PARTNERS IN COMMUNITY FORESTRY

2024 CONFERENCE

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Modeling Solutions for Air Quality
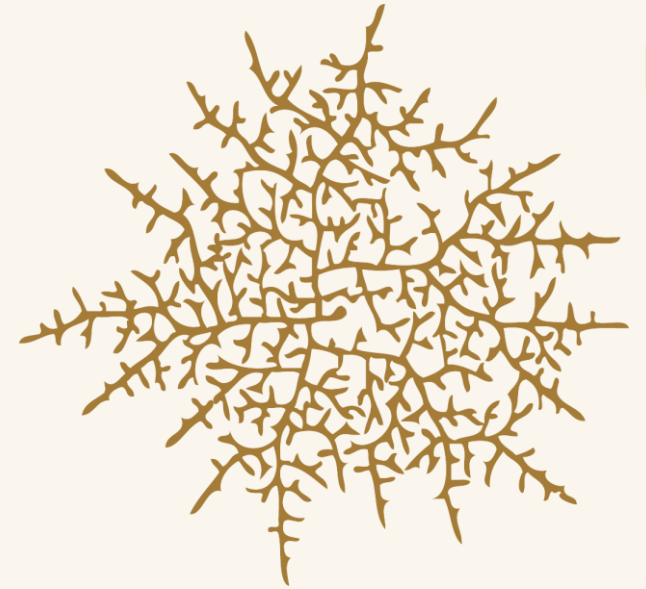
PRESENTED BY:

Mei Visco

Designer, Hyphae Design Laboratory

mei@hyphae.net

AGENDA

Evidence Based Design

Prescott Greening

Modeling Pollution

Vegetated Buffers
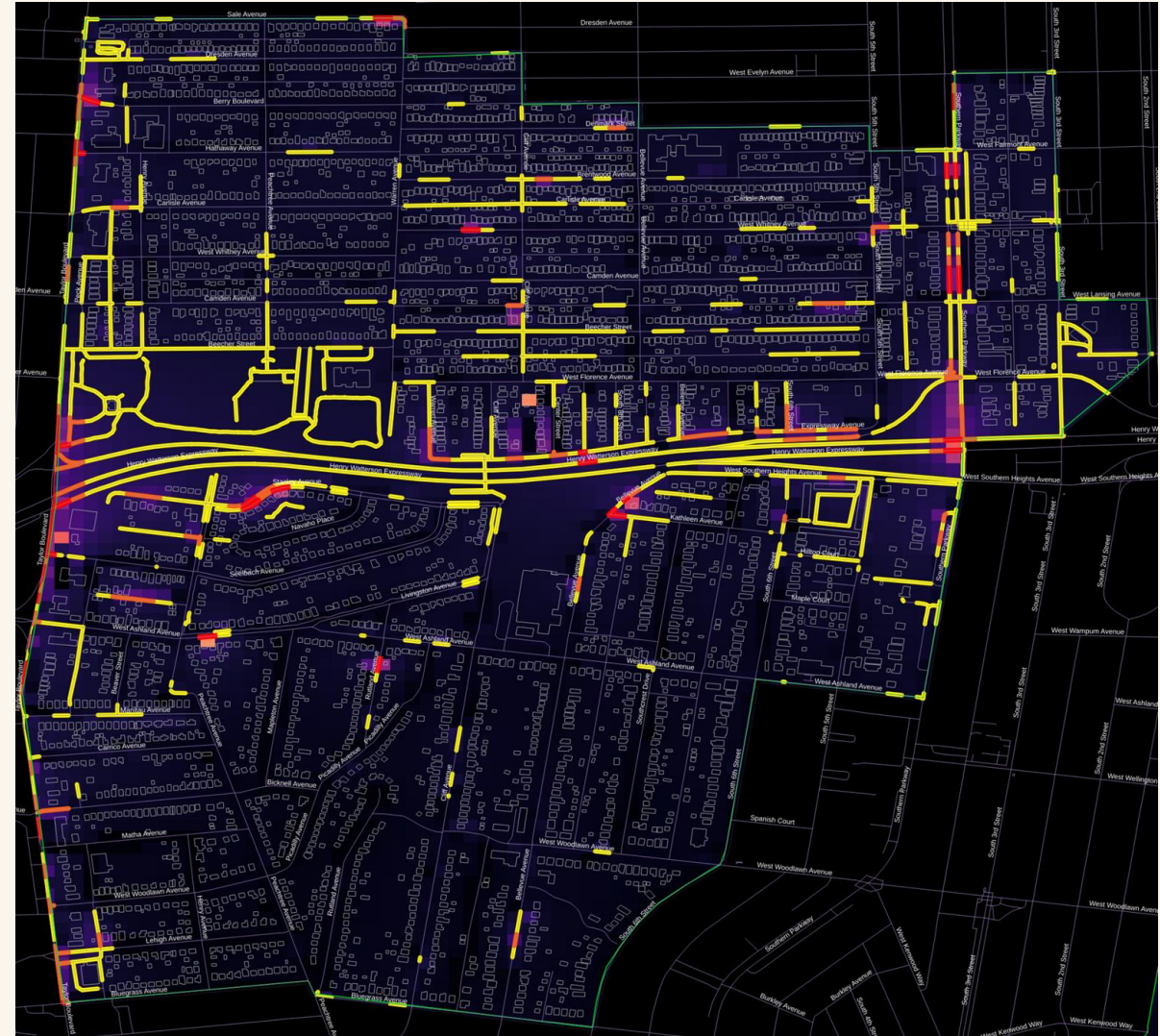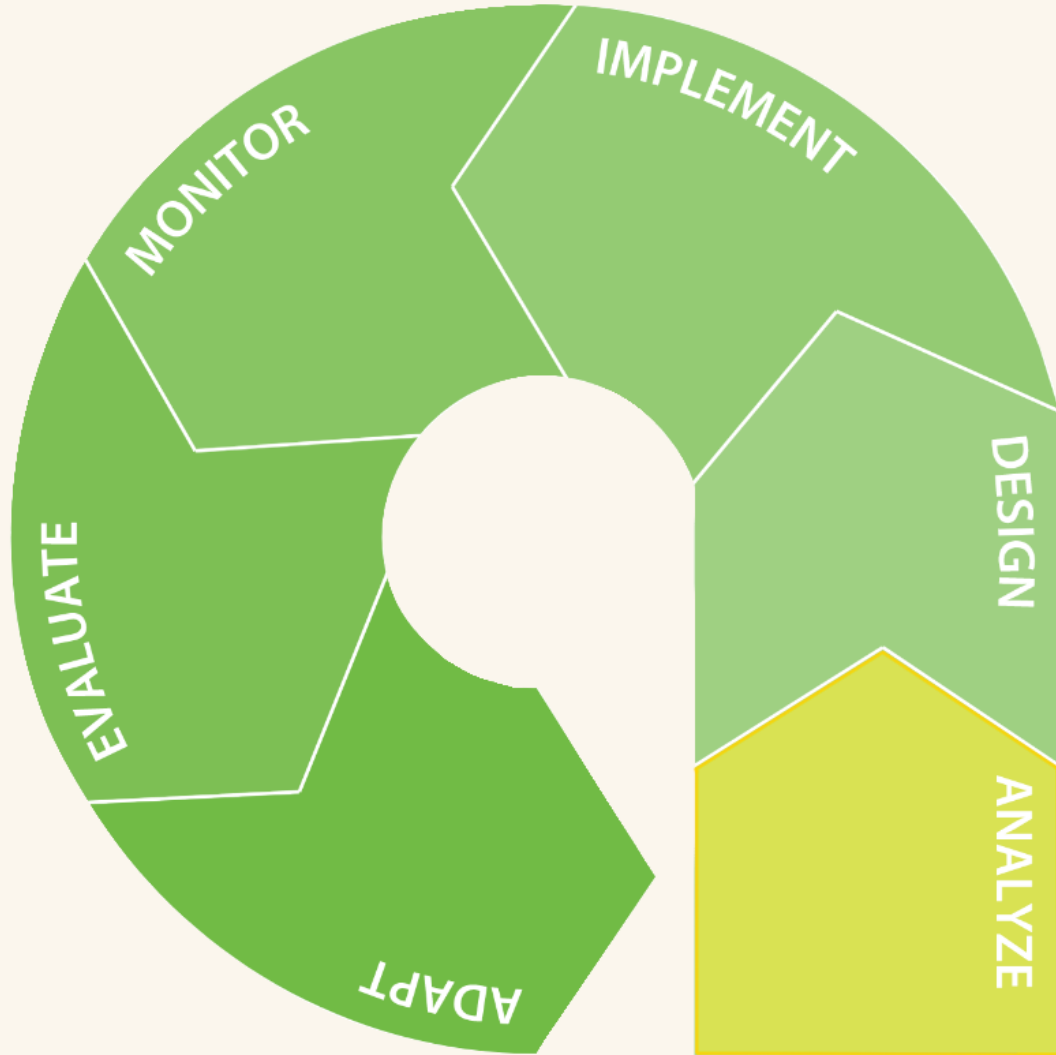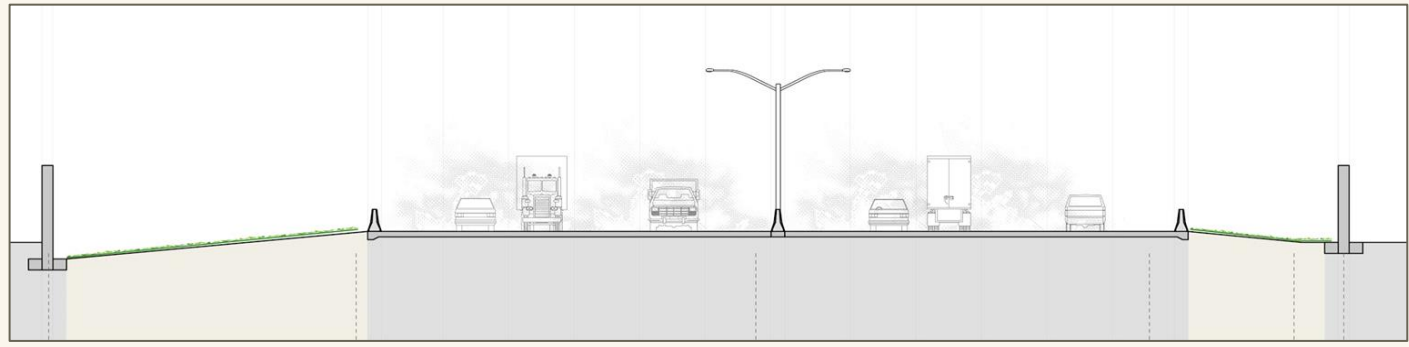
Prescott Concept Designs

Summary

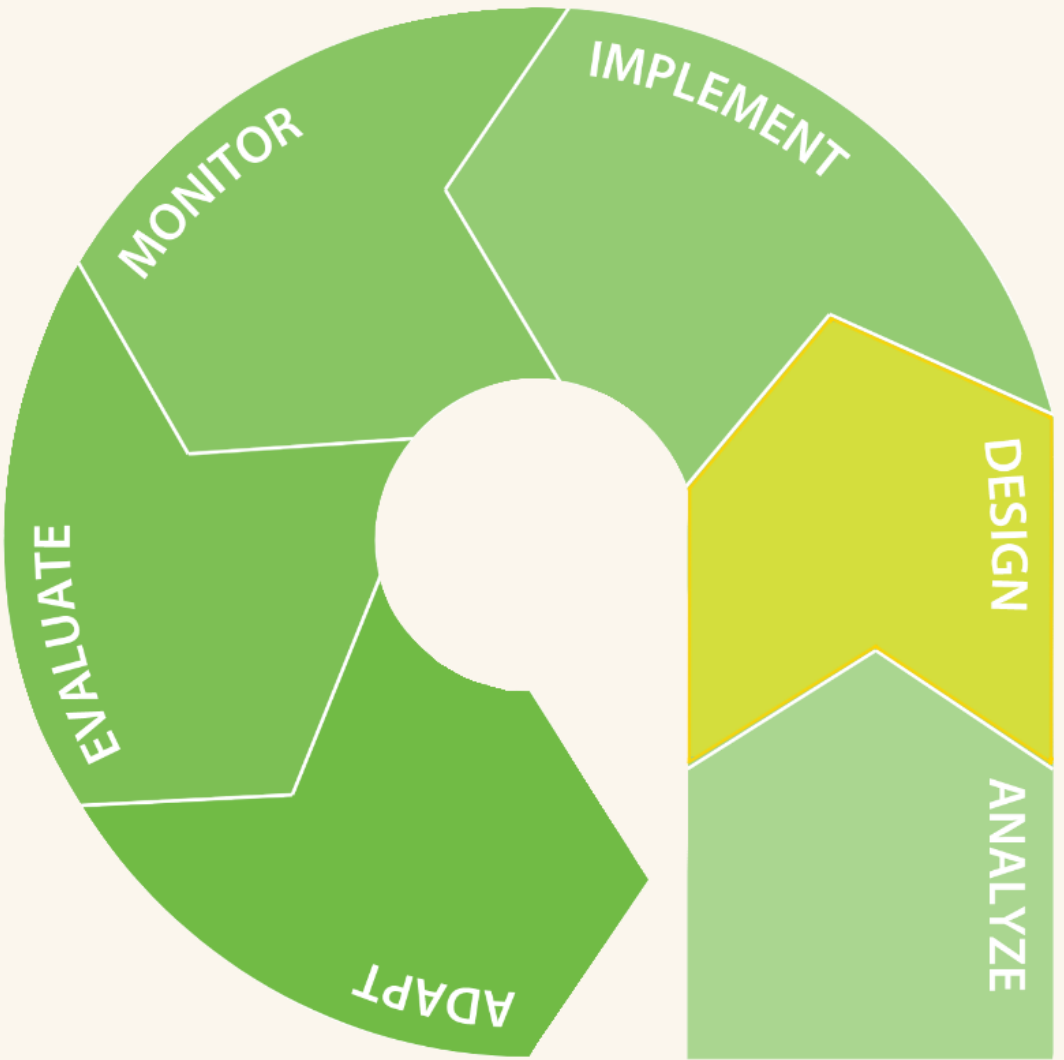# Evidence Based Design

MONITOR · IMPLEMENT · EVALUATE · DESIGN · ADAPT · ANALYZE

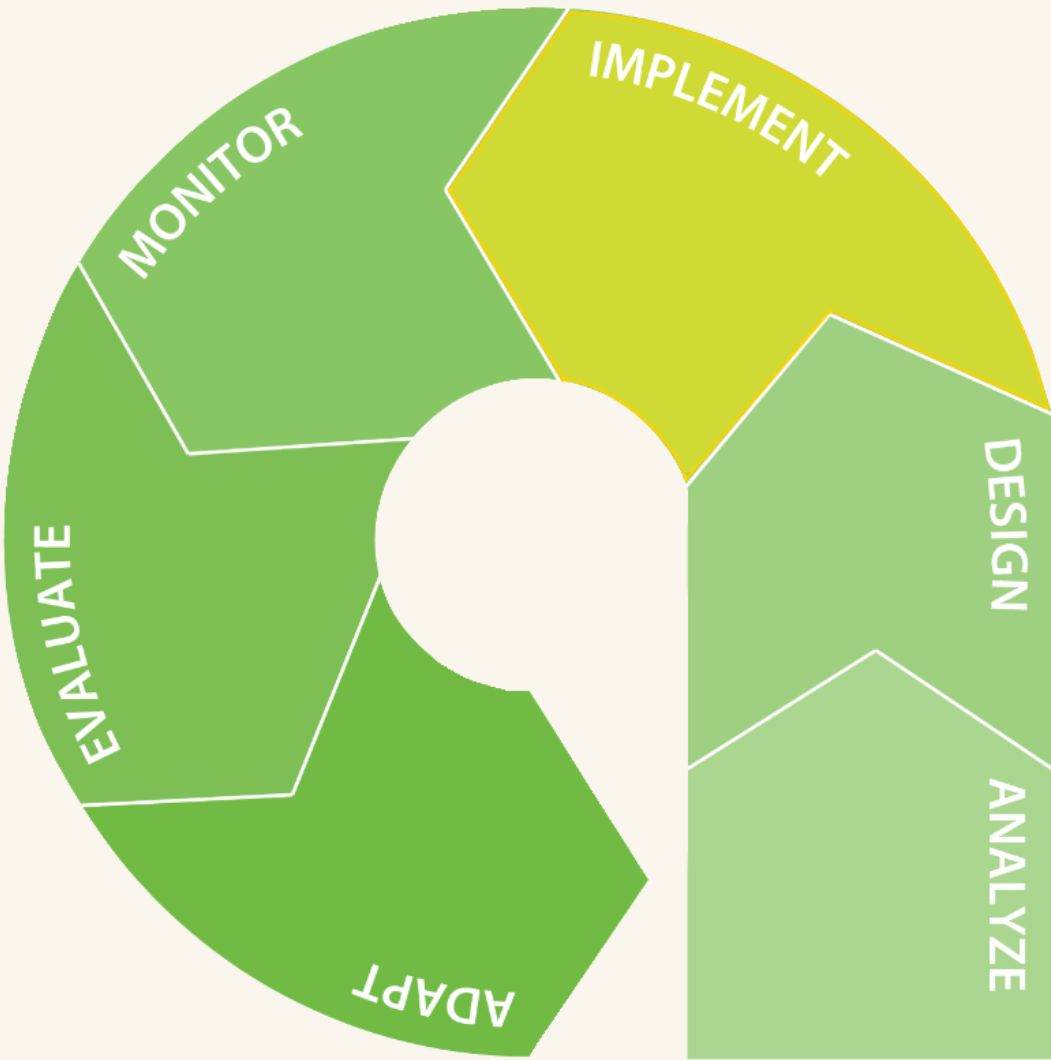Analyze where pollution is the worst

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Evidence Based Design
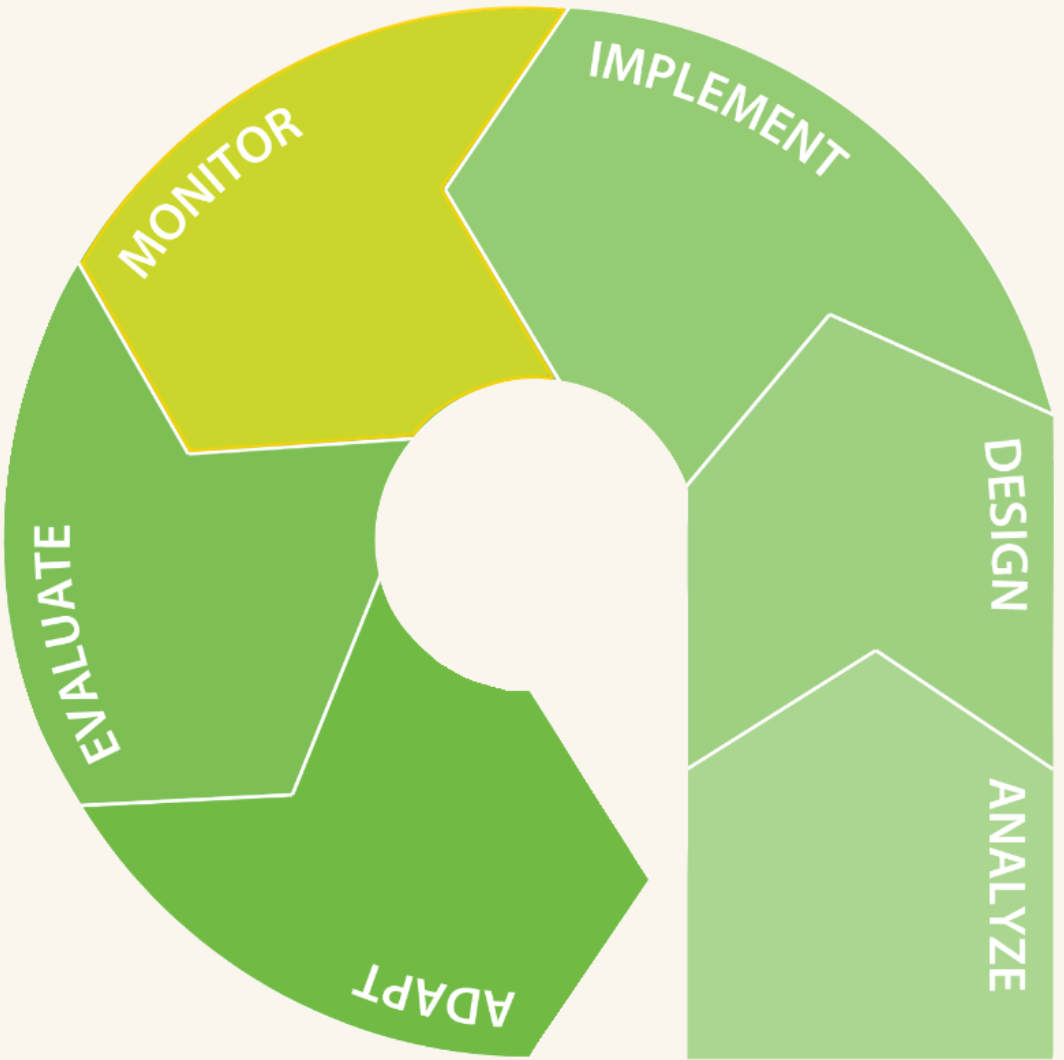

Design an intervention

Evidence Based Design

Implement/Install the design
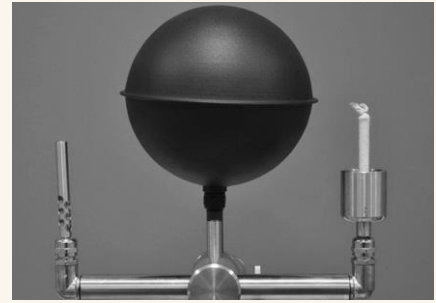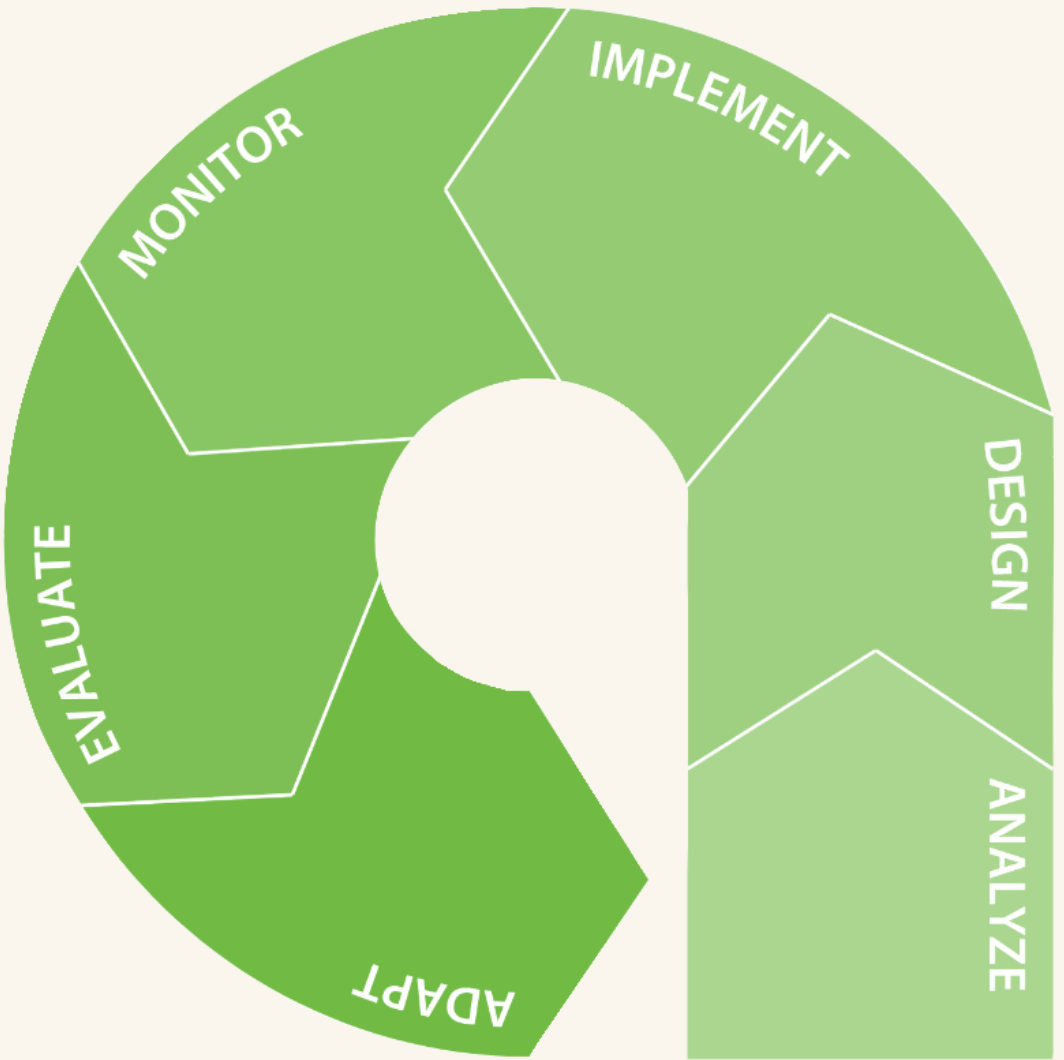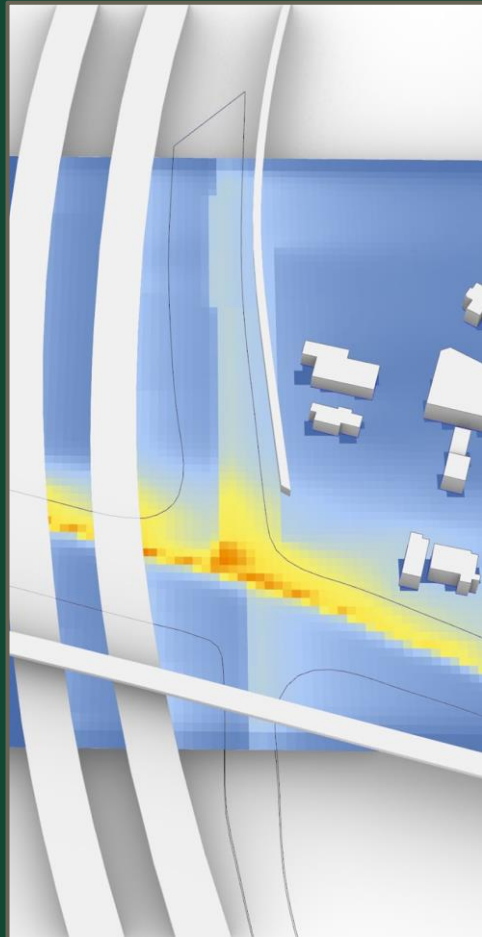
Evidence Based Design

Monitor the results

Evidence Based Design

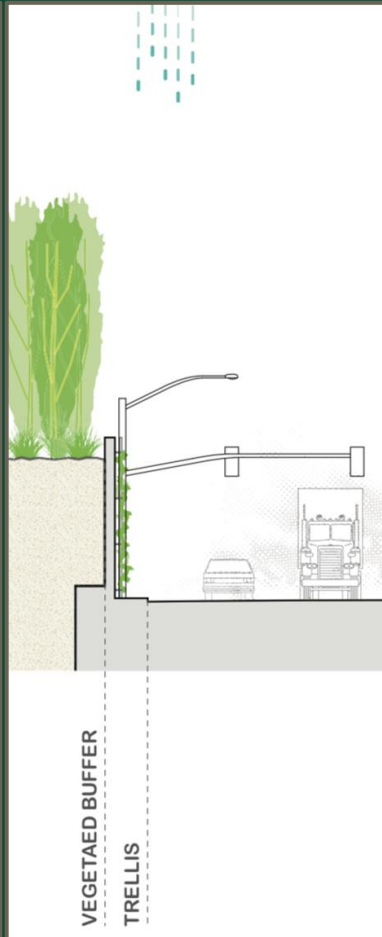# Prescott Greening Project

Model Pollution　　**Design**　　**Model Solutions**　　**Build Interventions**　　**Monitor Results**
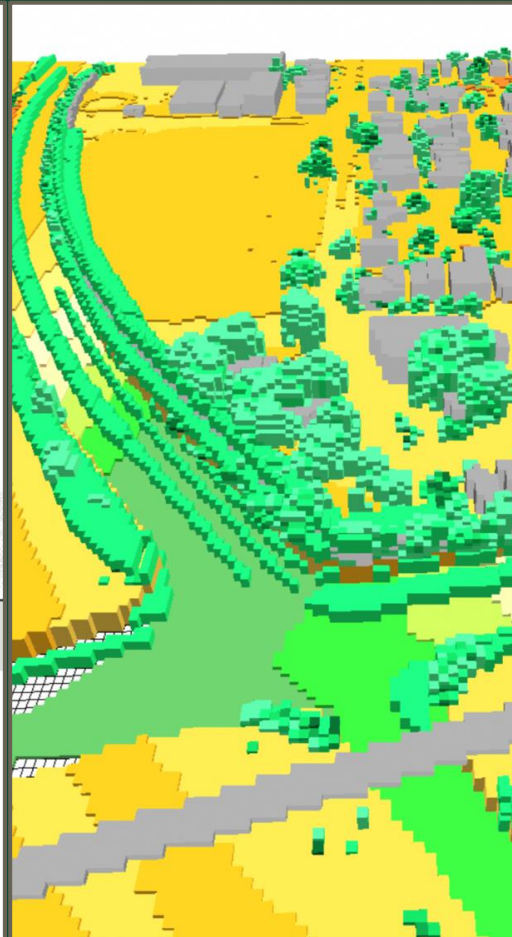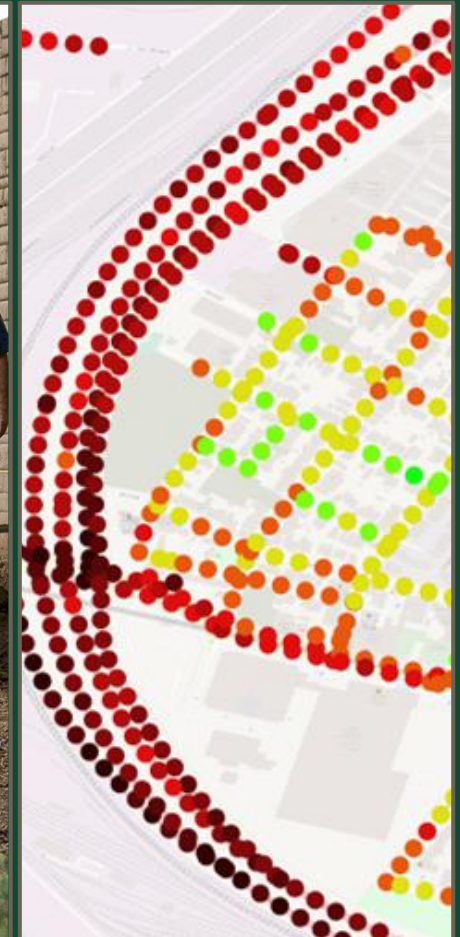
WEST OAKLAND
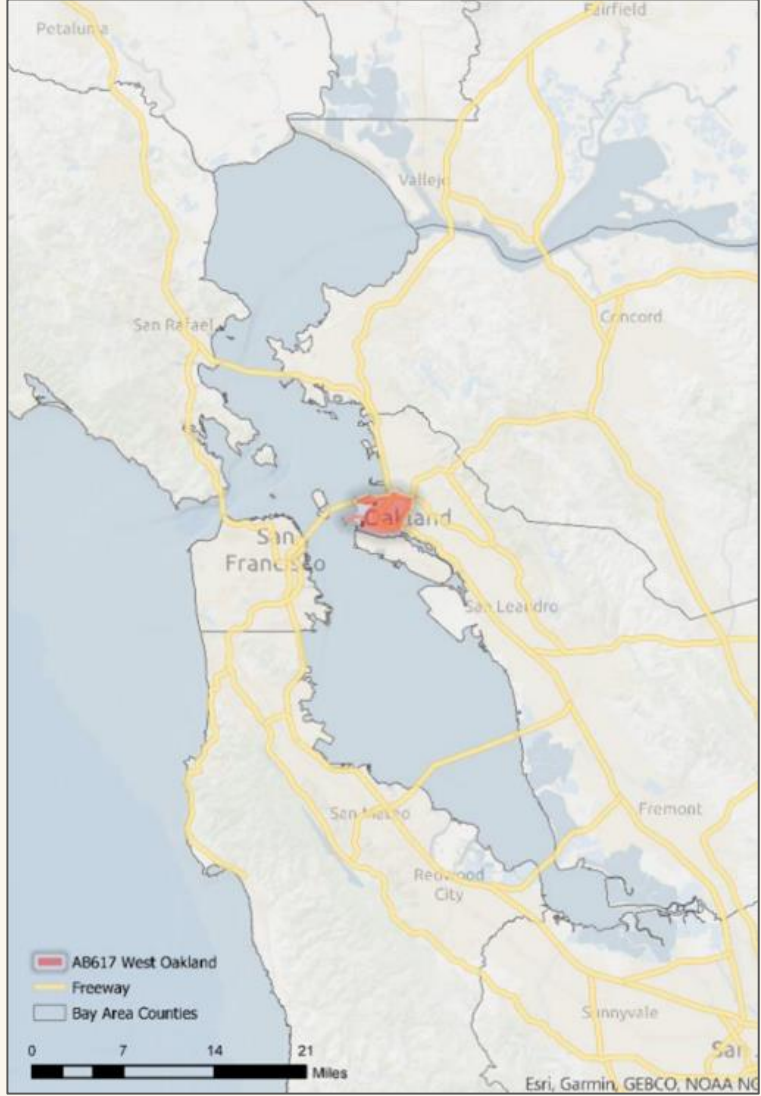
What we need to model how a green intervention impacts exposure risk

Change in Air Pollution Level =

| Physical Environment | Pollution Sources | How Air Moves through the environment | Different Buffer Designs |
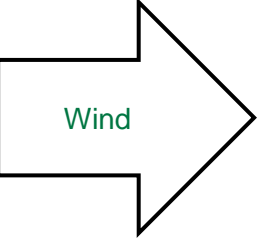
Wind

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Collect LiDAR data of the structures and trees

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Bridging scales

We want our simulations of site-scale interventions to exist in the context of larger models created by the Air District
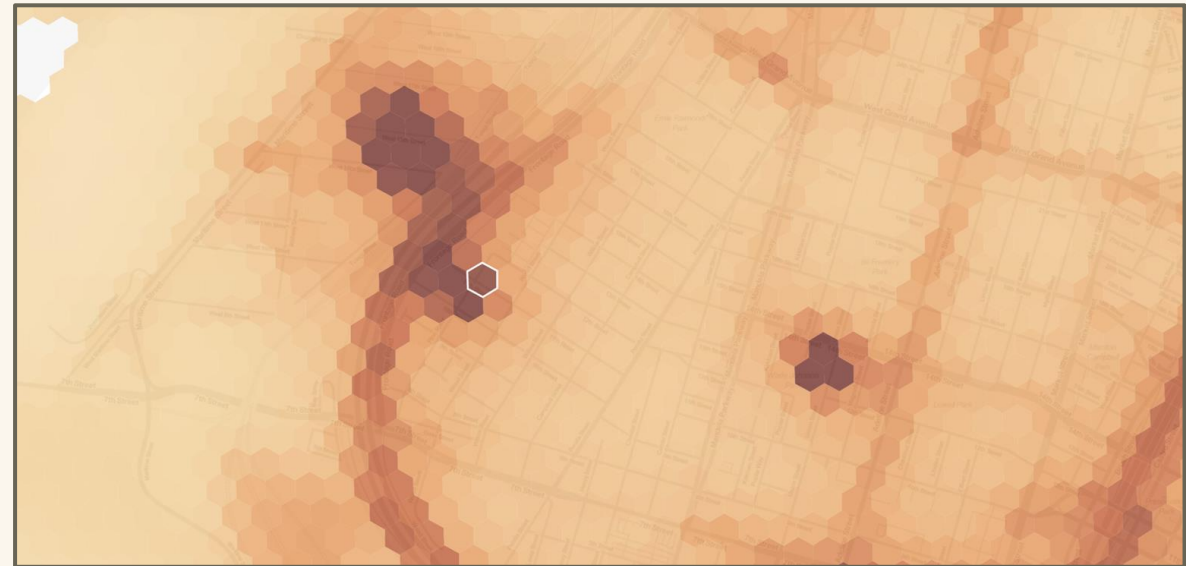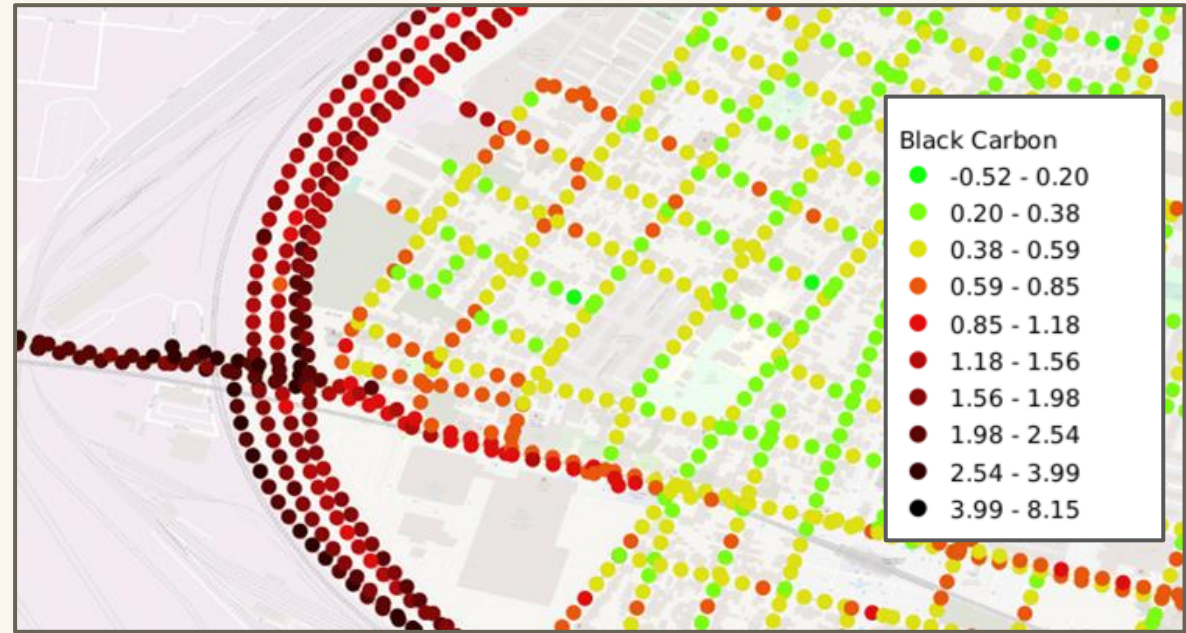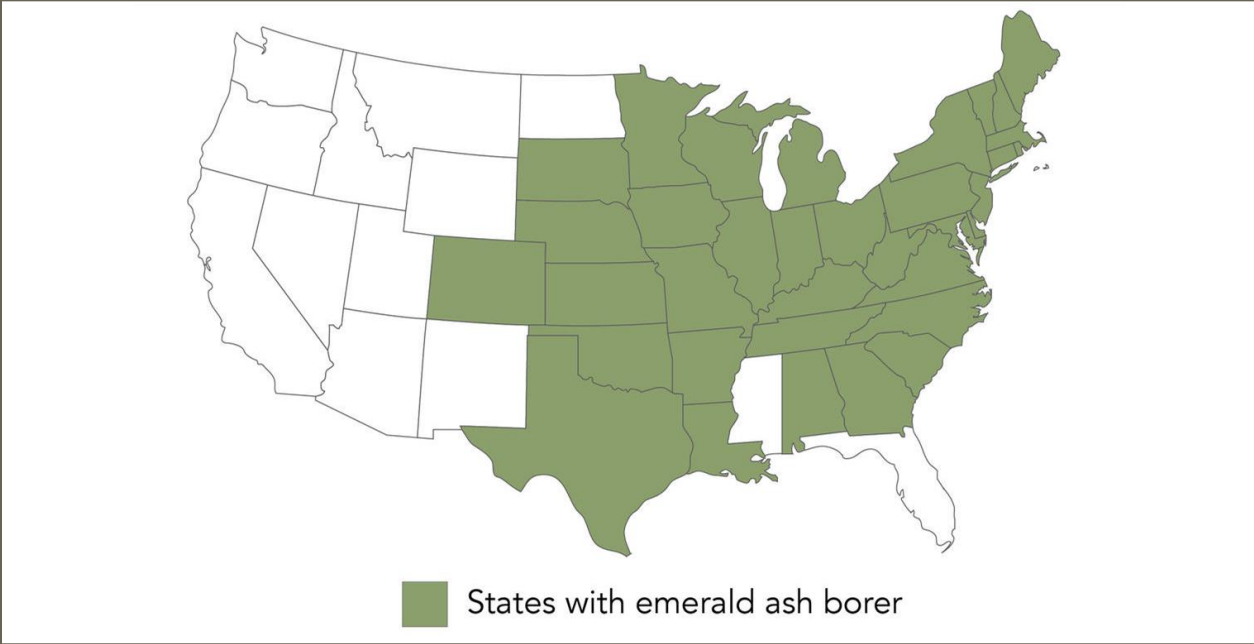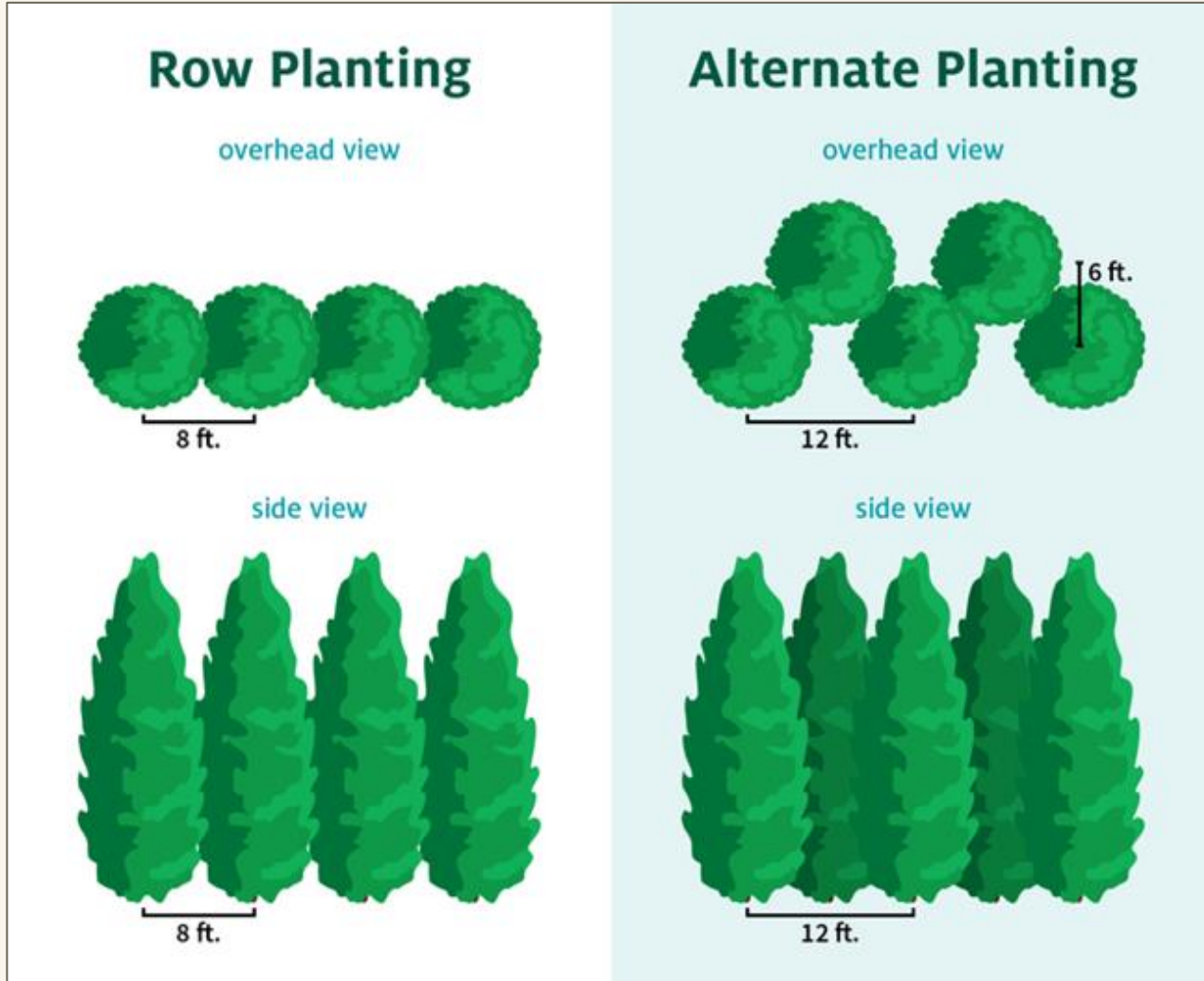
VEGETATED BUFFERS

Variable to test

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Counties where the Emerald Ash Borer had killed more trees had more cardiovascular-related deaths

States with emerald ash borer

Vegetated Buffers: Using trees as technology

According to the EPA, these are the important factors to roadside vegetation design:

| Barrier Length	Height	Porosity	Coverage	Thickness
Extend at least 50 meters past area of concern to limit downwind concentrations	At least 4 meters of height will prevent downwind spread	High porosity leads to pollution stagnation, low porosity is similar to a wall	No gaps between or below trees is ideal. Bushes can be used to block low gaps	5-10 meters recommended, but effectiveness impacted by porosity of barrier

Effective Barrier

Ineffective Barrier

Measuring the leaf area density of trees to input into our models
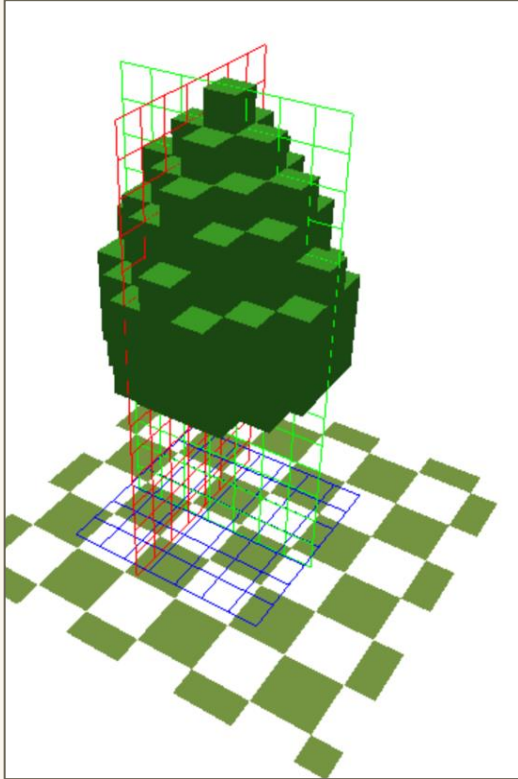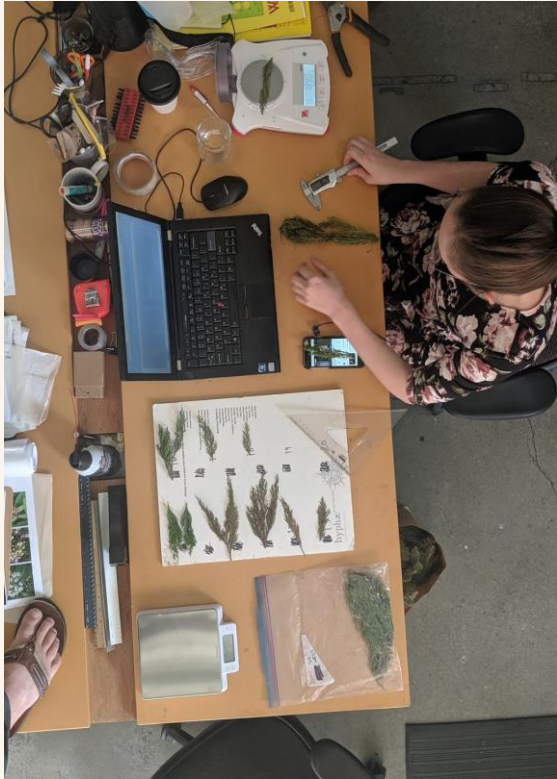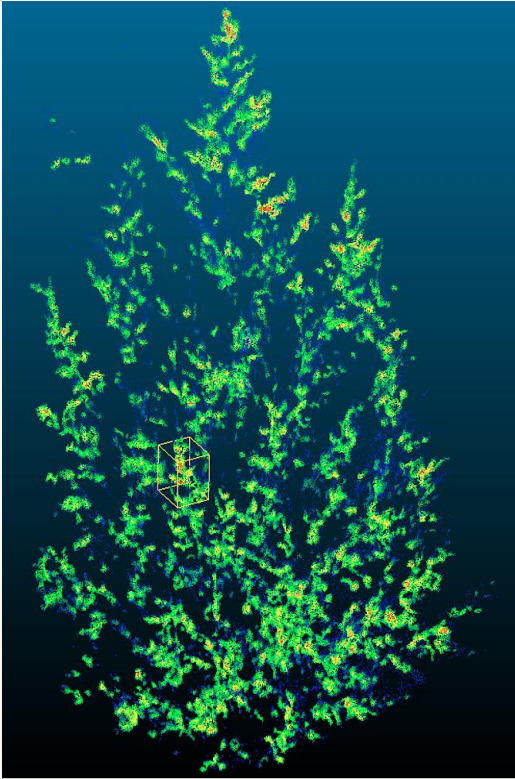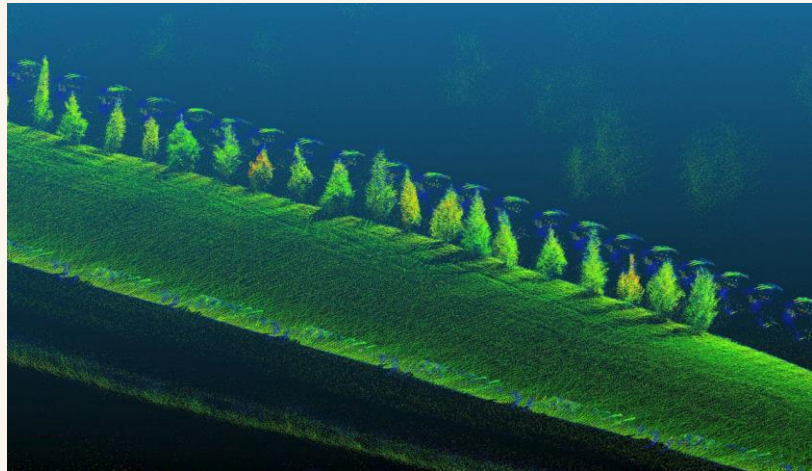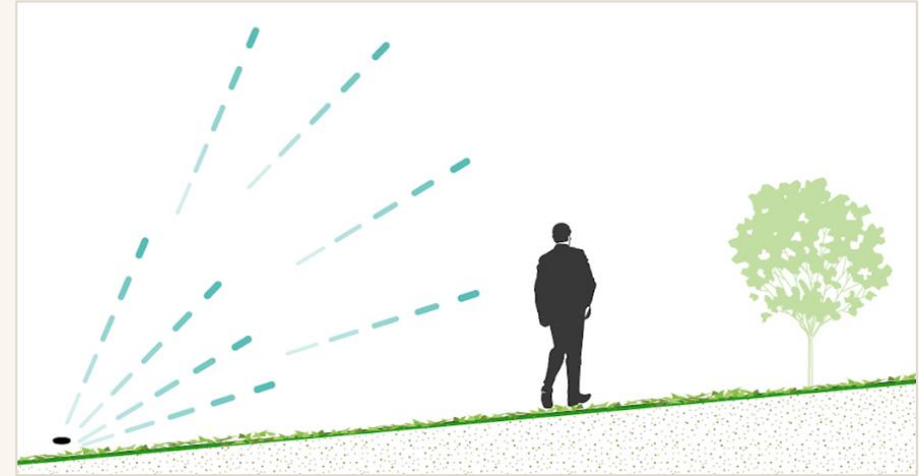
Planting a vegetated buffer closer to the source of pollution is more effective
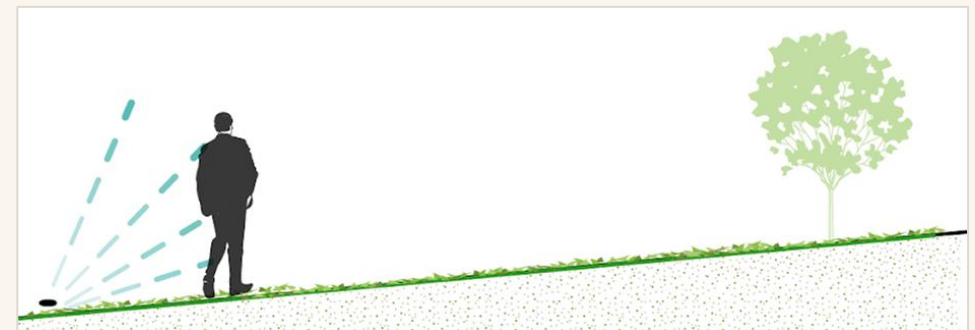

Less effective at blocking

Less effective at blocking
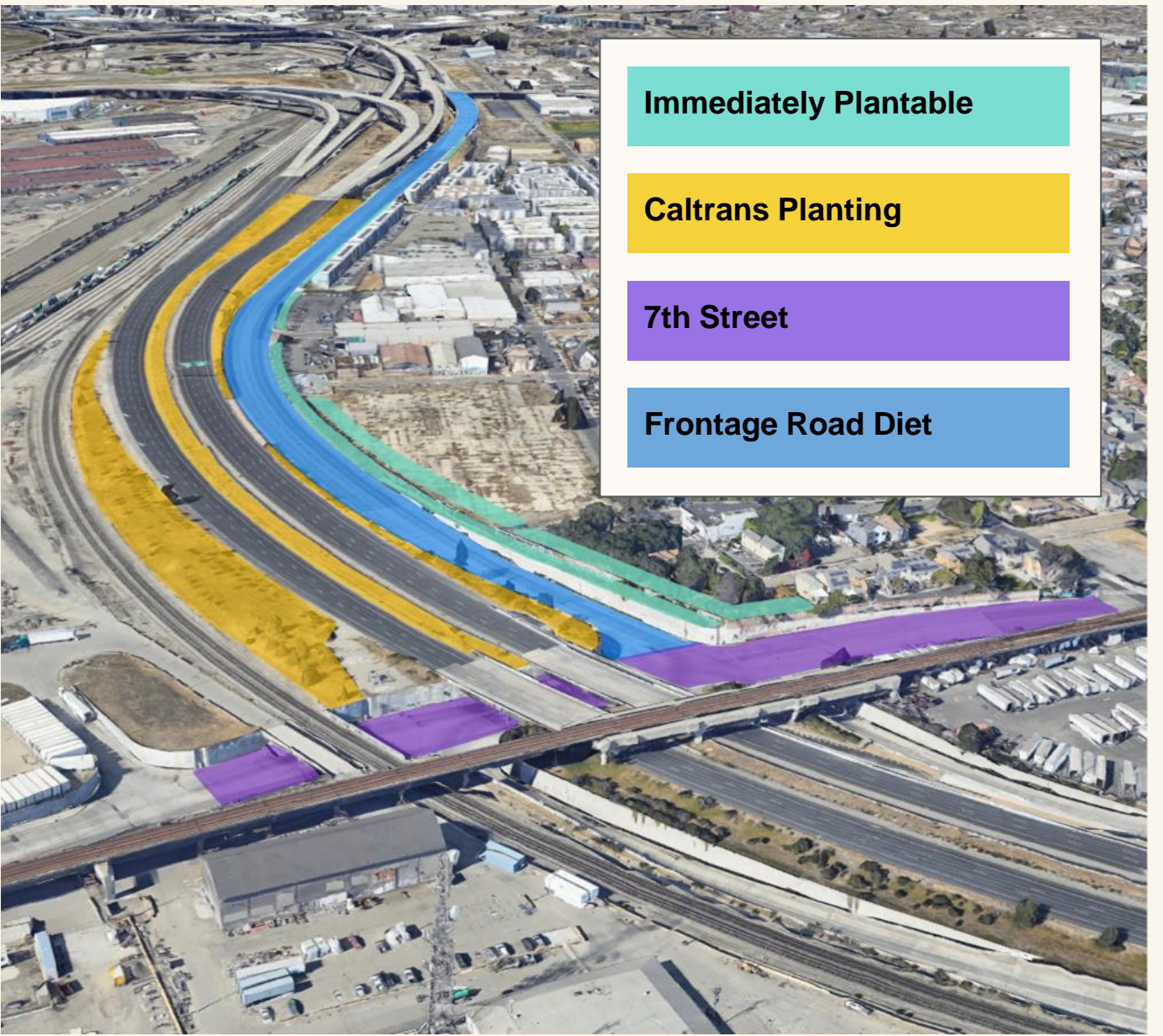

More effective at blocking

More effective at blocking

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PLANTING AREAS
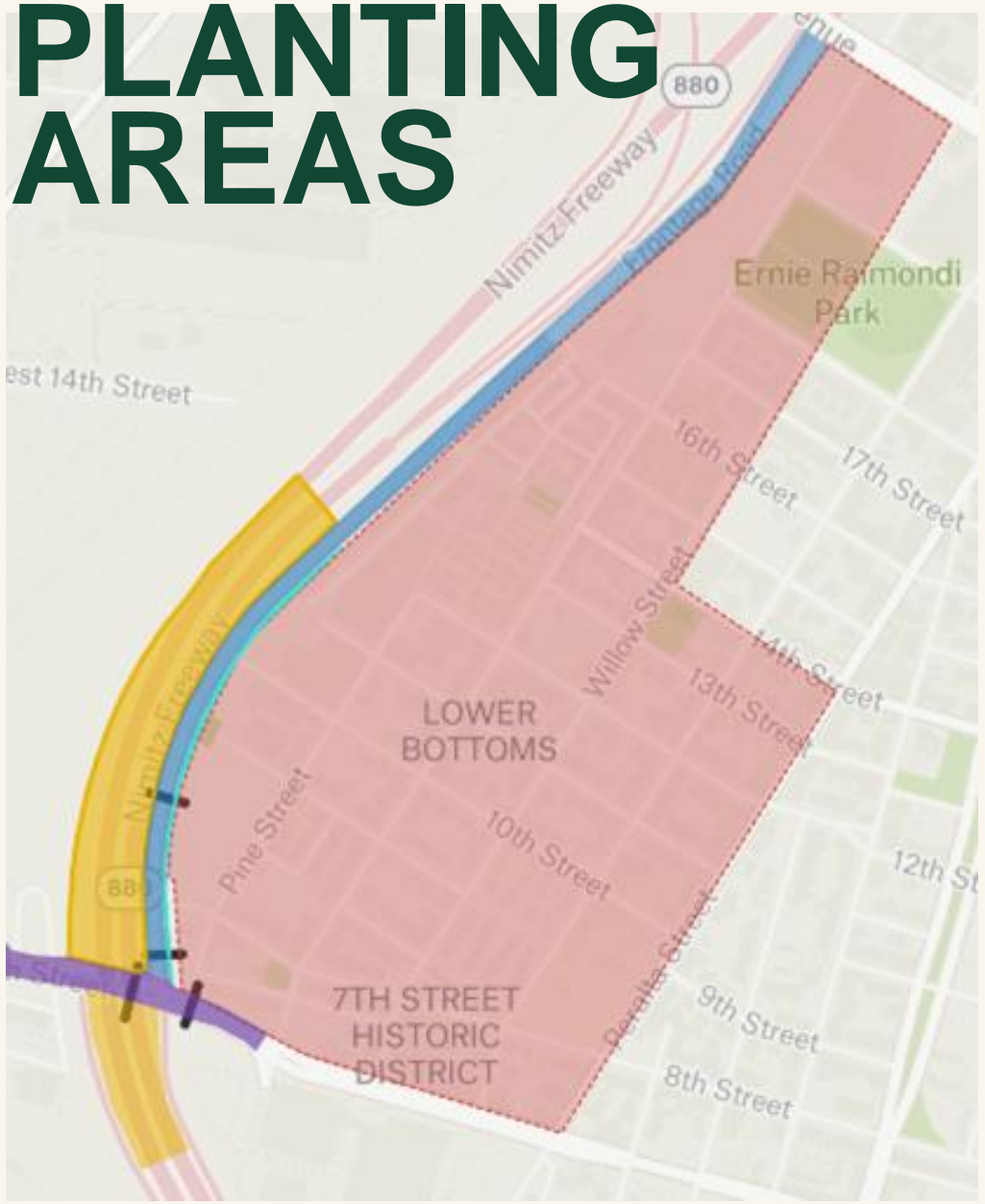
Immediately Plantable

Caltrans Planting

7th Street

Frontage Road Diet
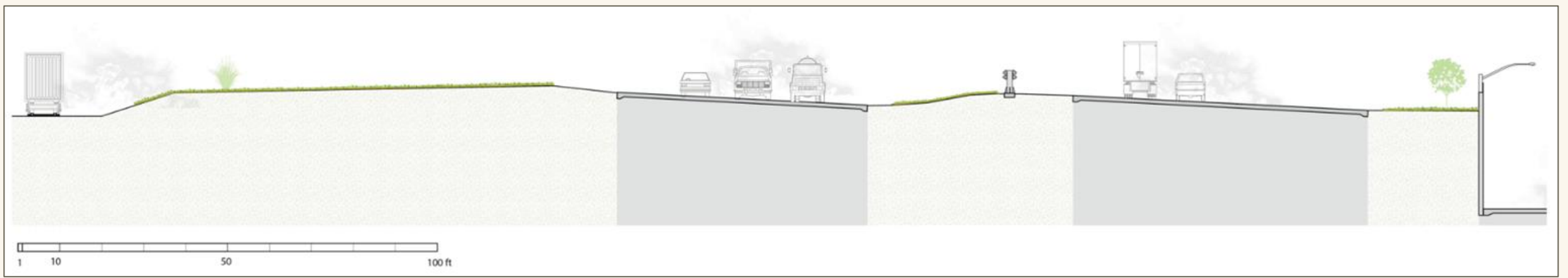
Caltrans Freeway ROW - Existing
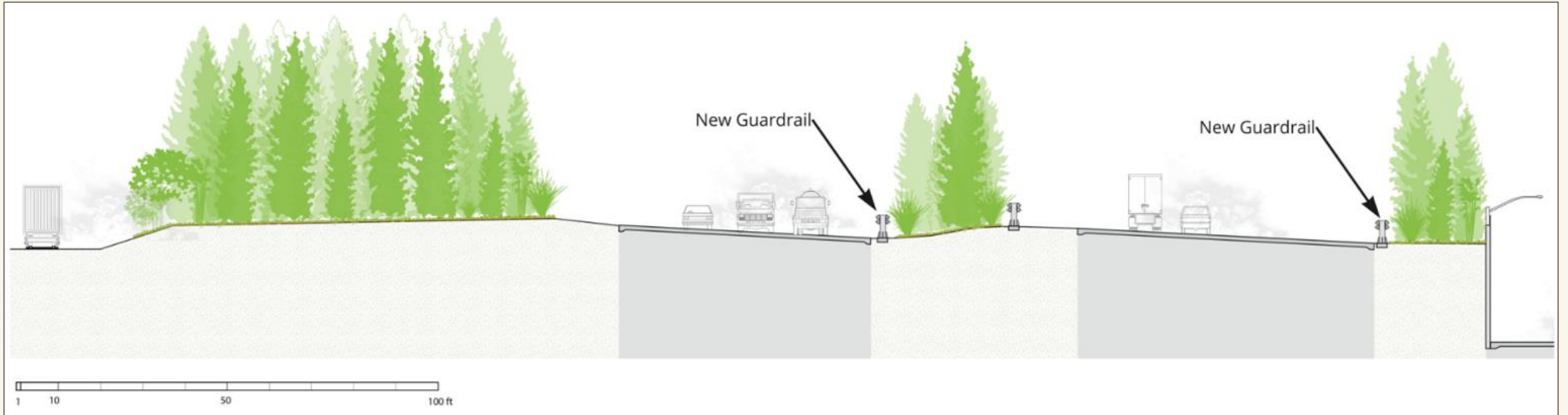
Caltrans Freeway ROW - Proposed

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Existing

Proposed

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Option to have planters be replaced by turn lanes where necessary

Exploring different buffer sizes and placements

Exploring lane reduction

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Existing Vegetation
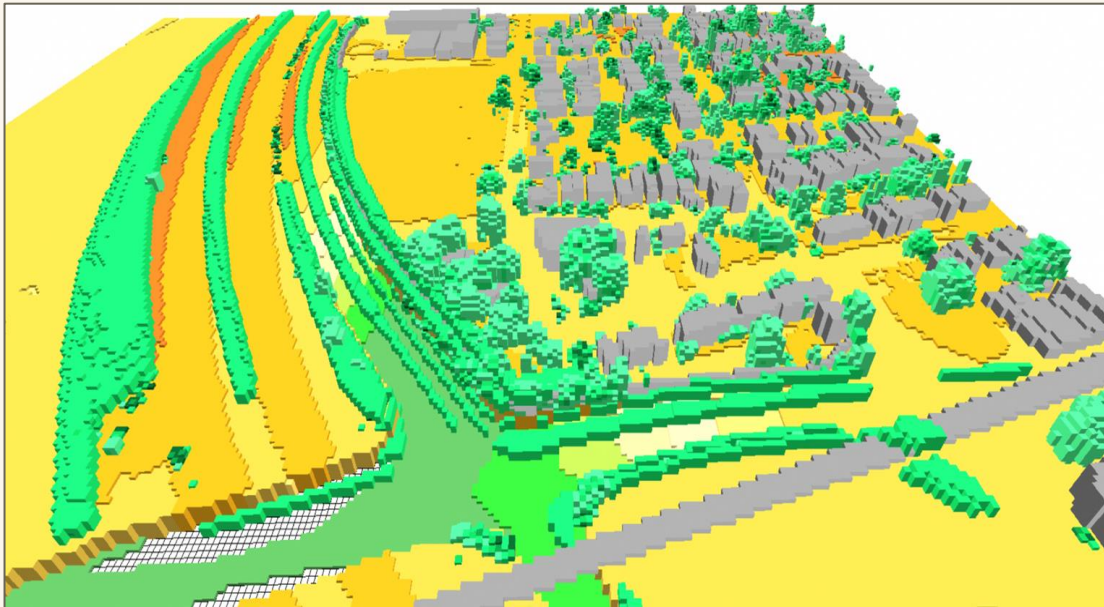
Adding in proposed vegetation

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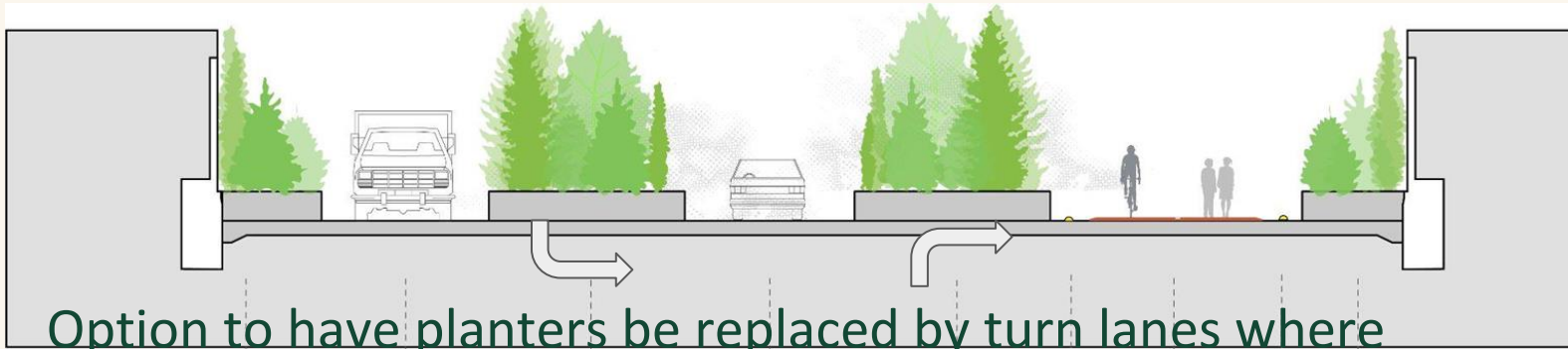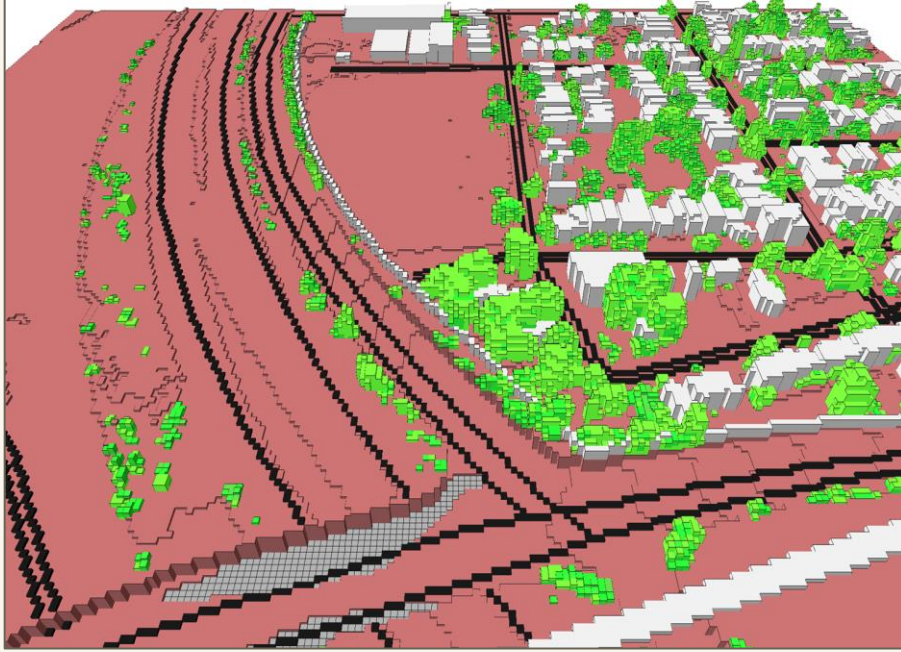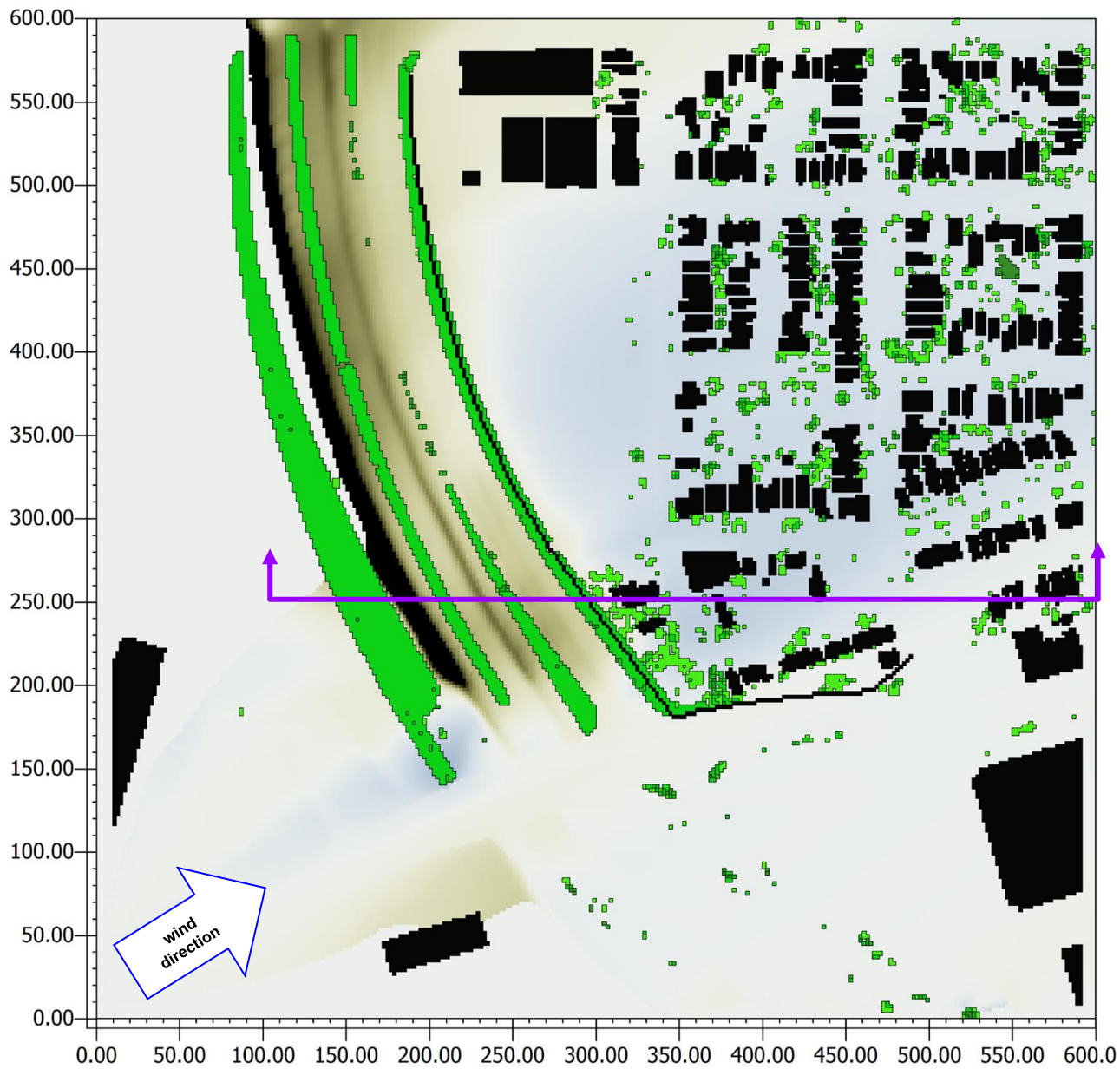# Simulation of Pollution Removal

Bluer areas are where the pollution is better than existing

Darker areas are where pollution is worse

relative difference PM0.015 Concentration

<	-30.0 %
	-20.0 %
	-10.0 %
	0.0 %
	10.0 %
	20.0 %
	30.0 %
	40.0 %
	50.0 %
	60.0 %
	70.0 %
	80.0 %
	90.0 %
>	100.0 %

Min: -25.3 %
Max: 2717.2 %

98%-Percentile 63.9 %

wind direction

N

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Cross section view
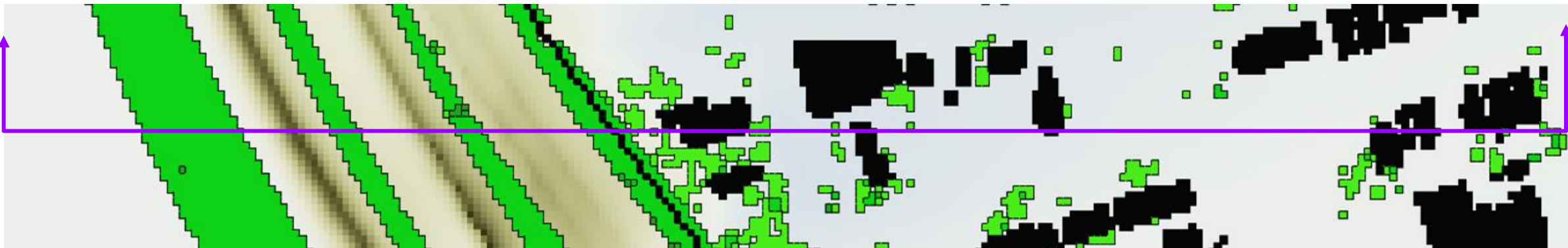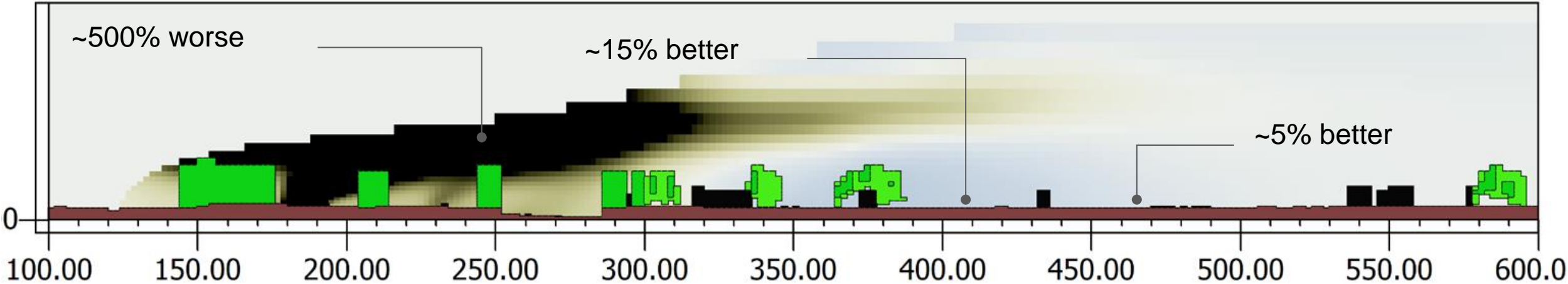
What things should we can choose to prioritize in designing the place we live?

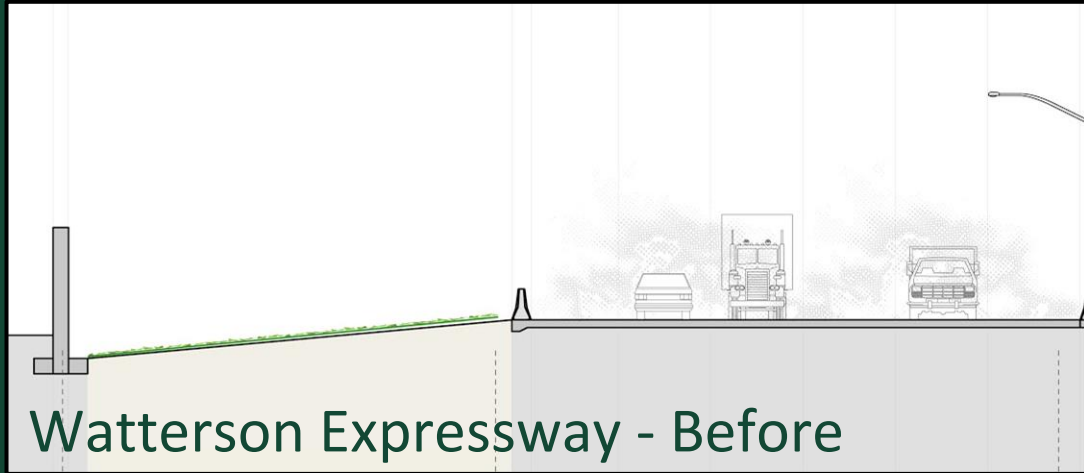**Habitat**   **Stormwater**   **Aesthetics**   **Road safety**
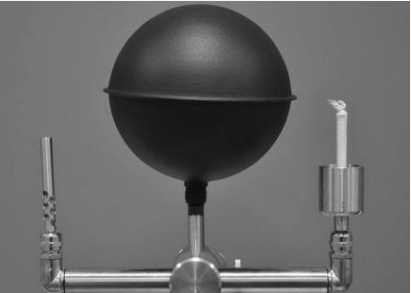
Implementation
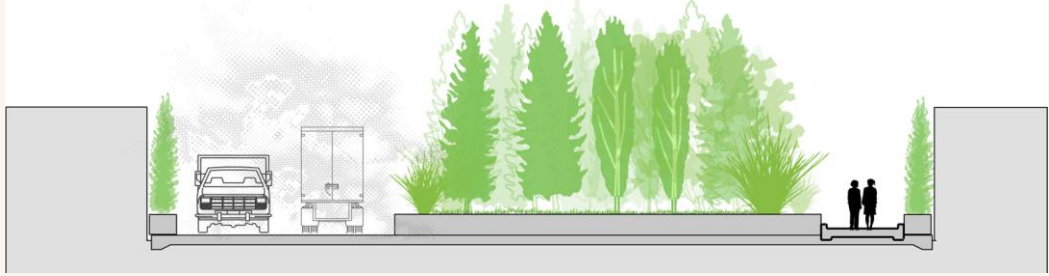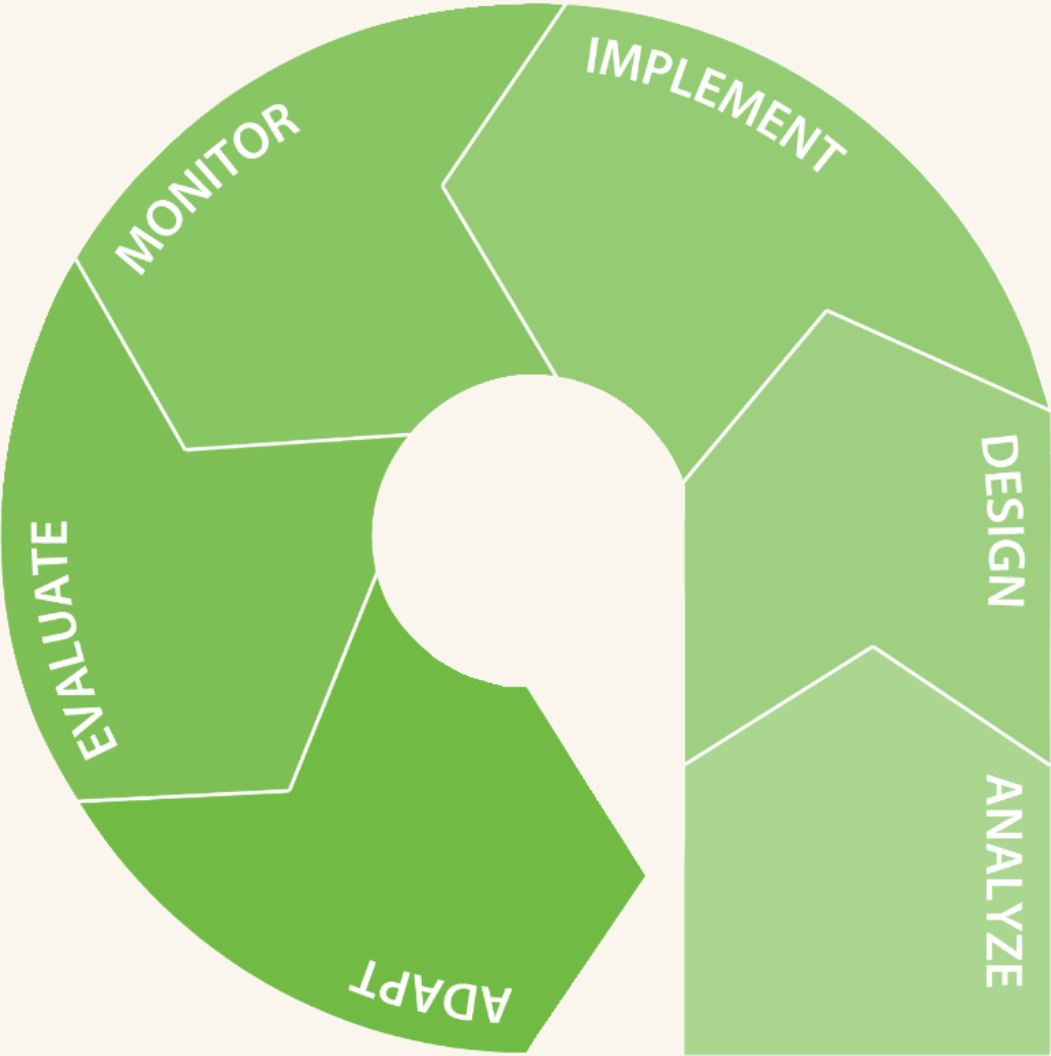

Watterson Expressway - Before
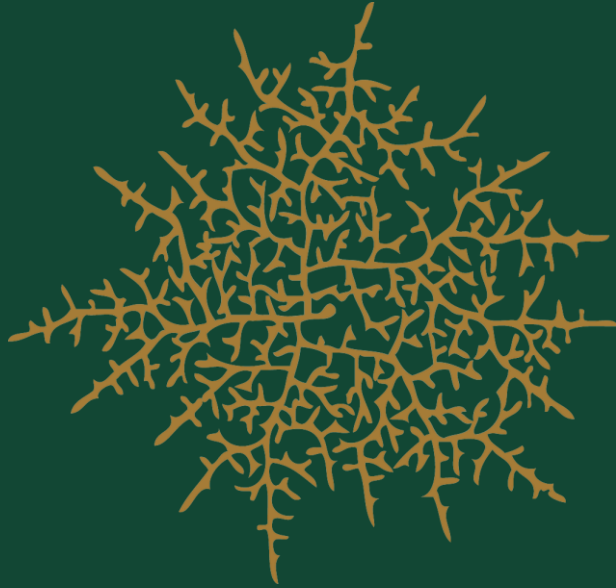
Watterson Expressway - After

Watterson Expressway Planting

During Planting

After Planting

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Summary

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MONITOR

IMPLEMENT

EVALUATE

DESIGN

ADAPT

ANALYZE

Thank you.

mei@hyphae.net

CEUs

Modeling Solutions for Extreme Heat and Air Quality

Speakers:

Mei Visco

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Sign-in sheets for Society of American Foresters (SAF) CFE credits are available at the registration desk post conference.

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