

FUTURE FOREST

In 1663 The Palace of Versailles constructed its first orangery, designed to both shelter tender plants and impress visitors, later expanded to accommodate the garden's 1055 containers of orange, lemon, oleander, palm and pomegranate trees, from Portugal, Spain and Italy. The exoticism, beauty and scent celebrated in this way launched the popularity and world trade in citrus. The orangerie remains one of the most celebrated aspects of Versailles to this day with many of the trees more than 200 years old.

Today oranges (if not the orange tree itself) can be found throughout our urban centres, our native habitat not so much. As our cities have grown and our needs and ideas change, our relationship to the once commonplace and familiar changes too. Our interconnection to the natural world shifted. We make environments which entertain and stagger us with their beauty and brilliance, but in so doing we sometimes forget all the ingredients which make a living place.

The lost spaces beneath the Gardiner are prime examples. The intersection of York street and Lakeshore boulevard gives a sense of 'running the gauntlet' to reach the other side. This downtown portion of the Gardiner is also Canada's fourth most congested traffic bottleneck, with an average volume of 110,000 vehicles per day, the heart of a major pollution hotspot. It is truly inhospitable.

What if the Gardiner could give host to its own counterbalance, a re-designation of this lost space as productive, constructive and an environmental investment for the city?

Background photo by Brett Lantz



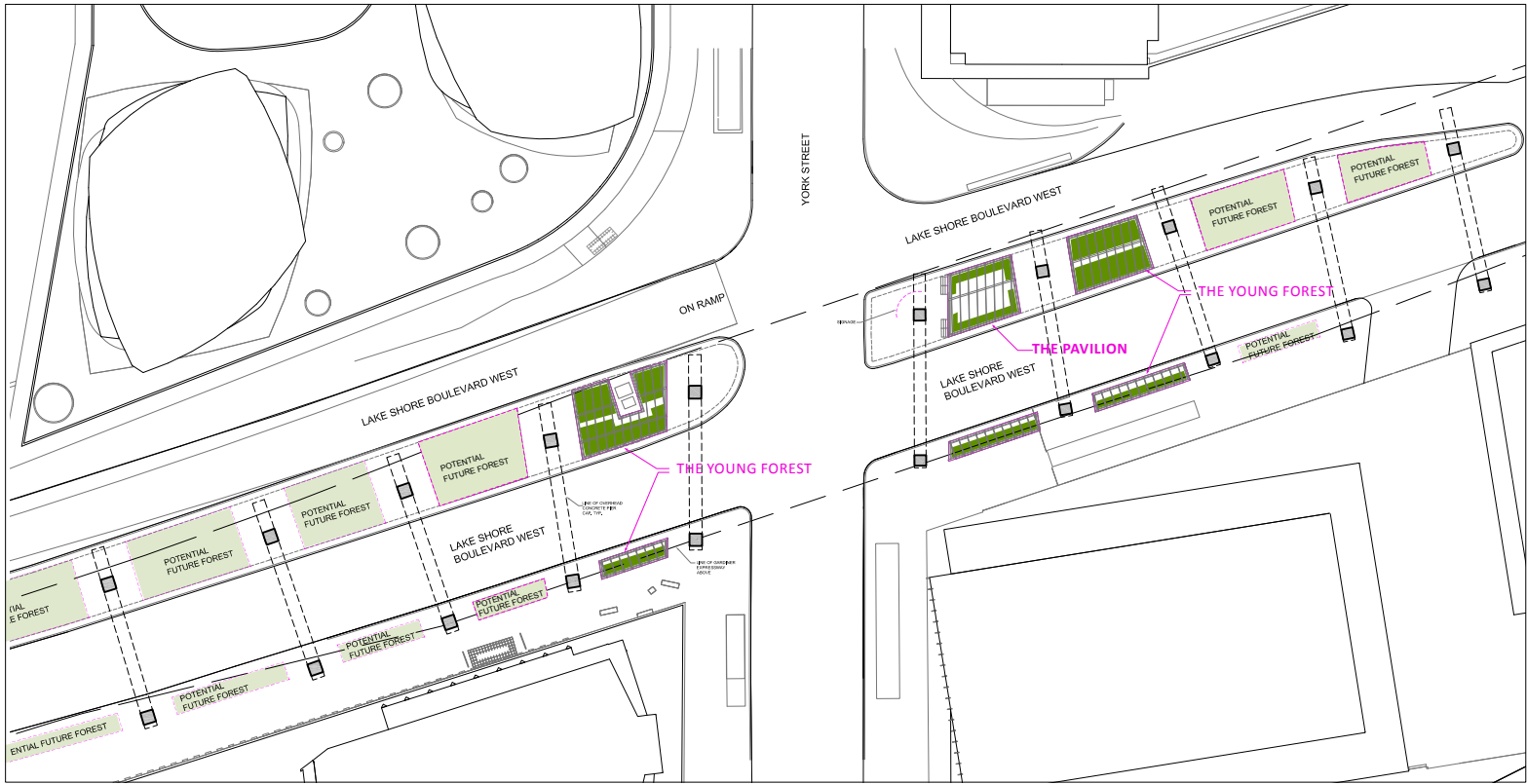
Future Forest, will transform this place by **demonstration, participation and celebration** by planting and nurturing of the Gardiner's own native forest, **10,000 native trees, shrubs and plants**. After 3 years this new fledgling forest will be dispersed into peoples' homes, balconies, sidewalks, and pocket green spaces of the residents in the surrounding communities through a 'build a forest' adoption process, thereby continuing the environmental and social benefit and material **legacy to surround the Gardiner**, an area of the city which would benefit the most.

URBAN FORESTS

Canopy coverage is not equally dispersed throughout our cities. Leafy suburbs are so named for a reason as canopy cover is both an ingredient and a signifier of urban inequity¹. Street trees, those lining our roads and sidewalks - just 5.4% of Toronto's total tree population - contribute 19.4% of the total environmental value of all trees in the city². These trees are in the most urban parts of our city, where there are currently the fewest, yet they have a proportionally much greater environmental benefit with a single street tree able to filter up to one third of fine particle pollutants within 300 yards³.

The government of Canada has committed to planting 2 billion trees across the country over the next 10 years in an effort to reduce temperatures, help fight climate change, remove pollution, increase carbon sequestration, and reduce the risk of floods and fires while also gaining all the human benefits of health and improving mental well being.

The City of Toronto has embraced its own tree canopy project with a multitude of initiatives⁴ resulting in a 1.8% increase in tree canopy cover between 2008 -2018. Today's total canopy cover brings an estimated total annual benefit of \$55 million to the city and has put Toronto on a path to increase from 28.4% canopy cover to the 2030 goal of 40%. However, in this same period the emerald ash borer has killed ash trees across the city, an ice storm left scores of damaged trees in its wake, and Toronto also experienced its share of development and population growth. Although tree canopy has increased the total leaf area has actually decreased by about 11%, impervious land cover has increased by 1.4%, (to 49.2%) and non-plantable space has increased by 3%. All of which corresponds to a decrease in the removal of annual pollution and carbon sequestration.⁵



Site plan 1:1000

1. The dispersal of trees is reflected in many ways we may not consider at first. For example, in 2016 researchers at the UC San Diego studied how heat-related ambulance calls in Toronto were negatively correlated to canopy cover and positively correlated to hard surface cover. This data suggests that even a marginal increase in the tree canopy cover from <5% to >5% could reduce heat-related ambulance calls by approximately 80%. Tree cover alone is clearly not the only influence.
Neighbourhoods with less than 5% canopy cover had approximately five times as many heat-related calls as those with greater than 5% tree canopy cover and nearly fifteen times as many as those with greater than 70% tree canopy cover.
2. CanopyTO 2018 study of Toronto tree coverage
3. from The Nature Conservancy
4. The Neighbourhood Tree Giveaway Program, The Back Yard Tree Planting program, Highway of Heroes Tree Campaign along the 401, Grandtrees, being the main ones
5. Figures from Toronto Urban Forestry 2018 tree canopy study & Toronto Urban Forest Council

OAK SAVANNAH

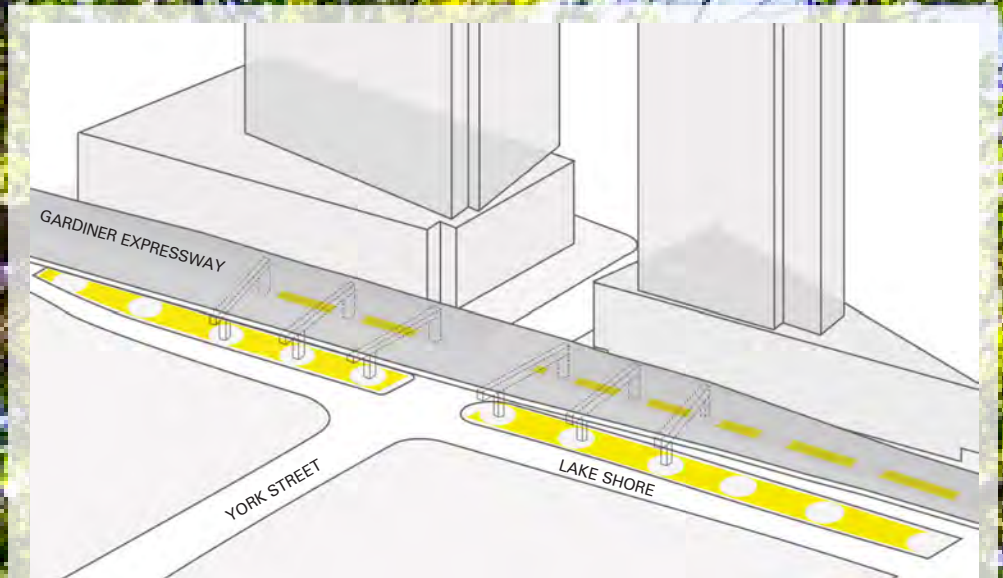
Before the arrival of European settlers, vast areas of forest and tallgrass ecosystems - prairie and savannah- dominated the landscape that is now Southern Ontario. Indigenous people used fire to sculpt and maintain these lands for millennia before colonization. Oak savannahs are sacred lands that continue to be important sites for Indigenous peoples. "The remnants of oak savannahs scattered throughout Toronto today are perhaps the most visible and lasting monuments to Indigenous legacies on these lands".⁶

Of the over 2 million ha of prairies and savannahs that once covered southern Ontario less than 0.1% remains today. Many of the trees which lined Toronto's streets just 80 to 100 years ago were from these original forests, alongside remnants of planted hedgerows from agriculture and trees planted to line streets. As the city grew and priorities changed to increase transportation and servicing (the Gardiner as a case in point), trees were considered an encumbrance to road construction and maintenance, as well as potential hazards for utilities.

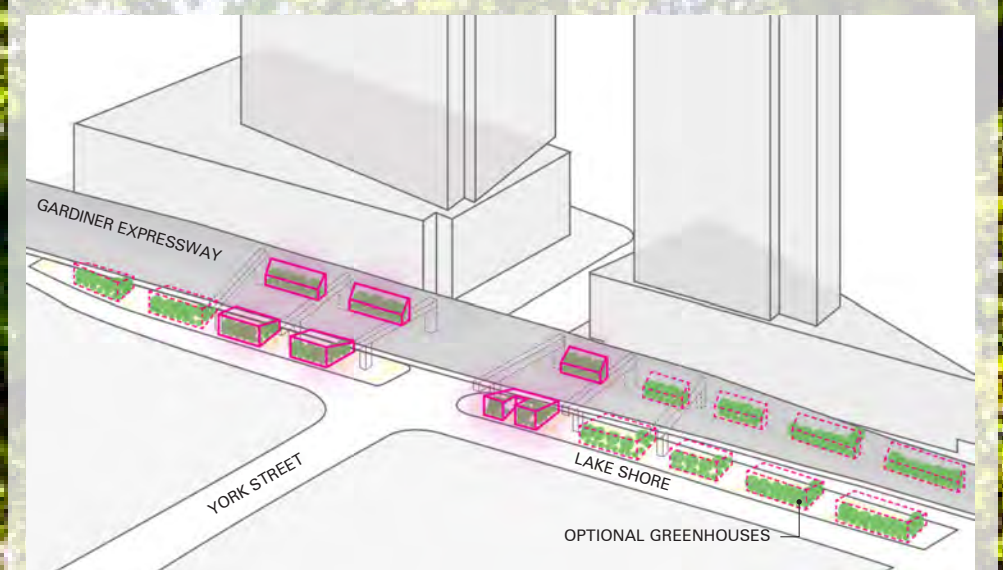
And yet in select places there still remain Black, Red and White Oaks, hundreds of years old, predating the City of Toronto. With just 50% of Toronto's Canopy cover today made up of trees native to Southern Ontario, it is the seeds of these remaining ancient trees which will form the Gardiner's Future Forest.

Future Forest will partner with Trees for Life and their seed collection schools program to nurture the seedlings of these ancient trees in the Gardiner Forest Nursery. It is understood that not only do these native species belong to this context but also the surviving trees have evolved to be successful specifically to the context of Toronto. These trees are Toronto's remaining native forest for a reason.

6. Indigenous Land Stewardship Circle, of the Anishinaabe, Haudenosaunee, Wendat, Wyandot, and Métis Nations.



1 BUILDABLE AREA UNDER THE GARDINER



2 'FUTURE FOREST' GREENHOUSES AT THE INTERSECTION



3 'FUTURE FOREST' DISPERSES INTO THE NEIGHBOURHOOD : BALCONY PLANTERS + GREEN SIDEWALKS

The Gardiner Future Forest demonstration will consist of two components:

THE YOUNG FOREST

a protected and sheltered nursery of both seedlings and semi-established shrubs and trees grown from the seeds of the ancient forests (One of the major challenges for the tree programs in Toronto is the lack of sufficient nursery space). Future Forest utilizes all of the available spaces under the Gardiner, filling the areas left by the maintenance restriction set-backs. Akin to extended Wardian cases⁷, the shelters create a micro-environment that protect the seedlings and require minimum maintenance.

Powered by wind power from the Gardiner, and potentially solar from building reflections, this is where the young trees are potted and start their life. The weather protection and coloured growing LED lights will afford the trees an advantageous extended growing season and allow the trees to be passively cooled in summer.



7. The Wardian case, a self-regulating almost completely sealed environment made intercontinental plant transport possible in the mid 1800s—which revolutionised the world of botany and had enormous ramifications on international trade and competition. It was invented accidentally by Nathaniel Bagshaw Ward, an East London doctor and amateur horticulturist. Ward's attempts at a home garden had failed due to the nearby industrial pollution which led to acid rain and poor air quality.

Background photo by Tom Heen



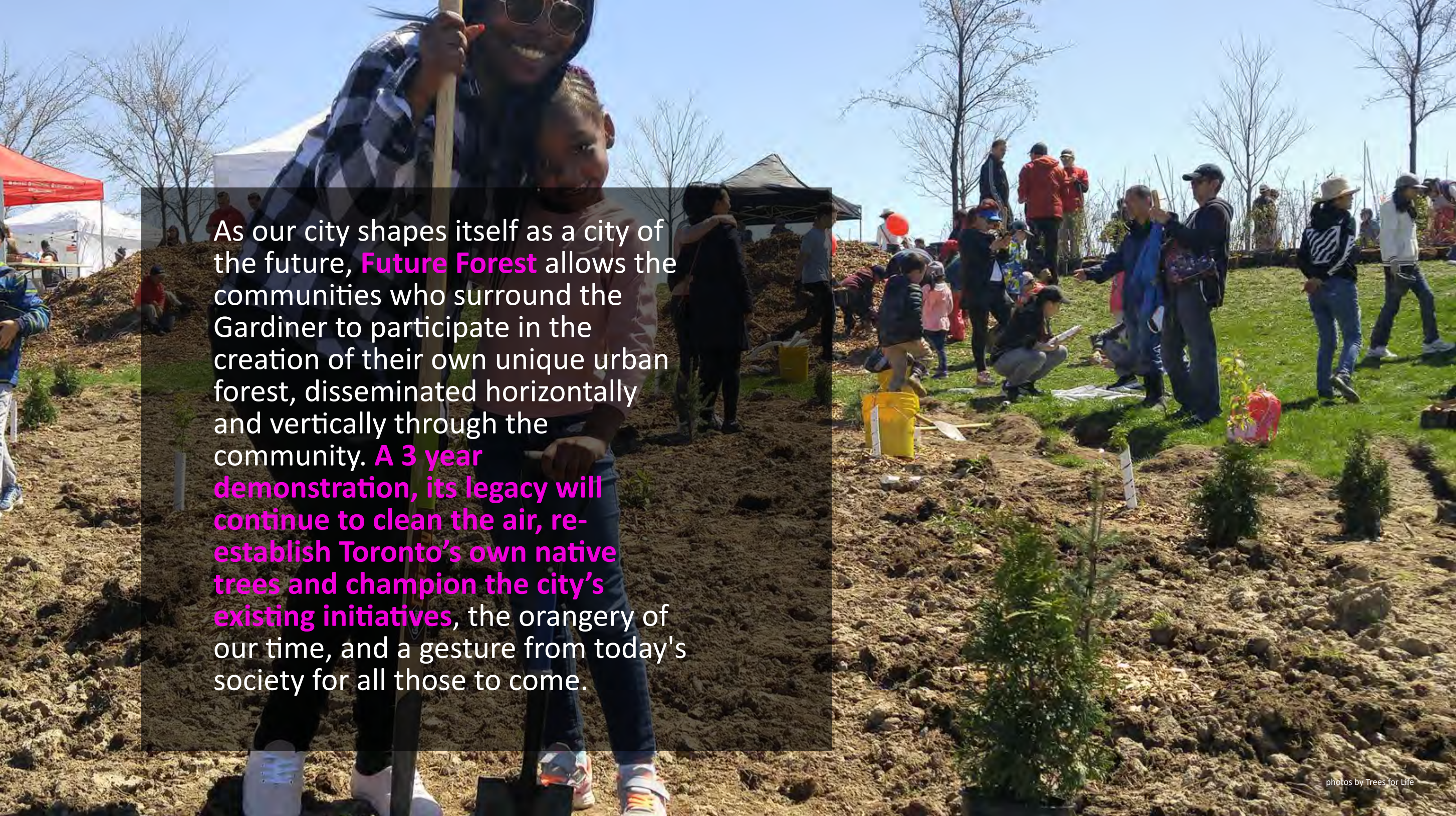
THE PAVILION

A potting room/arboretum - a place where anyone can learn about urban planting, whether it's on a balcony, in a back yard or living room. The pavilion potting room houses an established demonstration forest with a clearing at its centre which may be used for demonstrations or presentations by the many tree organisations. It is also where people from surrounding communities will choose a plant from the forest to be adopted when it is distributed in 3 years time. The space will function as social hub for the neighbourhood.

photos by Eric Sucar

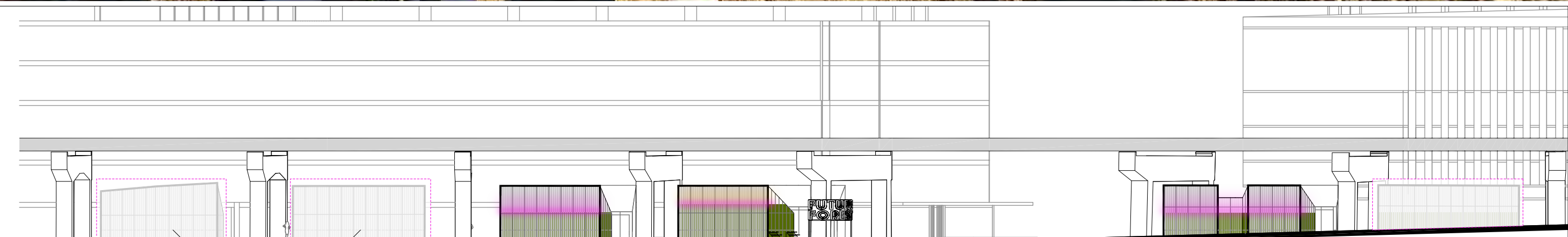


photos by Food New York



As our city shapes itself as a city of the future, **Future Forest** allows the communities who surround the Gardiner to participate in the creation of their own unique urban forest, disseminated horizontally and vertically through the community. **A 3 year demonstration, its legacy will continue to clean the air, re-establish Toronto's own native trees and champion the city's existing initiatives**, the orangery of our time, and a gesture from today's society for all those to come.

photos by Trees for Life



Potential expansion

North elevation

INSTALLATION

The installation of the project will be focused on key principals that drive the overall design vision of the work.

- > Use material that is easily repurposed so that material is not diverted to landfill at the end of the 3 year installation
- > The materials used lend themselves to prefabrication and quick construction on site to minimize any disturbances on site
- > Use materials that are robust enough to withstand the harsh winter climate in Toronto

Installation of Structure

The nursery and pavilion structures will be built offsite and brought to site in prefabricated modules to facilitate quick construction. We would expect that this construction could happen within a 3 day window.

The structure will be bolted to the sidewalk. Structural engineers will be engaged to make sure the connections and member sizes of the structure resist uplift and the wind loads that the structure will see during a typical year in Toronto at this location. We have identified a strong wind tunnel effect that occurs on site. The construction will consider these elevated wind loads. Polycarbonate is the main material for the cladding. This material is used in industrial applications and will be able to resist the wind loads as well as the winter weather with salts and other material hitting it due to car movement on the site.

Installation of Trees

The trees will be installed on large open tables that will have small holes cut out to allow for the saplings to be mounted in pots. This will allow for ease of maintenance.

Power

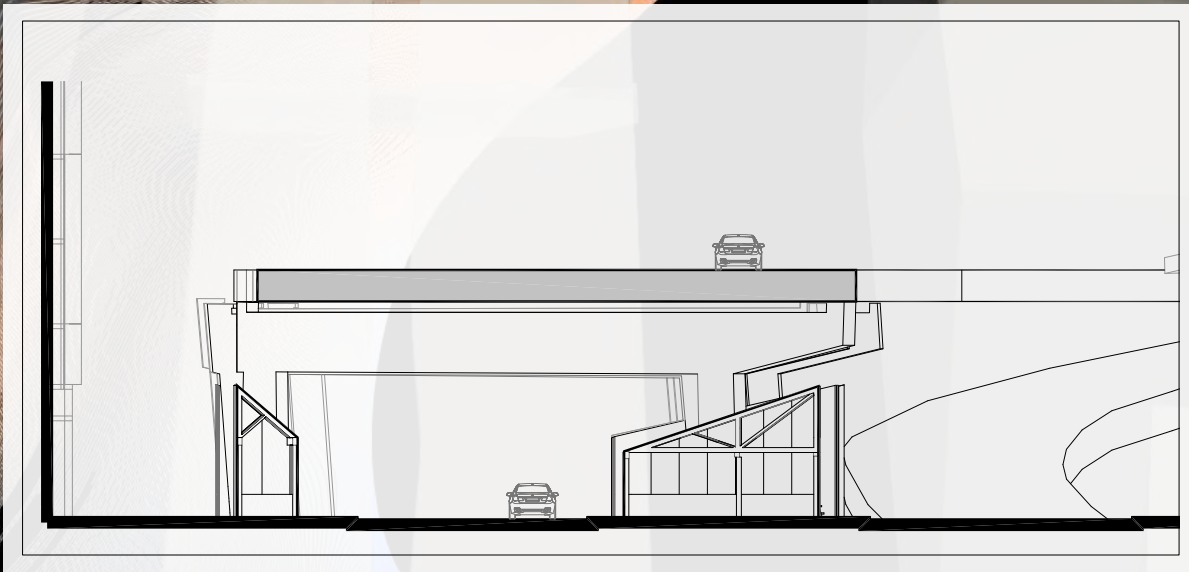
Since we have identified strong wind tunnel effect on site, power will be provided by vertical wind turbines that will be mounted to the structure of the nurseries. Each nursery will have its own supply of power that will be adequate to power the lights within each structure. The number of lights and lumens required will be determined by the species of trees. The location of the turbines will be determined by wind studies done by Zeidler Architecture. We will also study to see if solar panels are sufficient to provide power. There is concern with the output of solar panels on site due to shadowing, but this will be addressed in the next phase of the project.

Water

A simple irrigation system that employs drip irrigation will be installed after the installation of the structure is complete. The system will be tied to a centralized location for water in each greenhouse. This water will be filled manually. The amount of water for each tree will be determined with the assistance of Trees for Life.

Decommissioning

At the end of the 3 year period, the structures will be dismantled. The material will be re-used by other organizations in need of material or re-used as greenhouses. This will be dependent on the condition of the material at the end of the 3 year cycle.



MAINTENANCE AND UPKEEP

Successful socially engaged art works require relationships and associations with invested individuals and organizations. To help realise Future Forest we are proposing *Trees for Life* are brought into the wider project team, from detail design stage through implementation and throughout the 3 year activation. *Trees for Life* is a national charity committed to mobilizing, empowering, and inspiring tree-planting initiatives across Canada. They provide ‘tree-planting organizations with the tools, resources, and networks to enable them to grow existing tree-planting initiatives, implement new ones, and educate members of their communities about the vital role of trees.’ (To affirm interest *Trees for Life* have been contacted by the artist team, but no commitment to them has been made).

Future Forest would also benefit by working in collaboration with The City of Toronto *Urban Forestry team*. The City is investing in tree planting and stewardship on private land to help enhance and expand our urban forest, and to improve the health of the environment. These programs support partnerships and collaborations with homeowners, landowners and not-for-profit organizations. Through these associations the project has the potential to access a wealth of additional knowledge and expertise in both the tree selection, planting and caring for the seedlings, the demonstration forest as well as the outreach and engagement of community projects based on trees. It will also build broader connections and coalitions with other existing initiatives to align and help organizations working long term in this area, leveraging greater awareness, knowledge and participation. In this way, the Gardiner's' Future Forest is a showcase for adaptive reuse, canopy cover, the value and impact of trees and the value of working with native species, while also celebrating the vision and ambition of the City.

Seeds and shrubs for the young forest will be collected with *Trees For Life*, and planted in the nursery in an arrangement that best suits the species and facilitates ease of maintenance.

The Future Forest is effectively off-grid. Power for grow lights is provided by Future Forest's own wind power generators. Our preliminary wind studies show that the volume of wind created in this environment is focused in key places,. Often seen as a negative by-product of tall buildings, by harnessing this free source we are able to

provide supplementary lighting, and turn this space into a viable place for growing trees while extending the growing season - not unlike methods used in indoor food cultivation throughout Ontario.

The trees and plants in the nurseries will be visible but inaccessible to the public, requiring minimal oversight with watering 1-3 times a week depending on the season. In the ideal scenario water from the Gardiner itself would be captured and filtered. Alternatively, water will be brought to site and may be distributed with a shoulder mounted sprayer or a simple irrigation system.

The demonstration pavilion/potting room/arboretum is the social space where workshops and events can take place. Outside of times when this space is being used by tree charities or the Future Forest team, it will remain locked. Through the transparent walls both the young and demonstration forests are lit and always visible.

The potting room also functions as a ‘sales suite’ for the forest, where the adoption events and adoption wall is located. The adoption wall lists all the adopters and approximate location where this part of the Gardiner forest will be sited. Adoption events will take place at key times throughout the 3 years to achieve the dispersal of the Gardiner Forest's 10,000 trees and shrubs.

Future Forest, is intended as a demonstration project which can be easily expanded or replicated,. The materials used for construction are easy to procure and work with, and the structures will be able to outlive the intended lifespan of this project, allowing them to remain in place if it is desired or be relocated. Alternatively, the structures can be gifted and reused as greenhouses for the partner organizations or dismantled and reconfigured as micro structures for at home or school greenhouses. Our team would like to assist with models of how these materials can be reused to ensure zero waste.

photos by Trees for Life



Potential for Gardiner at York, phase 1 & a potential expansion for all lost space