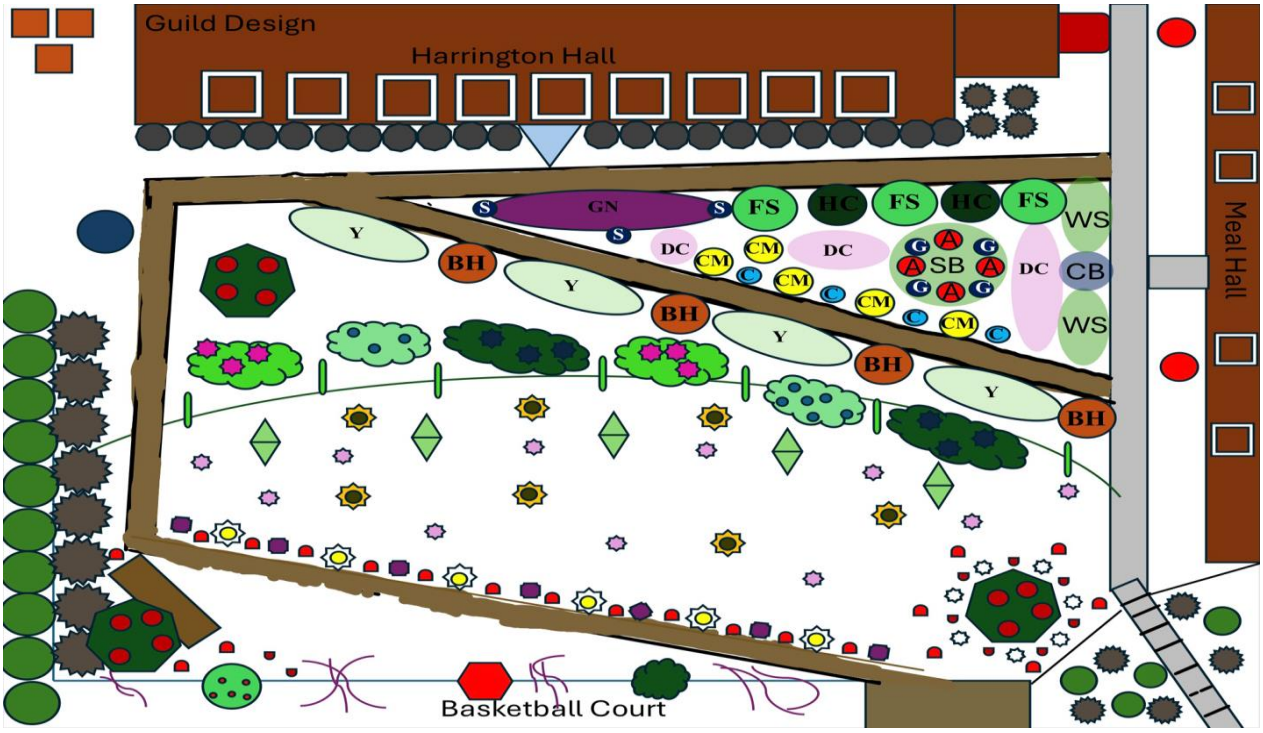


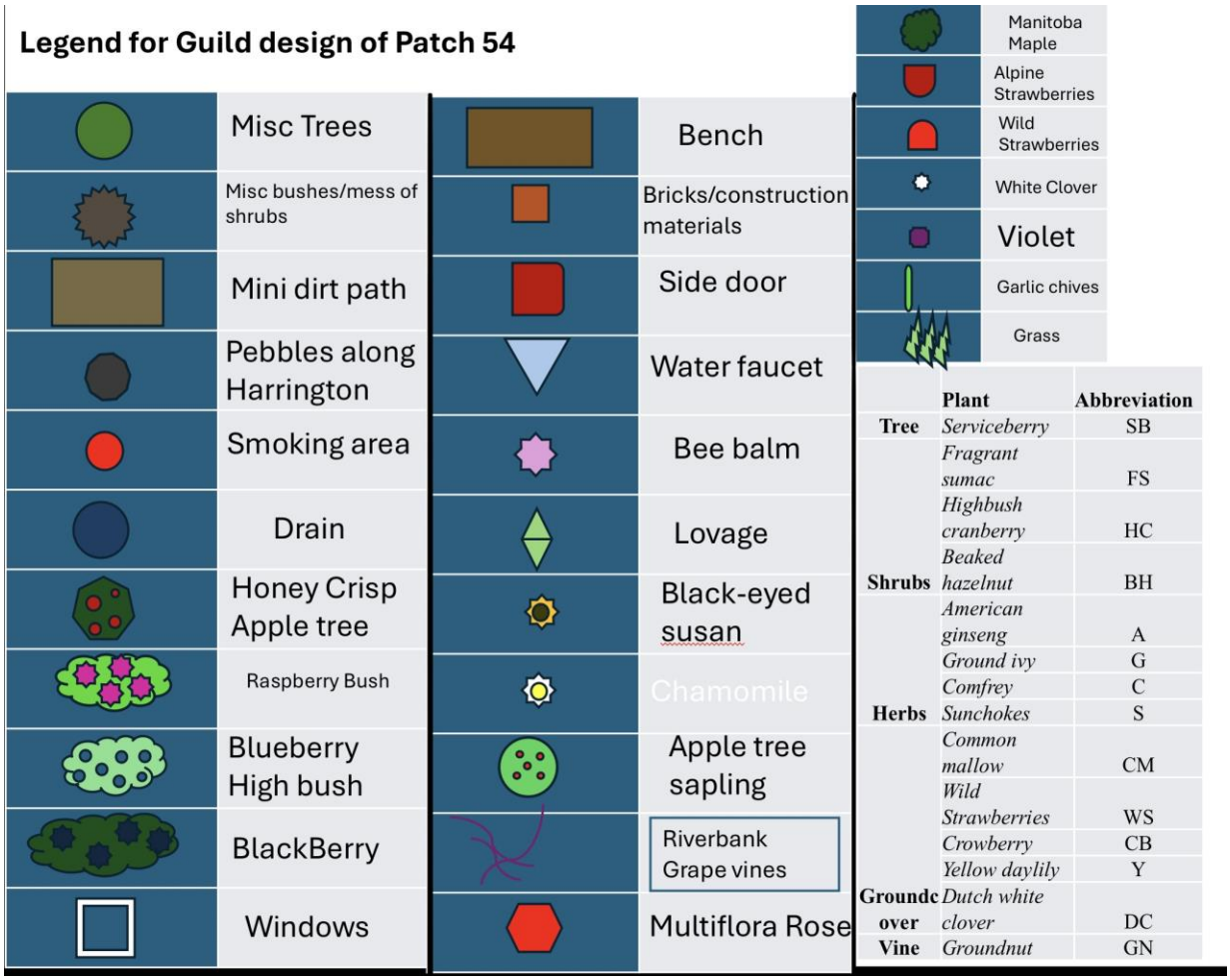
Regarding needs and yields, the site doesn't require a focus on nitrogen and dynamic accumulators. However, additional nitrogen and dynamic accumulator plants will be added for safe measure, considering that the site is prone to water formations during rain.

As well, edible plants will be diverse to offer various yields for wildlife and humans. Moreover, certain plants are shade tolerant, while other plants can offer shade for those that require it. Additionally, wind-barrier shrubs were placed to offer protection to plants that are prone to wind. Thus, plants will be strategically placed to offer the most benefits to other plants that are in the vicinity.

## 4. Detailed Design

### 4.1. Detailed Design Map






| | Plant | Abbreviation |
|---|---|---|
| **Tree** | *Serviceberry* | SB |
| | *Fragrant sumac* | FS |
| | *Highbush cranberry* | HC |
| **Shrubs** | *Beaked hazelnut* | BH |
| | *American ginseng* | A |
| | *Ground ivy* | G |
| | *Comfrey* | C |
| **Herbs** | *Sunchokes* | S |
| | *Common mallow* | CM |
| | *Wild Strawberries* | WS |
| | *Crowberry* | CB |
| | *Yellow daylily* | Y |
| **Groundcover Vine** | *Dutch white clover* | DC |
| | *Groundnut* | GN |

### 4.2. Design Notes

#### 4.2.1 Guild A Design Notes – Tyler D

- Guild will be contained in an open space within the looping path, which was inspired by identified desire paths.
- Paths are strategically placed to abide by selected patterns #49 (looping paths), #120 (paths) and #124 (density). Having two paths merging into one will make access easier and reduce pedestrian density on the path. Additionally, it will provide more privacy for pedestrians and the residents of Harrington Hall.
- One of the two merging paths will be layed nearest to the slope to minimize excess water from affecting the selected plants.
- Native and edible plants were prioritized; when selecting plants for the guild.
- A serviceberry tree will be at the center to provide an overstory layer, with smaller understory plants located nearest to the base of the tree.
- Shrubs were strategically positioned to provide privacy for visitors and to the residents of Harrington Hall.
- Edible and medicinal plants were placed nearest to the path, to ensure easy access and foraging. As well, this will deter visitors from stepping onto sensitive and fragile areas within the guild.
- Plants are positioned to follow an alternating pattern (e.g. *A-B-A-B)*, to minimize duplicate plants in the same area or next to one another.
- Sunchokes were placed in the corner—where the paths intersect—to contain them from spreading onto other nearby plants. As well, groundnut will act as an understory barrier for the sunchokes.

- Plants that require less sunlight are placed in the north, closer to Harrington Hall, whereas plants that require more sunlight are placed in the south to receive additional sunlight during the afternoon and evening.
- American ginseng and ground ivy will be placed beneath the serviceberry tree, for optimal growing, shade-tolerance, and wind-breaking.

#### 4.2.2. Guild B Design Notes – Ivory G

- Mainly based around the steep hill, as well as having a focus on implementing edible plants and ground covering plants that benefit the pollinators.
- Supplemental ground covering plants such as, bee balm, lovage, and brown eyed Susan's to deter individuals exploring the food forest from walking straight up or down the hill. Whole area gets good sun.
- Important to support the already existing plants of the area (Apple tree sapling and the Riverbank grape vines that are growing along the fence). I added three Honey crisp apple trees and more Riverbank grape vines to create privacy. Soil, sun, water puddles, and having pollinator plants creates the perfect growing conditions for the Honey Crisp's.
- Raspberry, Blackberry, and Blueberry bushes along the steep area of the hill, for easier access to the fruit. Wild strawberries, violets, and chamomile placed along the path on the flat area at the top of the hill. (Sun in this area, the ph of the soil, and where the bushes are placed in terms of water, creates perfect growing conditions)
- The rest area was placed in the corner of the patch on the flat area of the hill for privacy by using the already existing shrubs. I have also placed one of the Honey Crisp apple trees behind the bench to enable the person resting to have access to the fruit.

- The pathways were created following the already implemented desire lines, and the small, flat dirt patch beside the fence leading to the basketball court, so individuals will not have to go down the hill to exit the food forest.
- It is not pictured on the design map, but we will also be adding another rest area at the bottom of the hill by the Honey Crisp apple tree to allow individuals with mobility issues to also be able to experience the benefits of the food forest.

#### 4.2.3. Shared-Areas Design Notes

- Bird houses: Will hopefully be implemented in the already existing Maple trees, as well as in the Honey Crisp apple trees once they are grown.
- Communal spaces: We have implemented two seating areas. One at the bottom of the hill under the Honey Crisp apple tree for added privacy, and one in the corner by the fence at the top of the hill (also under a Honey Crisp apple tree).
- Looped path: We have used the already existing desire lines to create the paths through the food forest. We have added a path to go up the side hill (the side with the fence) as it is less steep. The exit will be located beside the end of the fence that leads to the basketball court.
- Fencing: There is a fence that separates the maple trees from the shrubs on site 54. The fence is located closest to Windsor St, and it goes up to separate the area from the basket-ball court.

## 5. Implementation and Maintenance

### 5.1. Implementation

The estimated costs for guild A and B will be included in the table below.

| Tree/Shrub/Herb/Vine | Cost per seed-pack |
|---|---|
| **Guild A (Tyler's Guild)** | |
| *Serviceberry* | 8.85 |
| *Fragrant Sumac* | 6.99 |
| *Highbush Cranberry* | 5.99 |
| *Beaked Hazelnut* | 9.99 |
| *American Ginseng* | 20.95 |
| *Ground Ivy* | 14.86 |
| *Comfrey* | 8.99 |
| *Sunchokes* | 6.95 |
| *Common Mallow* | 10.95 |
| *Wild Strawberries* | 2.99 |
| *Crowberry* | 6.99 |
| *Yellow Daylily* | 44.23 |
| *Dutch White Clover* | 5.20 |
| *Groundnut* | 12.7 |
| **Guild B (Ivory's Guild)** | |
| *Honey Crisp Apples* | 62.95 |
| *Raspberry* | 9.99 |
| *Blueberry* | 9.99 |
| *Bee Balm* | 4.25 |
| *Lovage* | 5.3 |
| *American Ginseng* | * |
| *Chamomile* | 2.19 |
| *Alpine Strawberries* | 2.99 |
| *Wild Strawberries* | * |
| *White Clover* | * |
| *Violets* | 5.99 |
| *Garlic Chives* | 3.90 |
| *Grape Vine* | 6.99 |
| ** : use existing seed-packs from Guild A* | |
| ***Total estimated cost; before sales-tax:*** | **281.17** |

Prior to implementation, training and skills should be provided to team members, which could include landscaping, pruning, weeding, soil testing, and seedlings. Once skills and training are complete, the implementation should include multiple phases, which could include:

- Formation of an Implementation Committee or group.
- Secure land and resources phase.
- Community consultation and engagement phase.
- Preparation of site phase (paths, signage, fencing, mulching, weeding, and acquisition of seeds, birdhouses, and seating for the added features in the shared areas).
- Plant seeds and seedlings phase.
- Evaluate, improve, and celebrate success with the team and community.

### 5.2. Maintenance

- Honey Crisp's need at least 8 hours of sun per day (reduce spread of disease and kill fungi). Also need regular water (especially from May-October). Hold hose near base of tree for around 30-45 seconds (allow water to access the deep roots).
- Honey Crisp's need nitrogen rich fertilizer during springtime and require pruning or need their branches to be weighed down.
- Need hardware cloth around the trunks of the Honey Crisp's. Important to identify the pests to assure the survival of the fruit.
- Blueberries need regular sunlight, moist soil, and organic mulch or sawdust. Cross pollination benefits the crop. Grow and spread out quickly, so need to be pruned.
- Blackberries spread quickly, so need to be pruned. Also, need to change the location of the blackberries because they can't be too close to the raspberries.

- Important to know which weeds are good and which are bad. Good weeds can be kept (as long as they are not large, and don't take over the area). Invasive weeds that are not good for the are must be removed.
- Buy weed barrier fabric to be placed on the path under the cement squares to prevent the weeds from growing through the cracks.
- Will need to trim/prune the lovage because it can grow to be huge and may create unwanted shade for other plants.
- Add compost and organic fertilizer to the bottom of the raspberry bushes for 4-6 weeks.
- Will need a push mower to mow the areas where nothing is planted and is just grass.

**6. Conclusion**

To summarize, the St. Thomas University food forest project will create a positive and lasting impact on humans, plants, animals, and the greater community. The proposed food forest embodies a sustainable, inclusive, and multifunctional space that aligns with permaculture principles. By integrating native and edible plants, plants that support pollinators, and thoughtfully designed pathways and seating areas, this project seeks to enhance both ecological health and community engagement.

Through careful site analysis, we identified key aspects such as, sun patterns, wind patterns, where water gathered, what type of soil was in our patch, etc. The design emphasizes needs and yields, ensuring that each plant contributes to the overall resilience and productivity of the ecosystem. Guilds A and B were strategically planned to provide food, medicine, and habitat while fostering a sense of place for students, faculty, and wildlife.

Implementation will require phased planting, maintenance routines, and community involvement to ensure long-term success. Regular pruning, soil enrichment, and potential invasive weeds management will sustain the food forest's health. Additionally, the inclusion of seating areas, birdhouses, and pollinator-friendly plants encourages interaction, education, and relaxation within the space.

Ultimately, this food forest represents more than just an alternative to traditional landscaping—it is a living example of sustainability, community resilience, and ecological stewardship. For Patch 54, we hope that an edible ecosystem thrives, while also providing the STU, and the greater Fredericton community with the chance to foster deeper connections between each other and with nature, while also providing lasting benefits to the future generations.

**7. References**


- Arbor Day Foundation. (2025). *Blackberry Planting & Care Instructions.* https://www.arborday.org/planting-your-tree/blackberry-planting-care-instructions
- Arbor Day Foundation. (2025). *Blueberry Bush Planting & Care Instructions.* https://www.arborday.org/planting-your-tree/blueberry-bush-planting-care-instructions
- Bradley, Lucy. (2019). *How to Organize a Community Garden*. NC State Extension Publications. https://content.ces.ncsu.edu/how-to-organize-a-community-garden
- Decorative Aggregates. (2024). *How to Lay Weed Membrane for Your Garden.* https://decorativeaggregates.com/blogs/how-to-guides/how-to-lay-weed-membrane-for-your-garden#:~:text=A%20weed%20membrane%20fabric%20is,visible%20within%20the%20gravel%20surface
- Government of Canada. (2025). *Canadian Climate Normals.* https://climate.weather.gc.ca/climate_normals/index_e.html
- LandscapeDirect. (2025). *Shop by Collections*. https://landscapedirect.ca/
- Mathis, Andrew and Lemay, Kayla. (2025). *Vegetation & Soil Analysis & Assessment.* Oasis Farmery.
- SunEarthTools. (2025). *Sun Position*. https://www.sunearthtools.com/dp/tools/pos_sun.php
- ThisOldHouse. (n.d.) *Honeycrisp Apple Tree Guide.* https://www.thisoldhouse.com/gardening/reviews/honeycrisp-apple-trees
- TreeSeeds. (2025). *Seed Store.* https://treeseeds.ca/