



# The Off-Grid Organic Food Shed

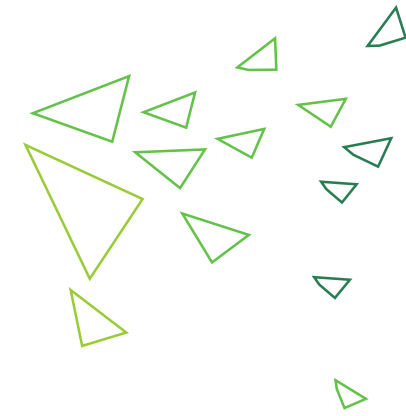
Presented by:  
 NATURE HARMONY

Bringing Nature to Those That Need It



# Overview

“The Off-Grid Organic Food Shed is an innovative intersection between nature and engineering that provides food and nature science education year-round in a self-sustaining envelope”



In this presentation we will go over:

- Executive Summary
- How does it work? How its off-grid?
- How has it been implemented at Gibson?
- Why its good for Brampton?
- How the backyard garden project & fire station can be part of the project
- Why is our project different than any other?
- What are the Cost, Components, and Timeline?

## Executive Summary:

Nature Harmony would manage the construction of a 161 sq ft Off-Grid Organic Food Shed in Brampton, in participation with Brampton Fire and the Backyard Garden Project. The shed would be powered by renewables (solar and wind), it would collect rainwater, and be made of highly energy efficient building materials. Inside the shed's automated LED lighting and grow beds would provide year round Organic food production. The project would cost \$50,000, and be completed by July 3<sup>rd</sup>. The shed would be operational as a pilot for 6 months, starting on July 3<sup>rd</sup> 2021 and ending on Jan 1<sup>st</sup> 2022.

# The Off-Grid Organic Food Shed

### Key Takeaways:



Grows Organic Produce & Fish, Year Round



Captures Carbon, Zero Waste



Off-Grid, Runs on Renewables & Rainwater



Promotes Community Engagement, Educational Tool

# How does it work? How is it Off-Grid?

## Powered by Renewable Energy



- 3.8 kw of roof mounted solar panels provide capture sunlight
- 2 kw Wind Turbine provides energy when the sun isn't out
- The shed is designed to be run completely Off-Grid

## Batteries Power Lighting & Electronics



- 24x 6v 230ah Batteries provide the energy storage for the shed
- The batteries can provide 2 full days of autonomy
- The Lighting is LED, so even when the sun isn't out the plants grow

## Automated Grow Systems produce organic food



- 64 sq ft of grow beds, produces up to ~150 lbs of produce in 6 month
- Includes Hydroponics, Aquaponics, and Organic Soil Growing
- Lighting & Watering are Automated
- Can grow a wide diversity of plants

## Rainwater Harvesting



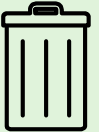
- Rainwater is harvested from the roof and directed into a large collection barrel.
- Each system draws water from the barrel and uses it to feed the plants

## Energy Efficient Building Exterior



- Building made of highly efficient Insulated walls
- Can maintain stable indoor temperatures all year long
- Smart HVAC control system keeps plants and occupants happy

## Carbon Capture & Waste Management



- Algae Bioreactor captures carbon from the air, and turns it to Algae
- The Duckweed System and Vermicomposting grows fish feed
- Any waste is sent to the vermicomposting bin and turns into soil

The combination of renewable energy, energy efficient envelope, and smart grow systems allow it to run all year long

# How has it been implemented at 105 Gibson Centre in Markham?

## History:



The Gibson Food Bank serves between **40-50 families per week**. Nature Harmony reached out to build a farm inside the center. The space for the Gibson Food Biome was provided by 105 Gibson Centre. In 2018 construction was completed and the Gibson Food Biome has been operational since.



## Results



- The Gibson Food Biome has donated organic produce to the at risk families that it services
- The produce donated is certified organic and some comes from one of the first organic fish systems in Canada
- The Gibson Food Biome also delivered education and hands-on classes to the public, offered tours to various groups, and will be a major part of a nature science camp for low income families in 2021\*



“The families love having access to the produce grown here, they say it tastes really fresh!”



\* Covid-19 Permitting, details still being finalized.



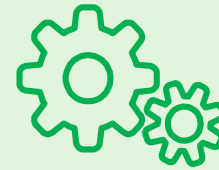
# Why is it good for Brampton?

<u>What are Brampton's Environmental Goals?</u> As stated in the 'Brampton Grow Green EMP 2020' document:	<u>How we are helping achieve Brampton's environmental goals?</u>
 <p><b>People:</b> Invest in People to create a healthy, livable, and safe community</p>	<ul style="list-style-type: none"> <li>- <b>Community engagement</b> by creating opportunities for all ages and demographics</li> <li>- <b>Education</b> on how to grow organic nutrient-rich food using minimal inputs (energy/water)</li> </ul>
 <p><b>Air:</b> Reduce impacts on air quality.</p>	<ul style="list-style-type: none"> <li>- <b>Air purifying plants</b> grown in large amounts help improve air quality</li> <li>- <b>Algae bioreactor</b> improves air quality by removing harmful CO2 in the atmosphere</li> </ul>
 <p><b>Water:</b> Protect and respect water as a non-renewable, life critical resource.</p>	<ul style="list-style-type: none"> <li>- <b>Rainwater harvesting</b> allows for the shed to run without needing a connection to municipal water</li> <li>- <b>Smart closed-loop grow systems</b>, and bio-engineered water filtration, reduce water consumption</li> </ul>
 <p><b>Land:</b> Manage land to sustain the natural environment.</p>	<ul style="list-style-type: none"> <li>- <b>Vertical farming practices</b> grows more food in less space</li> <li>- <b>Organic fertilizers and recycled fish waste</b> allows food to grow faster with higher yields using</li> <li>- <b>Closed-loop fish feed production</b>, and vermicomposting provide essential inputs grown in-house</li> </ul>
 <p><b>Energy:</b> Reduce energy consumption and manage the impact of energy usage on our environment.</p>	<ul style="list-style-type: none"> <li>- <b>Off-Grid:</b> 3.825kW roof mounted solar PV, and 2kW Wind turbine, 690AH Battery Storage</li> <li>- <b>Passive-house inspired design</b> uses less energy and stores heat better during the winter</li> </ul>
 <p><b>Waste:</b> Reduce and manage the materials considered waste.</p>	<ul style="list-style-type: none"> <li>- <b>Zero waste Closed-loop vermicomposting</b> system means any waste is put back into the system</li> <li>- <b>Nutrient-rich organic soil</b> is produced instead of waste as a vermicomposting by-product</li> </ul>

# Expanding on the Success of the Backyard Garden Project



Over 10,000 lbs of food was donated through the Brampton Backyard Garden Project



Through the Backyard Garden Project we could provide organic produce to people in need by donating everything grown in the food shed to the Knights Table and Regeneration



The Off-Grid Food Shed would contribute to Brampton's image as a true leader in promoting food security and sustainability.



This project would increase yield, and allow for year round food initiatives, all while drawing eyes toward the successful Backyard Garden Project.

# What makes this project so different?

Features	Description
Multiple Closed Loop Systems	Duckweed, Vermicomposting, Wetland & Algae Bioreactor to provide carbon capture
Multiple Growing Methods	Uses hydroponics, aquaponics, and soil to grow crops from a variety of cultures
Off-Grid, year-round production	Solar, Wind, and Rainwater supply the internal grow systems and LEDs.
Zero Waste Vermicomposting	All waste is returned to the vermicomposting bin producing useful worm castings.
Biochar Fish-Waste Filtration	Organic material used for fish water filtration that becomes a fertilizer/soil additive.
Incorporates Passive House Design	Uses high efficiency building materials reducing HVAC needs. Runs year-round.
Can Grow Organic Fish & Produce	We are one of the first in Canada to have our fish system certified as organic.

Bottom Line: There are no other organizations in Canada that can combine all of these very innovative features into one cohesive solution.





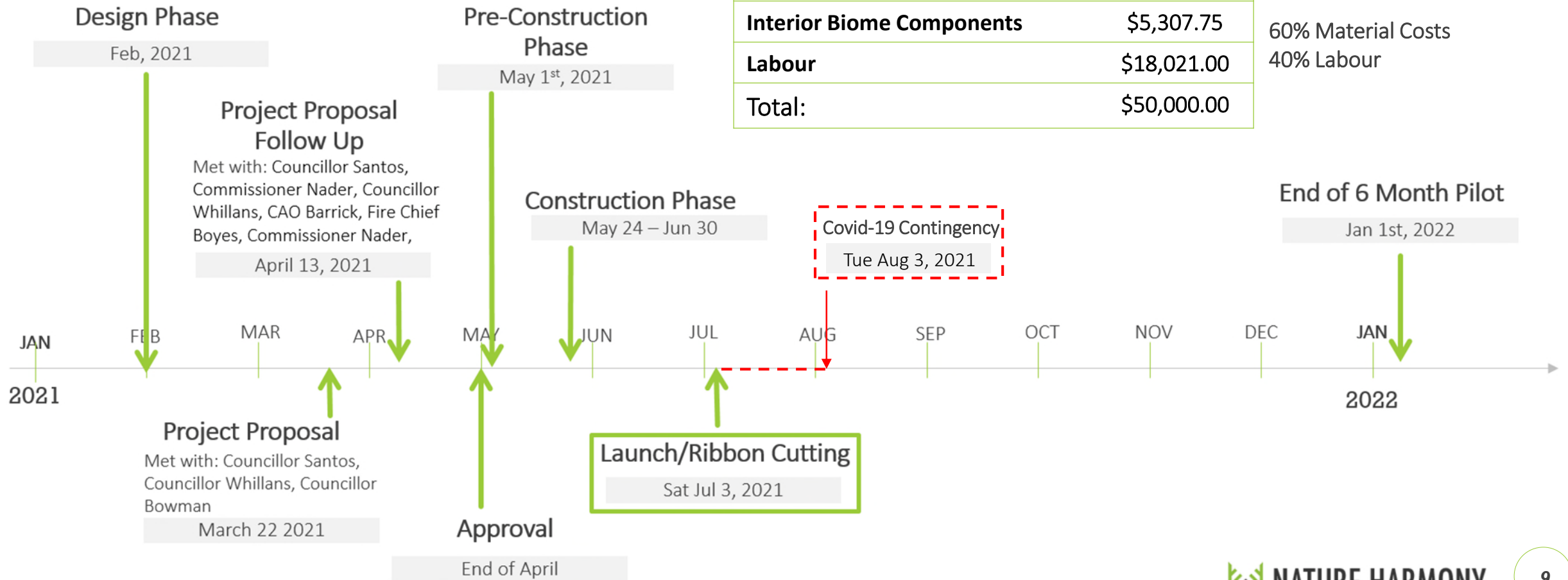
# Cost, Components, and Possible Timeline

Proposed	Shed Footprint	Cost
4/13/21	161 sq ft	\$50,000

Component	Cost
<b>Electrical + Generation Systems</b>	\$14,071.25
<b>Structure &amp; Envelope</b>	\$12,600.00
<b>Interior Biome Components</b>	\$5,307.75
<b>Labour</b>	\$18,021.00
<b>Total:</b>	\$50,000.00

## Construction Cost Breakdown:

60% Material Costs  
40% Labour



Thank You



**HiGarden**  
Bio-Inspired Design