Session 3.3

Wall-E: Promoting innovation, new technologies and future visions on the role of urban forests and trees to address climate change.

Moderator: Stephen Livesley

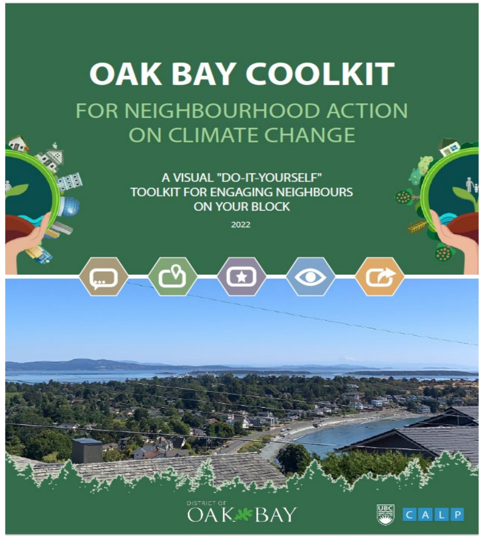
World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Beyond Education and Engagement

How the Oak Bay Coolkit program empowers climate champions in greening private and public land



DISTRICT OF OAK BAY · UBC · CALP · URBAN FORESTRY UBC

Presented by

Stephen R.J. Sheppard (PhD), CALP, UBC, Canada

Chris Hyde-Lay, District of Oak Bay, Canada

Elisa Kwun, CALP, UBC, Canada

Sara Barron (PhD), Urban Forestry Program, UBC, Canada

How do we scale-up community action on Urban Forestry & the Climate Emergency?

- collective action at hyper-local scales
- ‘cool tools’ & positive engagement processes

Why the urban forestry angle?

- urban forests as an easy entry point
- meeting canopy targets on private land
- resilience - cooling communities etc.

Presentation Overview

1. Introduce Oak Bay
2. The Oak Bay Coolkit and mobilization program
3. Results so far: champions, Climate Action Plans & trees on the ground
4. Scaling-up and replicability

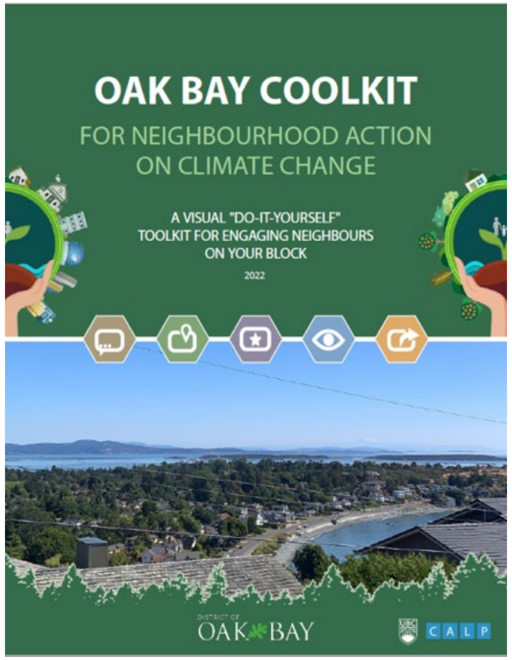
1 District of Oak Bay

Vancouver Island, British Columbia, Canada

- Population:18,000
- Primarily residential
- Canopy cover: 33%, target 40% by 2045
- Rare ecosystems & strong volunteer programs on ecological restoration
- Significant vulnerabilities in low-canopy neighbourhoods to heat, drought, wind, flooding/sea level rise etc.
- Leading policies: zoning canopy targets, electrical gardening equipment, engagement

LIKE MANY NORTH AMERICAN SUBURBS

2 Oak Bay Coolkit program



Goals:

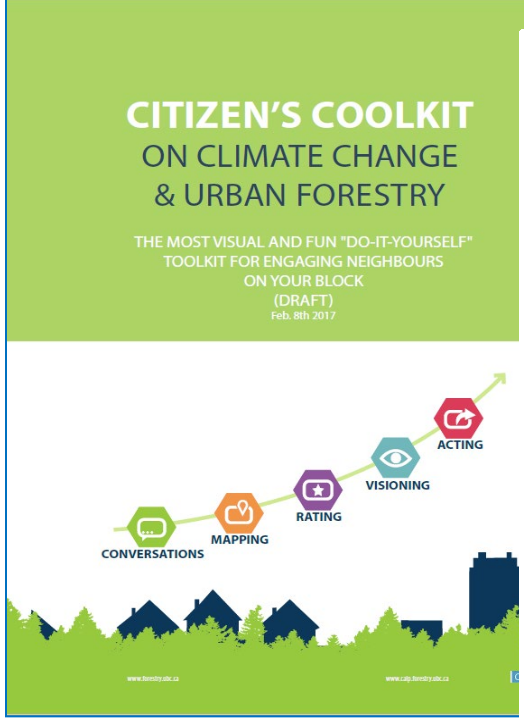
- Empowering local climate champions
- Mobilizing neighbourhood action to climate-proof the community (adaptation & mitigation)
- Making climate action & stewardship **visible** on private & public land

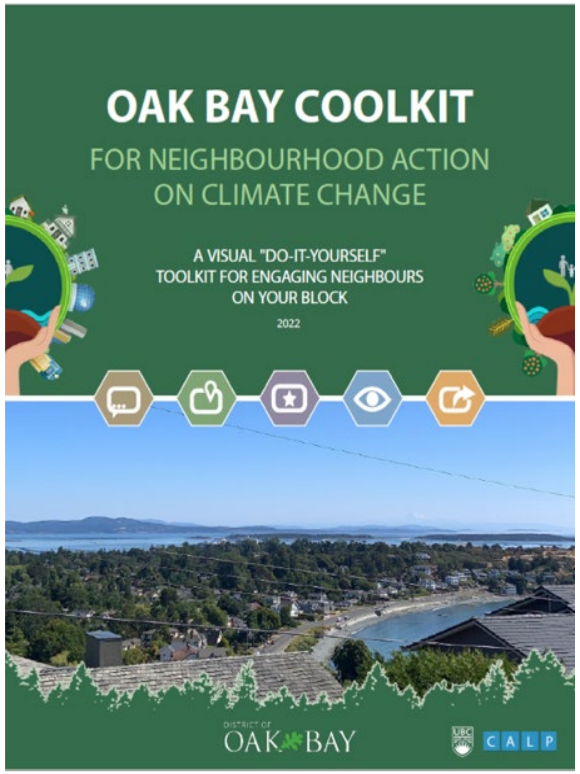
Council support/funding for 3 year program

Oak Bay Coolkit

Fun ‘Do-It-Yourself’ visual learning tool

- engaging citizens on climate change & urban forestry on their block
- applying 7 years of Coolkit research
- ‘one-stop-shop’ resource, customized to Oak Bay





5-step process


MAP YOUR BLOCK

URBAN FOREST QUEST

DO YOU KNOW...

How much squirrel habitat is on your block?

How many trees there are on your block?

Why trees are important to us and squirrels?

30 minutes

Your name/team name

1) COUNT THE TREES

Street trees are trees alongside the curb in the public right-of-way. Count the number of street trees on your bl

Total # of street trees: ____________

Total # of trees in gardens: ____________

3) THE LEAPING SQUIRREL TEST

Check out your block's street tree canopy by using the distance a squirrel leaps. Squirrels live up in the trees and are safer there than on the ground. Assume squirrels can leap about 2 metres (6 ft or a person's height) between branches:

can a squirrel make it from one end of the block to the other and cross the street at least twice, without coming down to the ground?

Yes / No

If "No", how many gaps (greater than 2 metres) between canopies did you see?

____

Important because...

Larger trees have bigger canopies and so more benefits. Smaller trees are also important since they will replace existing big trees one day.

Important because...

A continuous canopy has more shade during the summer for cooling and reduces stormwater flooding.

FIN

Groups map:

- **High vulnerability features**
- **Resilience assets**

"The most inspiring activity was going outside and measuring trees. We got to know about our community" *(Coolkit workshop participant in Vancouver)*

Visioning solutions

- Tree planting
- Active transportation
- Heat pumps
- Home energy retrofits
- Rain-gardens
- De-paving ‘car habitat’
- Rewilding parklets, etc.

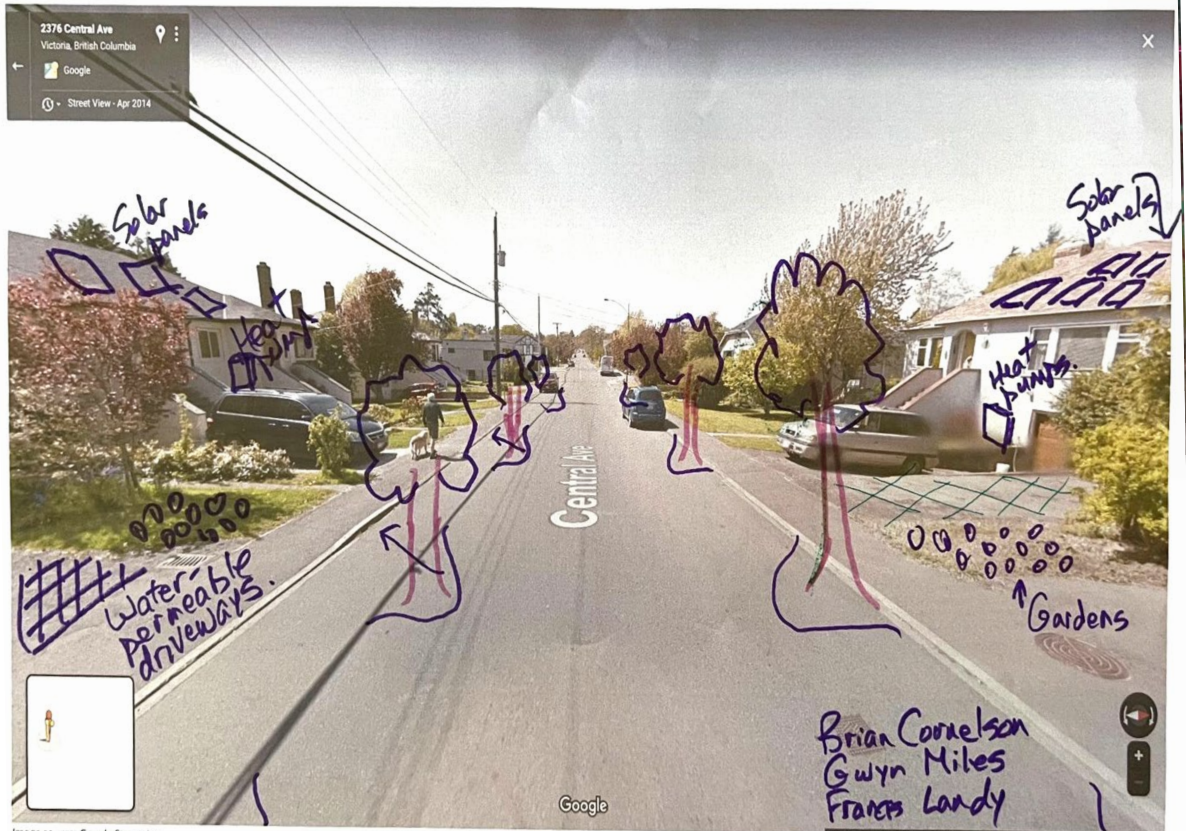


Image source: Google Streetview

South Oak Bay

“wonderful example of activity at extremely local level….empowering… really tangible…“

Teacher, Vancouver School Board

Climate Action Plans group brainstorming

Discuss/pick 3 key actions as priorities for your neighbourhood or group

5.2 ACTION PLAN
PRIORITIZE & MAKE A PLEDGE

Review previous exe visioning and scoreca climate action journe your yard or block?

We suggest making to diversify the sho long-term goals you include individual o actions and collective your friends and neig

I pledge

GOAL #1 *Cut your*
What is your goal?
Why is this important?
How is success measured?

GOAL #2 *Take an i*
What is your goal?
Why is this important?
How is success measured?

GOAL #3 *Take furt*
What is your goal?
Why is this important?
How is success measured?

5.3 ACT ON THE GROUND
CRAFT YOUR OWN ACTION PLAN

1. Remember to make sure your goal is SMART (Specific, Measurable, Actionable, Realistic and Time-bound)!
2. List specific actions you need to take, and explain how these would achieve your goal.
3. List the resources you need to complete the actions.
4. Stress-test your plan - identify potential obstacles and generate solutions for overcoming these obstacles.

Action steps	ACTION 1	ACTION 2	ACTION 3
Identify specific actions to take			
How will these actions help achieve your goal?			
What resources do you need to complete these actions?			
Anticipate obstacles and potential solutions			
When is my deadline to complete these actions?			

34

3 Coolkit Program Results

Years 1-2

Geographic spread

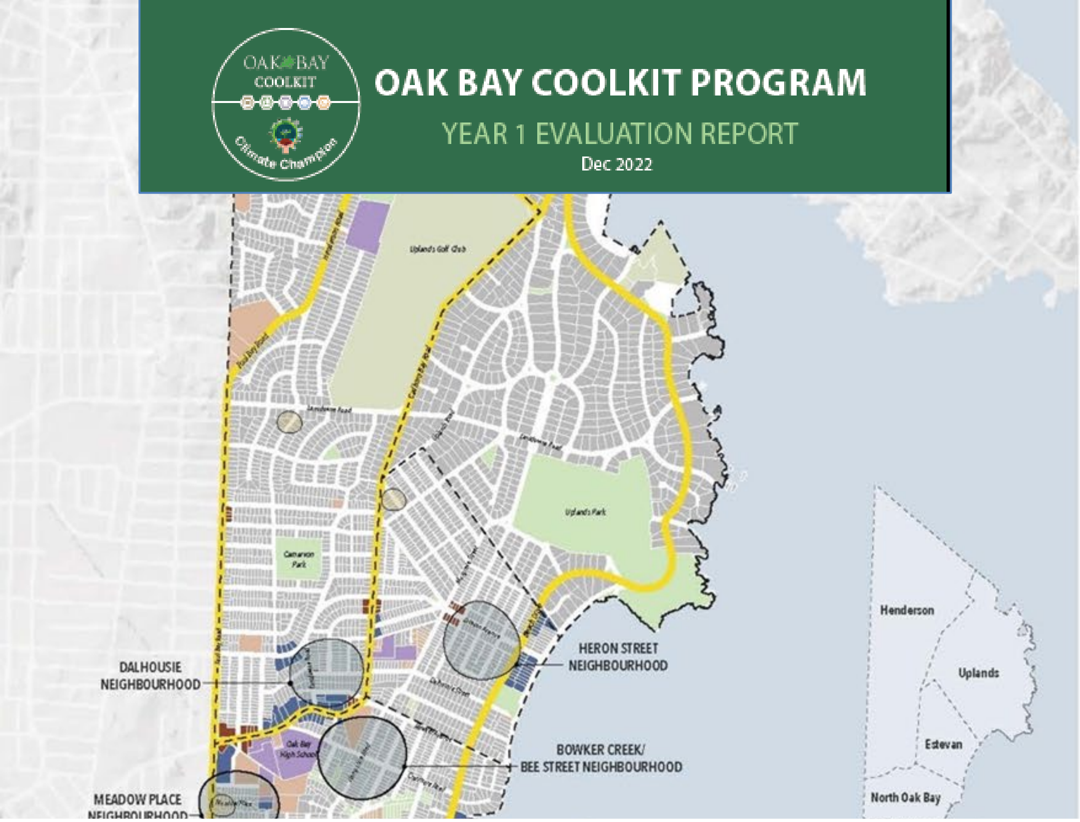
- **10 neighbourhood groups** + individual projects
- reaching **10-12% of Oak Bay blocks**

Broad representation

- **network of 40+ trained Coolkit champions**
- including 'The Choir' & neighbours, family members etc.

Creatively engaging others & building capacity

- **Block parties**
- **'Ice Cream Socials'**
- Block Watch meeting
- Strata council meetings
- 'InTreeging' proposal
- Walkability audits…..
- Emergency Response volunteers
- Community-led Facebook site
- **Official celebration event with Champion Awards**



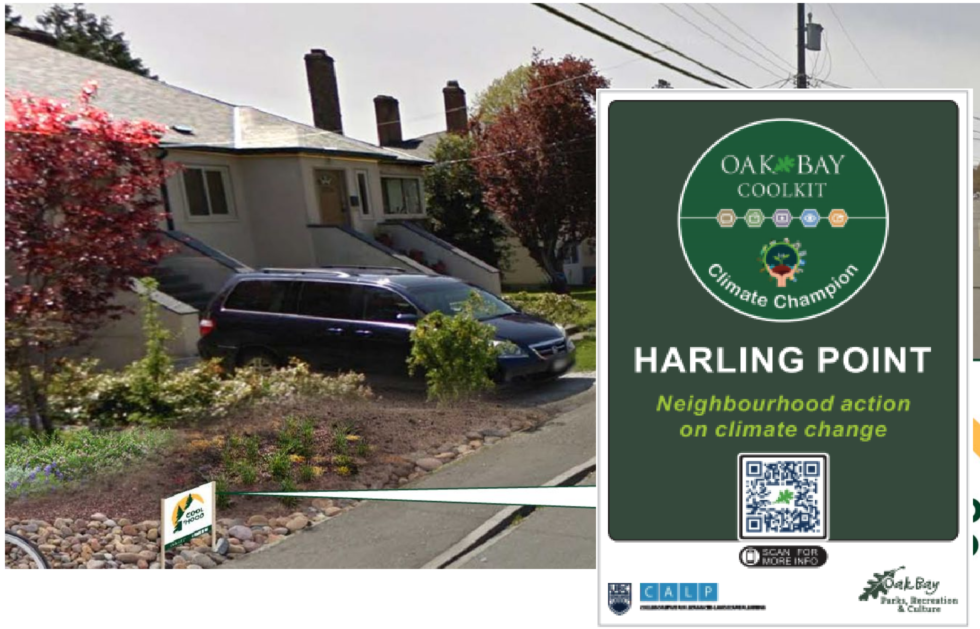
Harling Point neighbourhood Climate Action Planning

Overview of Climate Action Plans

- **10+ climate action plans / project designs:**
  - physical and behavioural solutions
  - **Adaptation and Mitigation** - tree-planting, meadow-scapes, traffic calming, white roofs, local food etc.
  - aligned with Oak Bay Council's "Big Moves"

- **Some CAPs require joint resident/District action** on public & private land:
  - **street bump-outs, de-paving parking lot,** landscape/tree stewardship etc.

- **Collaborative outcomes to date:**
  - **60 Coolkit trees** planted on private & public land
  - strata council plan for cool roofs
  - Oak Bay tree-list for citizens
  - monthly Coolkit meetings/presentations
  - to make climate projects visible **neighbourhood signage**



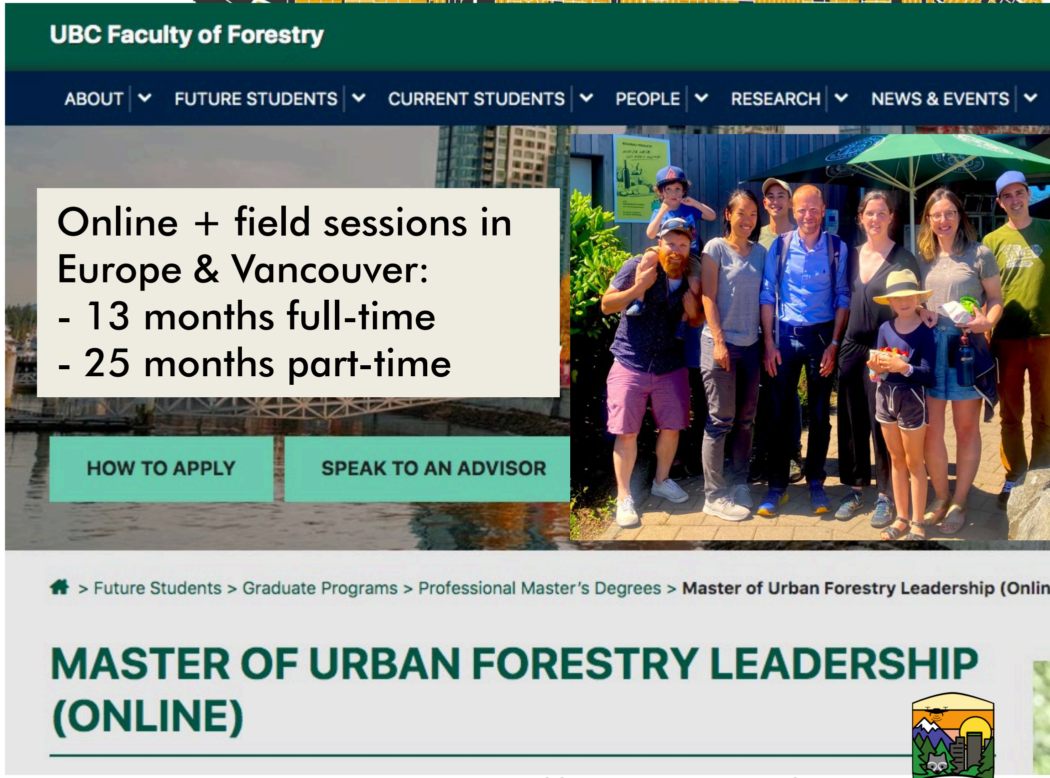
4 Scaling-up and replicability
for community climate & urban forest action

- **Scaling-up** neighbourhood action is doable & crucial to meeting targets (eg. private trees)

- **Tips for organizers:**
  - Tools & processes **applicable** across N. America & beyond, but **customize** to your community
  - Make it **visual, fun, simple, positive**!
  - Trees & pollinators a good **entry-point** but will need broader/deeper actions (aligned with municipal policies)

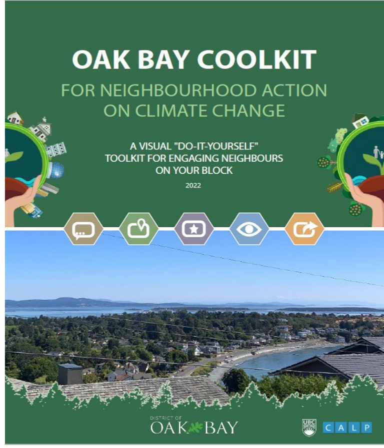
- **Needs:**
  - **Train-the-trainer programs** for practitioners & community organizers (eg. micro-certificates)
  - **Sustained, funded, collaborative programs** with designated **backbone organization** (eg. municipality, contracted NGO, community trust)

https://forestry.ubc.ca/programs/certificate/climate-action-community-engagement/



https://forestry.ubc.ca/mufl

Thank you!



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Collaborative for Advanced Landscape Planning
https://calp.forestry.ubc.ca/

https://connect.oakbay.ca/coolkit

2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Session 3.3

No easy shortcuts to a 'green future': lessons from imagining 2050s desired urban futures in six cities

Presented by

Dr. Mariana Dias Baptista

Co-authors: Olivia Bina, Andy Inch, Mafalda Pereira, Roberto Falanga

Principal Investigator: Tom Wild

CONEXUS

Funded by the European Union

University of Sheffield

Agenda

Overview

Nature Futures Workshops

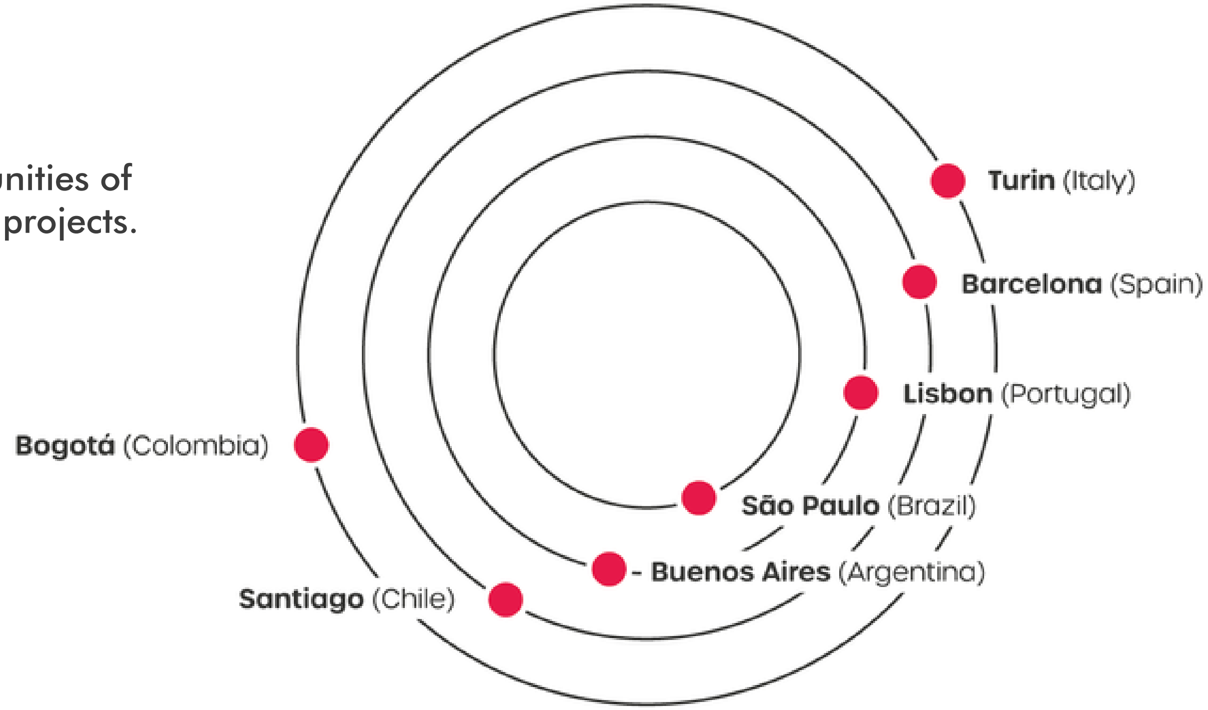
- Methodology
- Results & Discussions

Next Steps

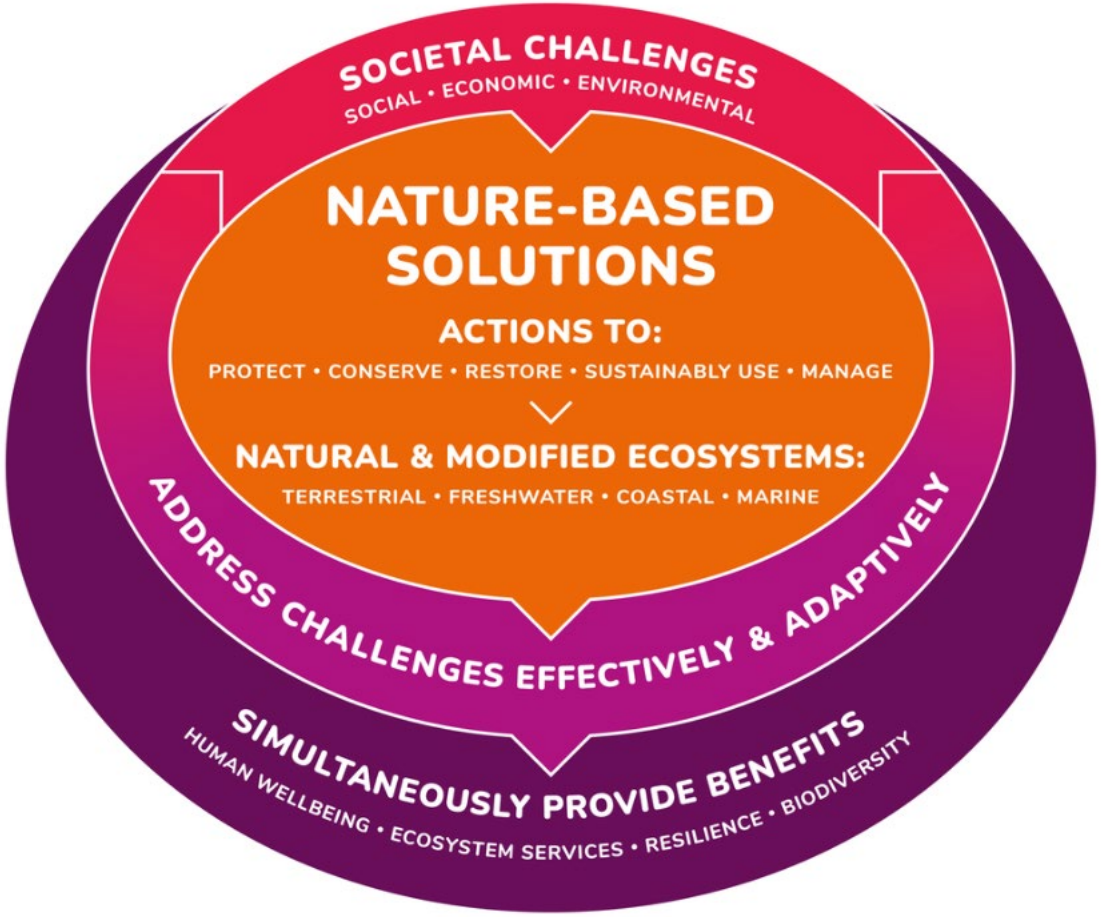
Overview

- **Conexus – H2020 EU Project**
- Latin American and European partners
- **Aim:** to strengthen international cooperation on nature-based solutions (NBS) and ecosystem restoration.
- **Urban Life-Labs*** in 7 cities.

*collaboration and partnerships with local communities of learning to support the development of NBS pilot projects.



CONEXUS



Nature-based Solutions

- The United Nation Environmental Assembly (UNEA-5) resolution formally adopted the definition of NbS as ‘actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.’

Nature Futures Workshops

Desired Futures

- 'Cities are creating futures without challenging the deep inequities' (Inayatullah 2011, p. 656), partly linked to persistent imaginaries of cities as machines.

- A gap in terms of **positive future visions** that are needed in many cities (McPhearson et al. 2016 ; more generally, see: Bai et al. 2016), and more specifically in exploring urban related imaginaries and pathways that foreground nature and plural perspectives of urban HNRs (Elmqvist et al. 2013 ; Mansur et al. 2022).

- There are calls for **alternative visions beyond** 'merely purchasing the **used futures** of other cities' (Inayatullah 2011, p.654), enabled through a (re)discovery of desire and utopian imaginaries (Bina et al. 2020 ; Pötz 2019).

Bina, O., Baptista, M.D., Pereira, M. M, et al. (Under review) Exploring desired urban futures: the transformative potential of a nature-based approach. Futures

Objectives

The Workshops were an opportunity to think about a nature-based future in the cities of Conexus, through a **more creative way**.

Explore wishes, hopes and possibilities around the idea of nature-based futures for cities in the year 2050.

Engage a **variety of perspectives** and **plurality of voices** in discovering desired futures for nature (and life) in cities;

Why 2050?

Because the scale and scope of the transformation we are considering is the kind of long-term change that requires a generation, as it includes social values and attitudes.

Who?

NbS-Community:

- A variety of leaders, experts and agents of change involved directly and indirectly in the future of nature (and life).
- Local government, academics, NGOs, and activists.

Expected to co-create:

- Elements of a desired future for nature (and life) in cities in 2050
- Elements of pathways to get there, which will include NbS.

METHODOLOGY

The Three Horizons

Three Horizons approach (Sharpe et al., 2016): understanding the current world and creating representations of desired future states.

Horizon 1 - The Present Futures:

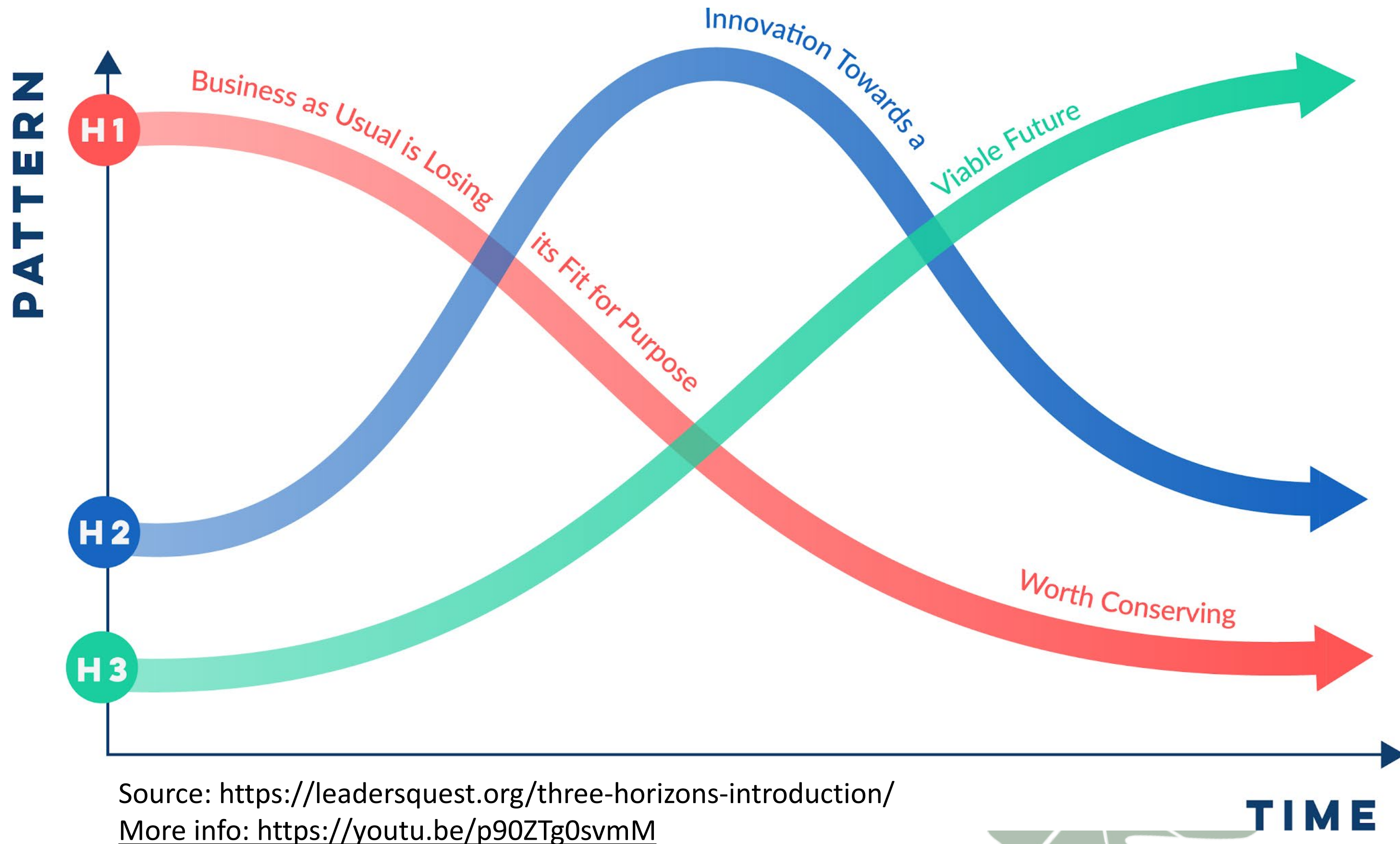
- Where participants discuss the current trends that determine the "business as usual" of our cities;

Horizon 3 - The Futures We Want:

- where participants set out their visions;

Horizon 2 - Possible Ways Forward:

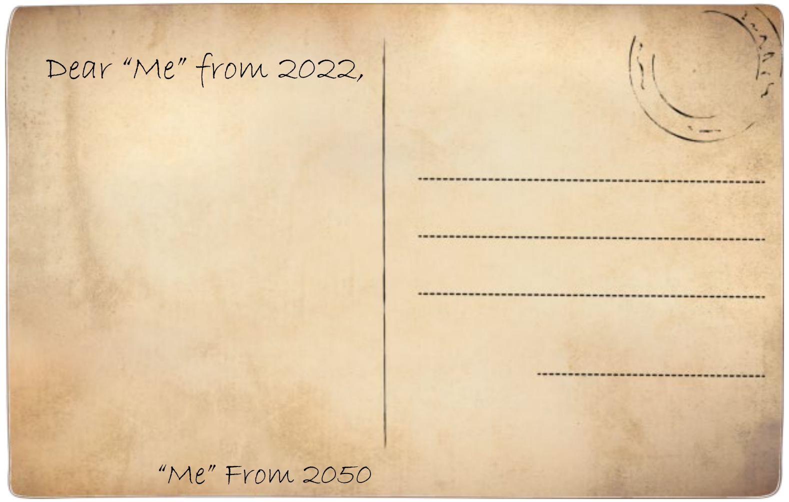
- actions and interventions capable of operating transformation paths from H1 to H3.



Source: https://leadersquest.org/three-horizons-introduction/
More info: https://youtu.be/p90ZTg0svmM

Pre-workshop Survey

- Three basic questions which will prepare participants for the Horizon 1.
  - **Question 1**: Share 3 key problematic/concerning **trends** for the area of your city.
  - **Question 2**: Share 3 **drivers of change** that you think are the most relevant for exploring the present and future of your city.
  - **Question 3:** Share 3 **seeds of change** that you think are the most promising for shaping the future of your city.
- Initial creative exercise for the Horizon 3: Postcards from the future



More information: Bina, O., Inch, A., Baptista, M., Pereira, M. and Falanga, R. (2**023**) Guidance for Nature Futures Workshops, Working Document (revised), EU funded project CONEXUS grant agreement no. 867564, University of Lisbon and University of Sheffield, ULisboa repository http://hdl.handle.net/10451/56074

Results & Discussion

What is changing
(Seeds in the present)

Alternative Economic models
- *Alternative modes of economic activity e.g. circular economy/universal basic income/localism*

Human-Nature Relationships
- *Public demand for socio-environmental equity*
- *Knowledge of the environmental and benefits of urban green*
- *Events that promote ecological awareness*
- *Environmental education in schools*

Awareness & education

Governance, Policy & Planning
- *Strategic plans for adapting to climate change*
- *Incentives to sustainable means of collective and individual mobility*
- *Cooperation between different sectors to improve green spaces and integrate NbS*
- *Platforms/movements of active and participatory citizenship*
- *Urban agriculture collectives*

Green spaces

Collaboration & Agency

Urban food system

What changed: narratives from the year 2050
(Desired future)

Changing Human-Nature Relationships
- *Greater connection between humans and nature (connectedness, respect, gratitude, care)*
- *Cultural change relating to how human-nature relationships are understood / valued*
- *New ways of living, producing working, and using time*
- *New ideas about the economy and its relevance to urban quality of life and to the environment*

Education, Awareness and Cultural Change

Alternative Economic models

Governance, Policy & Planning
- *Major increase in quality /quantity of public transport and softer mobility systems*
- *Rigorous implementation of pro-environment public policies*
- *Biodiversity (nature) in city makes a significant recovery (some as a result of climate change mitigation and adaptation)*
- *Major improvements in the quality/availability of, and accessibility to, public green areas / Green equity*
- *Sustainable urban food systems and integrated landscape management benefiting humans and biodiversity*
- *New social and environmental collectives are now central to governance; Collective decision making*
- *Shared care for the environment has become the norm*

Equity

Public Green Spaces & Lifestyles

Urban Food System

Collaboration, Community & Agency

What needs changing
(Pathways to the future)

Environment
- *Renaturation of rivers*
- *Giving rights to nature*

Changing Human-Nature Relationships
- *Offer more inclusive forms of environmental education and awareness raising.*
- *Changing people's habits and ways of living to overcome the climate and biodiversity crisis*
- *Implement radical and potentially transformative public policy initiatives (e.g. universal basic income, participatory budget)*

Education, Awareness & Cultural Change

Alternative models

Public green spaces
- *Training for city planners and technical staff*
- *Strategic distribution of vegetation in the city, based on diagnosis, planning and incentives*

Urban Food system
- *Promoting urban food initiatives and local production*

Governance, Policy & Planning
- *Diverse and inclusive decision making participation*
- *Political and economic incentives (public and private) for community-led environmental initiatives*
- *Creating local decision making instances*

Collaboration, Community & Agency

"Today I notice that we have a greener and more colourful environment thanks to the tree planting and the permanent flowering of plants" Bogota

"The result of this change of trajectory in my opinion were the new social and environmental collectives that grew throughout the city, the change from public policy and planning and the spaces of co-creation and construction that were given to have citizen participation in decision making." Bogota

"There are no more cars in the city centre and the public transports are super-efficient with a very affordable fare. It is also possible to get around on the numerous bike paths, some passing through the green corridors of the city, which simultaneously allow the inhabitants to spend more quality time in natural spaces." Lisbon

"We have developed a more local and organic food production chain, with agroforestry spaces scattered around the city, producing healthy, poison-free food in backyards and public gardens." Sao Paulo

"People are also more involved in local decision-making, with opportunities to really shape how public services work. The time for all of this has been made possible by the introduction of a universal basic income (UBI)". Lisbon

"awareness-raising and education to [consumption] renunciation, understood as degrowth (...)no longer seen as negative" raising "the awareness that the race for progress is no longer sustainable". Turin

"(...) in this projection, in which there is a less predatory relationship [with nature], with respect to the environment we inhabit, this is also transferred to the bonds and relationships established among us. (...) it seems to me, the notion of care, and indeed, we realize that what surrounds us perishes, if we do not sustain a concrete care." Buenos Aires

What needs changing
(Pathways to the future)

Environment

- *Renaturation of rivers*
- *Giving rights to nature*
- *Offer more inclusive forms of environmental education and awareness raising*
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Education, Awareness & Cultural Change

Alternative models

Governance, Policy & Planning

Public green spaces

Urban Food system

Collaboration, Community & Agency

Discussions

- We cannot create greener futures without considering the broader contexts in which we imagine they will function.
- Exercising our collective imagination about desired futures allows us to step back, shape alternatives to the present, and identify detailed pathways towards them.
- Imagining and reimagine positive visions of fairer and more just requires some optimism (Sardar 2013).
- Limited opportunities to step back from dealing with immediate or urgent problems
- Exercising our capacity to co-imagine desired futures can help us strengthen our NBS communities and broader ‘nature-based thinking’ within it.

Mercado, G., Wild, T., Garcia, J. H., et al. (Accepted) Supporting Nature-based Solutions via Nature-based thinking, across European and Latin American cities, Ambio

Next steps

Official futures

-Visions
-Scales of change
-Actors
-Action
-Challenges and threats

Desired futures

- What are the differences and similarities?

- Are the actions we could imagine enough to bridge the gaps between the world we feel we are heading towards and where we would really like to be?

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My LinkedIn profile

Thank you

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2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Trees as Infrastructure

Driving investment in urban NbS - interim learnings from our case study in Glasgow, UK

Presented by

Chloe Treger

Co-lead TreesAI Pilots

Dark Matter Labs

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Funded by the European Union

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- CONTEXT

TREESAI APPROACH

LEARNINGS

NEXT STEPS

TreesAI

Nature as adaptation

Organisations are facing climate-related risks affecting their financial operations.

Water Utilities | (Re)Insurance | Lenders | Local Authorities | Large Property Owners

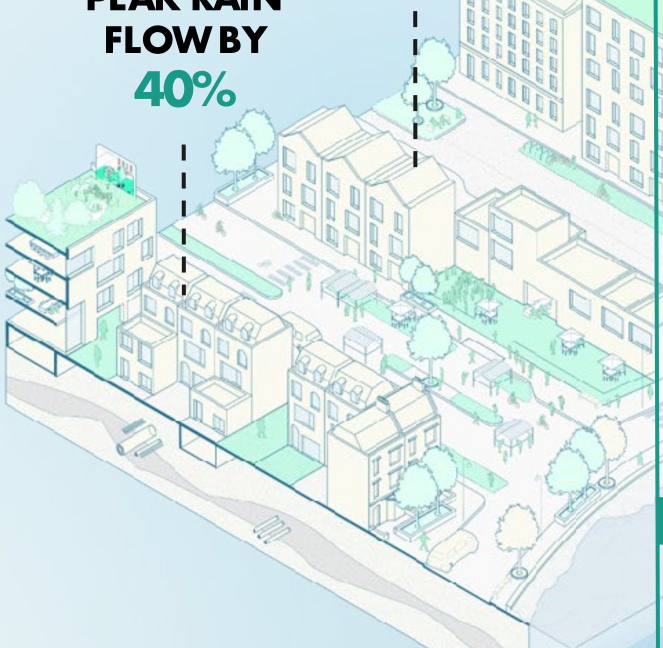
These risks include various transition (e.g. new PRA regulation on disclosing risks) and physical risks (e.g. heavy rainfall causing repeated surface water flooding.) Typically, the mitigation of climate risk is managed using financial hedging products (such as insurance solutions) or grey infrastructure. But the ongoing climate volatility will lead to escalating costs, carbon- intensive adaptation investments and ultimately uninsurability.

Public and Private Organisations will need to adapt.

Part of a risk mitigation strategy is investments in Nature- based Solutions (NbS) that help to mitigate climate risks, reducing and preventing exposure.

Street Trees
CAN REDUCE PEAK SUMMER TEMPERATURE BETWEEN
1- 5 C

Rain Gardens
CAN REDUCE PEAK RAIN FLOW BY
40%



- Crime decrease
- Community enhancement
- Improved attention & focus
- Lower noise levels
- Reduce Inactivity & obesity
- Reduced time in hospital
- Improving mental wellbeing
- Improve visitor spend
- Job creation
- Biodiversity
- €40 Land value uplift
- €9 Air quality
- €18 Energy savings
- €3 Reduce medical incidents
- €15 Reduce road repair costs
- €5 Reduce water treatment costs
- €1 Carbon sequestration

The Challenge

1

Desirability
Confidence in NbS

a. Locational information - lack of data and modelling of locationally calibrated NbS

b. Lack of long- term benefits valuation and infrastructure

c. Lack of data- sharing protocols & proprietary modelling

2

Feasibility
Delivery

a. Lack of space

b. Small scale of projects

c. Small market/ Limited number of contractors

d. Unfamiliarity with capex and opex (maintenance) costs

e. High levels of tree death

3

Viability
Collaboration

a. Inter- organisational challenges (e.g. siloed departments)

b. Misalignment of bureaucratic processes

c. Complex ownership requiring collaborative delivery

d. Lack of standards

TreesAI

A Solution: TreesAI

A cloud- based open source platform which aims to revalue nature from a liability to an asset to drive investment into our collective resilience

1. Scenario impact models for informed decision- making
2. Civic Engagement & match- making for delivery of just portfolios
3. Developing new funding structures for collective investment

SUPPORTED BY:

Innovate UK

Morgan Stanley

Google.org

WORLD ECONOMIC FORUM

Climate KIC

Esmée Fairbairn

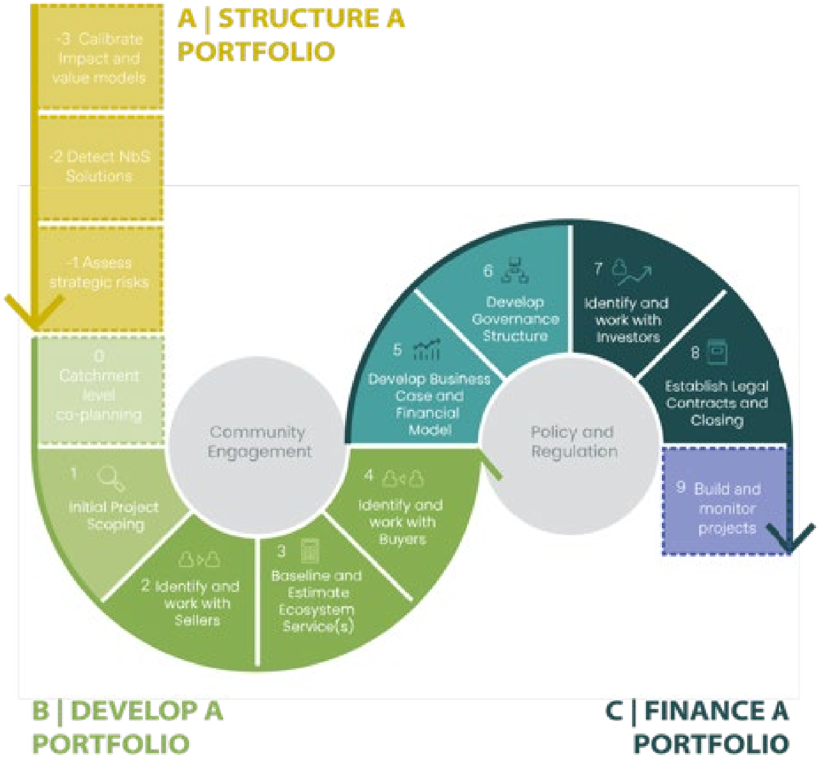
National Trust

TreesAI

Glasgow Pilot

Glasgow City Council

Aim: To fund a portfolio of Nature- based Solutions projects in Glasgow and the Clyde Valley.



1

Desirability

Embedding open source scenario modelling into flood- risk models to calculate risk- reduction (partnership with IBM/ STFC)

2

Feasibility

Portfolio- based strategy with multiple projects and developers, with pre- agreed maintenance schedules.

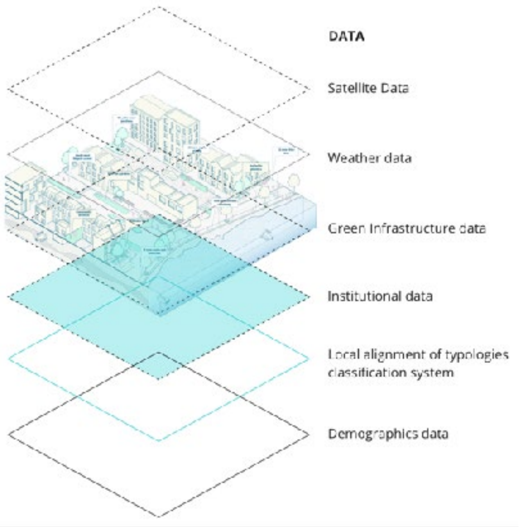
3

Viability

Bringing in blended finance to support the planting and growing of urban nature- based solutions

Desirability

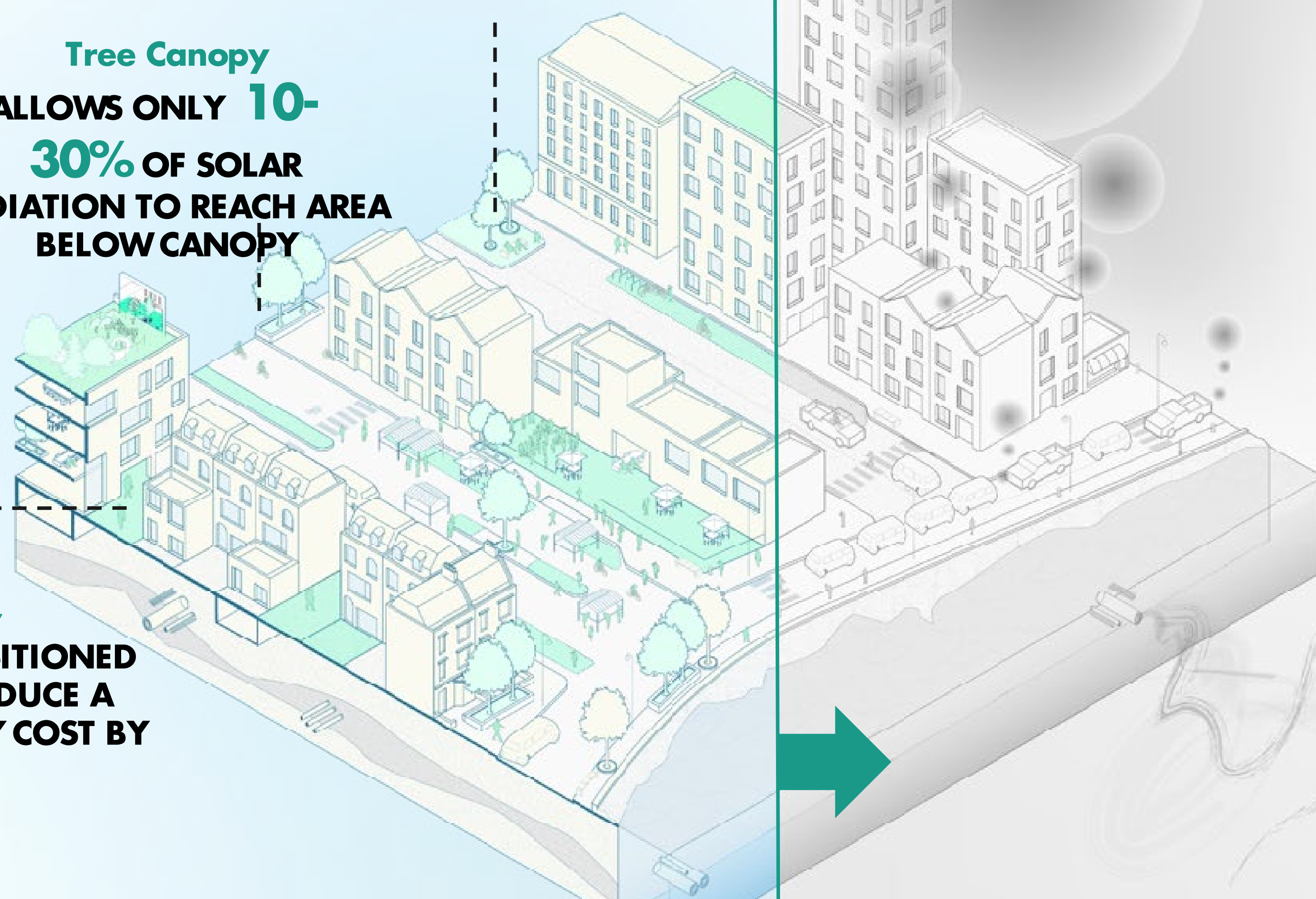
Location Based Scoring: Where to locate NBS to maximise benefits?



Street Trees
CAN REDUCE PEAK SUMMER TEMPERATURE BETWEEN **1- 5 C** THROUGH EVAPOTRANSPIRATION

Tree Canopy
ALLOWS ONLY **10-30%** OF SOLAR RADIATION TO REACH AREA BELOW CANOPY

Energy
CAREFULLY POSITIONED TREES CAN REDUCE A HOME'S ENERGY COST BY **25%**

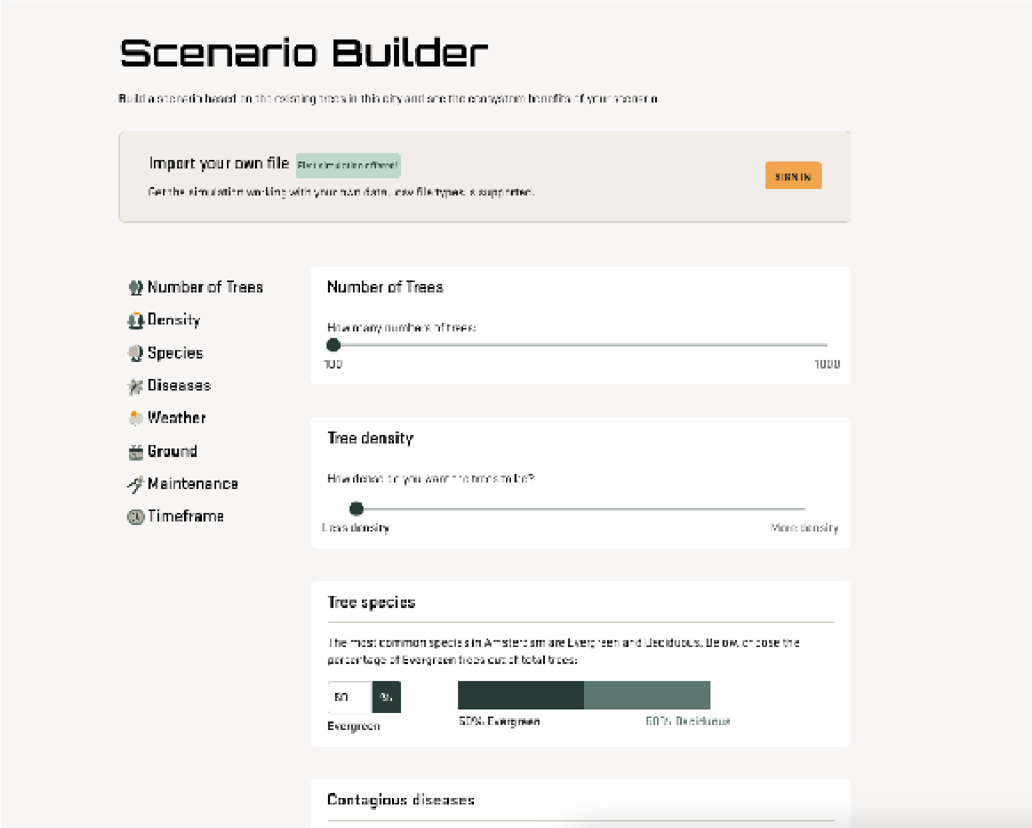


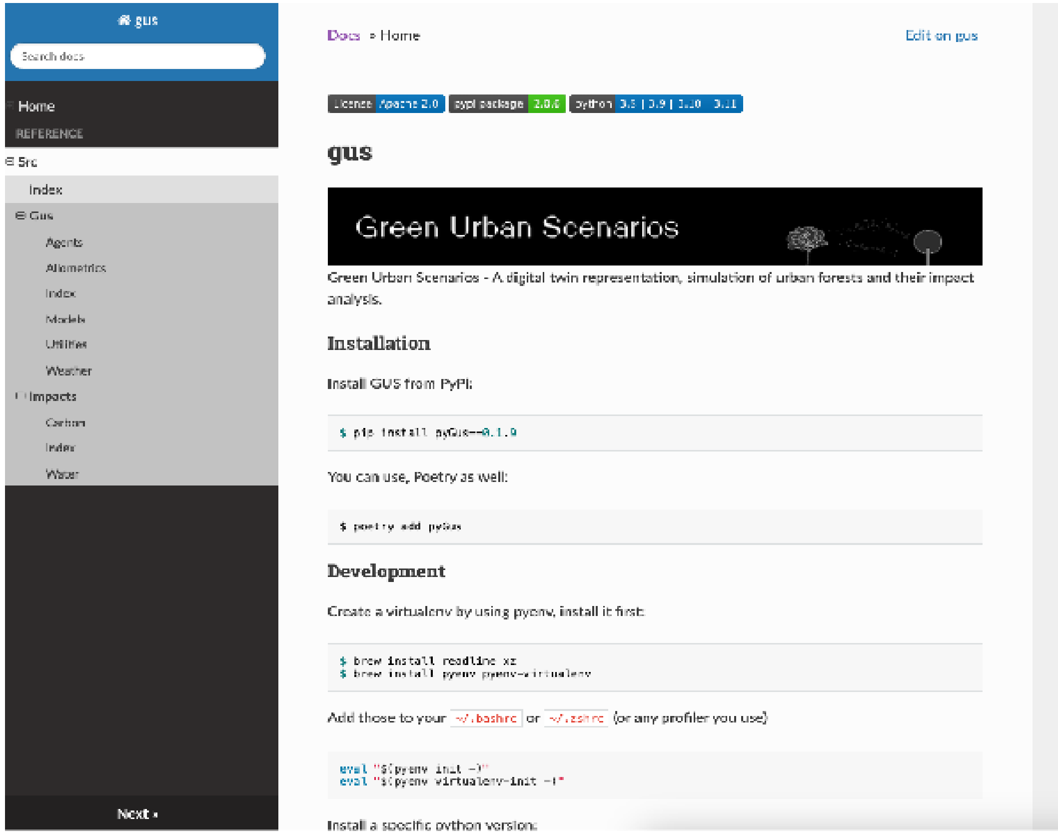
TreesAI

Desirability: Scenario- modelling

Impact Chain | Data Management | Score Calculation | **Scenario modelling** | **Data Visualization**

Find out more: www.greenurbanscenarios.com

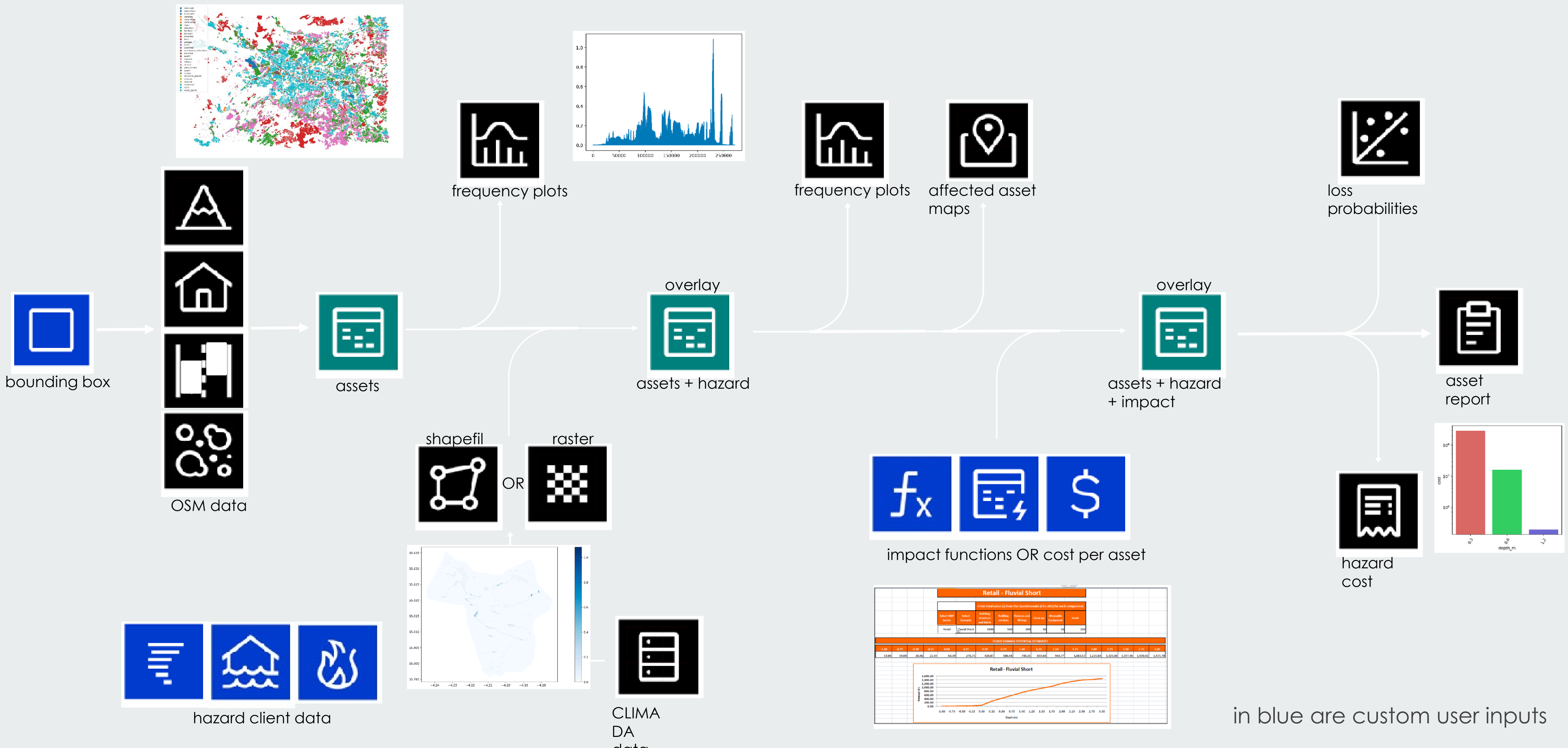




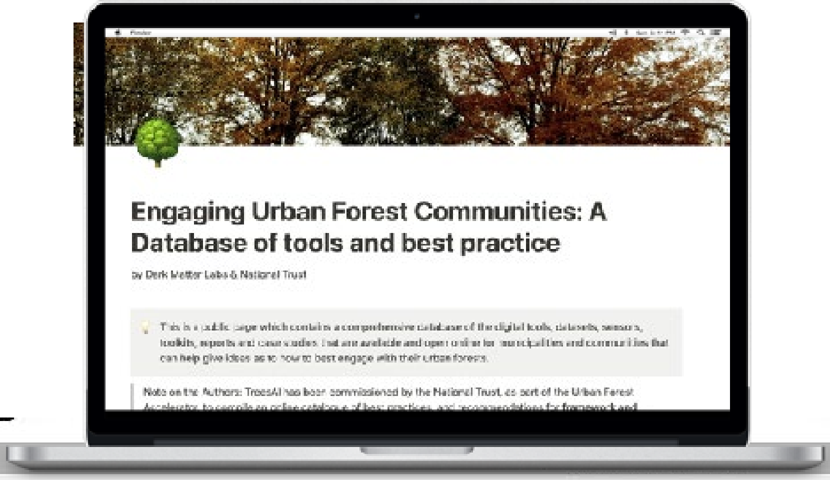
TreesAI IBM

Desirability: Impact Functions

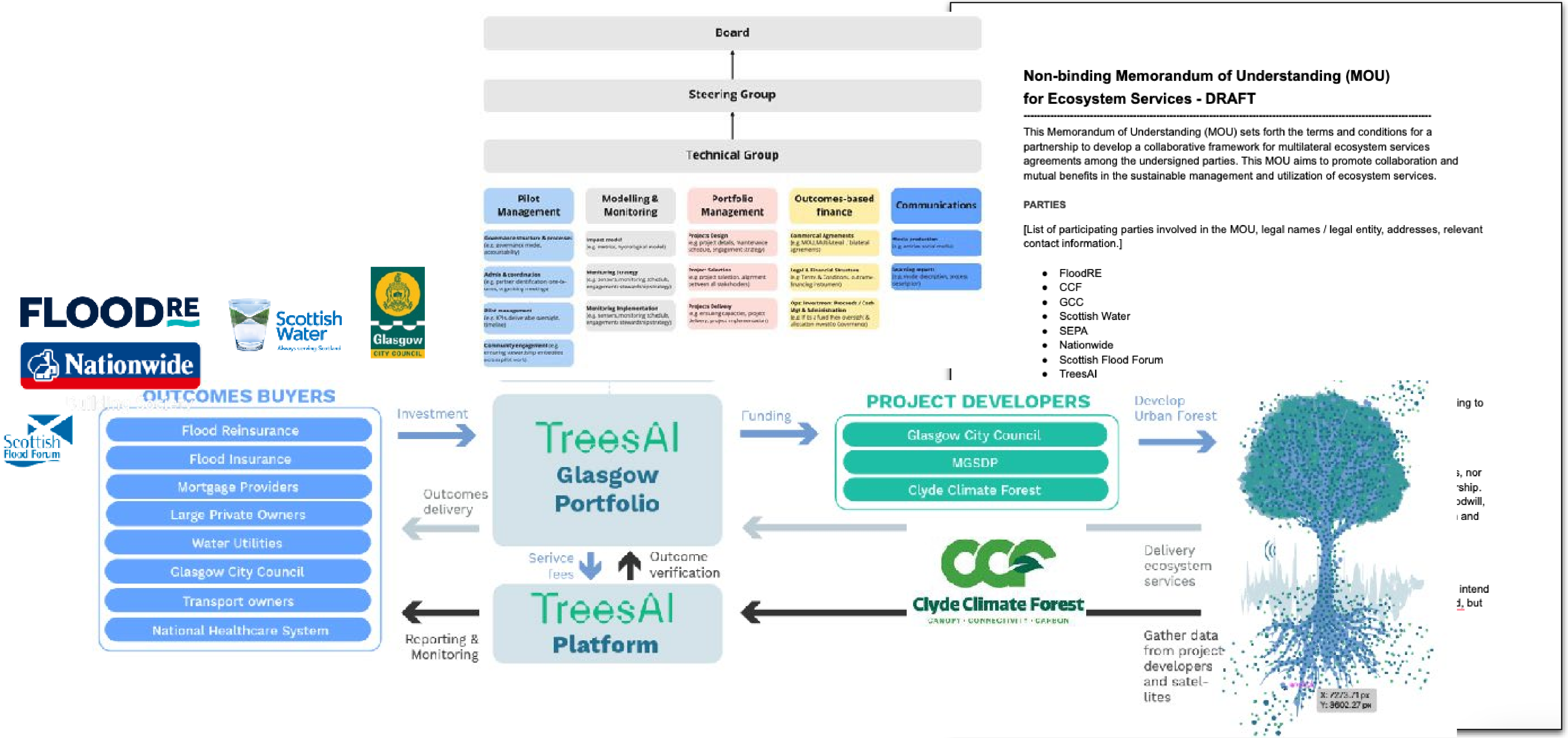
Version 1.0



Feasibility: Community- based portfolios



Viability: Pilot Partnership



Next Steps

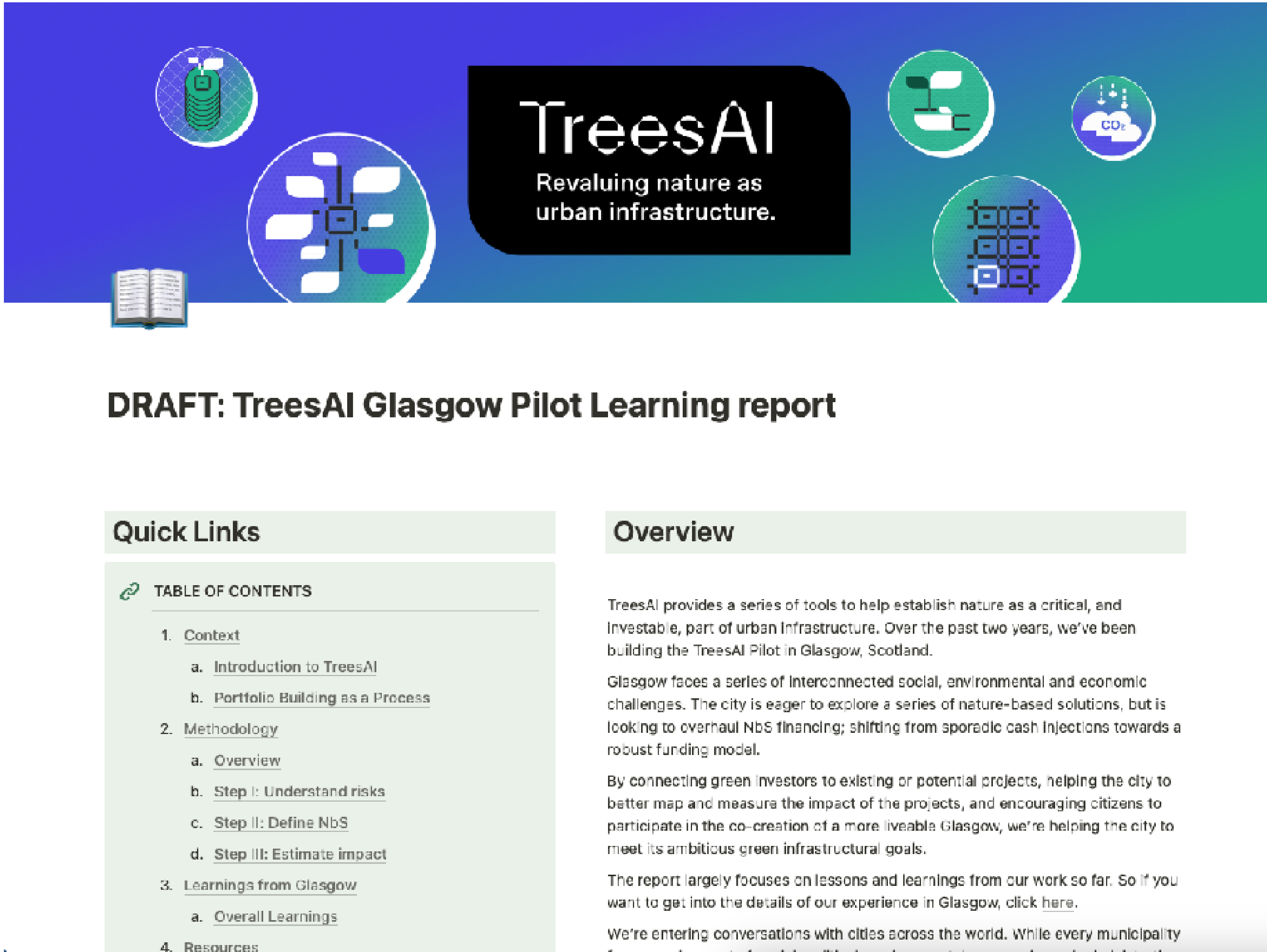
POTENTIAL

Your city?

FIND OUT MORE

Our initial blog, which laid out our concept of an open source model to support municipalities in transitioning toward resilient urban forest management practices, and our strategy document, which provides more detail.

Our interim learning report provides an analysis of how we can overcome existing structural challenges to reach investment readiness for the long- term stewardship of Nature- based Solutions in cities.


TreesAI

Revaluing nature as urban infrastructure.

DRAFT: TreesAI Glasgow Pilot Learning report

Quick Links

TABLE OF CONTENTS

Overview

TreesAI provides a series of tools to help establish nature as a critical, and investable, part of urban infrastructure. Over the past two years, we've been building the TreesAI Pilot in Glasgow, Scotland.

Glasgow faces a series of interconnected social, environmental and economic challenges. The city is eager to explore a series of nature-based solutions, but is looking to overhaul NbS financing; shifting from sporadic cash injections towards a robust funding model.

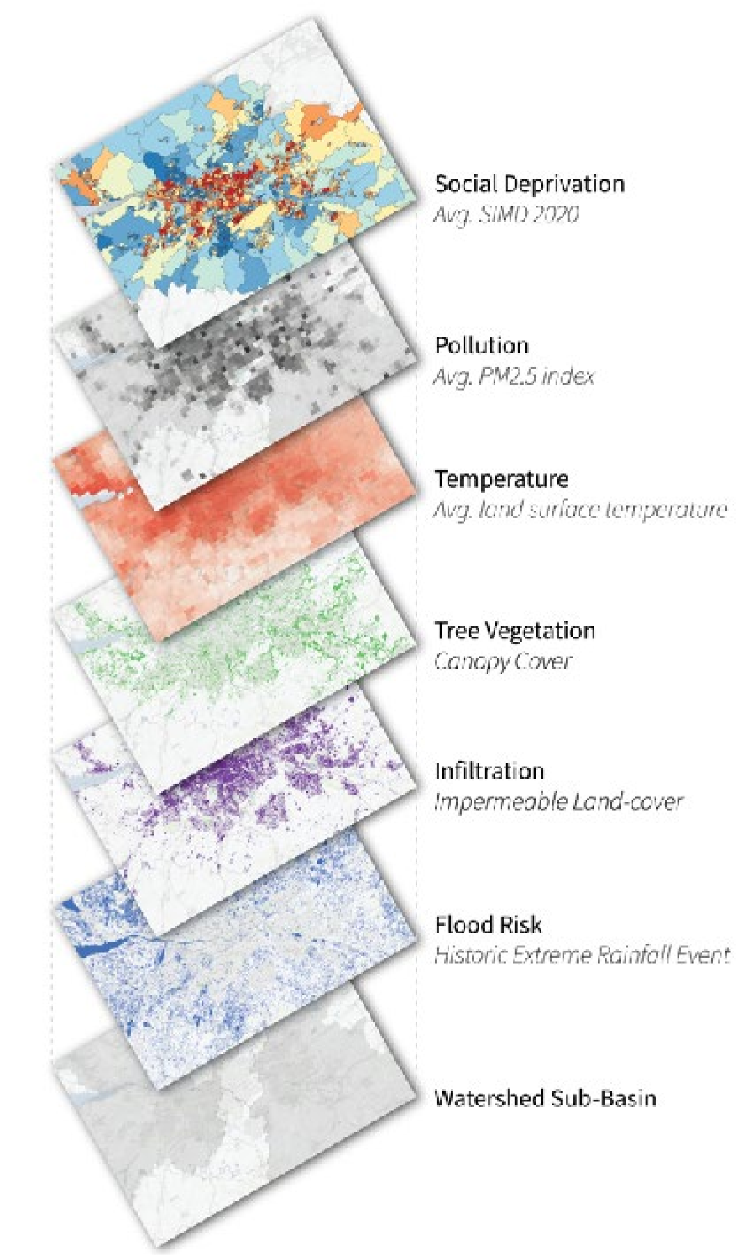
By connecting green investors to existing or potential projects, helping the city to better map and measure the impact of the projects, and encouraging citizens to participate in the co-creation of a more liveable Glasgow, we're helping the city to meet its ambitious green infrastructural goals.

The report largely focuses on lessons and learnings from our work so far. So if you want to get into the details of our experience in Glasgow, click here.

We're entering conversations with cities across the world. While every municipality

APPENDIX

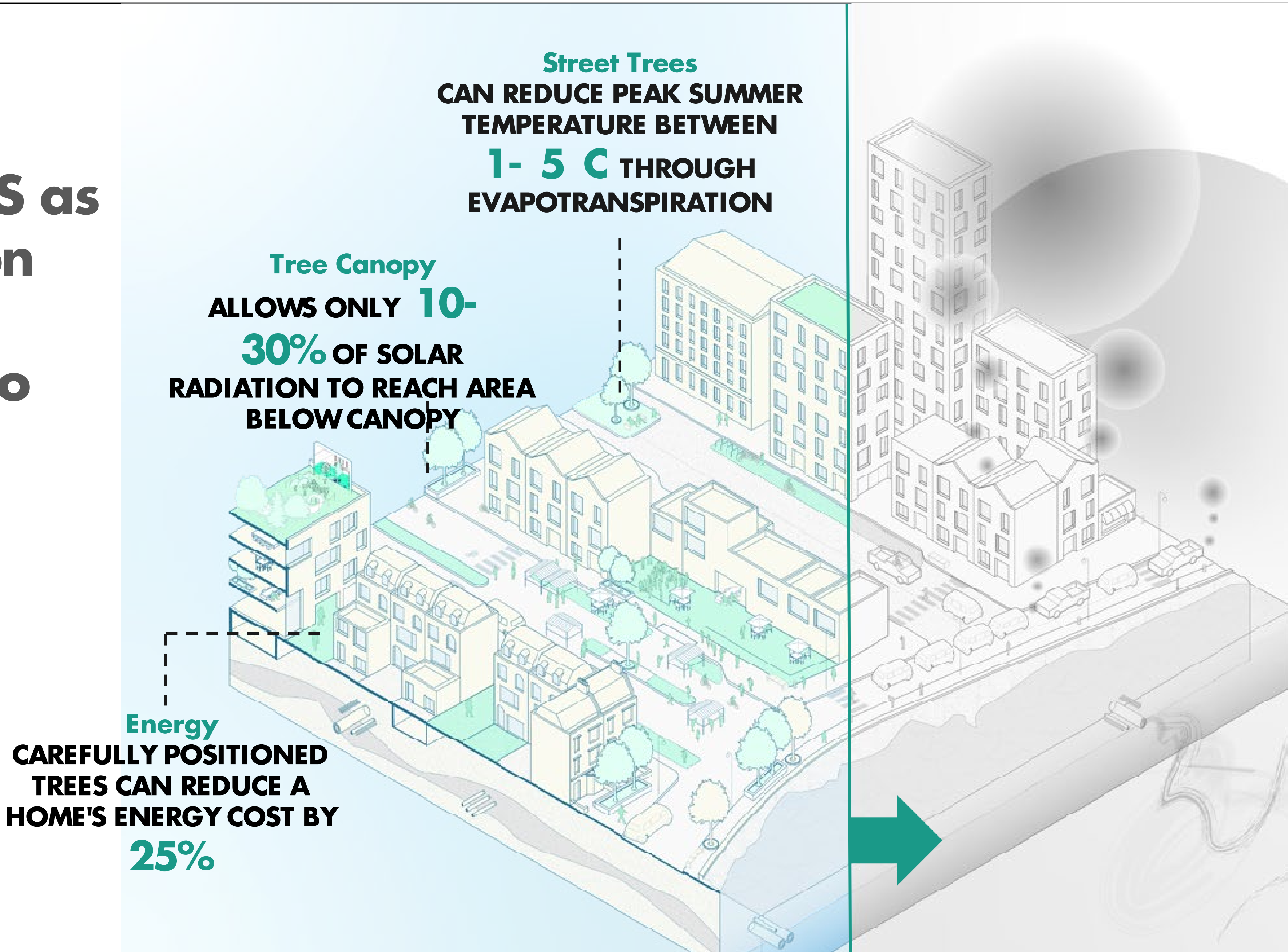
LBS
Location- based
Scoring



LBS - Location- based Scoring

Where to locate NBS as a climate adaptation strategy and to maximise benefits to the city?

- Cooling effect
- Flood Alleviation
- Improved air quality
- Improved noise pollution
- many more

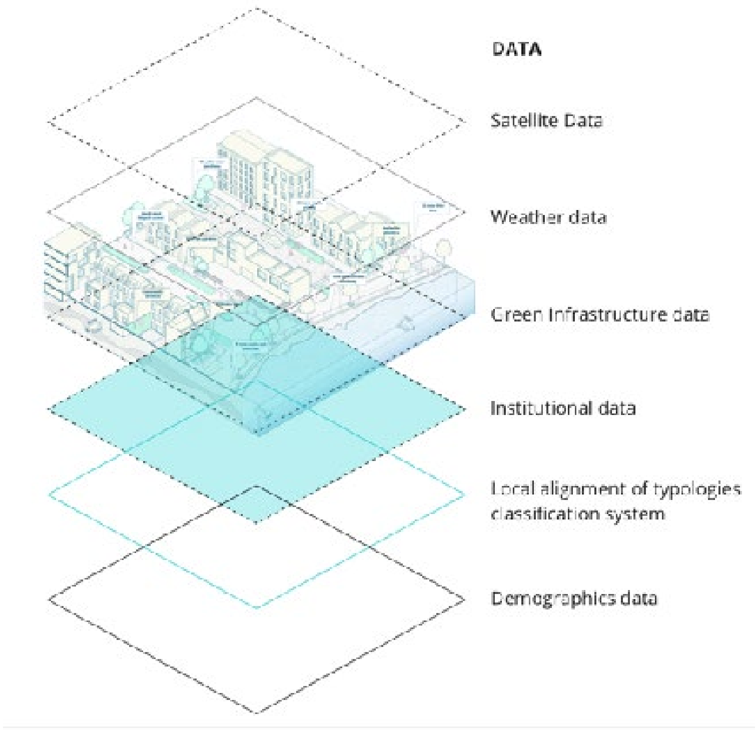


LBS - Location- based Scoring

Location criteria helps prioritise projects to mitigate targeted risks through weighting formulas.

Location- based scoring developed using the IVAVIA framework (Resin, 2018) and the IPCC's Fifth Assessment Report.

Spatial indicators of climate-related risks of a given landscape.



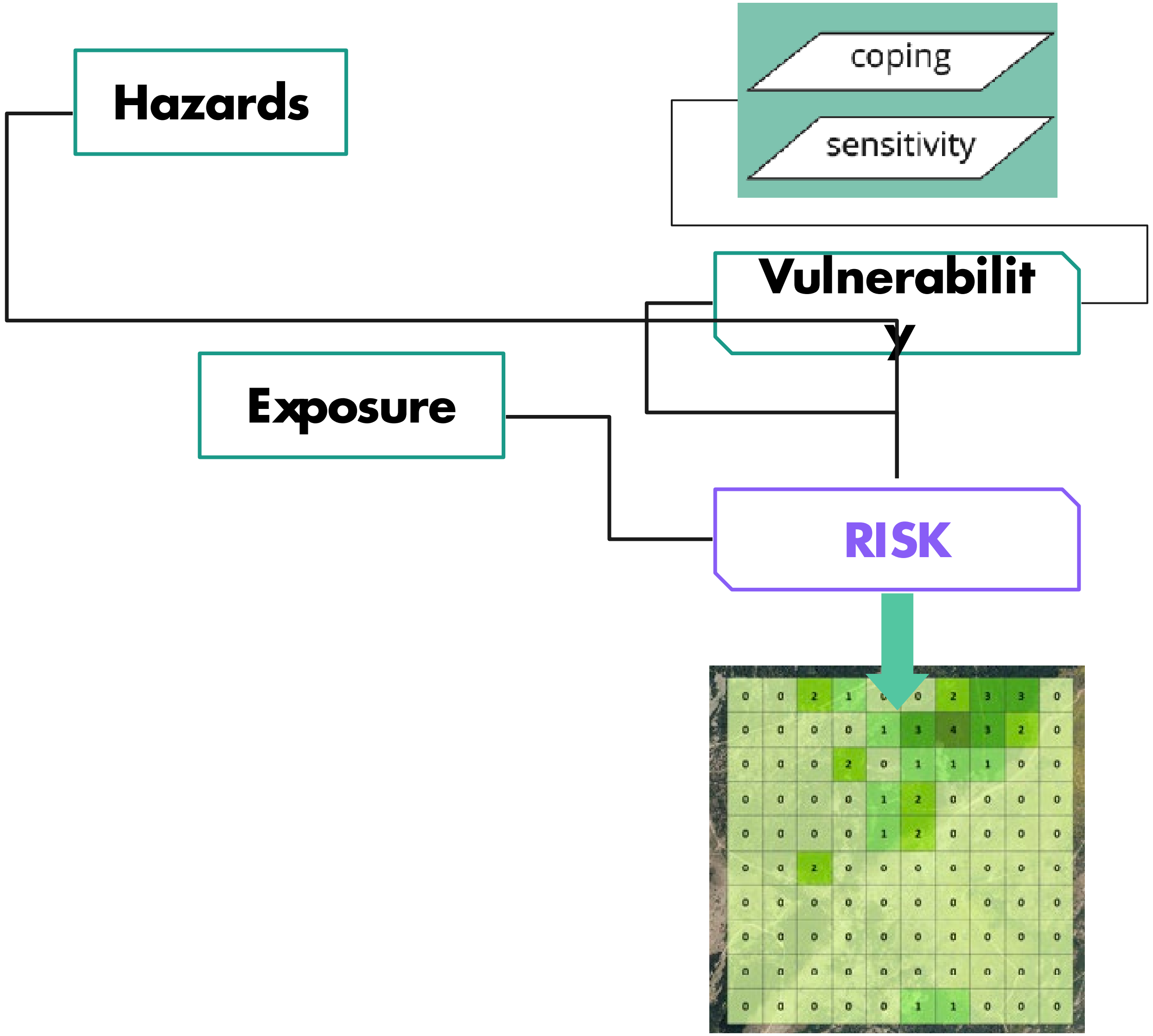
LBS - Process

Impact Chain	Data Management	Score Calculation	Overlay with GUS	Data Visualization
Qualitative Risk Assessment	Data collection and geoprocessing	LBS Model (data normalization, weighting of indicators and aggregation)	Risk score map is compared to GUS impact assessments of the current canopy structure	Maps, sankey diagrams, and charts

TreesAI

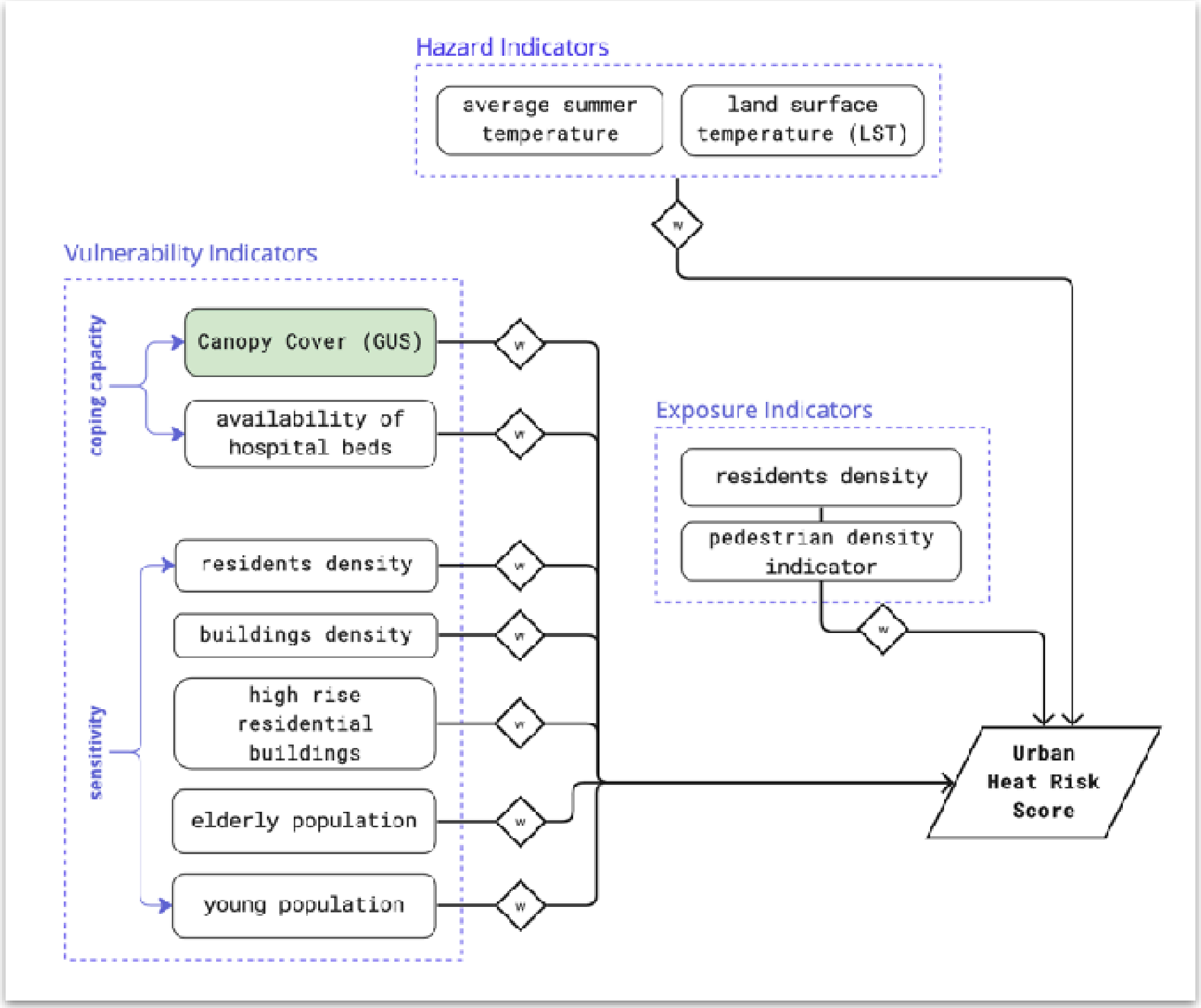
LBS - Impact Chain

Climate Risk is understood as the result from the interaction of vulnerability, exposure, and hazard



LBS - Example of Impact Chain

Risk =
Exposure + Hazard + Vulnerability
(coping capacities & sensitivity)



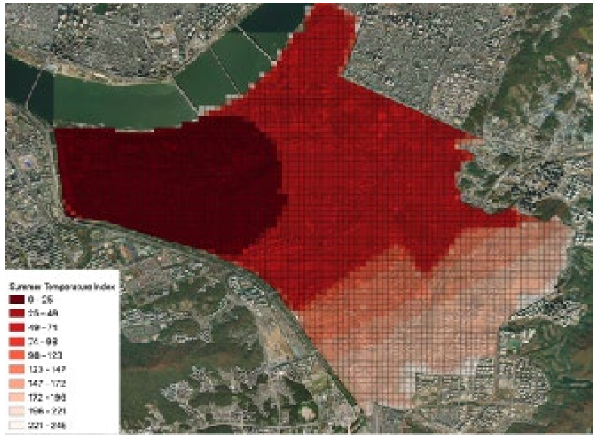
TreesAI

LBS - Data Management

Data collection and geoprocessing

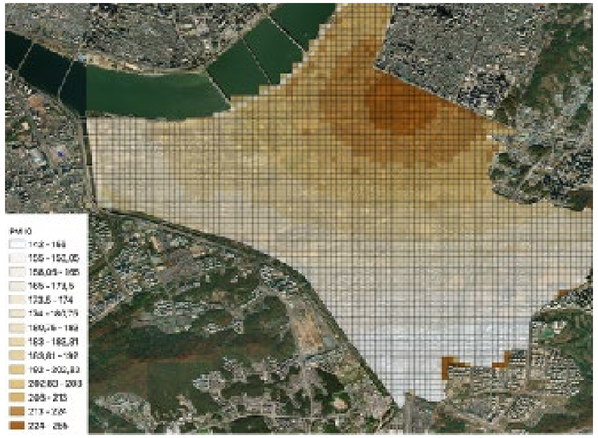
H01

Avg. Summer Temperature



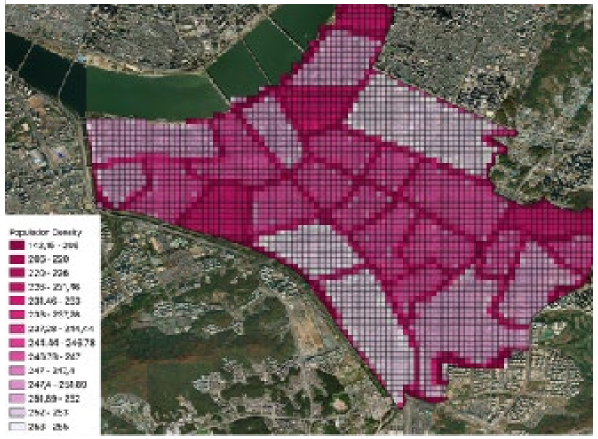
H03

PM10



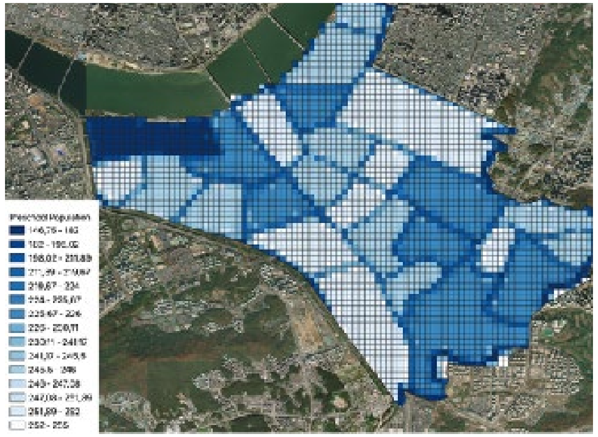
E01

Population Density



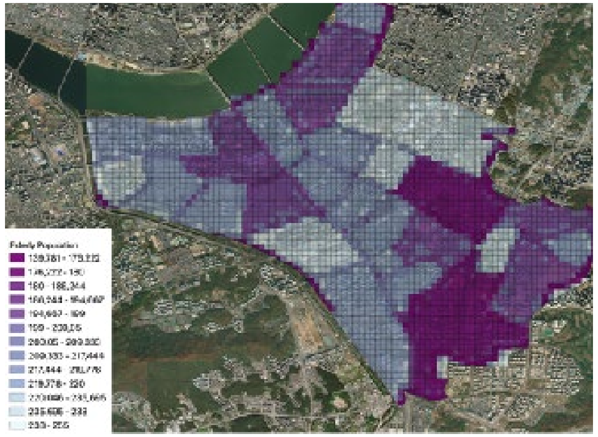
VS01

Preschool population



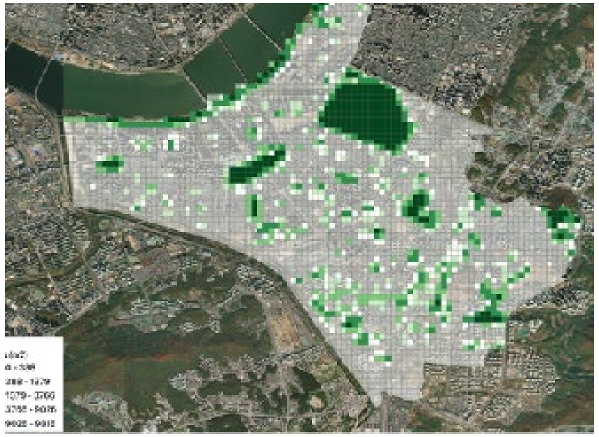
VS02

Elderly Population

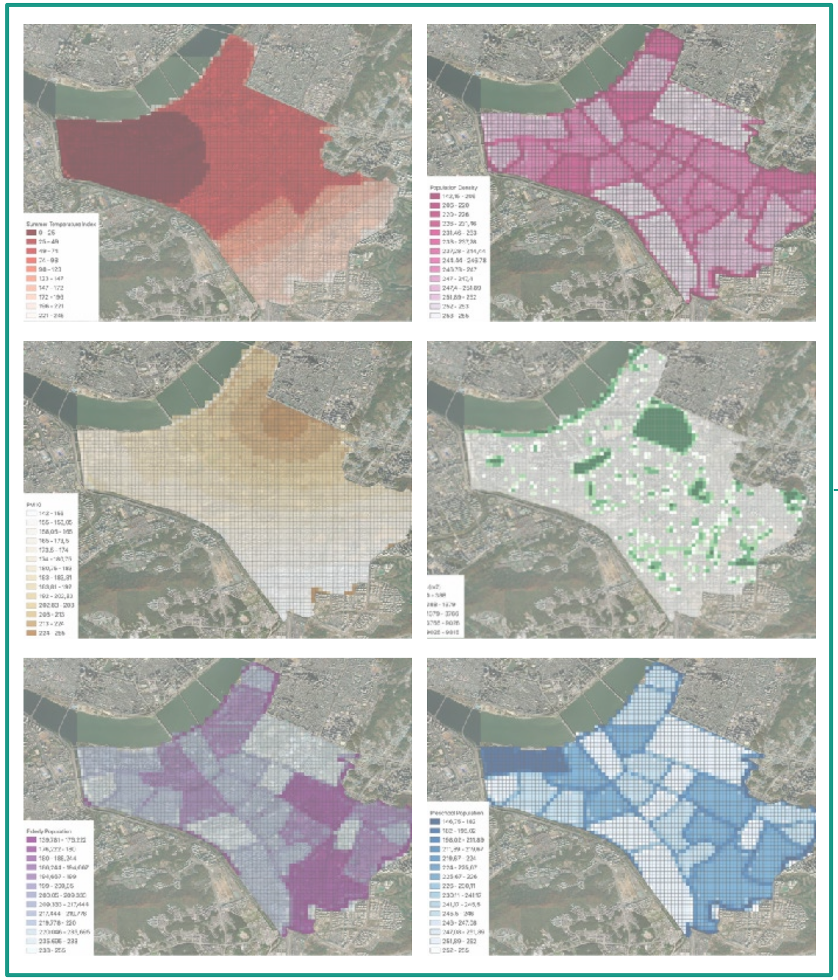


VC01

Parks



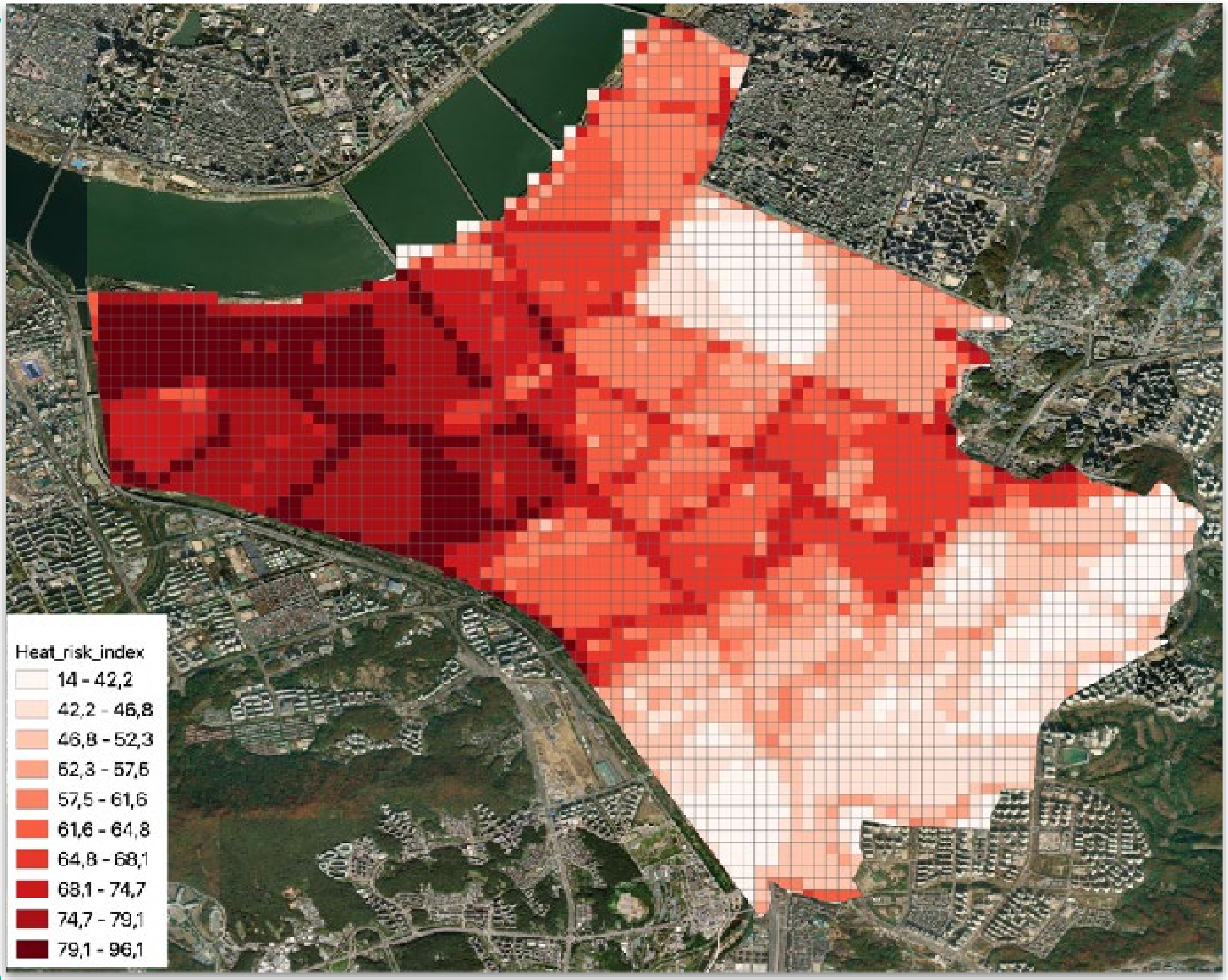
LBS - Score Calculation



LBS Model

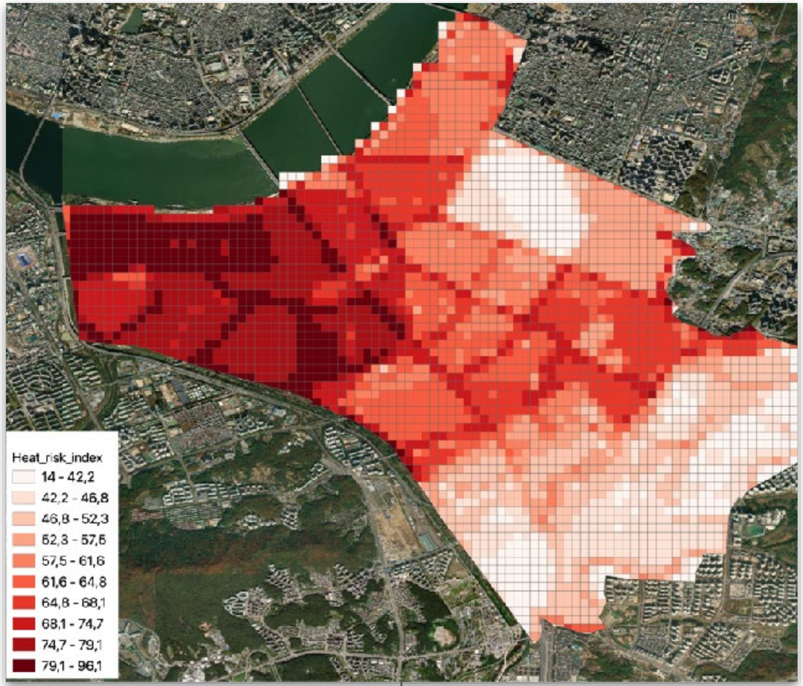
(normalization, weighting, aggregation)

LBS for Heat Risk

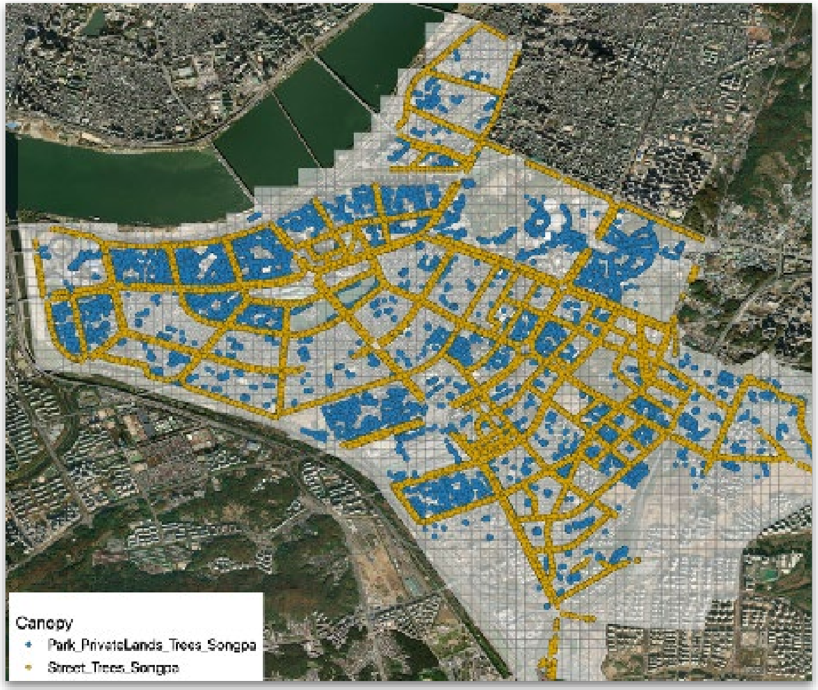


LBS - Overlay with GUS

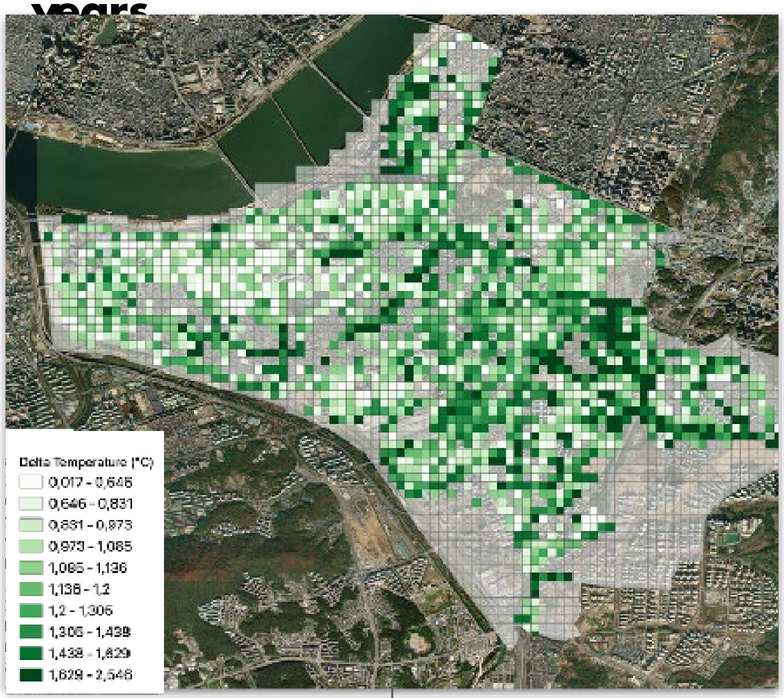
LBS Model - Heat Risk LBS



Location of Street, park and private land trees



GUS Cooling Potential Model - Cooling Effect of Trees in 10 years



Indicate areas in the city where there is a high risk of heat stress and low cooling effect from trees to support in the decision- making of planting new trees for heat stress alleviation

July 2023

IBM Research

TreesAI
Impact Work Package

Katharina Reusch

Content

Open Street Map (OSM) Data Extraction

=> show for any bounding box the buildings, landuse, natural land and roadnetwork

=> For TreesAI use case: show trees per bounding box

Flood Data

=> showcasing different flood data availability

=> CLIMADA global dataset
=> SEPA: Scottish Environment Flood Maps
=> GUS: TreesAI Project Floodmaps

OSM – Flood Overlay

=> overlay of flood data (raster or shapefile) with OSM data

TreesAI Cost Calculations

=> estimating costs based on literature for flood damage at different depths

Fragility Impact Function

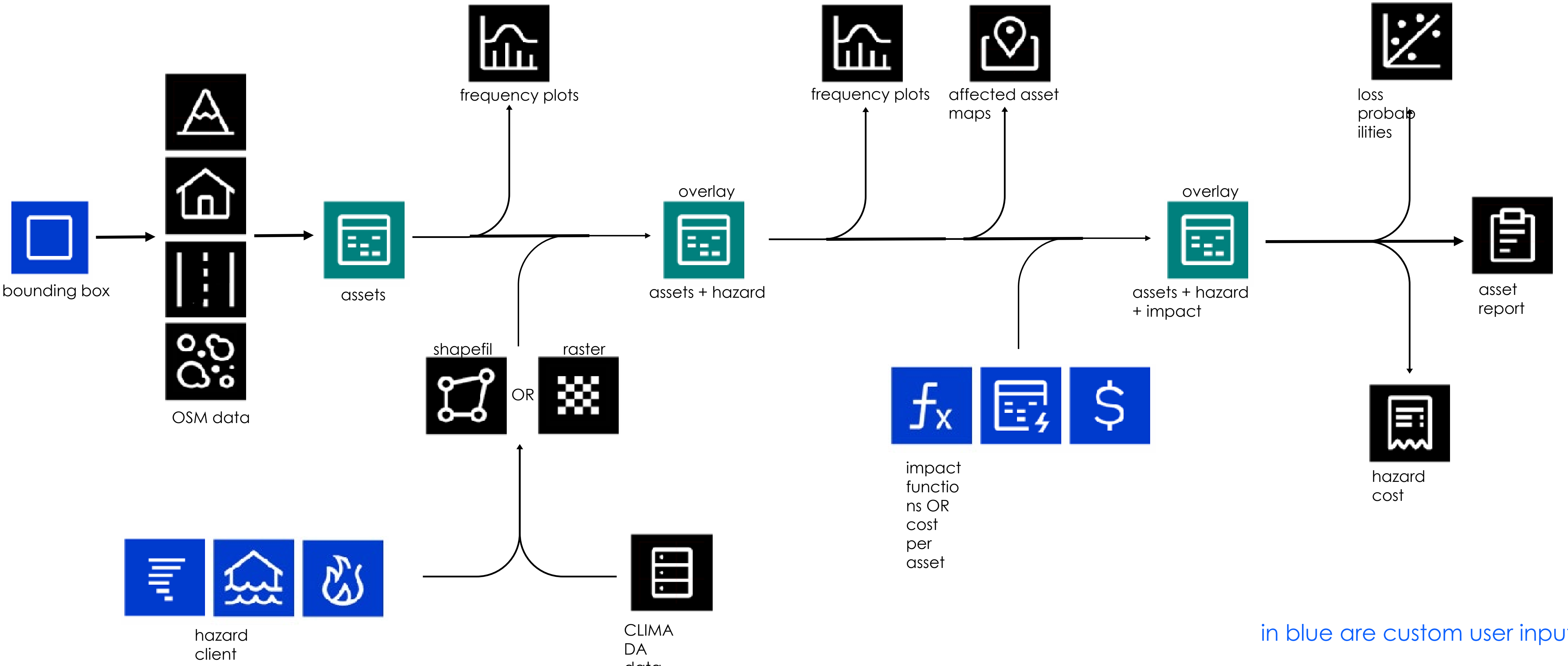
=> calculating building fragility probabilities for 4 fragility categories for Glasgow area

Other Impact Assessments

=> How to scale impact assessments globally

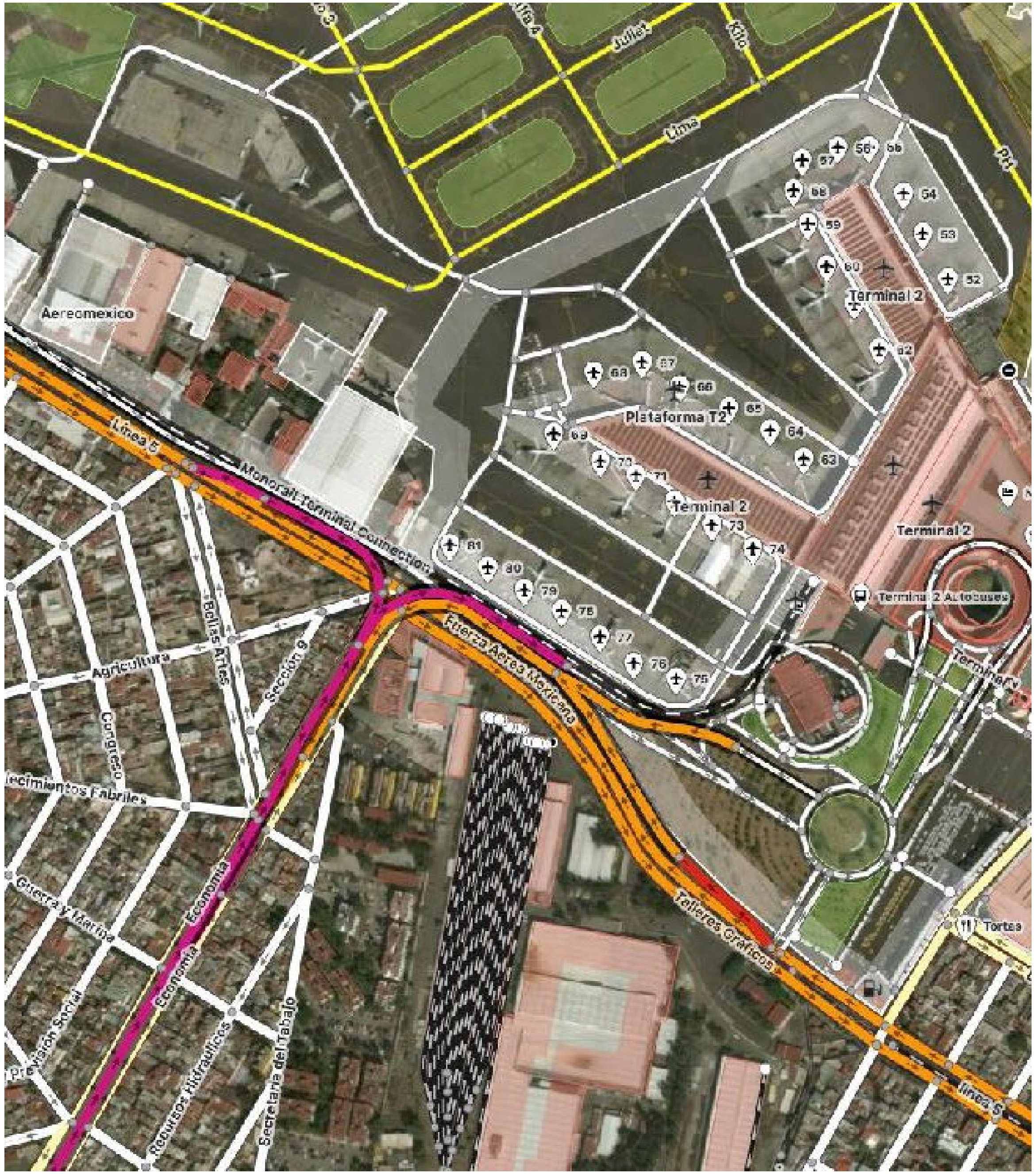
Overall Impact Workflow

as created for TreesAI project but available for any area as multiple workflows in GeoDN (soon)



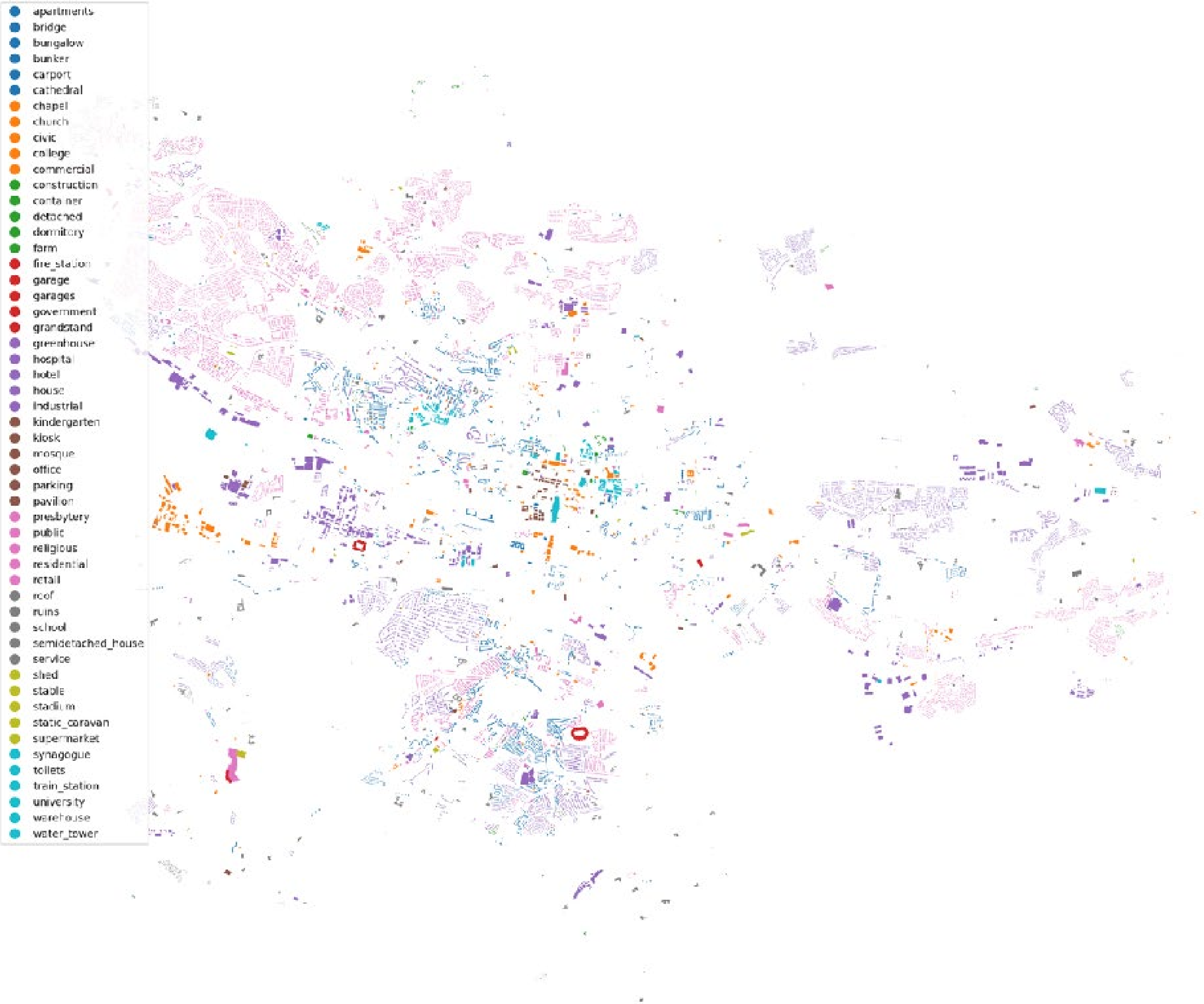
in blue are custom user inputs

Open Street Map Data Extraction



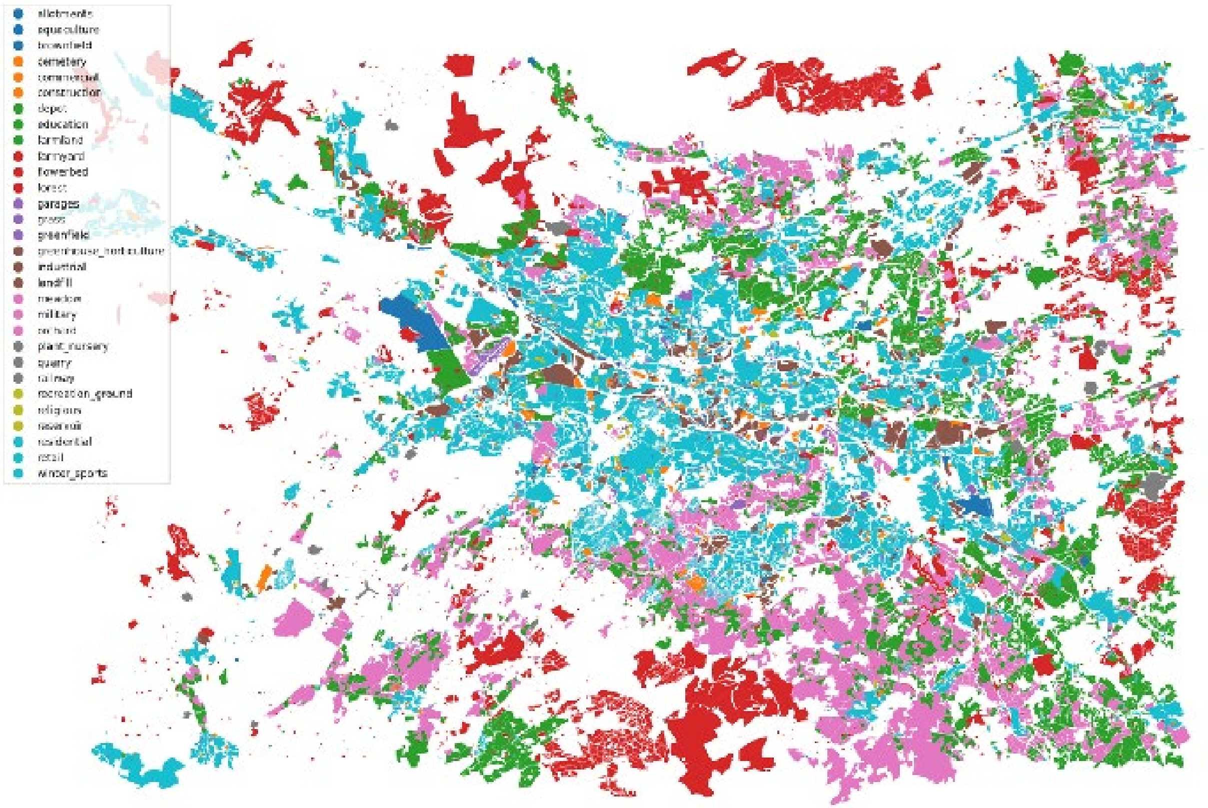
Open Street Map Data Extraction - Glasgow

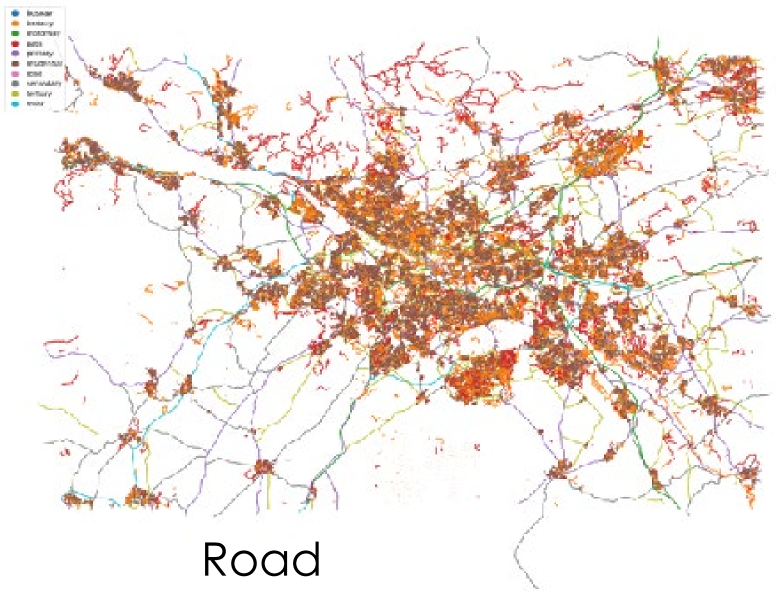
- OSM Python API allows to pull categories such as builings, landuse, natural land, highways, road etc https://wiki.openstreetmap.org/wiki/Map_features
- For example for buildings, they are put into categories such as houses, commercial, religious buildings https://wiki.openstreetmap.org/wiki/Key:building
- Run for Glasgow City, see image



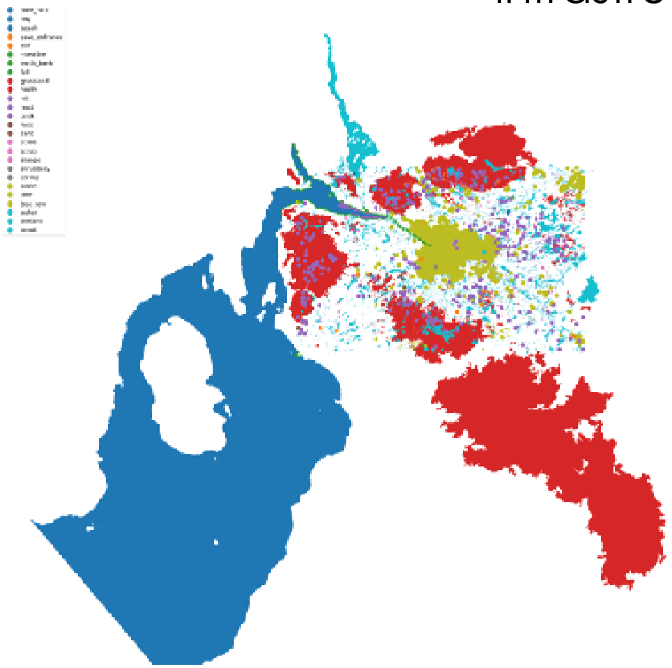
OSM Data

Landuse





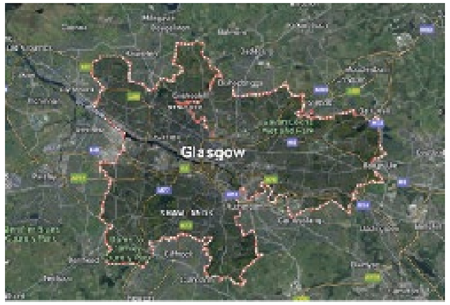
Road infrastructure

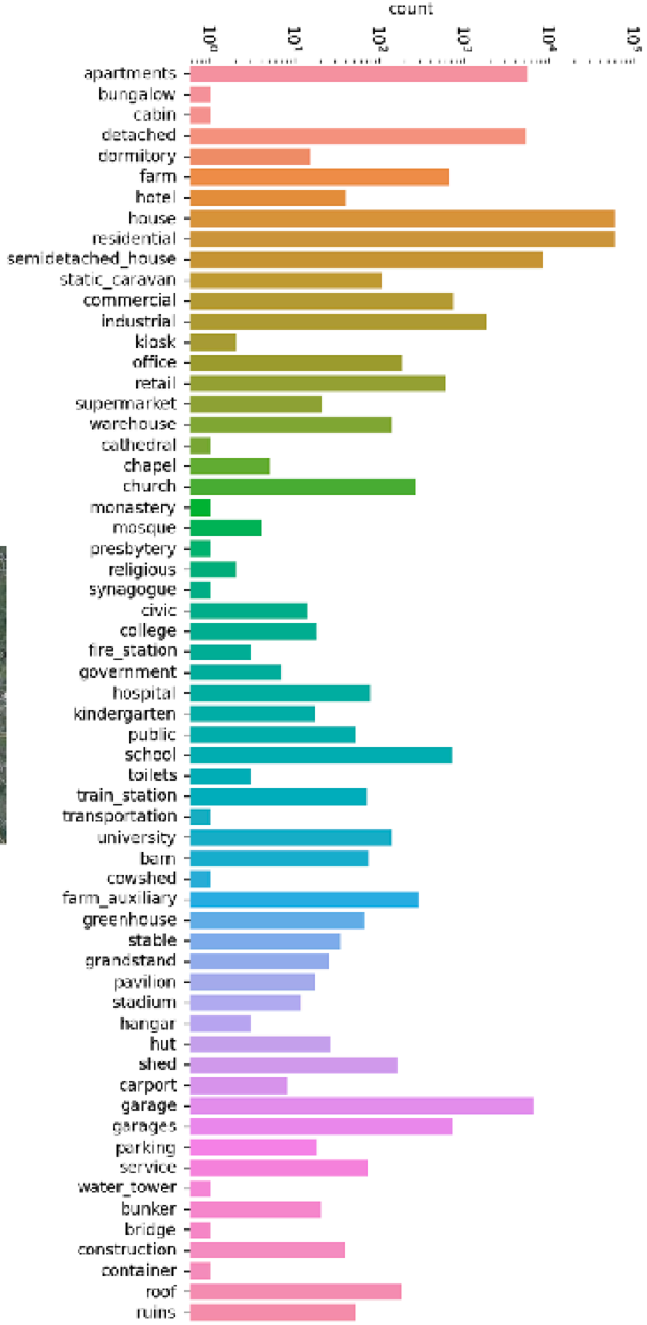


Natural landtypes

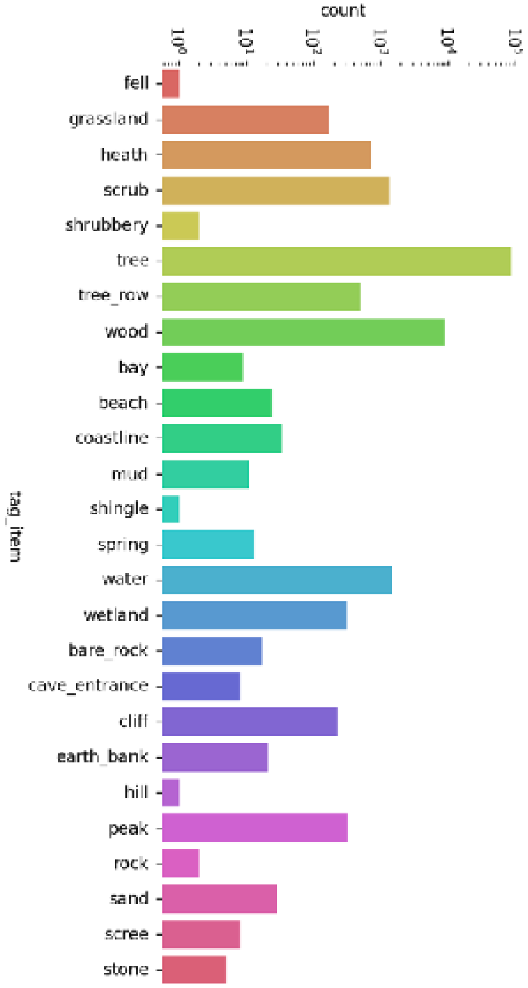
OSM Example Glasgow

Frequency of building types, natural land, landuse and road infrastructure

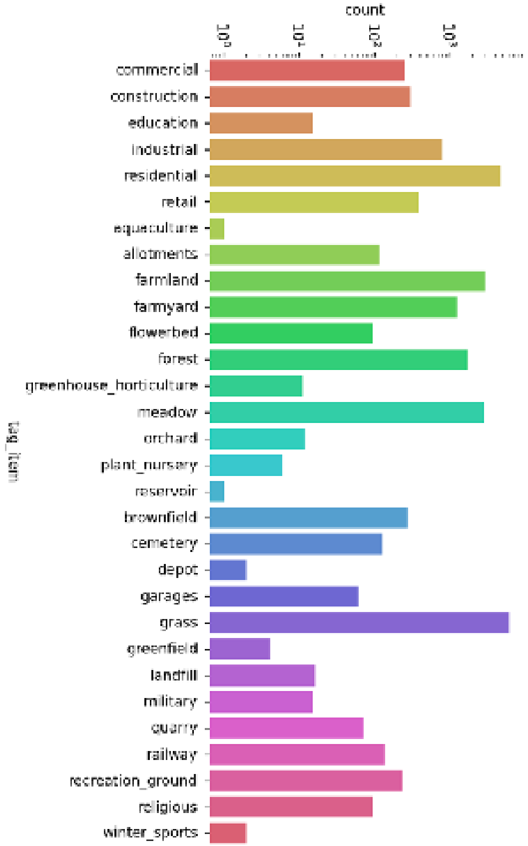




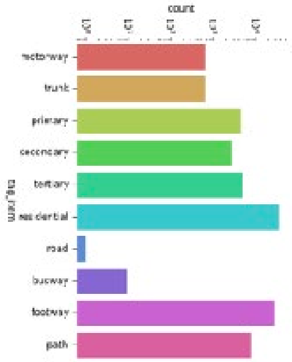
BUILDINGS



NATURAL LAND

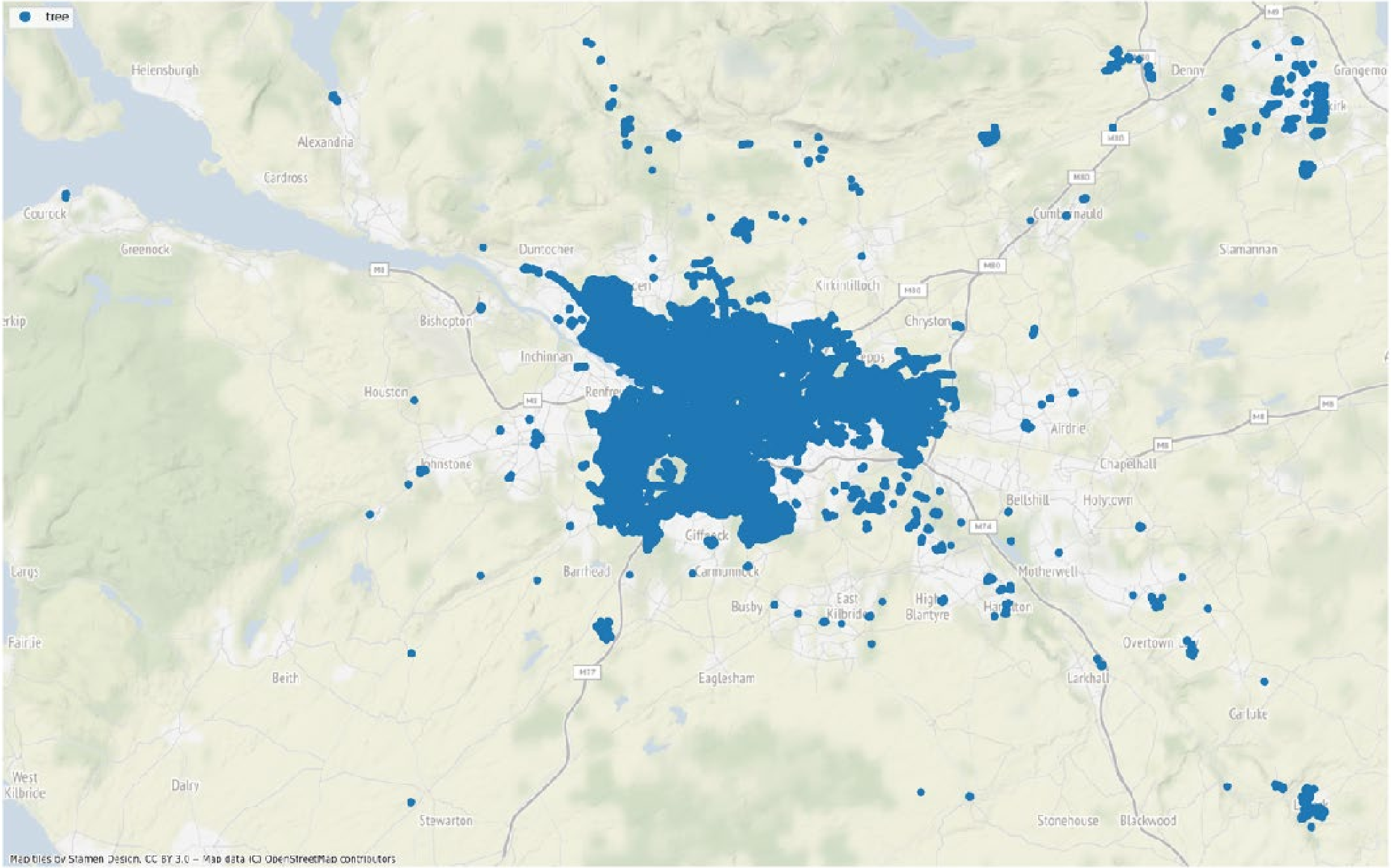


LANDUSE



ROADS

OSM Workflow also has trees itself – total 84k in Glasgow



Flood Data

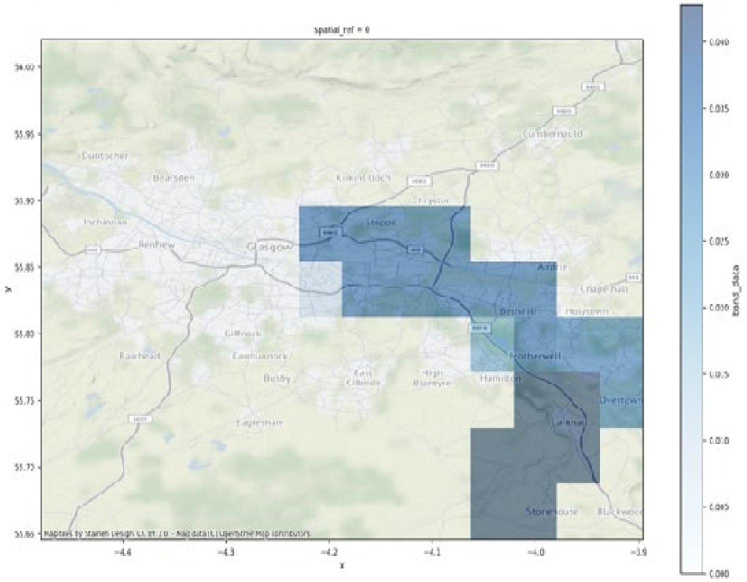
IBM

Note: With shapefiles of the actual flood extents, it is easier to pick out all buildings actually affected by a flood.

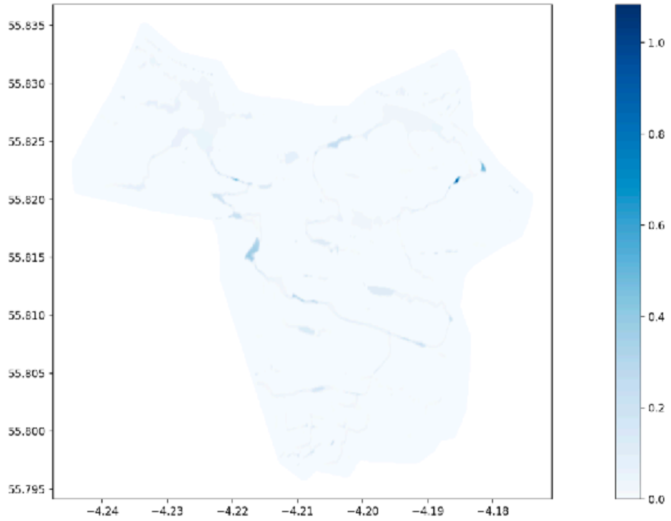
For Rasterfiles of for example 1km resolution, all assets in that area are listed and they are probably not all affected in the same way; additionally raster files average over a region and usually have much lower flood depths in meters than shapefiles with actual flood extents and depths

SEPA Flood extent and depth (10m)

CLIMADA River Flood Climate Scenario (5km)

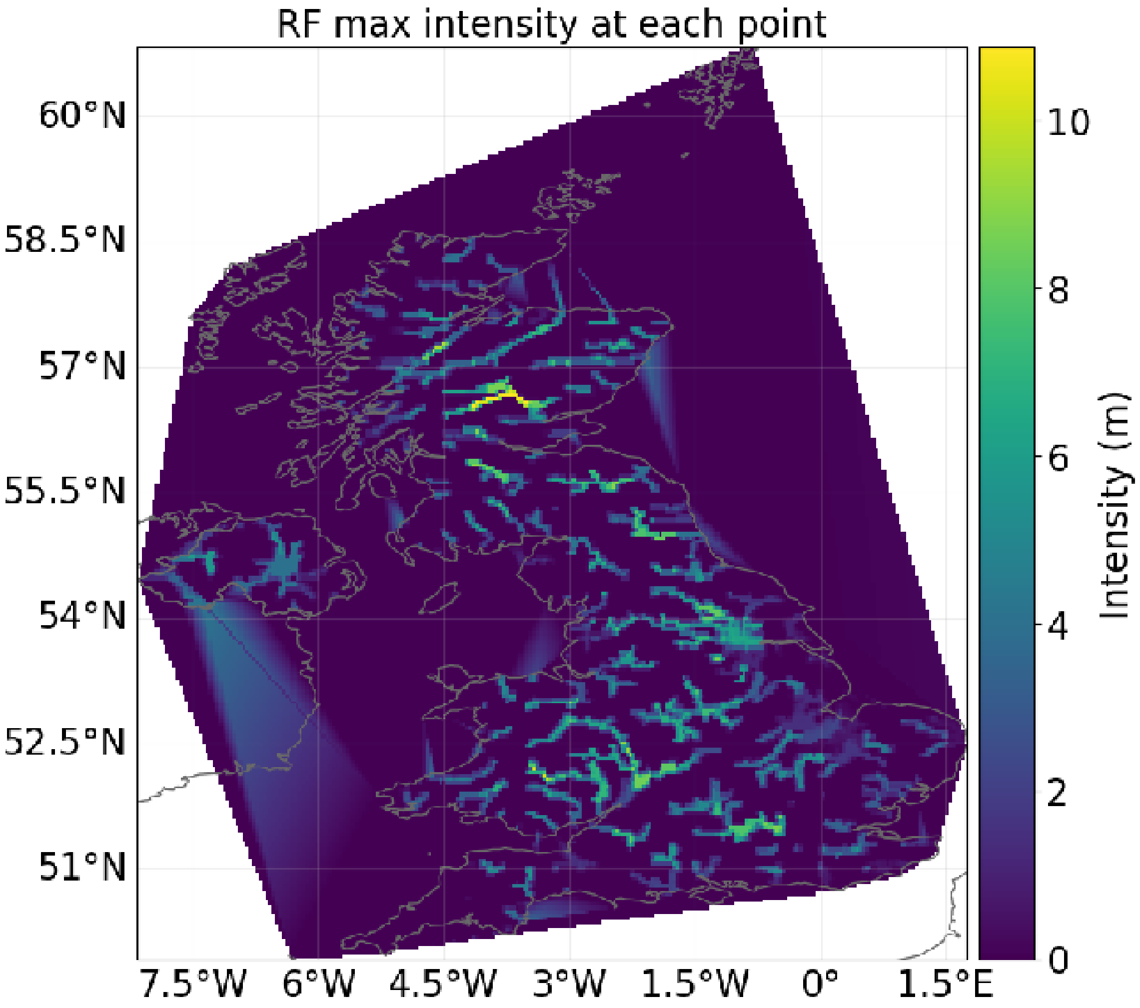


TreesAI Project GUS model (10m)



- Trying out Climada Library
  https://wcr.ethz.ch/research/climada.html

UK Flood Hazard from Climada

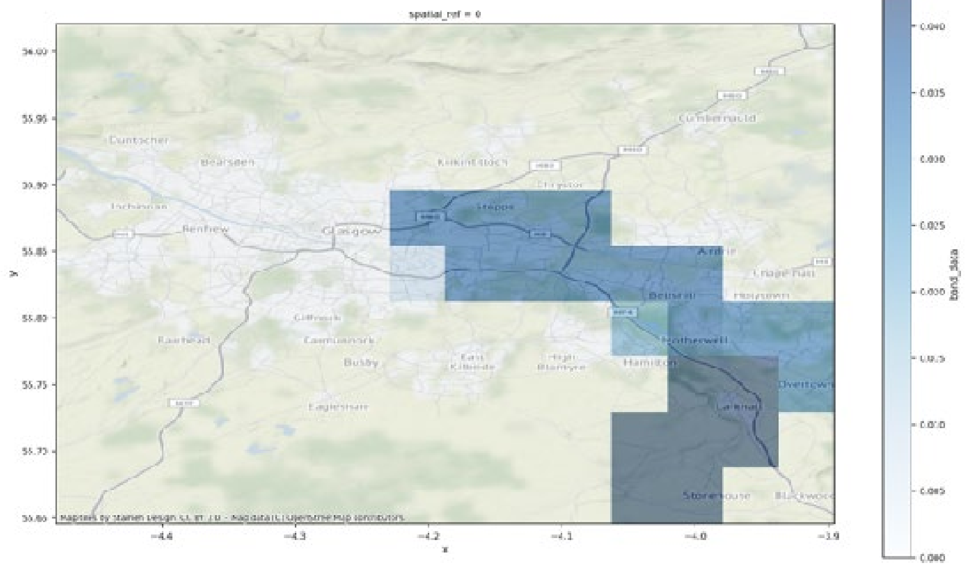


- Flood Hazards available for various climate scenarios

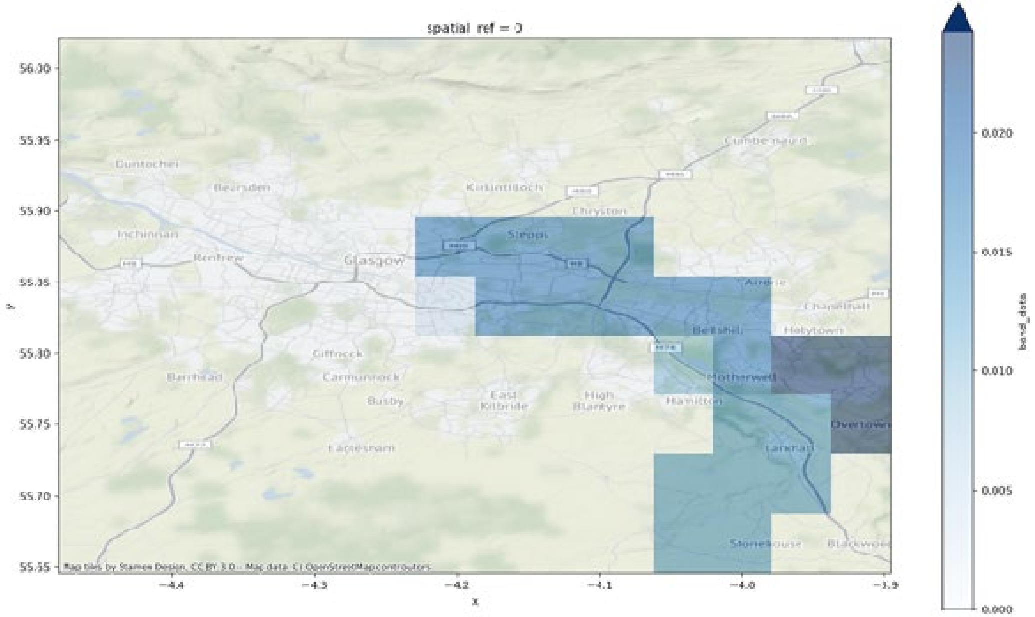
  'res_arcsec': ['150'],
  'climate_scenario': ['rcp26', 'rcp85', 'historical','rcp60']
  'year_range': ['2010_2030', '2030_2050', '2050_2070', '2070_2090', '1980_2000']
  'spatial_coverage': ['country']

- For Glasgow example, downloaded climate scenario **rcp85** =>This high-emissions scenario is frequently referred to as "business as usual" if society does not make changes

- RCP85 for year 2030 to 2050: 2050



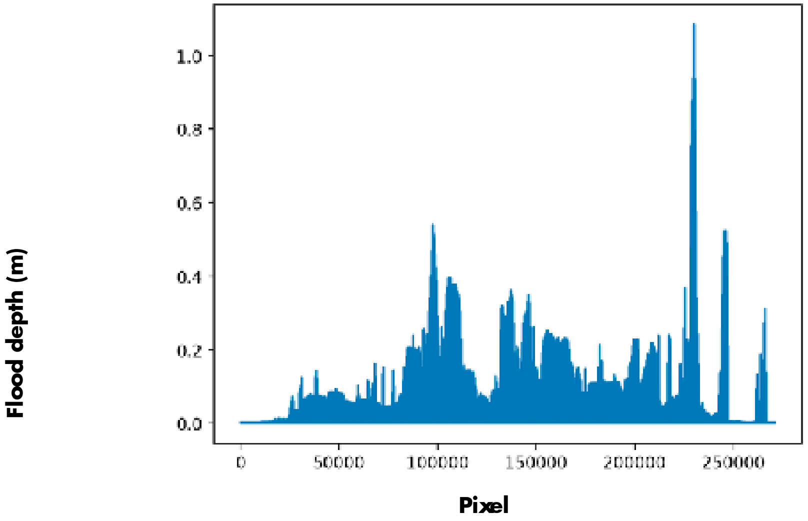
RCP26 (global temp rise below 2 degrees) for year 2030 to

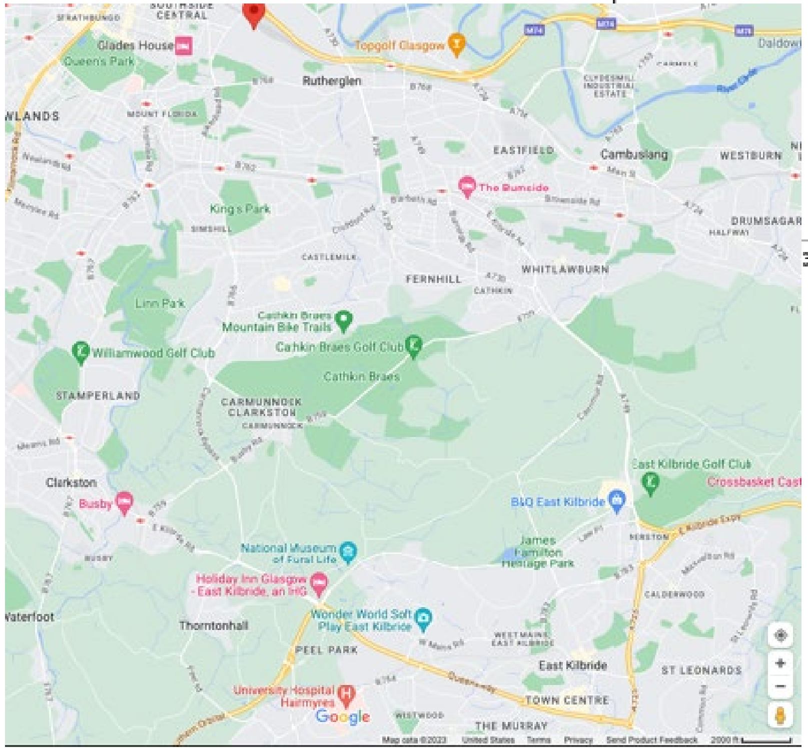


GUS model Glasgow

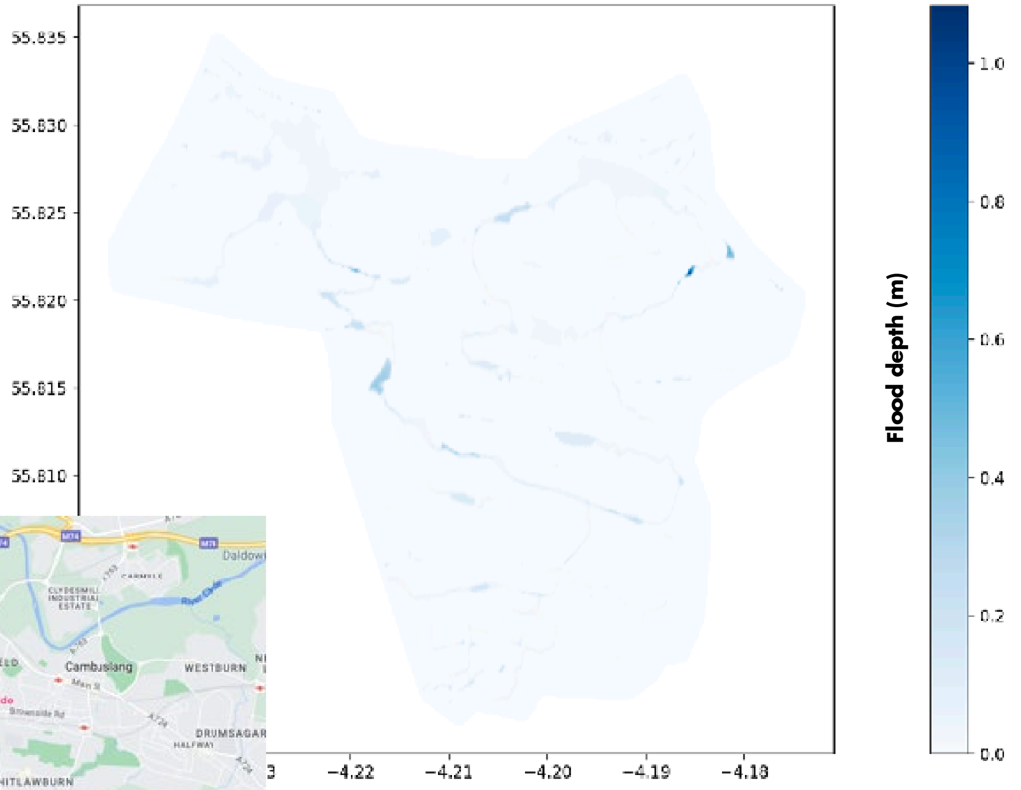
GUS = Growth Urban Scenario
https://lucidmindsai.medium.com/green-urban-scenarios-298d75b100b4

Flood extent and depths

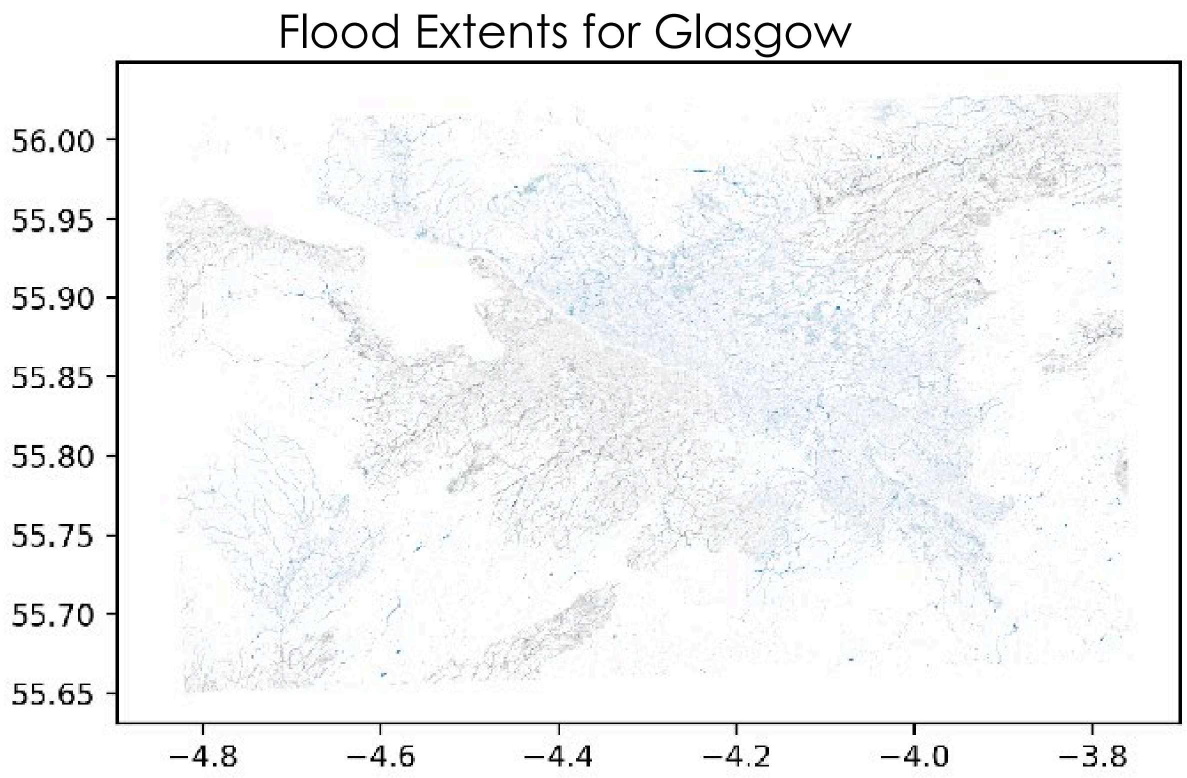




Shapefile with flood extents and depths

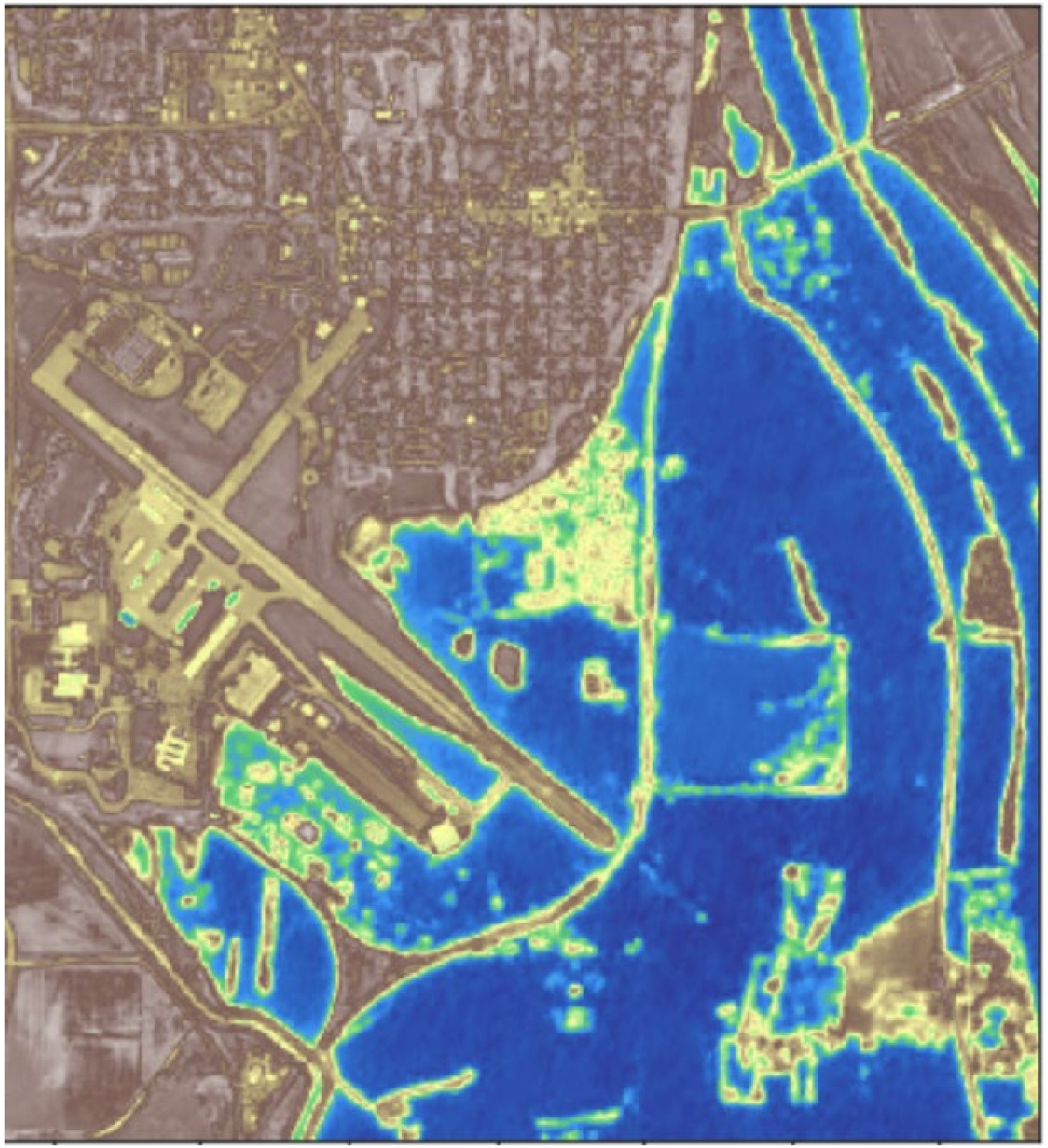


SEPA Flood Map



Zoom in

OSM with Flood Overlay



How to?

- The flood hazard is then converted into a dataframe with a location and flood depth
- This is then overlayed with the polygons from OpenStreetMap

Processing Pipeline

Flood Intensity in meters

	longitude	latitude	depth
0	-4.458333	56.000000	0.000000
1	-4.458333	55.958333	0.000000
2	-4.458333	55.916667	0.000000
3	-4.458333	55.875000	0.000000
4	-4.458333	55.833333	0.000000
...	...	...	...
121	-3.916667	55.833333	0.000000
122	-3.916667	55.791667	0.032686
123	-3.916667	55.750000	0.032686
124	-3.916667	55.708333	0.000000
125	-3.916667	55.666667	0.000000

Convert point data into mini polygons

	depth	geometry
0	0.000000	POLYGON ((-4.43750 56.02083, -4.43750 55.97917...
1	0.000000	POLYGON ((-4.43750 55.97917, -4.43750 55.93750...
2	0.000000	POLYGON ((-4.43750 55.93750, -4.43750 55.89583...
3	0.000000	POLYGON ((-4.43750 55.89583, -4.43750 55.85417...
4	0.000000	POLYGON ((-4.43750 55.85417, -4.43750 55.81250...
...	...	...
121	0.000000	POLYGON ((-3.89583 55.85417, -3.89583 55.81250...
122	0.032686	POLYGON ((-3.89583 55.81250, -3.89583 55.77083...
123	0.032686	POLYGON ((-3.89583 55.77083, -3.89583 55.72917...
124	0.000000	POLYGON ((-3.89583 55.72917, -3.89583 55.68750...
125	0.000000	POLYGON ((-3.89583 55.68750, -3.89583 55.64583...

Building Polygons Categorised

archtype	geometry
F14	POLYGON ((-4.29466 55.88897, -4.29436 55.88896...
F14	POLYGON ((-4.29683 55.89257, -4.29658 55.89258...
F14	POLYGON ((-4.28612 55.87517, -4.28588 55.87511...
F14	POLYGON ((-4.28482 55.87310, -4.28470 55.87326...
F14	POLYGON ((-4.28407 55.85641, -4.28274 55.85652...
...	...
F5	POLYGON ((-4.31576 55.85281, -4.31550 55.85281...
F6	POLYGON ((-4.35819 55.84568, -4.35807 55.84556...
F6	POLYGON ((-4.35660 55.84549, -4.35649 55.84552...
F6	POLYGON ((-4.35331 55.81037, -4.35308 55.81058...
F6	POLYGON ((-4.24363 55.83754, -4.24346 55.83779...

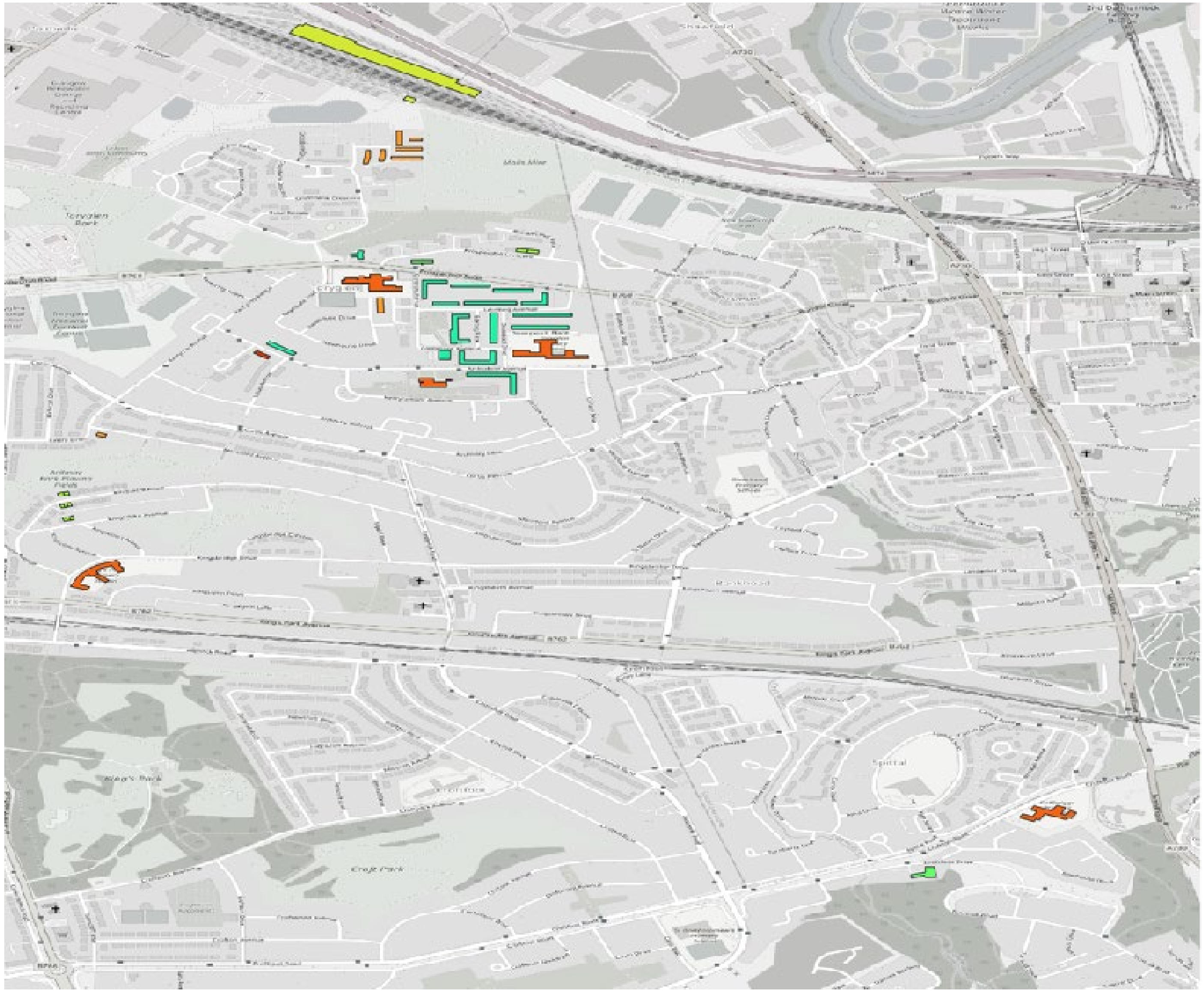
JOIN

	archtype	depth	geometry
0	F14	0.0	POLYGON ((-4.29466 55.88897, -4.29436 55.88896...
1	F14	0.0	POLYGON ((-4.29683 55.89257, -4.29658 55.89258...
2	F14	0.0	POLYGON ((-4.28612 55.87517, -4.28588 55.87511...
3	F14	0.0	POLYGON ((-4.28482 55.87310, -4.28470 55.87326...
4	F14	0.0	POLYGON ((-4.28407 55.85641, -4.28274 55.85652...
...	...	...	...
36320	F6	0.0	POLYGON ((-4.31576 55.85281, -4.31550 55.85281...
36321	F5	0.0	POLYGON ((-4.35819 55.84556, -4.35807 55.84556...
36322	F5	0.0	POLYGON ((-4.35660 55.84549, -4.35649 55.84552...
36323	F6	0.0	POLYGON ((-4.35331 55.81037, -4.35308 55.81058...
36324	F5	0.0	POLYGON ((-4.24363 55.83754, -4.24346 55.83779...

GUS model Glasgow

Overlay flood extents with affected buildings

	btype	binned	count
0	apartments	0.02	336
1	apartments	0.04	18
2	apartments	0.06	17
3	apartments	0.08	8
4	church	0.02	18
5	house	0.02	30
6	industrial	0.02	50
7	office	0.02	21
8	residential	0.02	68
9	school	0.02	189
10	school	0.04	1
11	school	0.06	4
12	school	0.08	2
13	school	0.12	2
14	semidetached_house	0.02	11
15	shed	0.02	5

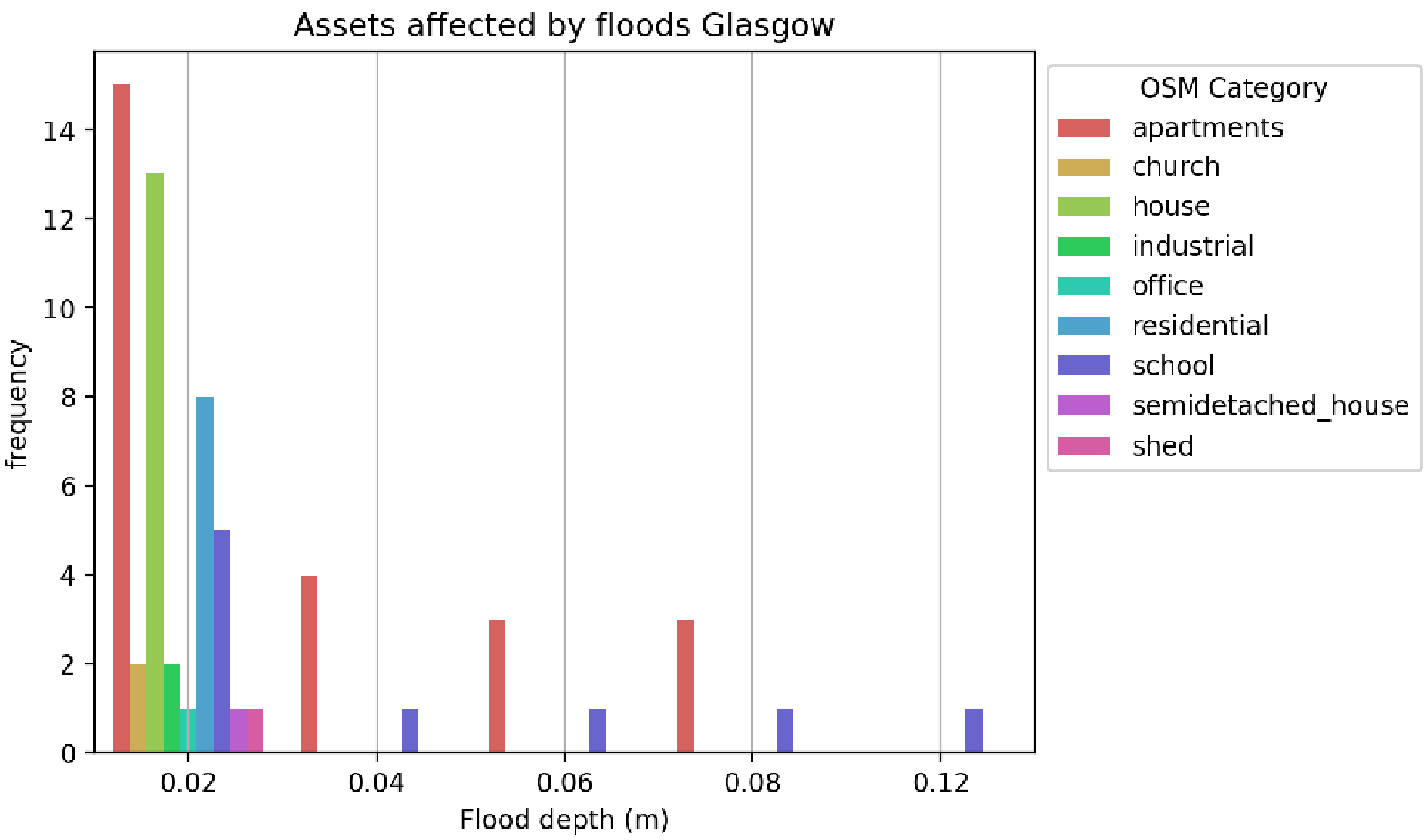


GUS model Glasgow

Frequency of buildings affected by floods and the relevant depth

Note: This is only a subregion of Glasgow where GUS model ran, this does not represent all Glasgow buildings.

Note: There are multiple school buildings, but probably one school itself affected. It depends how OpenStreetMaps maps buildings



Using Climada Data

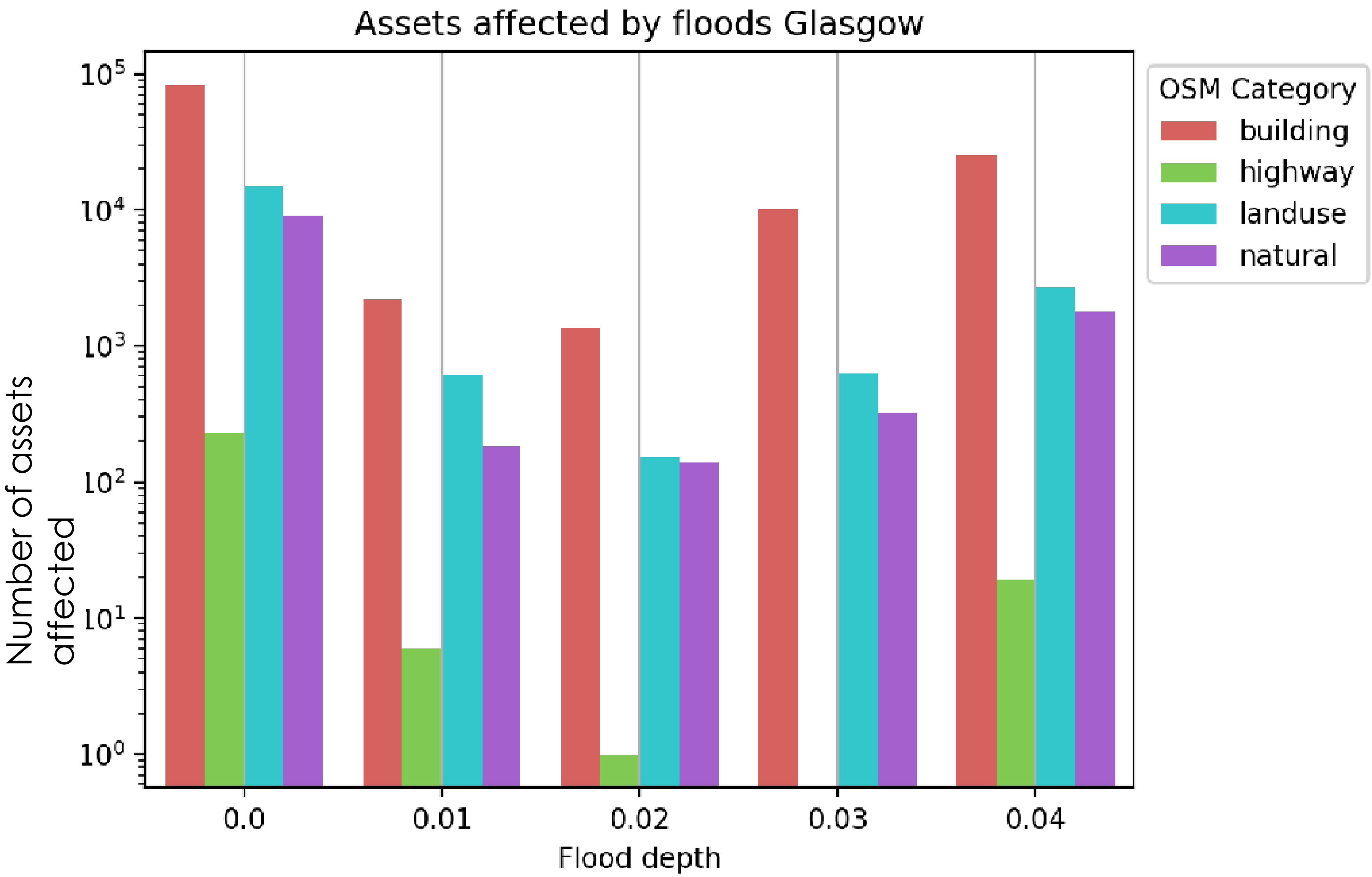
All of Glasgow covered

Overlay flood raster all data and show breakdown of affected assets and areas based on flood depth (in meters)

Flood Data:

```
flood_hazard = client.get_hazard(
hazard_type="river_flood",
properties={
"country_name": "United Kingdom",
"climate_scenario": "rcp85",
"year_range": "2030_2050",
},
```

(ISIMIP, https://data.isimip.org/)



Fragility Impact Function

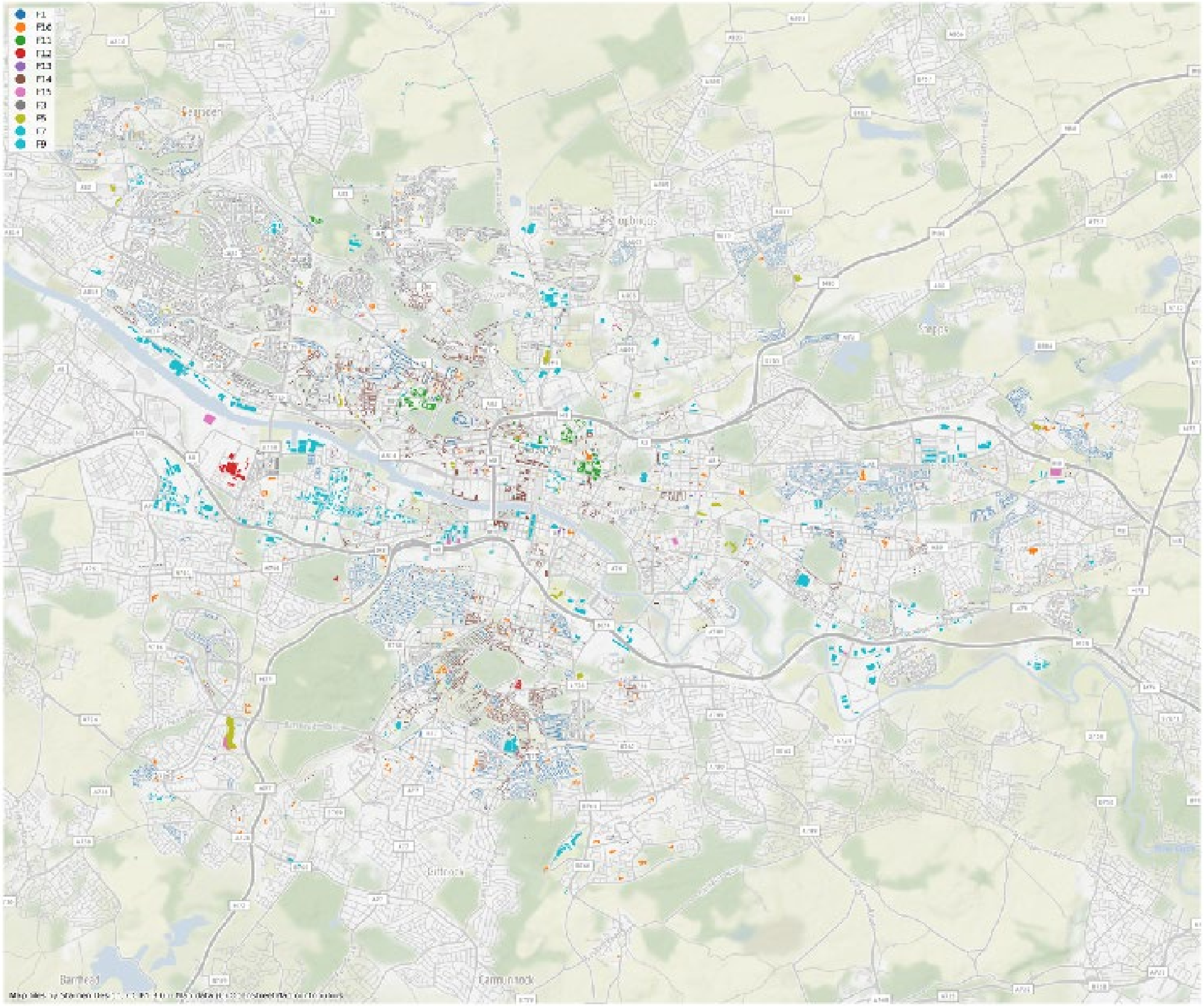
IBM

Re-categorise of Glasgow

- For IBM Impact example all buildings were recategorized into 15 different building types, each having its own fragility function based on building ype

Figure 4. Schematic representation of using minimum building archetypes portfolio to model a community.

- F1: One-story single-family residential building on a crawlspace foundation.
- F2: One-story multi-family residential building on a slab-on-grade foundation.
- F3: Two-story single-family residential building on a crawlspace foundation.
- F4: Two-story multi-family residential building on a slab-on-grade foundation.
- F5: Small grocery store/Gas station with a convenience store.
- F6: Multi-unit retail building (strip mall).
- F7: Small multi-unit commercial building.
- F8: Super retail center.
- F9: Industrial building.
- F10: One-story school.
- F11: Two-story school.
- F12: Hospital/Clinic.
- F13: Community center (place of worship).
- F14: Office building.
- F15: Warehouse (small/large box).



"""Flood impact function.
flood_depth: water surface elevation in meters.
first_floor_elevation: the building's first floor elevation in meters.
name: the name of the function.

Damage state goes from DS0 to DS4.

- DS0: Insignificant damage to components below first-floor elevation. Water enters crawlspace/basement and touches foundation (crawlspace or slab on grade). Damage to components within the crawlspace/basement including base insulation and stored inventory. Minor damage to garage interiors including drywall, cabinets, electrical outlets, wall insulation (Garage is below the first-flood elevation (FFE)). No sewer backup into the living area.

- DS1: Water touches floor joists up to minor water entering the building. Damage to carpets, pads, baseboards, flooring. Damage to the external AC unit (if the AC unit is not elevated) and the attached ductworks (if ductworks are in the crawlspace). Complete damage to the garage interior (if the garage is below FFE). No drywall damages with the potential of some mold on the subfloor above the crawlspace. Could have a minor sewer backup and/or minor mold issue.

- DS2: Partial damage to drywalls along with damage to electrical components (base-outlets), water heater, and furnace. Complete damage to major equipment, appliances, and furniture on the first floor. Damage to the lower bathroom and kitchen cabinets. Doors and windows may need replacement. Could have a major sewer backup and major mold issues.

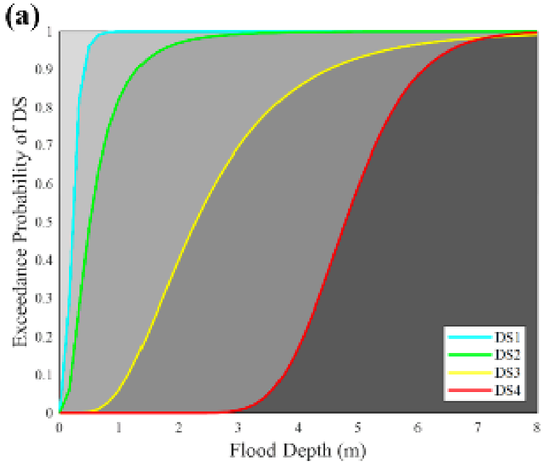
- DS3: Damage to the non-structural components and interiors within the whole building including (but not limited to) drywall damage to upper stories for multi-story buildings (e.g., attic, second story, etc.). Electrical switches and mid-outlets are destroyed. Damage to bathroom/kitchen upper cabinets, lighting fixtures on walls are destroyed with potential damage to ceiling lighting fixtures. Studs reusable; some may be damaged. Major sewer backup will happen along with major mold issues. Equipment, appliances, and furniture on the upper floors are also damaged (e.g., attic, second floor, etc.).

- DS4: Significant structural damage present (e.g., studs, trusses, joists, etc.). Non-structural components and interiors are destroyed including all drywall, appliances, cabinets, furniture, etc. Damage to rooftop units/components including roof insulation, sheathing, and electro-mechanical systems (rooftop AC units, electrical systems, cable railing, sound system, etc.). Foundation could be floated off. The building must be demolished or potentially replaced.

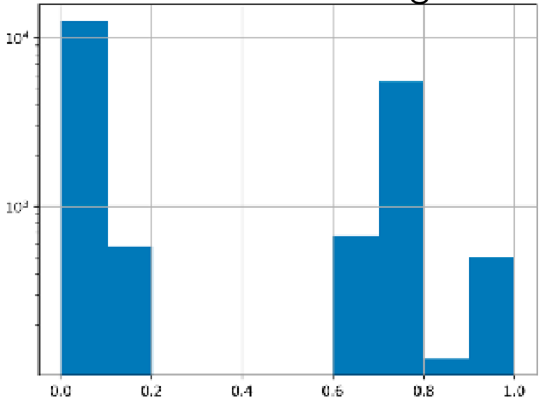
Fragility Impact Calculation

Used: OSM Buildings Glasgow
Flood: SEPA Flood model
(due to more and higher flood values than GUS output which only had a max flood depth of 12cm when overlayed with buildings

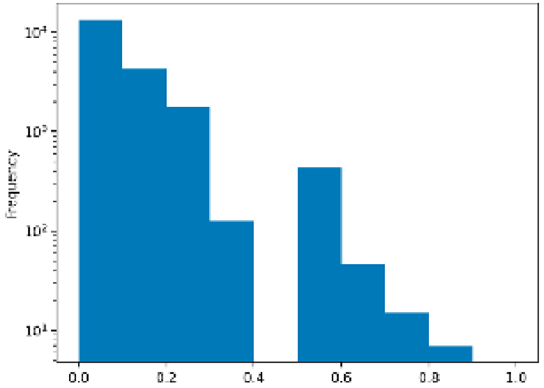
DS1: Water touches floor joists up to minor water entering the building.
DS2: Partial damage to drywalls along with damage to electrical components
DS3: Damage to the non- structural components and interiors within the whole building
DS4: Significant structural damage present (e.g., studs, trusses, joists)



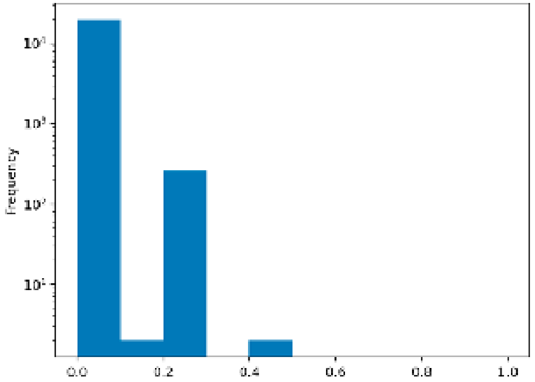
DS1 for all buildings



DS2 for all buildings



DS3 for all buildings



DS4 for all buildings

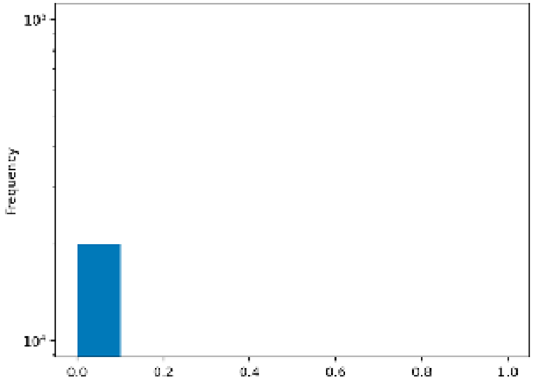


Illustration for one building – flood depth 0.3m

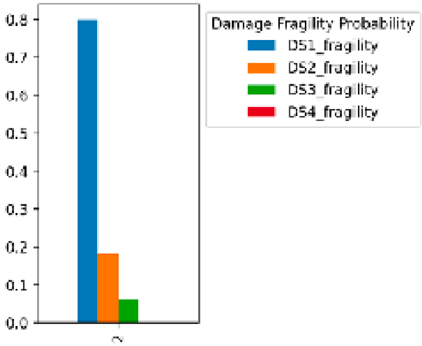
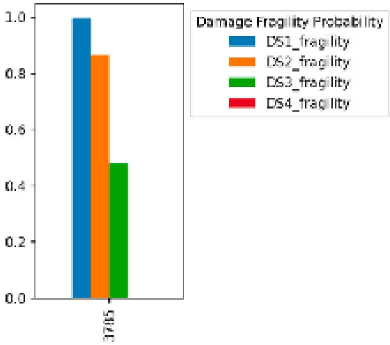
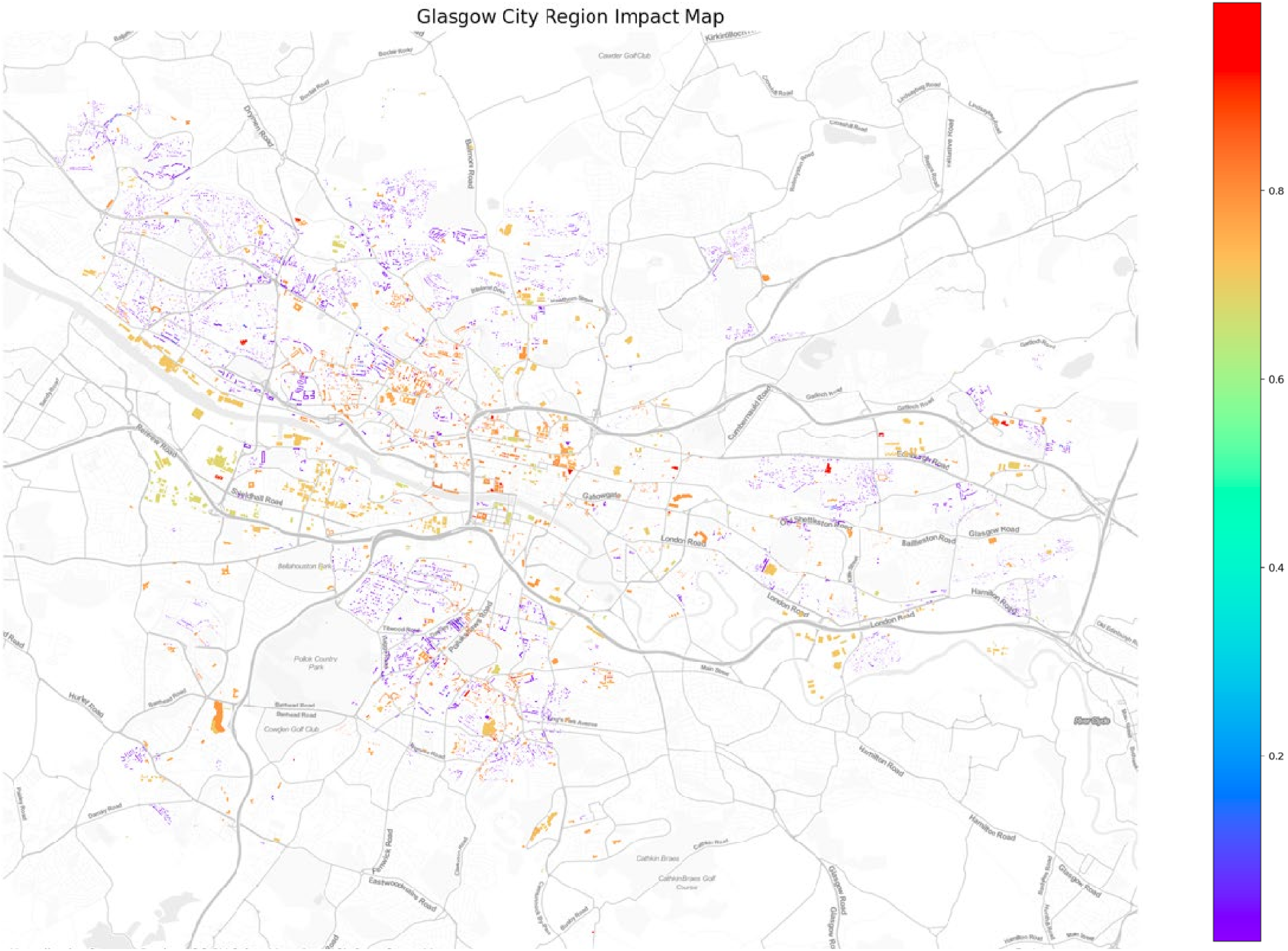


Illustration for one building flood depth 1.2m



Glasgow City Region Impact Map

- based on forecasted CLIMADA river flood depth (in meters) for 2030-2050
- Impact function calculated on the 15 building types specified before
- 4 different damage categories based on first floor levels and estimated impact for those
- Left is an example of Damage State 1 (DS1) probability for each building in Glasgow



TreesAI Building Cost Calculations

IBM

https://docs.google.com/document/d/1QI9WVJEdn5iWMZ1IqY-BmmTulbbGvTcZo4lTslt51cc/edit#heading=h.j7gxg8nzwnm3

Retail - Fluvial Short

		Enter total value (£) from the Questionnaire (Ch5.AR1) for each component:					
Select NRP Sector	Select Scenario	Building structure and fabric	Building services	Fixtures and fittings	Clean up	Moveable Equipment	Stock
Retail	Fluvial Short	1000	500	200	50	10	200

FLOOD DAMAGE POTENTIAL ESTIMATES

-1.00	-0.75	-0.50	-0.25	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
13.84	19.04	20.46	22.19	63.39	276.75	428.87	586.48	740.25	859.64	964.77	1,063.57	1,225.83	1,325.00	1,397.46	1,430.42	1,475.78

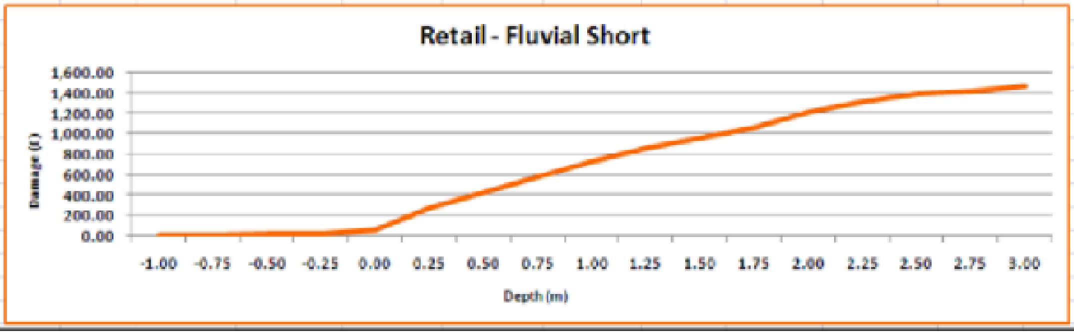


Table 4.17 Weighted annual average damage calculations: residential property with no protection (where <0.1m = all sector residential damage figures at 0.05m – Appendix 4.1).

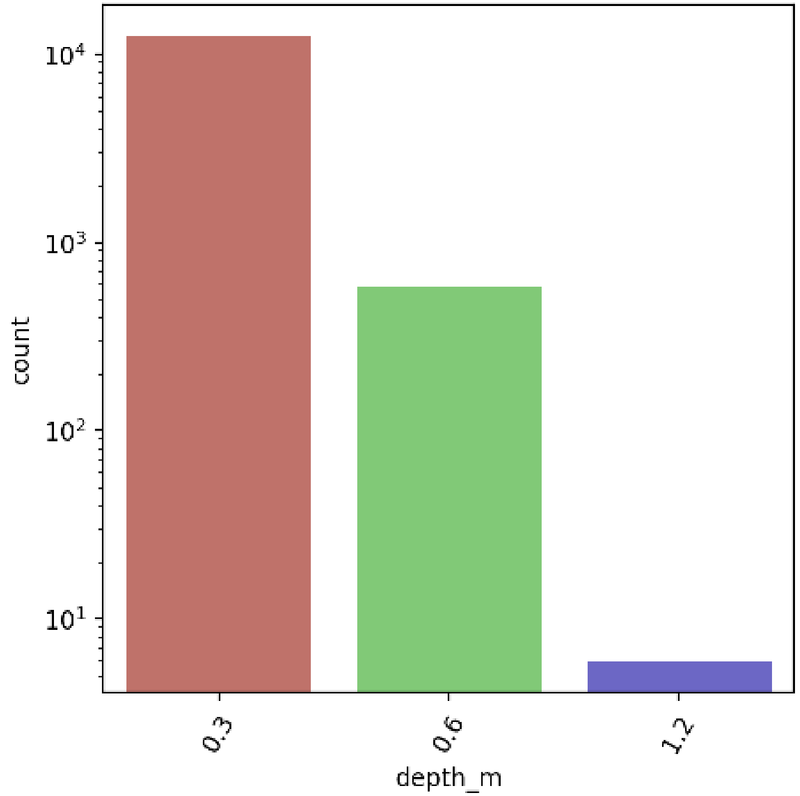
Flood frequency	Distribution of flood depths		Damage (£)	Weighted damage (£)
	M	%		
5 years	<0.1	81	10,973	8,888
	0.1-0.3	7	23,290	1,630
	0.3-0.6	11	27,687	3,046
	0.6-0.9	1	30,267	303
	0.9-1.2	0	32,153	0
	>1.2	0	33,040	0
			Total weighted damage	13,867
10 years	<0.1	50	12,783	6,391
	0.1-0.3	31	26,075	8,083
	0.3-0.6	10	30,762	3,076
	0.6-0.9	6	33,108	1,986
	0.9-1.2	2	34,895	698
	>1.2	1	35,669	357
			Total weighted damage	20,592
25 years	<0.1	45	12,783	5,752
	0.1-0.3	24	26,075	6,258
	0.3-0.6	22	30,762	6,768
	0.6-0.9	5	33,108	1,655
	0.9-1.2	4	34,895	1,396
	>1.2	1	35,669	357
			Total weighted damage	22,186
50 years	<0.1	32	14,592	4,670
	0.1-0.3	20	28,859	5,772
	0.3-0.6	21	33,837	7,106
	0.6-0.9	21	35,949	7,549
	0.9-1.2	4	37,638	1,506
	>1.2	3	38,299	1,149
			Total weighted damage	27,751
100 years	<0.1	22	14,592	3,210
	0.1-0.3	16	28,859	4,617
	0.3-0.6	26	33,837	8,798
	0.6-0.9	19	35,949	6,830
	0.9-1.2	12	37,638	4,517
	>1.2	6	38,299	2,298
			Total weighted damage	[illegible]

Based on the costs, we can calculate the total cost per flood depth for Glasgow
SEPA Flood Maps

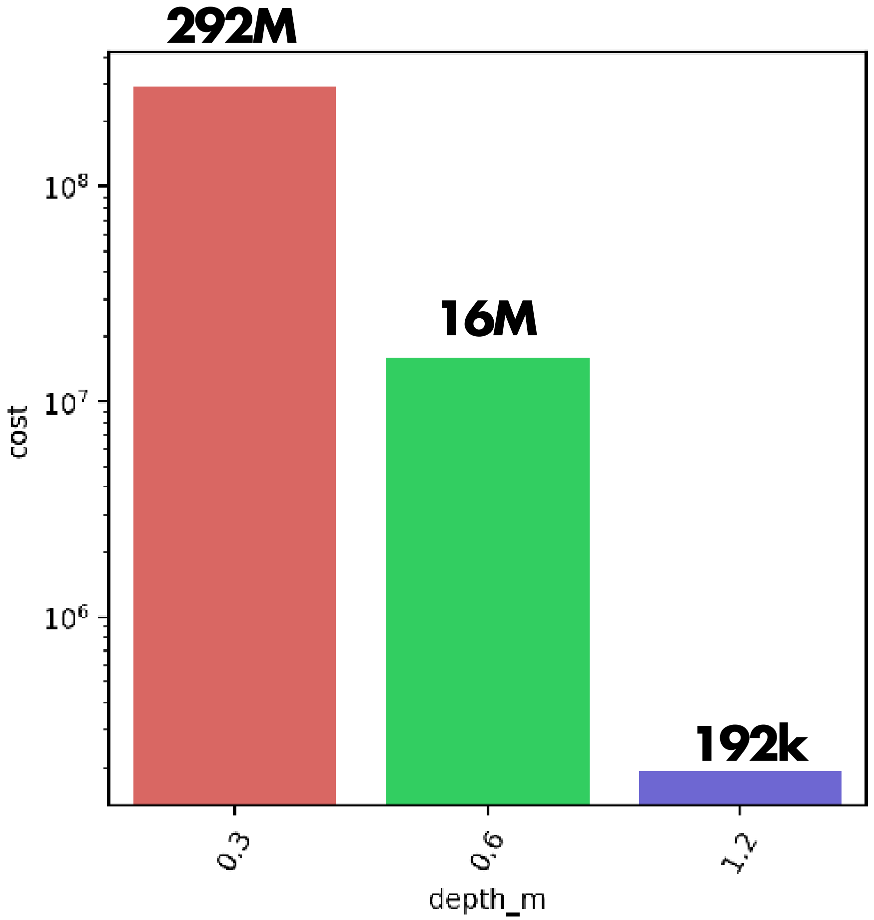
More than 13 000 buildings affected

Costs of 308 Million in damages

```
Total number of buildings affected
13126
____________________________________________
Total cost of damage based to all buildings
308307146.0
____________________________________________
Show the number of buildings affected per flood depth
```



Total per flood depth – more buildings are affected by lower flood depth, so the cost is higher there



Thank you

Chloe Treger | TreesAI

chloe@ darkmatterlabs.org

2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

3.3. Jeff Carroll

Corning a Unicorn: Forging An Urban Wood Marketplace At Scale

Presented by

Jeff Carroll CEO

Urban Wood Economy

Industry Problem

Is there enough material?
46 million tons from Cities

- Assuming a mortality rate of 2%, annual urban woody biomass loss in the U.S. = @ 46 million tons of fresh-weight merchantable wood OR 7.2 billion board feet of lumber OR 16 million cords of firewood.

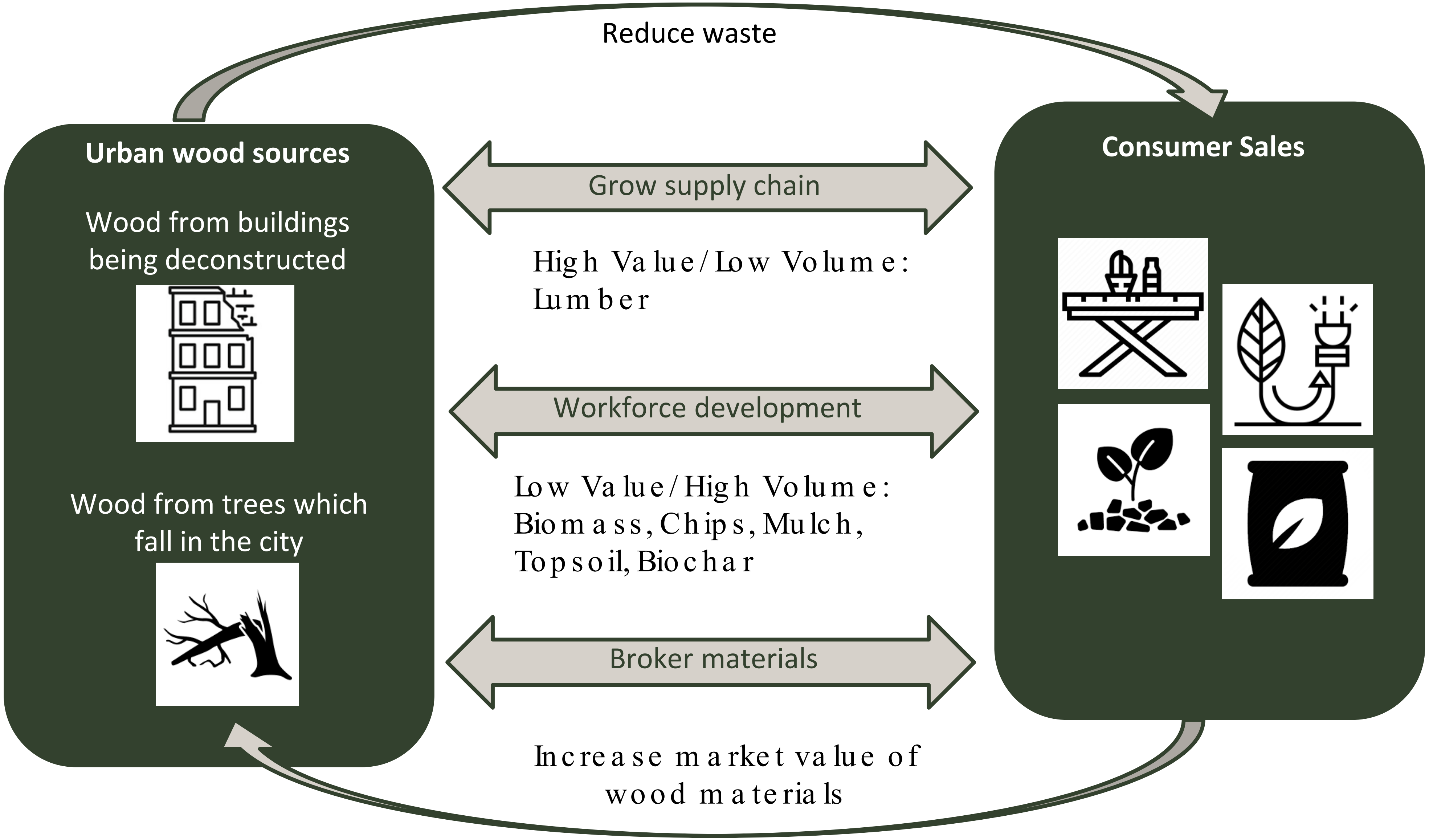
- The potential value from urban wood waste ranges between $89-$786 million annually depending upon the product (e.g., wood chips, lumber, biochar).

Nowak, David J.; Greenfield, Eric J.; Ash, Ryan M. 2019. Annual biomass loss and potential value of urban tree waste in the United States. Urban Forestry & Urban Greening. 46: 126469. 9 p. https://doi.org/10.1016/j.ufug.2019.126469.

What if…

we could **extract** wealth from the urban wood waste stream, **capture** the carbon, and **create** jobs… sustainably?

Business Model, Impact & Opportunity


Reduce waste
Urban wood sources
Wood from buildings being deconstructed
Wood from trees which fall in the city
Grow supply chain
High Value/Low Volume: Lumber
Workforce development
Low Value/High Volume: Biomass, Chips, Mulch, Topsoil, Biochar
Broker materials
Consumer Sales
Increase market value of wood materials

IMPACT: Reduced Waste & Increased Value of Materials

Urban and Community wood falls into two categories:

- High value / Low volume
- Low value / High volume

Both require a supply chain for economic success:

- High value material = value-add milling and processing.
- Low value material = lesser value alternative product.

Both generate revenue, create jobs, and capture carbon

IMPACT: Employment for the Marginalized

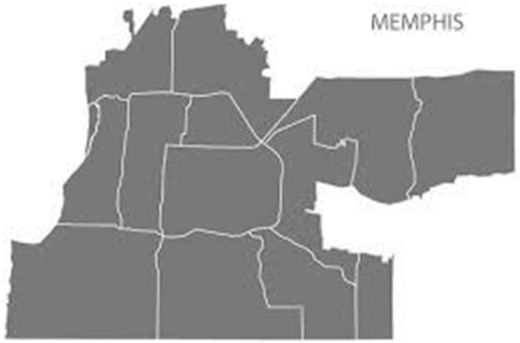
- Revenue from an urban waste creates jobs
- National (U.S.) unemployment may be low but urban community rates above 20%.
- An urban wood economy creates access to the larger wood industry.


DETAILS
DETAILS

OPPORTUNITY: Large Untapped Market

- High volume users want eco-friendly wood
- Demand for U&C wood grows as climate concerns grow
- Build a robust supply chain

Memphis



The land of the Delta Blues has a lot to be optimistic about.

1) Launch first biomass campus/zero-waste facility

2) Assets in place e.g. real estate, equipment, improvements, and funding

3) Moving material to the site

4) Currently hiring staff

5) Establishing "Good Neighbor" practices

Pittsburgh

Pittsburgh has on-going workforce development programs to provide employment pathways for individuals returning from incarceration.

1) Current contracts for deconstruction - a job generator
2) Funding acquired for mill shop operation and market development
3) Planning underway for a biomass campus
4) Early commitment to fund the development of a biomass campus

San Diego

UWE is looking to partner with state and federal agencies to provide feasibility studies and pre-development work in several CA cities.

TBD

Partners

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

THE WORKS

Construction Junction
BUILDING MATERIAL REUSE

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION
CAL FIRE
SINCE 1885

CAH
CLASSIC AMERICAN HARDWOODS

18 ATLC 89

DOVETAIL PARTNERS

QUALITY Taylor GUITARS

Quantified® Ventures

AGRICULTURAL ENTERPRISE FUND
Growing Tennessee

TN Tennessee State Government

TREE SAN DIEGO

URBAN WOOD NETWORK

NHLA


URBAN WOOD
ECONOMY

Thank you

Jeff Carroll| Urban Wood Economy

Capturing Carbon and Creating Jobs

info@uweconomy.org

Food and Agriculture Organization of the United Nations
Arbor Day Foundation
POLITECNICO MILANO 1863
SISEF
ISA
Smithsonian

2nd World Forum on Urban Forests

2023

World Forum on Urban Forests

Growing to Its Potential

The Value of Urban Nature for Communities, Investors, and the Climate

October 18, 2023

Agenda

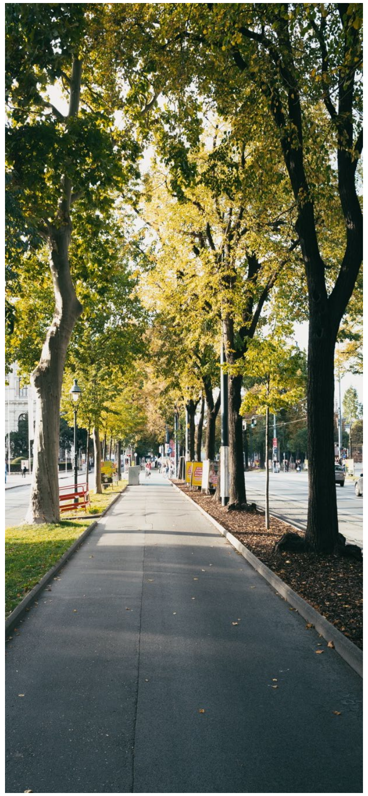
Urban Nature: An Overlooked Investment Opportunity

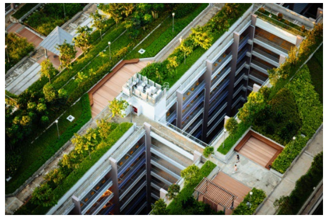
Quantifying the Value of Urban Nature

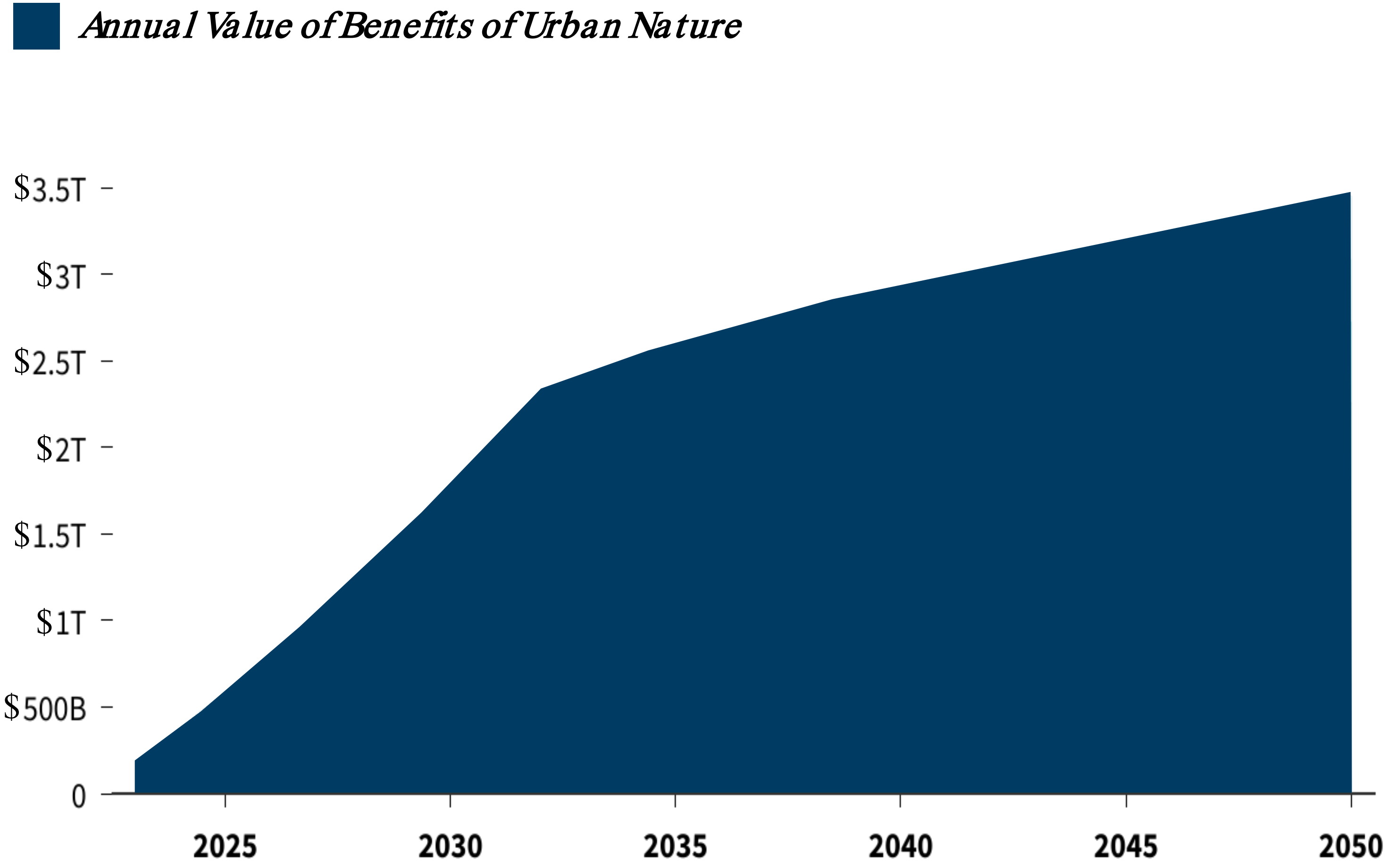
Developing Innovative Financing Solutions

1

Urban nature has the potential to deliver global net benefits exceeding $3T per year and cumulative net benefits of $59T between 2023 and 2050.

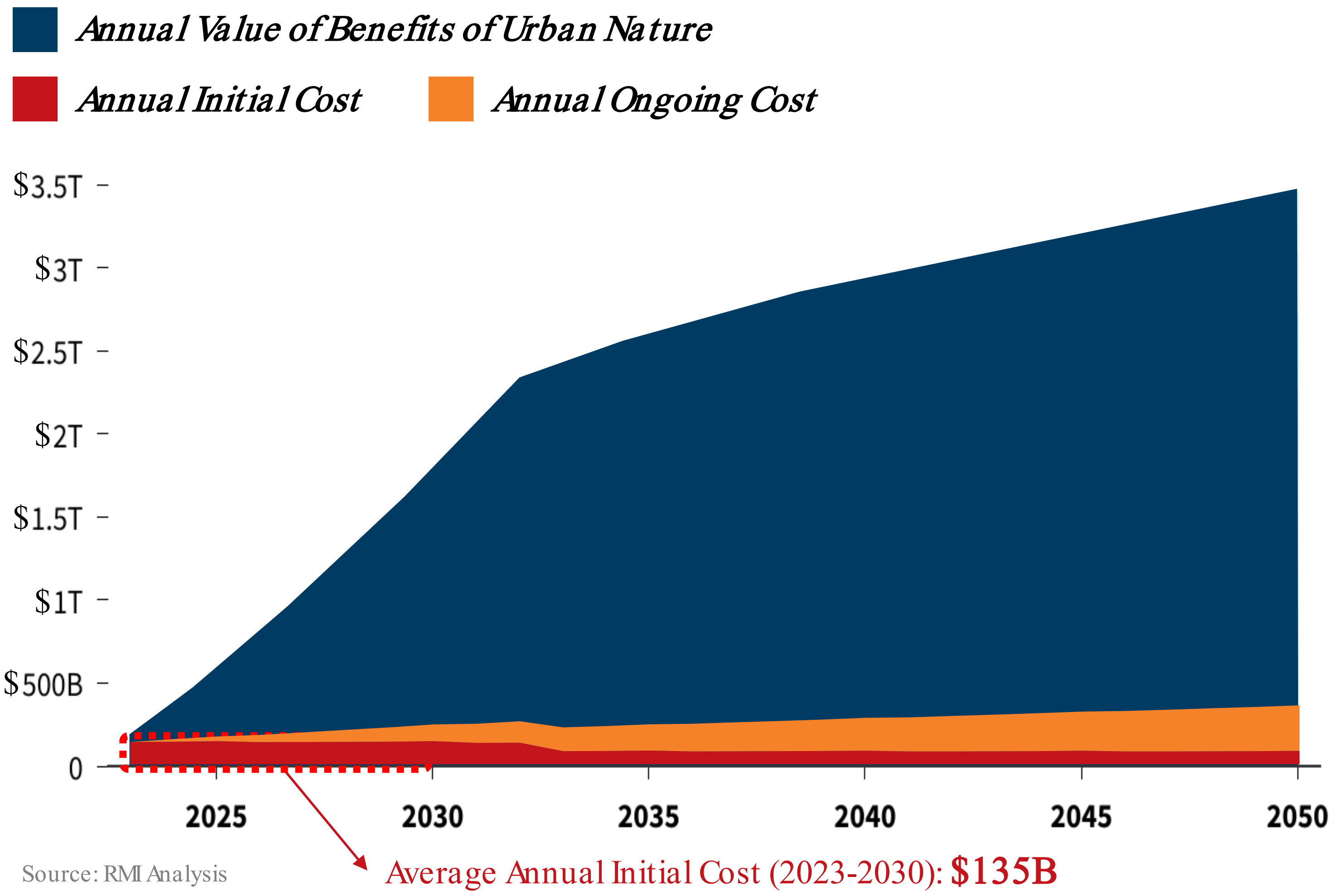


Source: RMI Analysis

To unlock those benefits, we need to invest $135 billion in new projects per year through 2030.



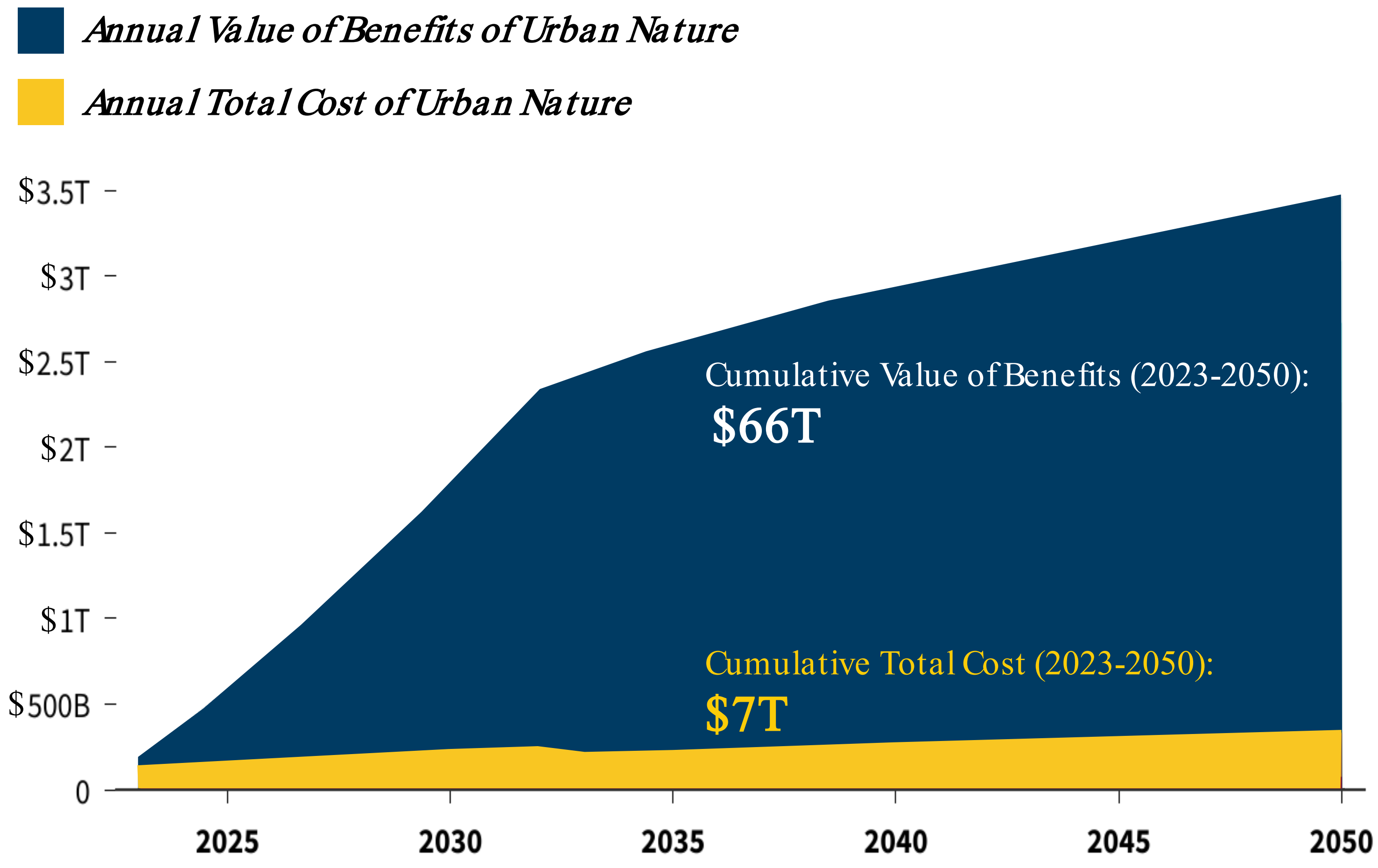
Source: RMI Analysis

This represents an overall benefit-cost ratio of 9-to-1.

As a comparison:
Investing in Resilience in Low- and Middle-Income Countries

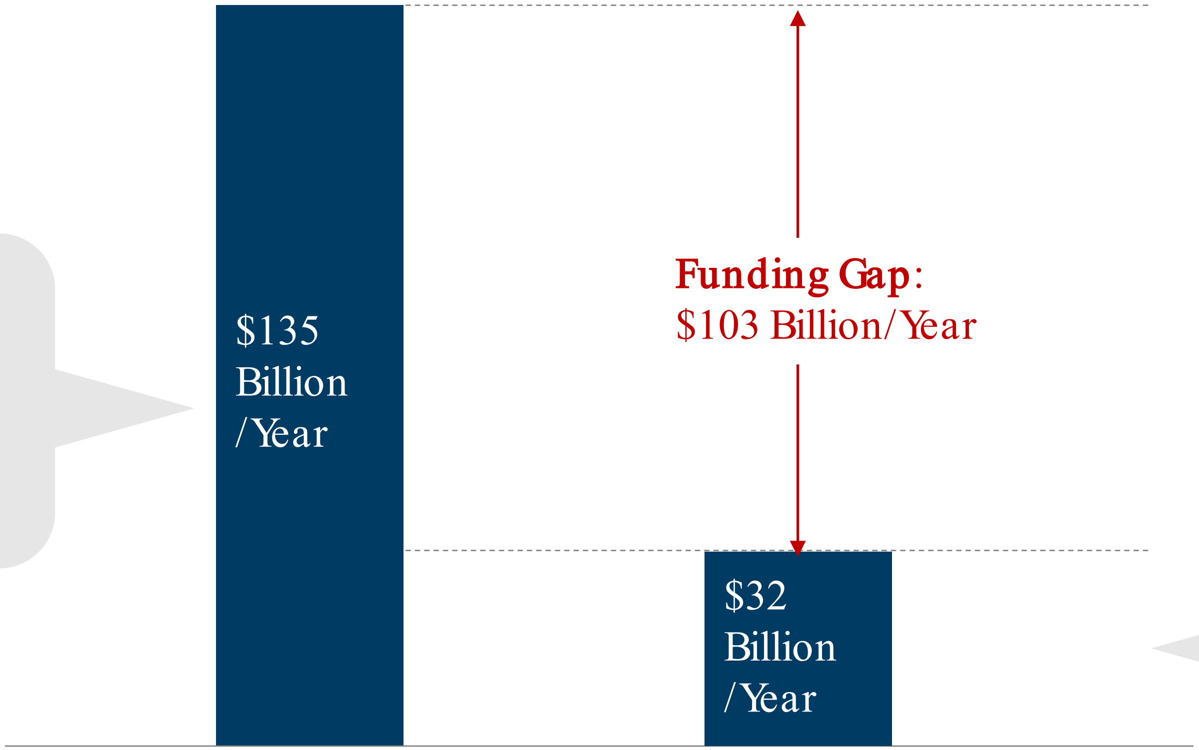
Economic Benefits:
$4.2 Trillion

Benefit-to-Cost Ratio:
4 to 1



We need to invest an additional $100 billion annually to fill the gap.

1% of
projected 2030
city spending on
infrastructure



<0.3% of
total city
spending on
infrastructure

How much investment do we need (average 2023-2030)?

How much investment do we currently have annually?

Source: RMI Analysis

Agenda

Urban Nature: An Overlooked Investment Opportunity

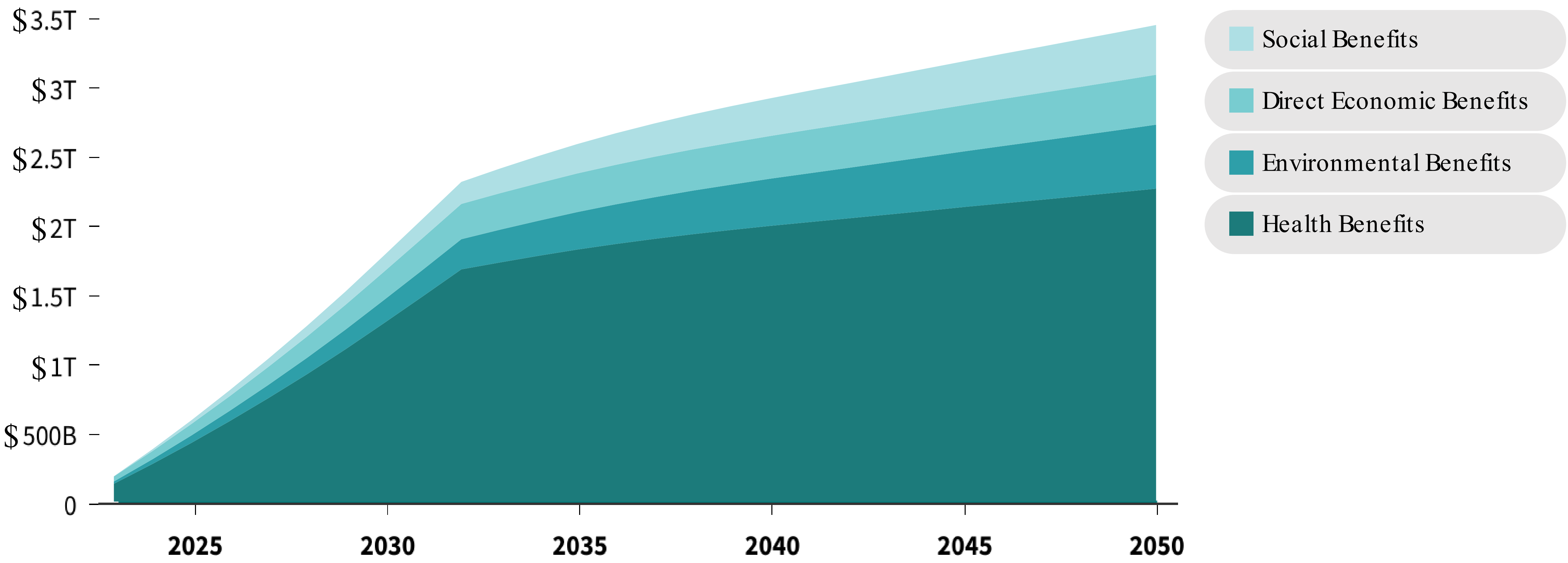
Quantifying the Value of Urban Nature

Developing Innovative Financing Solutions

2

Nature's many benefits add up for economic value.

Total Annual Value of Benefits of Urban Nature



Source: RMI Analysis

We analyzed three opportunities for urban nature to save energy and carbon.

Reducing mechanical cooling loads and building energy use

Avoiding the embodied carbon of grey stormwater infrastructure

Encouraging more walking, biking, and public transit instead of driving

Less mechanical cooling can lower building energy use, peak demand, and energy bills.

1. Lowering building **energy use** by over 1%

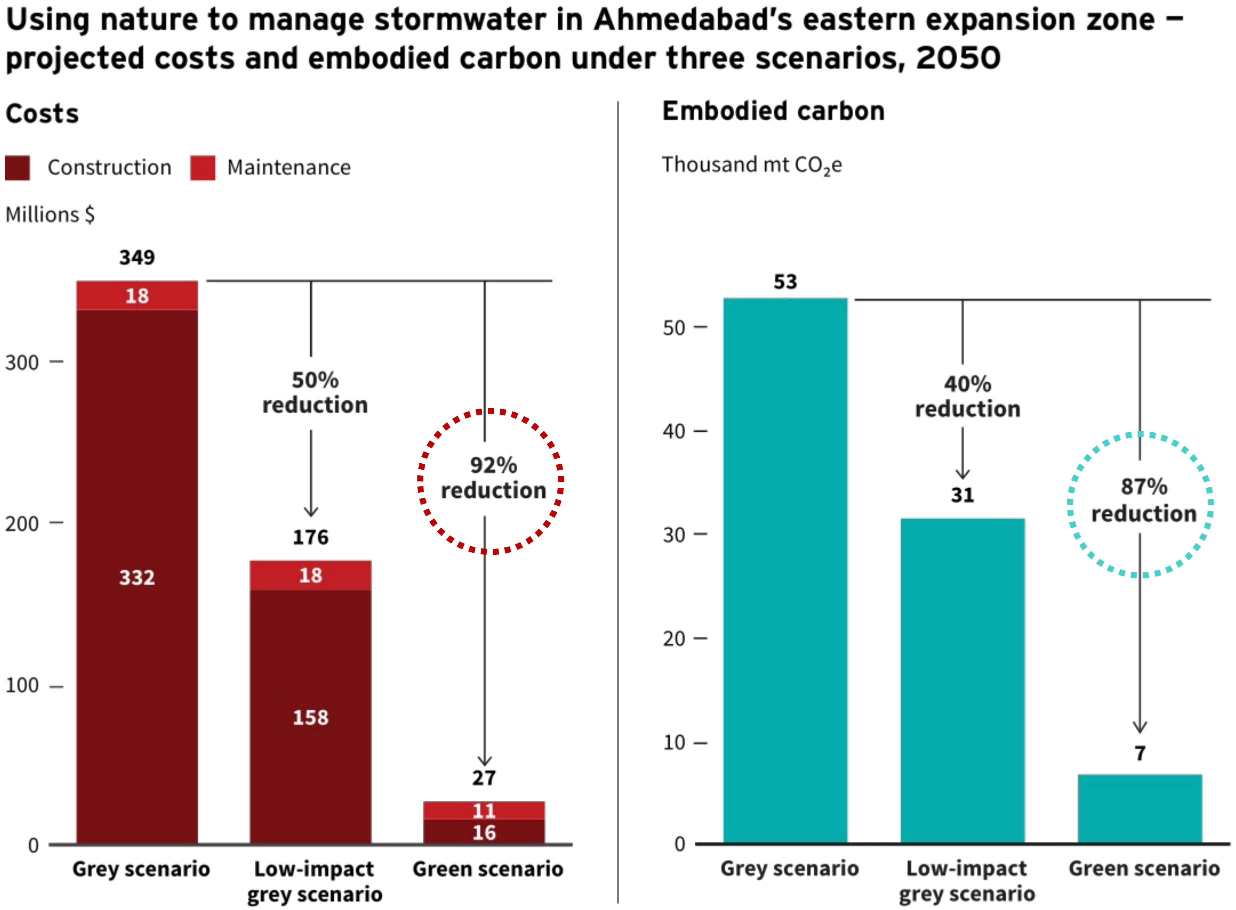
Energy savings alone pays back the cost of planting trees in 11 years

2. Decreasing buildings' **peak demand** by 1%-3% (Over 100 MW)

Enough to save over $150 million in new power generation costs

3. Reducing household **energy bills** by 12%

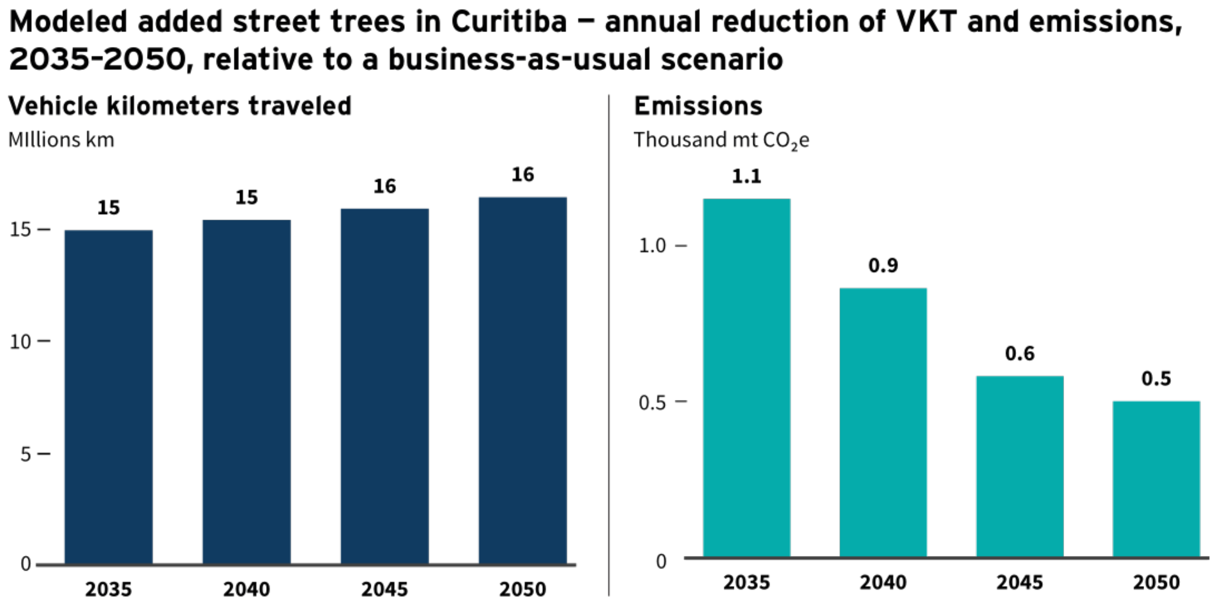
Green stormwater infrastructure slashes embodied carbon and costs.



Grey scenario includes concrete-lined lakes. Low-impact grey scenario includes lakes lined with rock and wire mesh. Green scenario includes preserved natural lakes. All scenarios assume maintaining 15% green cover in the eastern expansion zone. Maintenance emissions are minimal in comparison to construction. This excludes rehabilitation (material replacement) emissions.

Source: RMI

Street trees support a shift away from driving to walking, biking, and transit.



Source: RMI Analysis

Urban nature can also be a critical tool for equity.

We will need to break historical investment patterns to address inequity in urban nature

Agenda

Urban Nature: An Overlooked Investment Opportunity

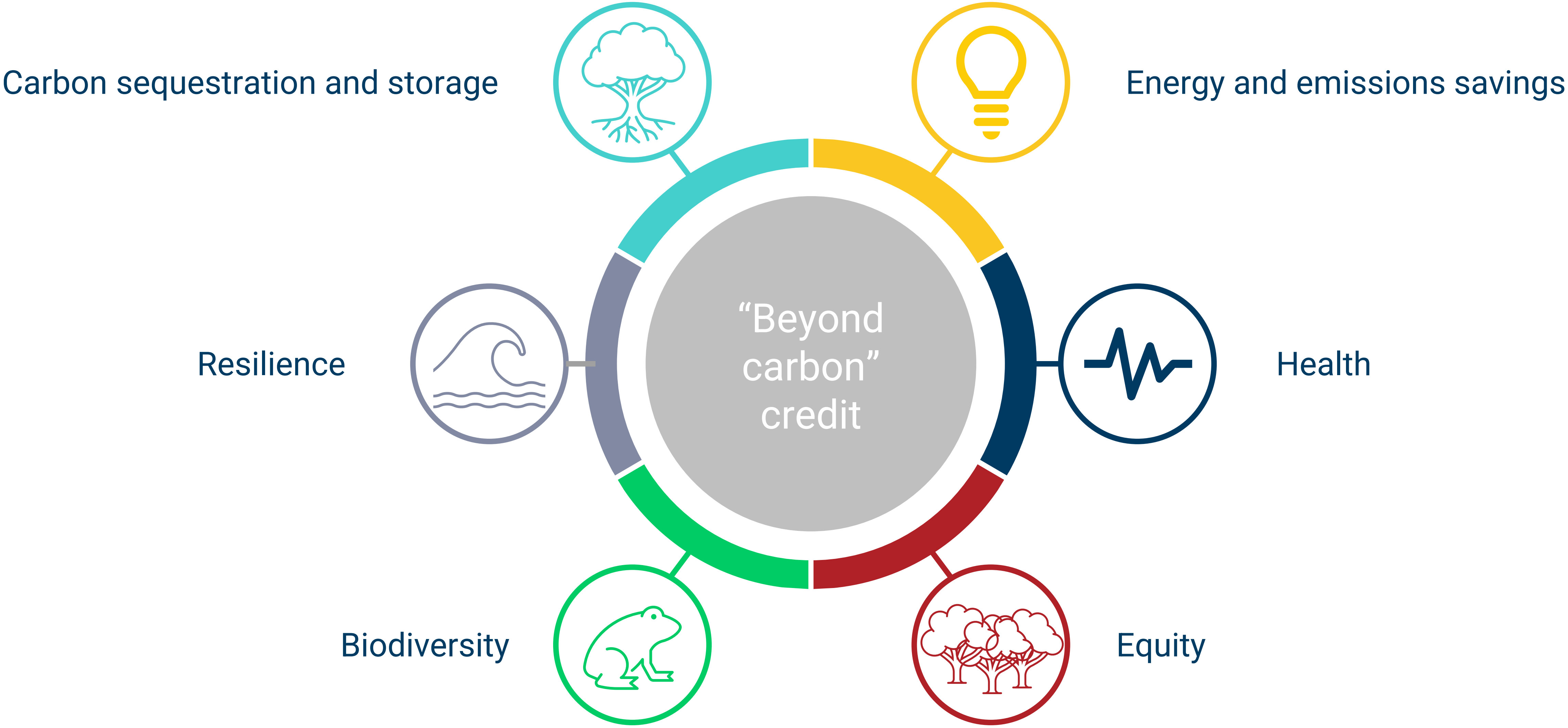
Quantifying the Value of Urban Nature

Developing Innovative Financing Solutions

3

Innovative financing solutions can drive investment in urban nature.

Multi-dimensional credits that go beyond carbon can unlock revenue for cities.



For more information, contact:

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Manager, Urban Transformation
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2nd

World Forum on Urban Forests

2023

World Forum on Urban Forests

2nd World Forum on Urban Forests

Washington DC, 2023

Data-Driven Decisions with Smart Tree Inventories

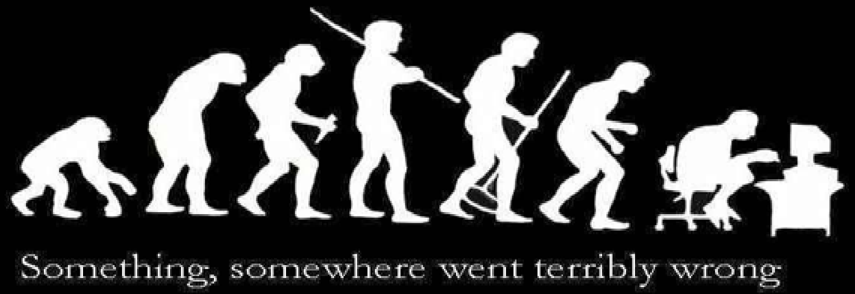
Presented by

Josh Behounek

Davey Resource Group

Right Decision, at the Right Time, on the Right Tree

Technology won't replace arborists but arborists who use technology will replace arborist who do not.



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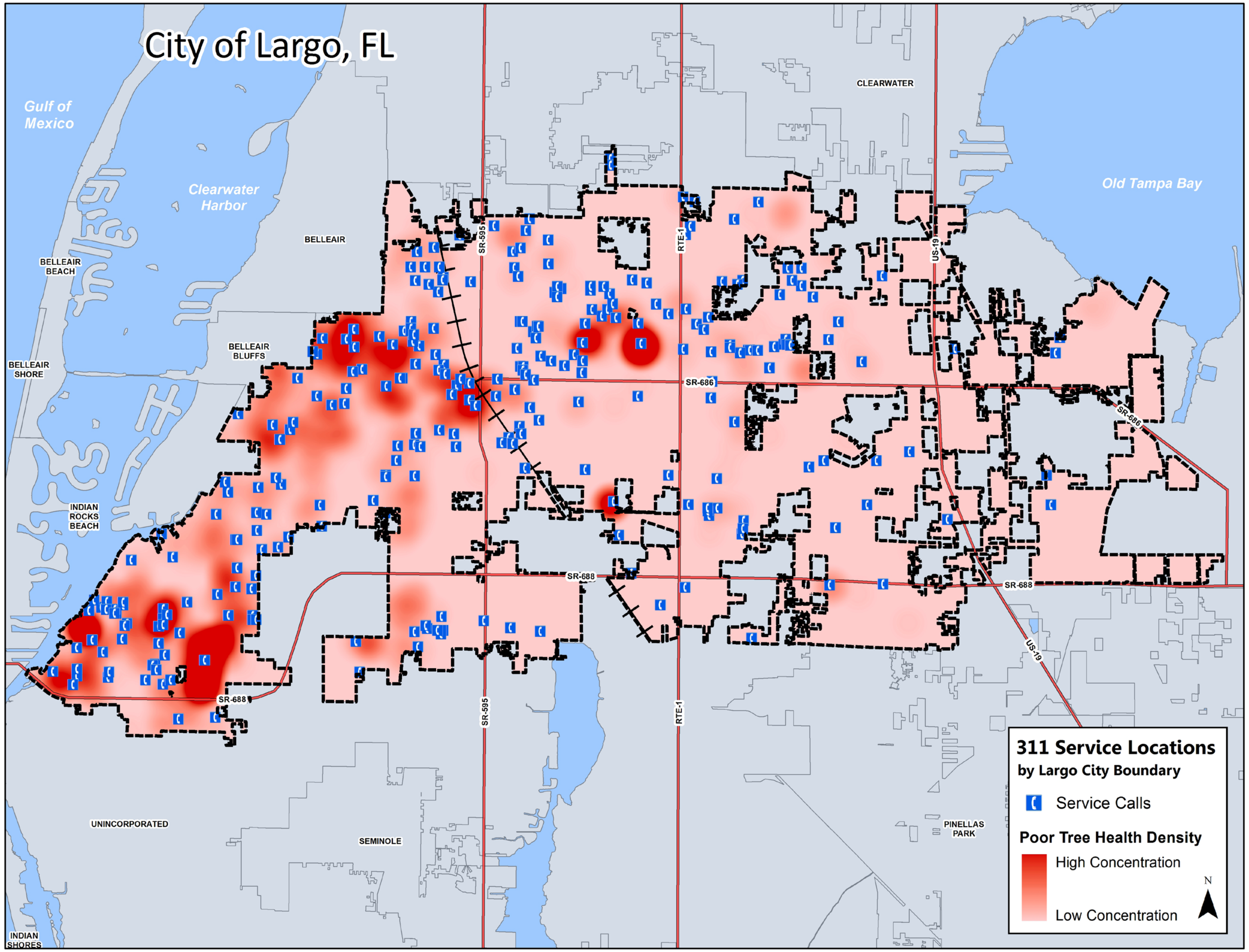
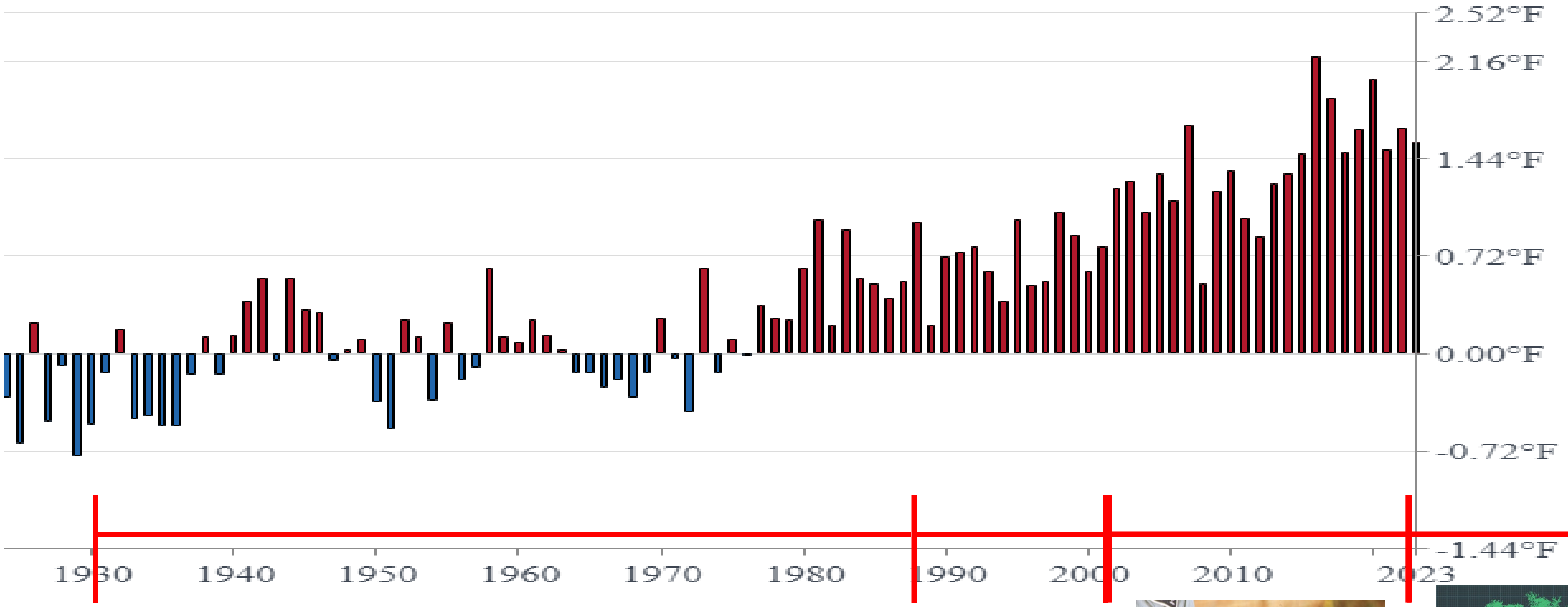
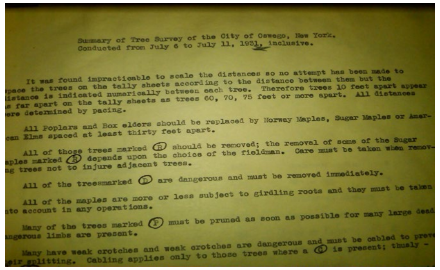
Washington DC, 2023






Summary of Tree Survey of the City of Oswego, New York.
Conducted from July 6 to July 11, 1931, inclusive.

It was found impracticable to scale the distances so no attempt has been made to pace the trees on the tally sheets according to the distance between them but the istance is indicated numerically between each tree. Therefore trees 10 feet apart appear s far apart on the tally sheets as trees 60, 70, 75 feet or more apart. All distances ere determined by pacing.

All Poplars and Box elders should be replaced by Norway Maples, Sugar Maples or Amer-can Elms spaced at least thirty feet apart.

All of those trees marked R should be removed; the removal of some of the Sugar aples marked R depends upon the choice of the fieldman. Care must be taken when remov-ng trees not to injure adjacent trees.

All of the treesmarked D are dangerous and must be removed immediately.

All of the maples are more or less subject to girdling roots and they must be taken nto account in any operations.

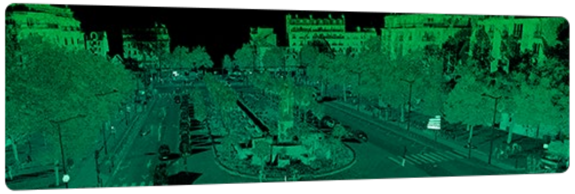
Many of the trees marked P must be pruned as soon as possible for many large dead angerous limbs are present.

Many have weak crotches and weak crotches are dangerous and must be cabled to prev eir splitting. Cabling applies only to those trees where a C is present; thusly -

Step 1: We capture cm- accurate point cloud and automatically identify each tree.

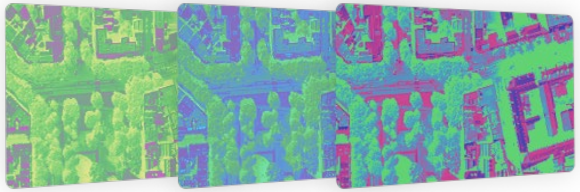
Step 2: Create a 4D Digital Tree Twin of each tree

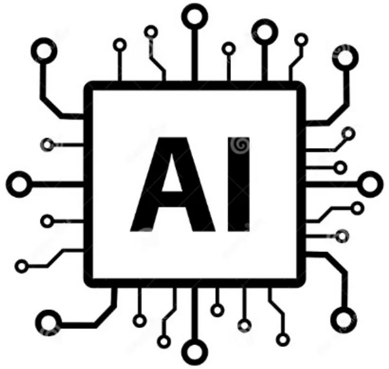
Point Cloud



Panoramic Images

Multispectral Satellite Images





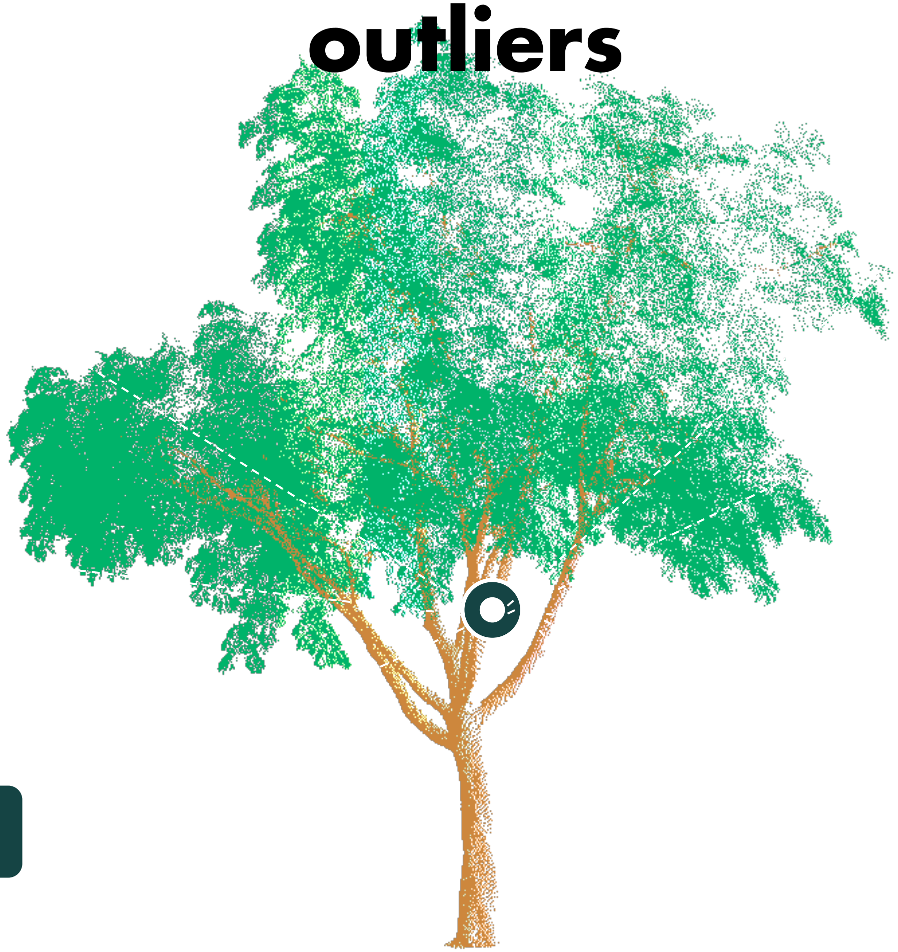
4D DIGITAL TWIN

Step 3: We analyze each tree and identify outliers

... on ecological benefits

... on economic value

... safety factor



Digital Tree Twin

... species

... metrics

... Leaf Area Index

... vitality

... changes over time

... cohort analsysis

Step 4: Arborists assess outliers

Remotely ~ 20%

In field ~ 10%

Smart Tree Inventory Program

Year 1

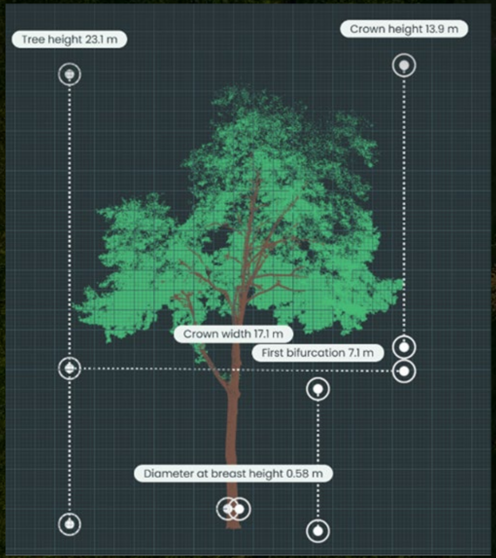
Initiate smart tree inventory

Perform outlier advanced assessments

Install TreeKeeper 9

Year 2

Implement information via TreeKeeper 9



Year 3

Re-scan smart tree inventory

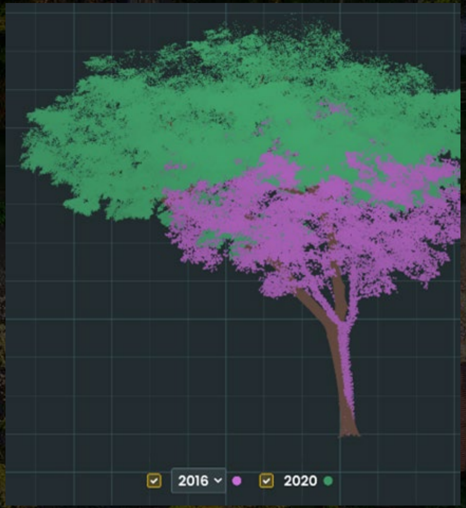
Perform outlier advanced assessments

Perform change analysis

Update TreeKeeper 9

Year 4

Implement information via TreeKeeper 9



Year 5

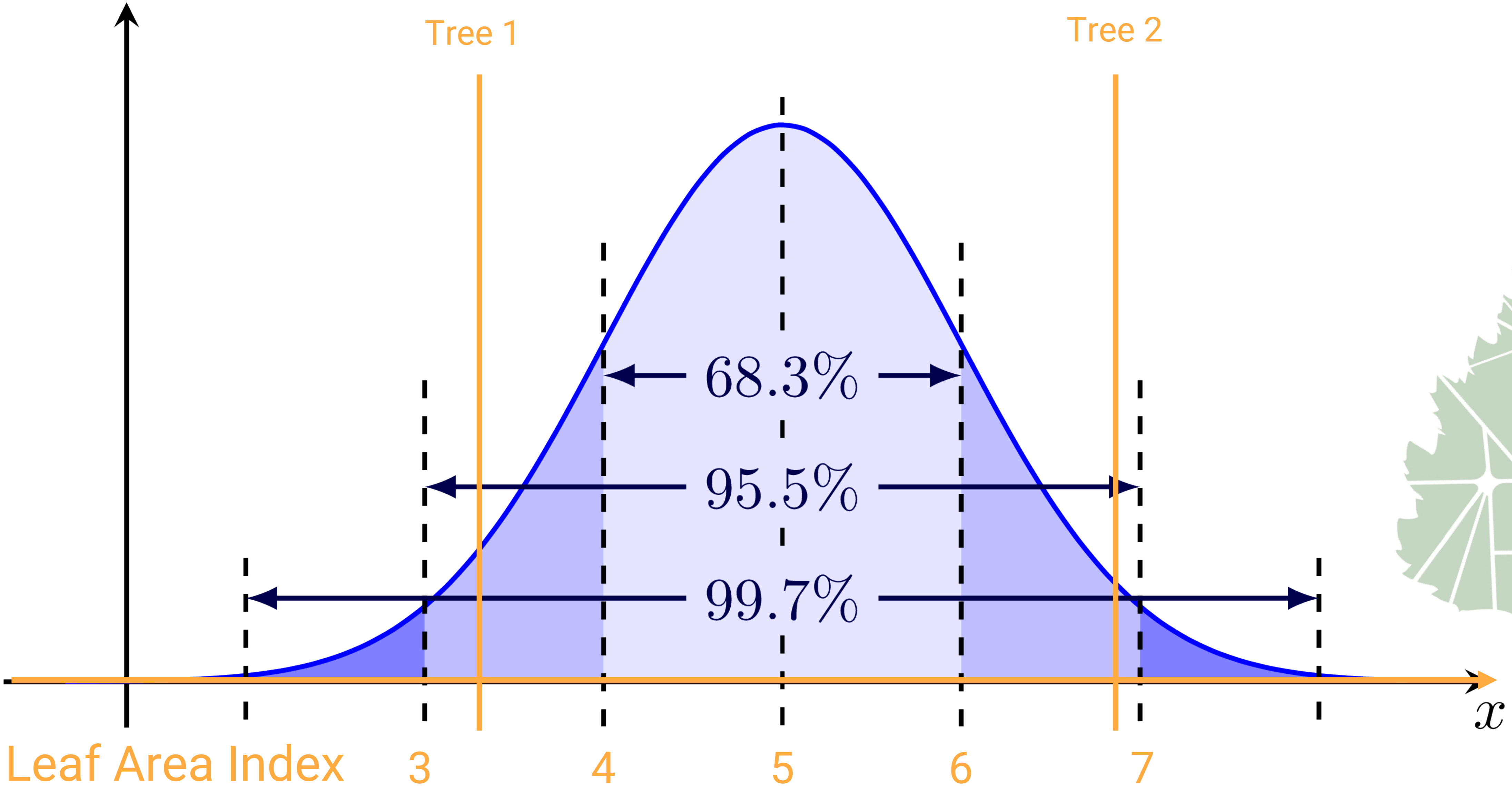
Re-scan smart tree inventory

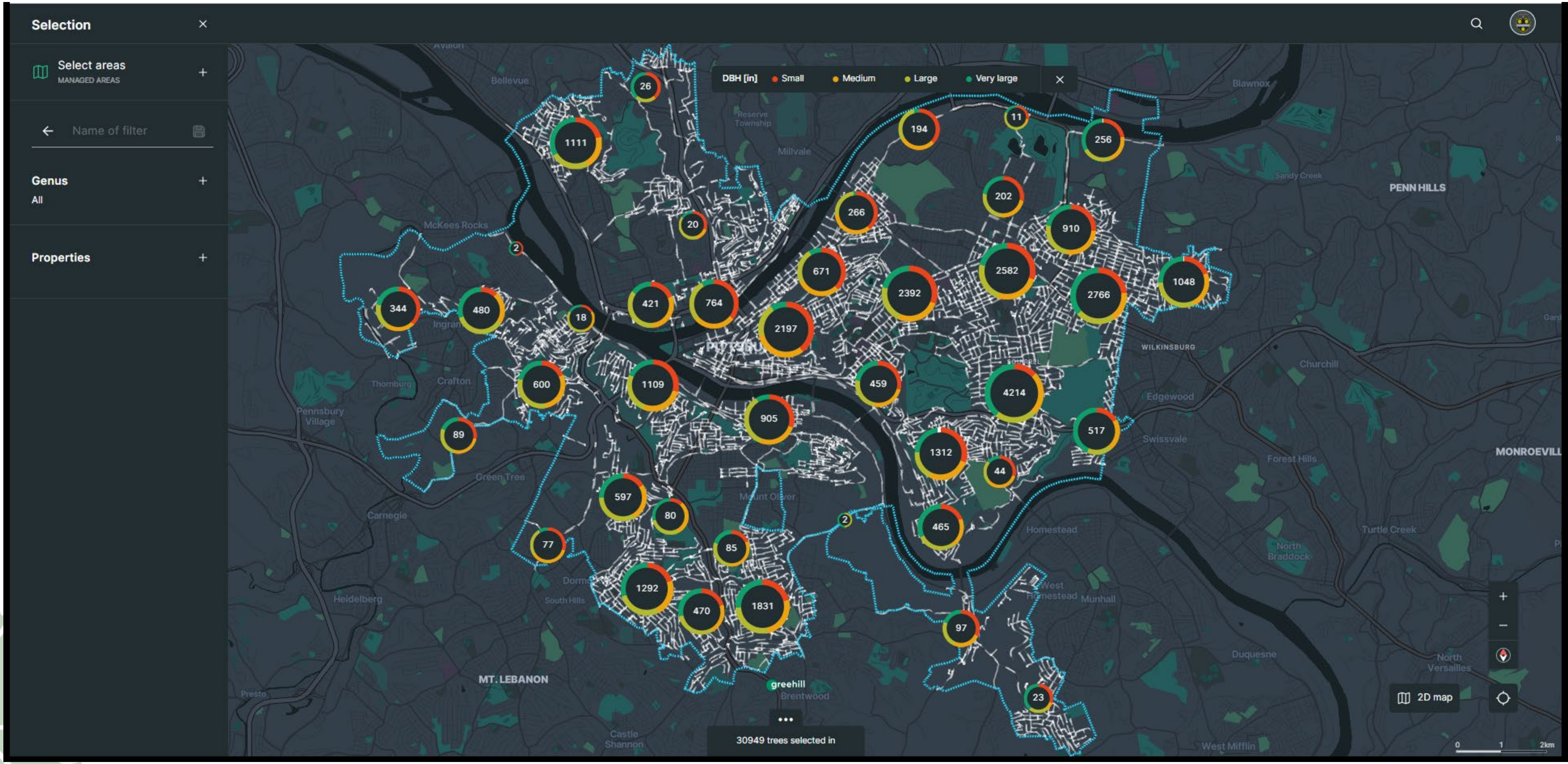
Performoutlier advanced assessments

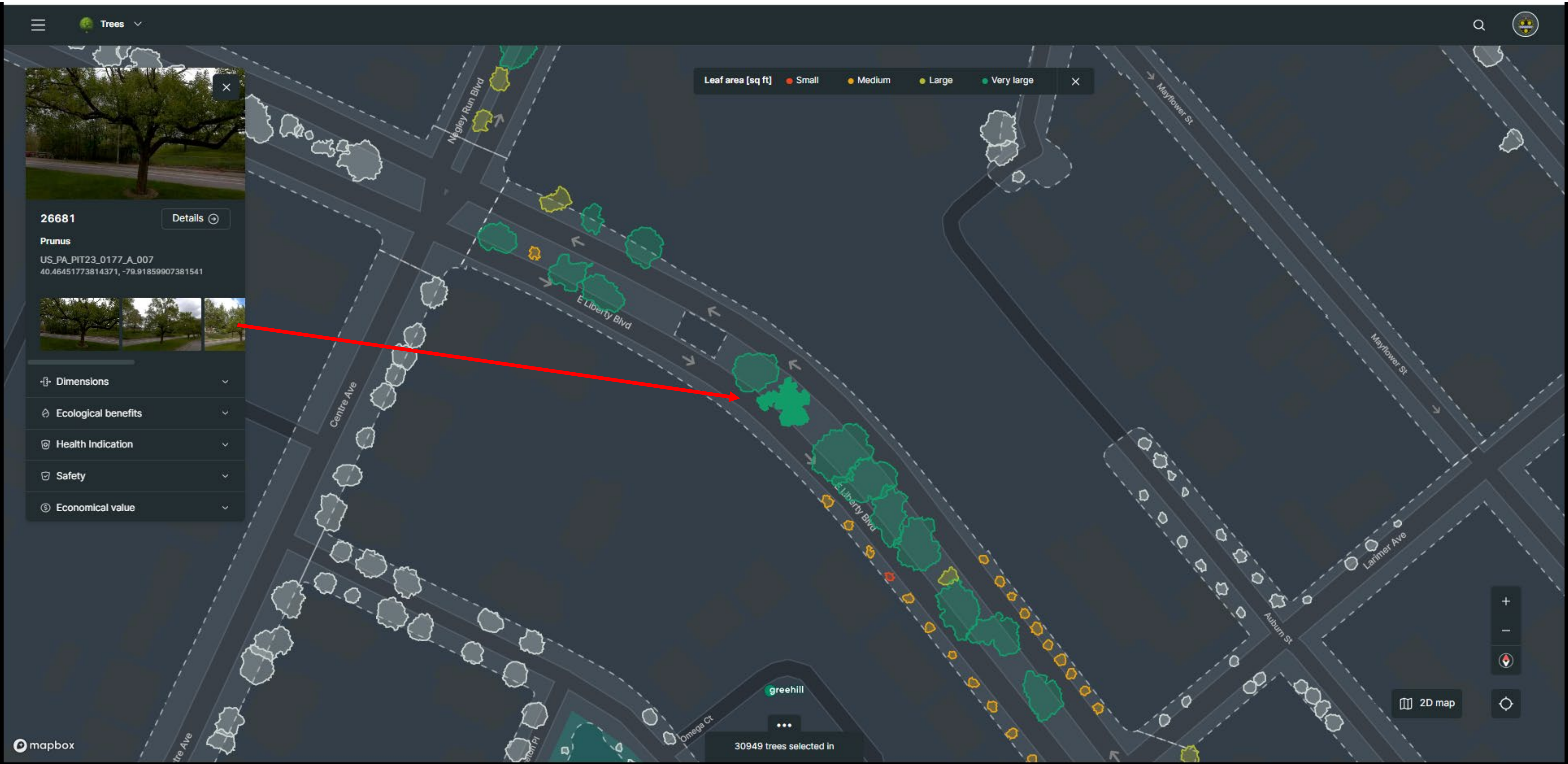
Perform change analysis

Update TreeKeeper 9

Cohort: 16″ Ash Trees ± 2″




Selection
Select areas
MANAGED AREAS
Name of filter
Genus
All
Properties
DBH [in]
Small
Medium
Large
Very large
Bellevue
Millvale
McKees Rocks
Crafton
Pennsbury Village
Green Tree
Carnegie
Heidelberg
MT. LEBANON
Mount Oliver
Brentwood
Castle Shannon
Blawnox
PENN HILLS
WILKINSBURG
Churchill
Edgewood
Swissvale
Forest Hills
MONROEVILLE
Homestead
West Homestead
Munhall
Turtle Creek
North Braddock
Duquesne
North Versailles
West Mifflin
2D map
30949 trees selected in


Trees
Leaf area [sq ft]
Small
Medium
Large
Very large
26681
Details
Prunus
US_PA_PIT23_0177_A_007
40.46451773814371, -79.91859907381541
Dimensions
Ecological benefits
Health Indication
Safety
Economical value
Negley Run Blvd
E Liberty Blvd
Centre Ave
Mayflower St
Auburn St
Larimer Ave
Omega Ct
greehill
30949 trees selected in
2D map
mapbox

Maple, Sugar at 131 Columbus St

0 Work Records

Show Work Records by Status

☑ Requested ☑ Scheduled ☑ Completed

Add Work

No work records found for this location.

Work

Work Species
maple, sugar (Acer saccharum)

DBH
26

Condition
Poor

Work Record

Load Last Work Record

Project * Required
Select

Work Type * Required
Select

Priority * Required
Select

Status: New Work Record
R S C

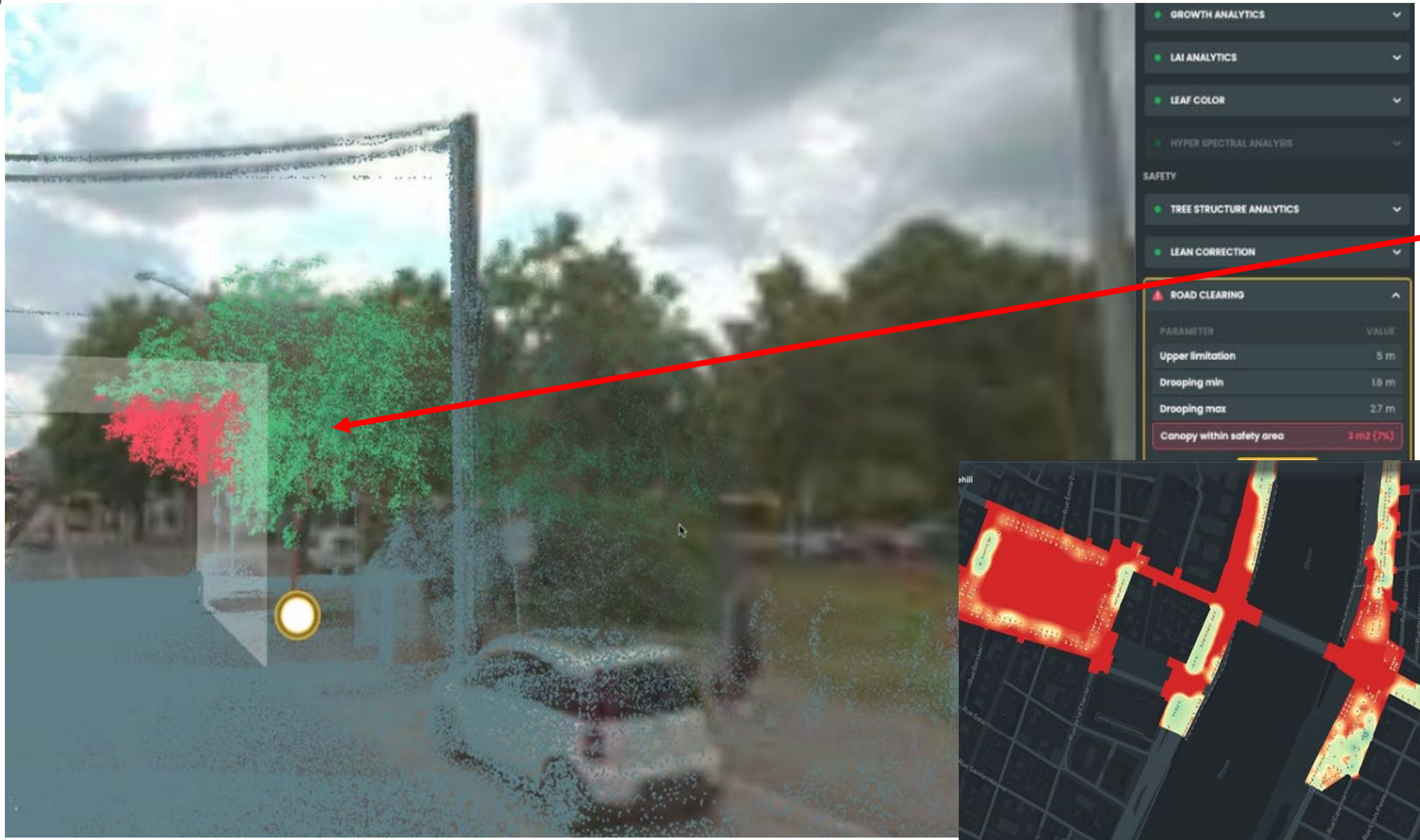
New Status: Requested

Requested Date
05/31/2023

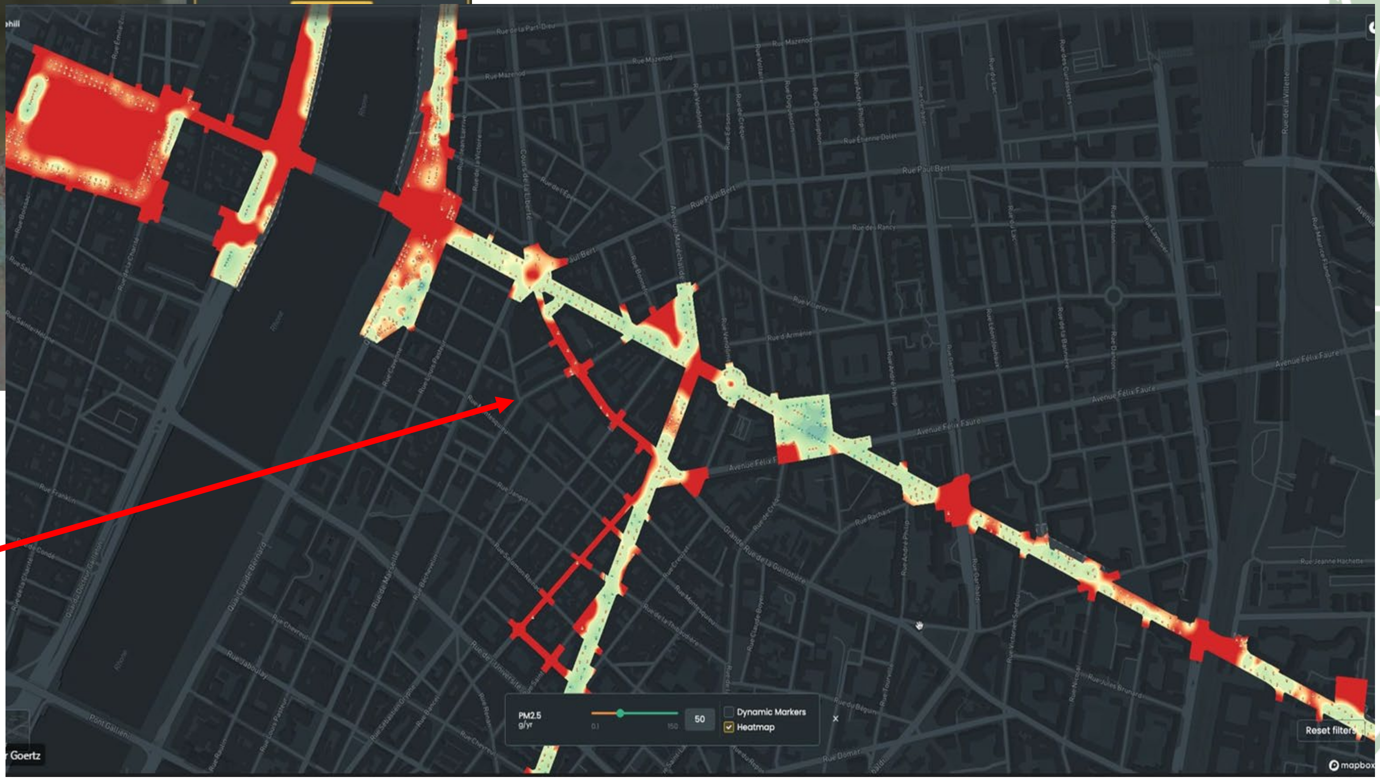
Scheduled Date
mm/dd/yyyy

Completed Date
mm/dd/yyyy

Submit Cancel

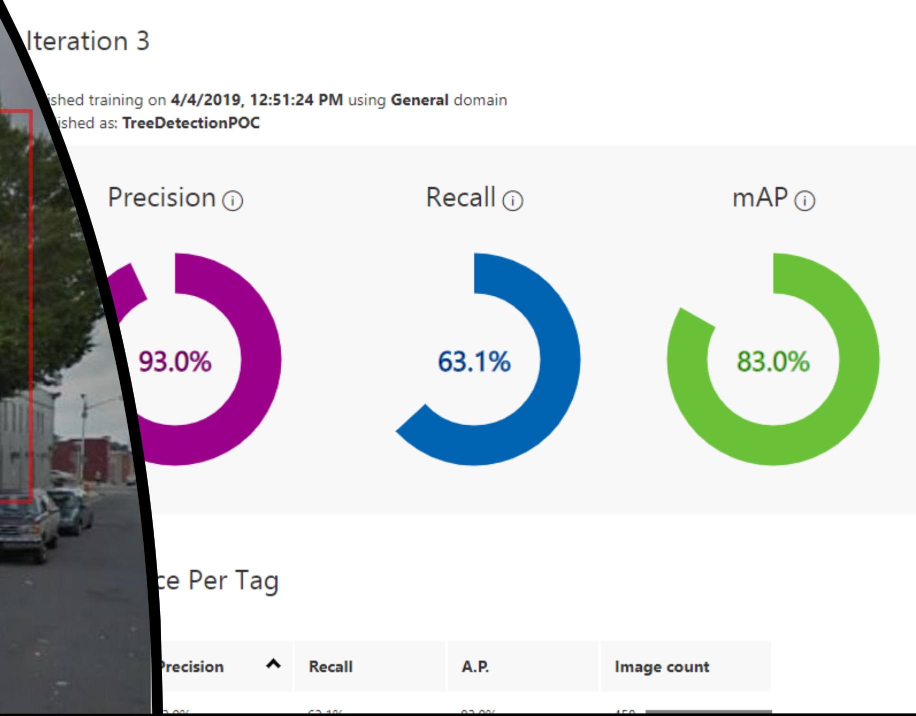


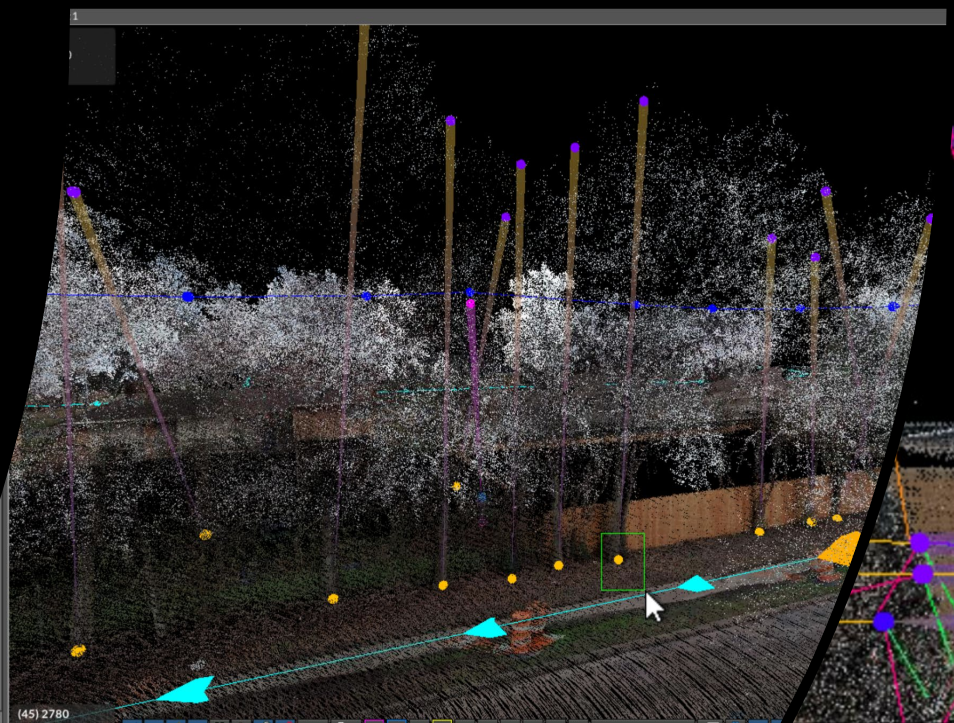
Corridor clearance

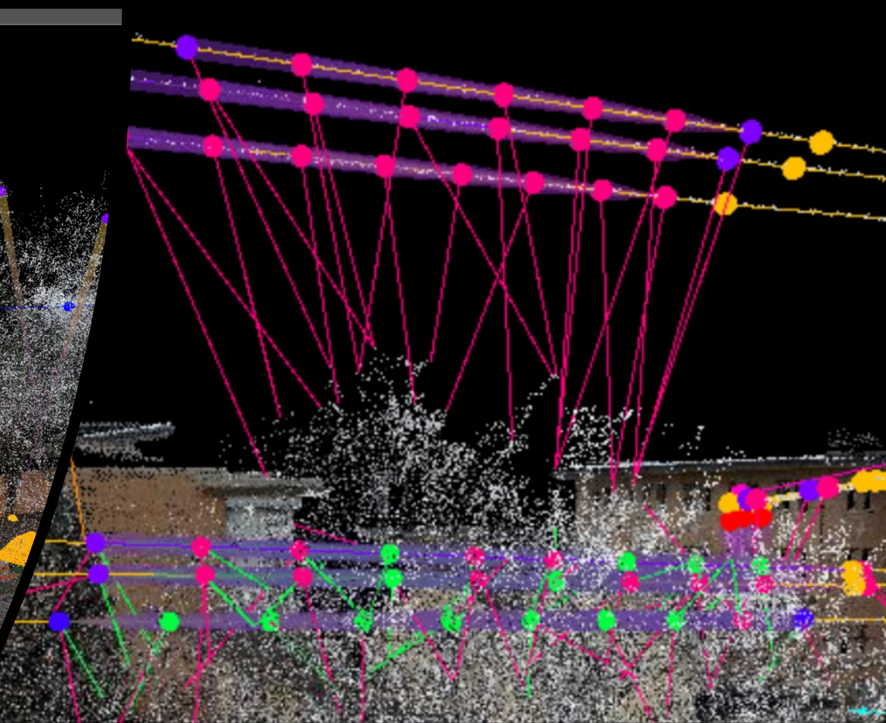


Human Thermal Comfort

- Objective
- Repeatable
- Efficient
- Precise







Thank you

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CEUs

Session 3.3: Wall-E: Promoting innovation, new technologies and future visions on the role of urban forests and trees to address climate change

CEU

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PP-23-3571

World Forum on Urban Forests