# BranchWise

## AI-POWERED URBAN FOREST PLANNING

## PROPOSAL

**PREPARED FOR :**
Borealis AI - Let’s SOLVE It

# What is the problem?

Urban forests refer to the trees located within city limits, whether planted or naturally occurring. These are trees found in parks, roadways, private yards, roadways, ravines, or commercial areas. Urban Forests are some of the most important assets in a city. Trees clean the air, water, and pleasant environments and neighborhoods.

In 2023, Edmonton Mayor Sohi stated that 31% of priority natural areas were permanently lost due to city development alone between 2000 and 2007. As a result of the significant losses in the past, the City is now aiming to reach 20% canopy cover by 2071. It is the **duty** of cities to maintain and ensure the health and growth of their Urban Forests, however, planning a forest is not a simple task.

# What is the problem?

Planting trees is a long-term investment, many factors must be taken into account when determining where, how, and which trees should be planted. Globally, tree planting initiatives over recent years have been **failing** due to their lack of intentional planting and focus on numbers planted rather than ecological impact.

Some of the challenges Edmonton faces include, intense climate fluctuations, pests and diseases, aging trees and replacements, limited biodiversity, and rapid urban development. Leveraging AI can help urban planners analyze climate data, soil conditions, water availability, and pest threats, to best select the right species and locations for planting. We believe that by utilizing Machine Learning in the planning of urban forests, cities can better address these challenges and carry out more **effective** and sustainable tree-planting initiatives.

# Our Team

## Who are we?

**KENNEDY BARBER**

Computer Science Student at University of Alberta

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Computer Science Student at University of Alberta

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Urban Planning Student at University of Alberta

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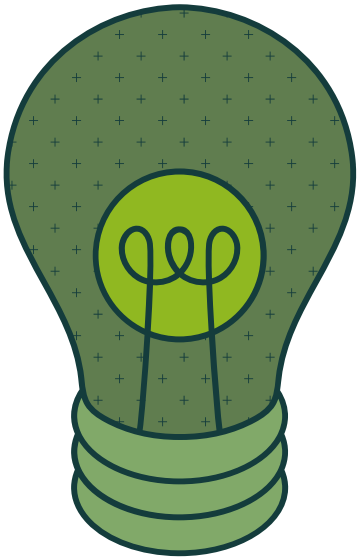
Computer Science Student at University of Alberta

## Why is this important to us?

We acknowledge that tree planting is important for making cities not only beautiful, but resilient, as it provides environmental, economic, social and health benefits. Urban trees are crucial as they can reduce air pollution by up to 24% and, especially for those living in Edmonton, can stabilize city temperatures while also storing over 708 million tons of carbon annually. For us, this project is a commitment to our current and future community's well-being and environmental sustainability. By leveraging AI and Machine Learning, we can make the complex task of urban forest planning more manageable and effective. Our group approaches this problem with diverse backgrounds, from university-level education in environmental chemistry, computer science, sustainability, and urban planning. By combining our technical skills and urban planning insights, we believe that we can work to develop a solution that goes beyond traditional tree-planting approaches. This project not only addresses local challenges but also sets a precedent for other cities facing similar issues, showcasing the potential of AI in urban forestry.

# How can Machine Learning Help?



Implementing Machine Learning in urban tree planting can transform how cities like Edmonton manage their urban forests. By analyzing data on climate patterns, soil quality, and tree health, ML can optimize tree placement and species selection, ensuring higher survival rates and better growth. Such technology not only addresses local challenges like intense climate fluctuations, pests, and limited biodiversity, but also has the potential to improve public health.

## Specifically, ML can:

**01. ANALYZE CLIMATE DATA:**

Predicting future patterns to choose tree species that can withstand Edmonton's climate.

**02. MANAGE SOIL AND WATER:**

Recommend the best tree species for specific areas and optimize irrigation schedules.

**03. DETECT PESTS AND DISEASES:**

Monitoring for early signs through image and sensor data analysis.

**04. ENHANCE BIODIVERSITY:**

Suggesting a mix of species that support each other for more resilient urban forests.

**05. INTEGRATE WITH URBAN DEVELOPMENT:**

Align urban forestry plans with city development projects by analyzing growth patterns and land use data, ensuring a complementary relationship between tree planting and Edmonton's urban expansion.

# What data will we use?

In order for our model to best make the best recommendations for urban forest development, we need our model to consider;

## 01. CLIMATE

https://data.edmonton.ca/Environmental-Services/Weather-Data-Daily-Environment-Canada/s4ws-tdws/data_preview

## 02. LOCAL PESTS & DISEASES

https://data.edmonton.ca/Pesticide/Tree-Insects-Other-Pests/9wtw-cyd3/data_preview

## 03. ENVIRONMENTAL SENSITIVTIES

https://data.edmonton.ca/Environmental-Services/Environmental-Sensitivity-Score-map-/mrgp-3hq5

## 04. GENERAL TREE KNOWLEDGE

https://open.alberta.ca/dataset/5654dd7f-9c73-496d-9163-99fc6601be6f/resource/7c8a17bd-3e50-4b45-975f-689ae8a6336e/download/2009-guide-common-native-trees-shrubs-alberta.pdf

## 05. SOIL CONDITIONS

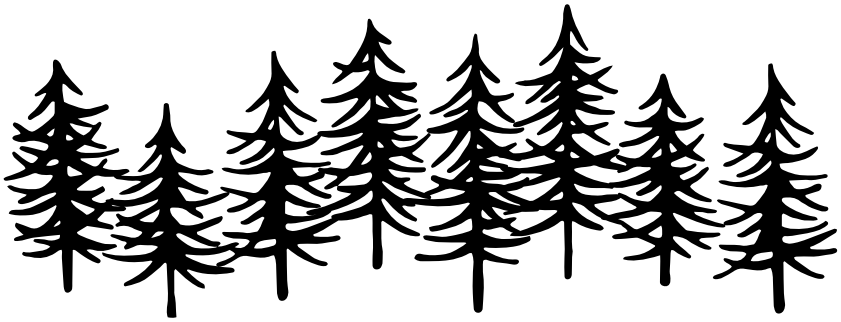
https://www1.agric.gov.ab.ca/%24department/deptdocs.nsf/all/sag9469/%24FILE/sq_criteria_relative_to_disturbance_reclamation.pdf

## 06. INHABITANT TREES

https://data.edmonton.ca/Environmental-Services/Trees-Map/udbt-eiax

## 07. LOCAL REGULATIONS

https://www.edmonton.ca/sites/default/files/public-files/COE-IM-GUIDE-0010-v02-20220110DesignandConstructionStandardsVolume5_Landscaping_DSO.pdf?cb=1716912273



By training our model on these diverse datasets, we believe it will be able to help make precise and valuable predictions that will positively influence urban forest planning for a greener and more sustainable future.

# Bibliography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