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FINAL REPORT

CITY OF VERNON

TREE CANOPY PRIORITIZATION



Loyola Marymount
University
Center for
Urban Resilience

SEPTEMBER 2022

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AUTHORS & ACKNOWLEDGMENTS

Acknowledgments

This project was a collaboration between the Gateway Cities Council of Governments, the Loyola Marymount University (LMU) Center for Urban Resilience, TreePeople, and the City of Vernon, and was supported by funding from the California Resilience Challenge. The parcel-level tree canopy assessment data produced by Galvin et. al (2019) was a fundamental part of this project.



Thank you, Vernon!

We are grateful to all of the participants from the City of Vernon who helped plan and participate in the tree summit. We hope this project helps you in further growing Vernon's urban forest.

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EXECUTIVE SUMMARY

The Loyola Marymount University Center for Urban Resilience, TreePeople, and the Gateway Cities Council of Governments partnered to conduct tree canopy prioritization in the City of Vernon. This process utilized high resolution, high accuracy tree canopy data as a foundation to engage the public in identifying their priorities for tree planting in the city. Analysis of tree canopy data showed that the City of Vernon has 2% existing tree canopy cover, which is the lowest tree canopy cover in all of Los Angeles County. The analyses also found that Vernon has great opportunity to increase its tree canopy, with 51% of the land area of the city shown to be Possible Tree Canopy. However, given Vernon's unique designation as an industrial city, much of the possible area is in places with impervious surfaces, such as concrete or asphalt, that would require modification to be a good place for trees.

The project partners held a series of planning meetings with the City of Vernon and conducted multiple forms of outreach to engage City, business and community participation. One event was a hybrid "Vernon community roundtable," which took place on March 16, 2022 at Vernon City Hall and via Zoom. Participants were presented with the numerous ways that their city could benefit from increased tree canopy, engaged in a discussion and an interactive activity about their personal experiences and values around trees, and were invited to take a survey to choose their top ten priorities for tree planting.

Approximately 35 people attended the community tree roundtable, and many others were reached through TreePeople's presentations at the Green Vernon Commission and Vernon Business Breakfast, a fruit tree distribution event, and direct email outreach. A small number (12) of those reached chose to participate in the survey, with the majority (83%) of respondents indicating that they were employees of the City of Vernon. Respondents had the opportunity to vote to prioritize 16 specific tree benefits across seven categories. Participants identified "Reduce Heat," "Beautify Neighborhoods and Promote Outdoor Activities," and "Improve Air Quality & Reduce Noise" as their top priority categories for tree planting. Among the specific benefits, the highest priorities were Heat, Low Tree Canopy, Air Quality, Pedestrian Routes, and Schools. Each of the benefits voted on by participants was associated with a spatial variable (e.g., "Heat" was associated with high-resolution surface temperature data available through NASA).

Using the results from the survey, priority weightings were calculated for each spatial variable at the parcel level. These rankings were mapped to provide a visual of where participants' combined priorities are located. The results revealed that many of the highest tree planting priority parcels for Vernon were in the southwestern, and north and south central parts of the city, as well as east of the LA River. Many of the lowest priority parcels were found in the northeastern and central parts of the city. In addition to the maps, tables were produced to provide rankings for each individual parcel in the Possible Tree Canopy boundaries. This dataset includes a comprehensive listing of nearly parcels in the City of Vernon, along with their priority score and percent of possible area for increasing tree canopy.

The survey also asked participants about their perceptions of tree planting and care in Vernon. All but one participant agreed that planting more trees is a priority, though 1/3 believed there are barriers to planting and taking care of the trees in Vernon. Participants named concerns about existing infrastructure and industrial operations, such as: big rig trucks, power lines, underground utilities, too much concrete, and small sidewalks. Barriers to tree care included: lack of watering, trash/pollution, and overall lack of care.

This project can help guide the City of Vernon in future urban forestry strategies. The City may look to focus their tree planting efforts in high priority locations that are near to existing, new, or planned residential developments. The City may also consider educational campaigns and incentives to reach out to specific landowners to increase tree canopy on private lands. Finally, the City may wish to pursue funding programs to help replace some of the impervious surfaces with tree canopy.

PROJECT OVERVIEW

Background

The Gateway Cities in Southeast Los Angeles County is a densely-populated region with many under-resourced, low-income, and transit-dependent residents. This population experiences increased vulnerability to extreme heat days and temperatures that are expected to accelerate with climate change. Urban heat can be mitigated with relatively inexpensive nature-based solutions, allowing residents to continue trends toward increased sustainability and usage of active transportation, while protecting public health and critical infrastructure. For example, TreePeople's Los Angeles Urban Cooling Collaborative found that one in four lives lost during heat waves could be saved in Los Angeles if we strategically increase urban tree canopy and cool surfaces, especially in low-income communities and communities of color (de Guzman et al. 2020).

Urban forestry is one strategy to increase cities' resilience. In addition to reducing the urban heat island effect, urban trees can help prevent flooding and runoff, and remove pollutants before water enters rivers and oceans. Trees filter air pollutants, which can improve air quality and produce public health benefits. Increasing the urban forest has also been associated with socio-economic improvements, such as reduced crime and improved social interactions (NRC 2013).

Many of the benefits that trees provide are correlated with the size and structure of the tree canopy, which is the layer of branches, stems, and leaves of trees that cover the ground when viewed from above. Recognizing these benefits, numerous cities have goals to increase tree cover, which often come without implementation plans or considerations of equity. Including community stakeholders in planning and using accurate data to inform decision-making is a way to increase the success of urban forestry programs and thus the resilience of communities.

Loyola Marymount University's Center for Urban Resilience, TreePeople, and the Gateway Cities Council of Governments partnered with the City of Vernon to conduct a community-based tree planting prioritization process with residents, business owners, and other city stakeholders. This follows an established approach (Locke et al. 2011) that has previously been implemented in the Cities of Commerce, Lynwood, and Paramount (LMU CUREs & TreePeople 2019, LMU CUREs et al. 2020, 2021). Participants were able to vote on the benefits of trees most important to them individually, and then this information was compiled to produce a collective map of priority locations for tree planting.

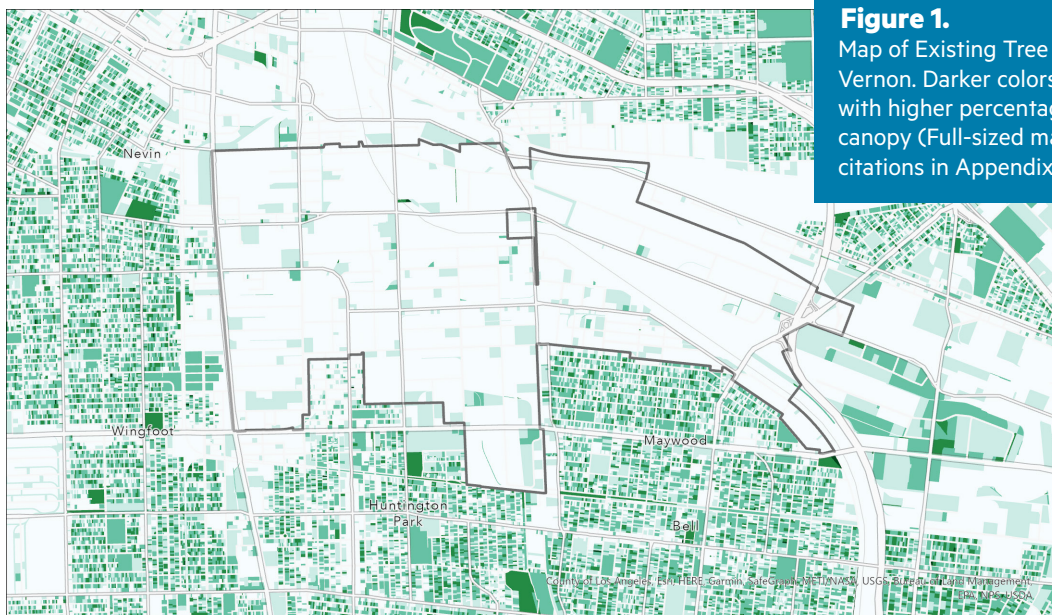


Figure 1.

Map of Existing Tree Canopy for Vernon. Darker colors are associated with higher percentages of tree canopy (Full-sized map with data citations in Appendix)

PROJECT OVERVIEW

Tree Canopy Data

Data acquired from the Los Angeles County Tree Canopy Assessment (Galvin et al. 2019) were used to provide a baseline understanding of the existing and possible tree canopy. This countywide assessment combined 2016 spatial imagery and LiDAR data to produce an 8-category land cover analysis (Figure 2) from which the tree canopy assessment could be derived.

The tree canopy assessment is a parcel-level analysis of both *Existing* (the land currently covered by tree canopy) and *Possible* (the land area where it is possible to plant new trees—excluding roads, buildings, etc.). An example of how this is mapped is shown in Figure 3.

Possible Tree Canopy combines *Possible Vegetated* and *Possible Impervious*. The Possible Vegetated area includes grass and shrub areas where it may be possible to plant new trees, and the Possible Impervious includes asphalt or concrete surfaces, other than roads or buildings, where it may be possible to plant new trees if improvements are made.

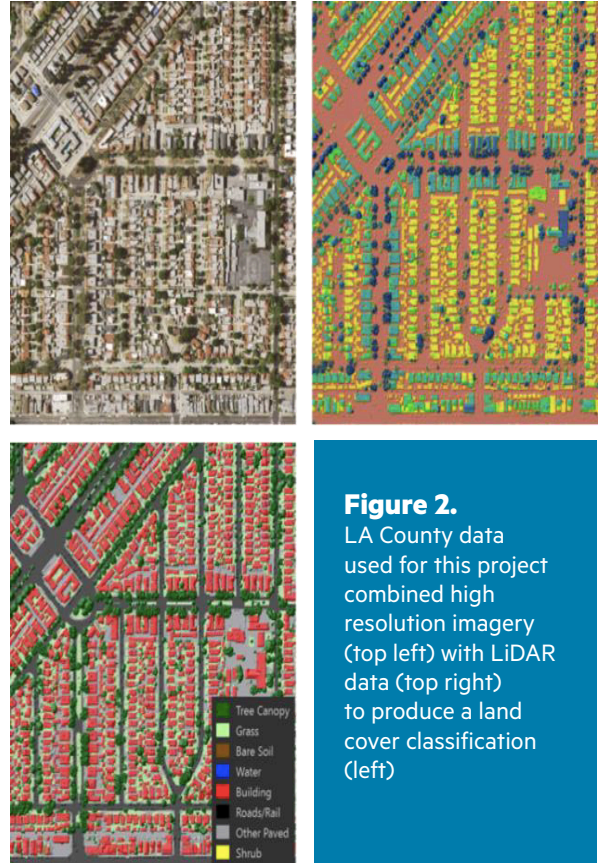


Figure 2. LA County data used for this project combined high resolution imagery (top left) with LiDAR data (top right) to produce a land cover classification (left)

Figure 3. An example of tree canopy cover calculated at the property parcel level



PROJECT OVERVIEW

Vernon's Environment

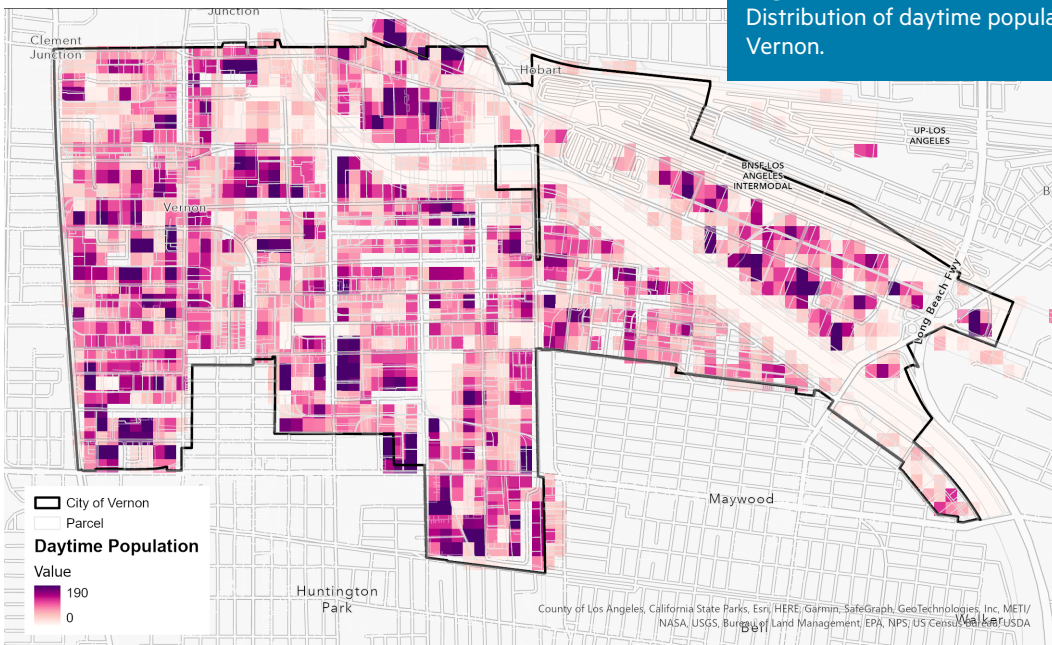
The City of Vernon is located on 5.16 square miles in southeast Los Angeles County, CA. The City is zoned entirely for industry and is considered the industrial engine of the Gateway Cities region, with businesses ranging from food to metalworking. While Vernon has a small residential population of 222 residents, the City has a daytime, employee population of approximately 40,000 (Figure 4).

Vernon has the highest amount of greenhouse gas (GHG) emissions in the region and has one large stationary source that is regulated by the state's Cap-and-Trade program. Information from the California Communities Environmental Health Screening Tool (CalEnviroScreen 4.0) shows that the majority of Vernon is classified in the highest category of pollution burden, ranked at 98%, meaning that residents and workers of these communities are most affected by many sources of pollution and are especially vulnerable to pollution's effects (CalEPA OEHHA 2021).

The City's one Census tract has the lowest tree canopy cover (2%) in all of LA County. Increasing Vernon's tree canopy is one way to help mitigate some of the impacts of environmental burdens.

The Green Vernon Commission is "intended to provide a forum for addressing the public's concerns related to sustainability and energy efficiency issues." Recent initiatives presented at Commission meetings include Vernon Public Utilities Electrification Strategic Plan, the construction of a City park, and the recommendation that the City should adopt a Mandatory Organic Waste Disposal Reduction Ordinance. Vernon's Public Works Department has a number of resources to further the City's sustainability efforts, such as the 2017 Bicycle Master Plan and expedited permits for solar panels.

Figure 4. Distribution of daytime population of Vernon.



Daytime population of City of Vernon (90-meter resolution)

Data source: LandScan USA population
<https://landscan.ornl.gov/>
 Resolution: 90 meters (98.4 yard)

PROJECT OVERVIEW

Vernon’s Tree Canopy

As shown in Figure 5, Vernon was found to have just 2% of its land area covered by Existing Tree Canopy (see Figure 1 on page 4). For comparison, the County of Los Angeles was found to have 18% average tree canopy cover and the Gateway Cities were found to have 15% average tree canopy cover.

The analysis also showed that 47% of the land area was deemed “not suitable,” meaning that tree planting cannot occur — typically roads, rails, or buildings are found in not suitable areas. The remaining 51% of the land area was found to be Possible Tree Canopy. Given the built out nature of the City of Vernon, most of the Possible Tree Canopy layer is Possible-Impervious, meaning that some modification of hardscaping may need to occur to plant trees in these areas. Figure 6 shows how the Possible-Impervious areas are distributed throughout Vernon.

Figure 5. Tree canopy metrics for Vernon, CA

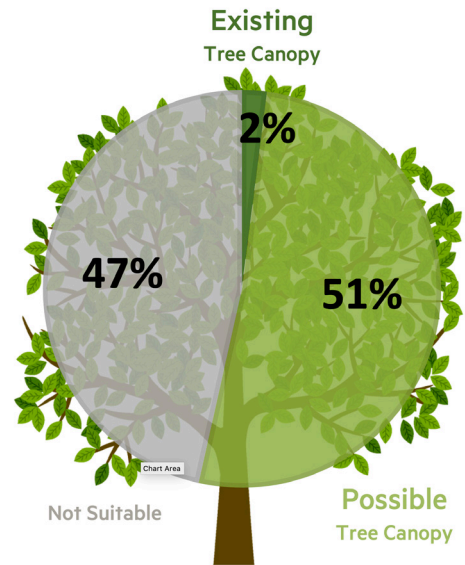
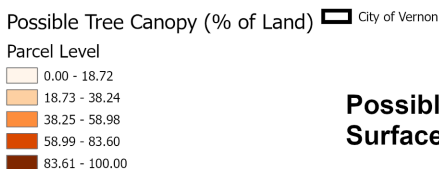
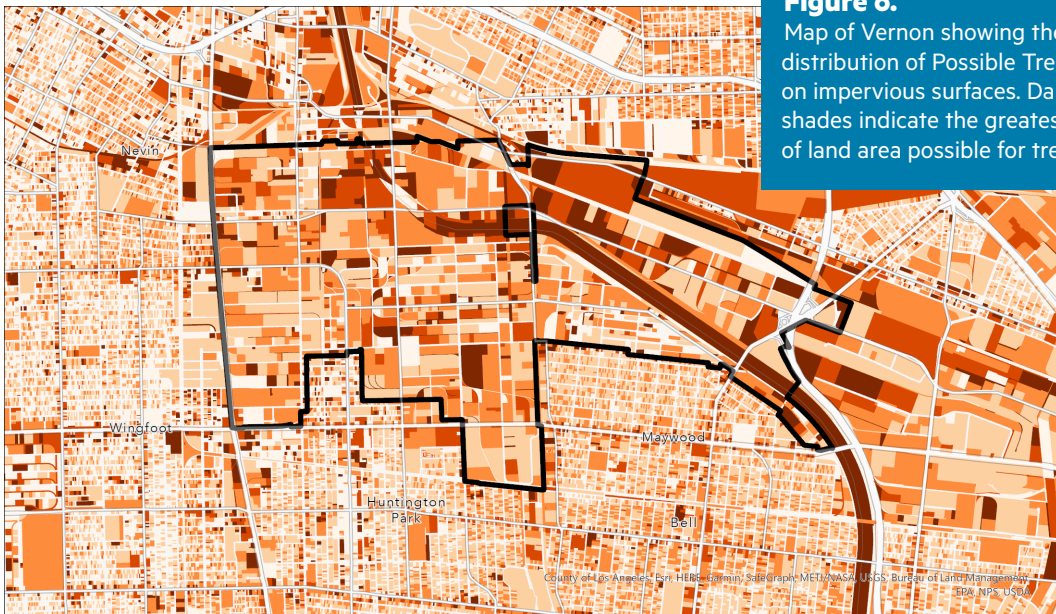


Figure 6. Map of Vernon showing the distribution of Possible Tree Canopy on impervious surfaces. Darkest shades indicate the greatest amount of land area possible for tree planting.



Possible Tree Canopy in Vernon over Impervious Surface (% of Land)

PROJECT OVERVIEW

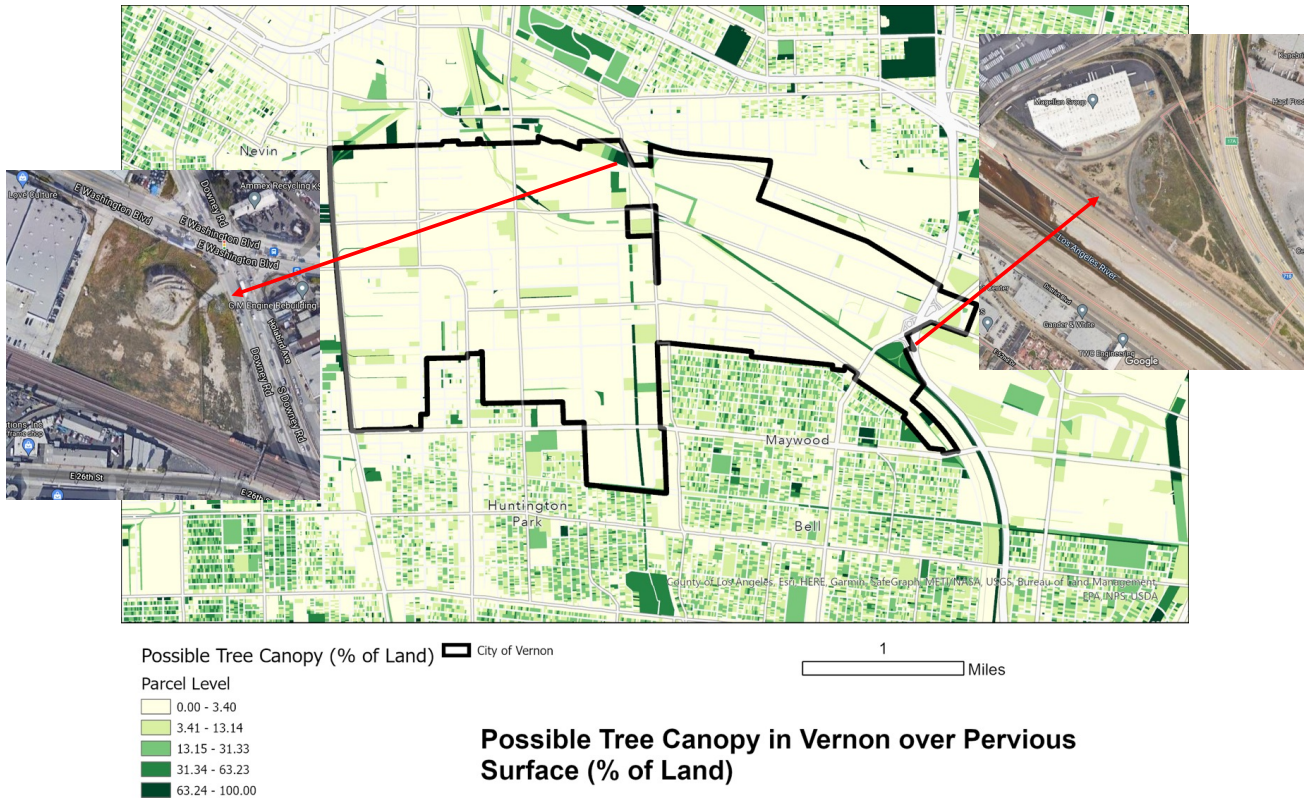


Figure 7. Map of Vernon showing the distribution of Possible Tree Canopy on pervious (vegetated) surfaces. Darkest shades indicate the greatest amount of land area possible for tree planting. Two example locations are called out as highly possible.

Despite the heavily built out character of Vernon, there are some opportunities for tree planting on vegetated, or pervious, land. Figure 7 shows some of the locations that were identified through the tree canopy assessment as Possible-Pervious. In some cases, these locations may be technically possible but not feasible given municipal constraints or community preferences. For example, while utility easements provide open spaces, they may not be desirable locations for increased tree canopy given maintenance requirements.

However, other vegetated or bare soil locations may provide the fewest barriers to planting trees. In Figure 7, some possible locations are called out as potential sites for increasing tree canopy. As stated earlier, these are places identified as possible for planting trees, but it is up to the City of Vernon, property owners, residents, and other stakeholders to determine what are the preferable locations for increasing tree canopy in their city.

PROJECT OVERVIEW

Community-Based Prioritization

The data on Vernon’s Existing and Possible Tree Canopy provided one layer of information about the urban forest. To help the City of Vernon develop priority locations for future tree planting, the project team of LMU CUREs, TreePeople, and the COG partnered with the City to conduct a collaborative tree canopy prioritization process, which consisted of three stages: 1) planning with City partners, 2) public outreach, including a “community roundtable” to gather input on priority locations for tree planting, and 3) development of maps and a report to the City.

The aim of this process was to engage residents and other stakeholders to provide their input on where the City should prioritize areas for increasing tree canopy based on desired benefits: for example, reduced impervious surface, mitigation of flooding, or vulnerable populations. By combining tree canopy data with other spatial data of interest, each participant was able to choose their personal priorities, and see how those compared to the priorities of the group. The final map can be used by the City of Vernon in their decision-making about where to plant future trees. This type of joint knowledge production can contribute to successful implementation of

programs and increased community resilience.

To conduct this process, the project team worked closely with the City of Vernon. Due to the COVID-19 pandemic, all meetings and most community engagement occurred virtually. Three meetings were held from August to December 2021 with City staff from the department of Public Works. The goals of these meetings were to better understand the history of urban forestry in Vernon; to gain insight on the urban forestry goals and current priorities; and to hear any concerns or other information that could help guide the project. The content of these meetings served to inform development of community engagement plans and the Vernon Tree Canopy Survey.

Community engagement occurred from March through May 2021. This effort was led by TreePeople and included presentations to the Green Vernon Commission and the Vernon Business Breakfast, a free fruit tree distribution event, direct email to Vernon businesses, and social media posts shared by the City of Vernon. Finally, a community roundtable event was held at City Hall and via Zoom on March 16, 2022 (Figure 8).



Figure 8.

Screen capture from the hybrid Vernon community tree canopy event.

PROJECT OVERVIEW

Vernon Tree Canopy Event

The public tree canopy event was held on March 16, 2022 at Vernon City Hall and online via Zoom. Project partners promoted the events through their websites and social media channels, and TreePeople offered a free fruit tree to those who attended to incentivize attendance. The tree summit was led by TreePeople and LMU CUREs, and included a welcome from the Gateway Cities Council of Governments. Goals of the event were to introduce the project to the public, to discuss the value and benefits of tree canopy, and to survey participants on their priorities for increasing tree canopy in Vernon. Participants were guided through an icebreaker in which

they were given the opportunity to identify an important tree in their life (Figure 8).

Participants were then directed to the Vernon Tree Canopy Survey, where they could choose their priorities for tree planting (Figure 9). Members of the project team were available to answer any questions for the approximate 5-10 minute duration of the survey. The tree canopy survey was offered in both English and Spanish, and was shared by TreePeople at additional community engagement events following the City Hall meeting to encourage completion. The full survey can be found in the Appendix.

Figure 9.
List of priorities that could be chosen by Vernon Tree Canopy Survey respondents.

I Want to Plant Trees To...	Specifically, I Want to Improve...	This Means the Tree Planting Team Will...
Beautify Neighborhoods & Promote Outdoor Activities	Low Tree Canopy	Plant trees on streets with few or no street trees, to beautify the city & provide shade for pedestrians.
	Pedestrian Routes	Plant trees along pedestrian routes to promote active transportation and community health.
Improve Air Quality & Reduce Noise	Air Quality Index	Plant trees in areas with the poorest air quality scores to help improve the air quality.
	Toxic Release Sites	Plant trees near facilities that emit toxic pollution to help reduce the impacts of the pollution.
	Major Roads	Plant trees near major roads to help reduce the impacts of the air pollution and noise.
	Industrial Activities	Plant trees near industrial zones to help reduce the impacts of the air pollution and noise.
Increase Equity for Residents	Access to Green Spaces	Plant trees on streets that are further away from parks, to provide residents access to nearby green spaces.
	Population Density	Plant trees where there are the most current residents or where future housing developments are planned.
	Vulnerable Populations	Plant trees in places with the most young children and elderly residents, to provide the benefits of trees to the most vulnerable residents.
Prevent Flooding & Increase Infiltration	Impervious Surface	Plant trees in places with highest amount of concrete, to help reduce the impacts of floods and increase the amount of water that infiltrates the ground.
Protect Critical Community Places	Bus Shelters	Plant trees near bus stops to provide shade for those waiting for the bus.
	Heavily Traveled Areas	Plant trees in places with the highest daytime populations, to provide benefits of trees where people spend most of their day.
	Schools	Plant trees near schools to provide school children with the many benefits of trees.
Reduce Crime	Crime	Plant trees in high crime areas to help discourage criminal activity.
Reduce Heat	Heat	Plant trees in areas with highest surface temperature to reduce heat.

STUDY FINDINGS

Priorities Identified by Participants

The hybrid community event was attended by approximately 35 people, but only 12 individuals chose to take the survey. Most (10) of the respondents were employees of the City of Vernon, with two community members responding.

Participants were given a list of 17 possible tree benefits to choose from when identifying their priorities for tree planting. The benefits listed were not a comprehensive list of all the possible benefits of trees; rather, they were carefully chosen for their applicability to the City of Vernon.

Criteria for inclusion were that:

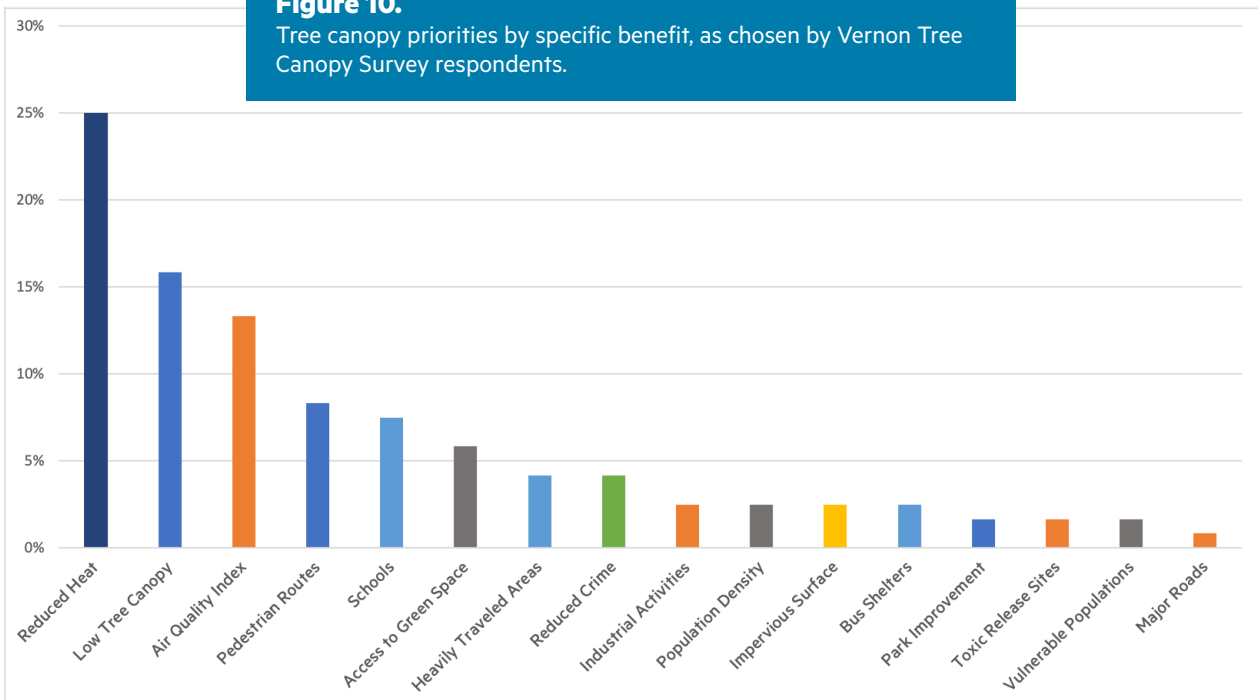
1) The item listed would address a social or environmental challenge faced by those living or working in Vernon.

2) The item listed was able to be mapped at a fine resolution so that priorities could be calculated and shown on maps.

The 17 benefits were grouped into 7 categories: Beautify Neighborhoods & Promote Outdoor Activities, Improve Air Quality & Reduce Noise, Increase Equity for Residents, Prevent Flooding & Increase Infiltration, Protect Critical Community Places, Reduce Crime, and Reduce Heat (see Figure 8 and Appendix).

Each participant was given 10 votes, and these could be distributed however the survey taker deemed appropriate. Thus, all 10 votes could be used for one benefit, the votes could be evenly distributed among 10 separate benefits, or some combination therein.

Figure 10. Tree canopy priorities by specific benefit, as chosen by Vernon Tree Canopy Survey respondents.



STUDY FINDINGS

When the survey results were analyzed by *specific benefit*, responses from the 12 surveys showed that participants most frequently identified Reduced Heat as the highest priority. This is followed by Low Tree Canopy, Air Quality, Pedestrian Routes, and Schools. Figure 10 shows how the specific benefits were prioritized.

When summarizing by *category*, the priorities follow a similar pattern. The highest priorities for tree planting were Beautify Neighborhoods and Promote Outdoor Activities (26%) and Reduce Heat (25%). Together, these two categories received half of the votes, followed by Improve Air Quality and Reduce Noise with 18% of the votes, Protect Critical Community Places with 14% of the votes, Increase Equity for Residents (4%), Reduce Crime (4%), and Prevent Flooding and Increase Infiltration (3%). Figure 11 shows how the votes were distributed for each category.

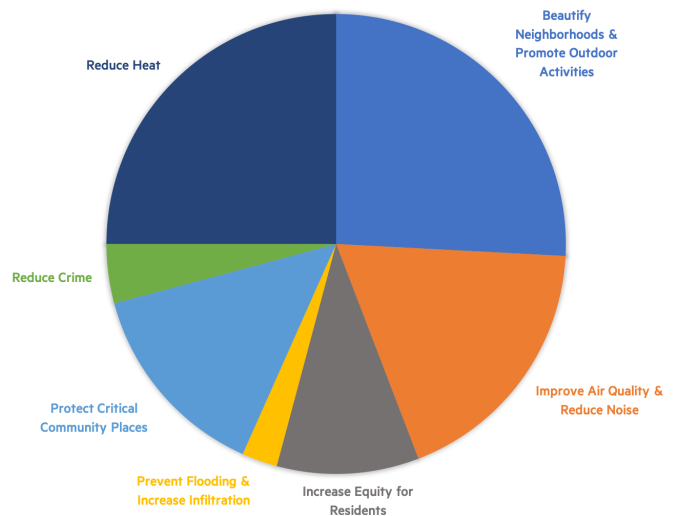


Figure 11. Tree canopy priorities by category, as chosen by Vernon Tree Canopy Survey respondents.

Map of Priorities

The priority data collected from the survey were then combined with the tree canopy data to develop maps and tables of priority locations for planting. As mentioned earlier, each priority had an associated spatial variable that could be mapped at a fine resolution. Data were acquired for each of these variables. For example, for Heat, surface temperature data was acquired from NASA's ECOSTRESS program. For bus shelters, LA Metro maps were used.

Each variable was given a different weighting to account for the information gathered from the survey. Heat was weighted the highest and Vulnerable Populations and Major Roads were weighted the lowest. The weighted priority variables were processed in an ArcGIS model to produce a map of areas where tree summit participants collectively prioritized planting trees. Figure 12 on the next page shows the overall

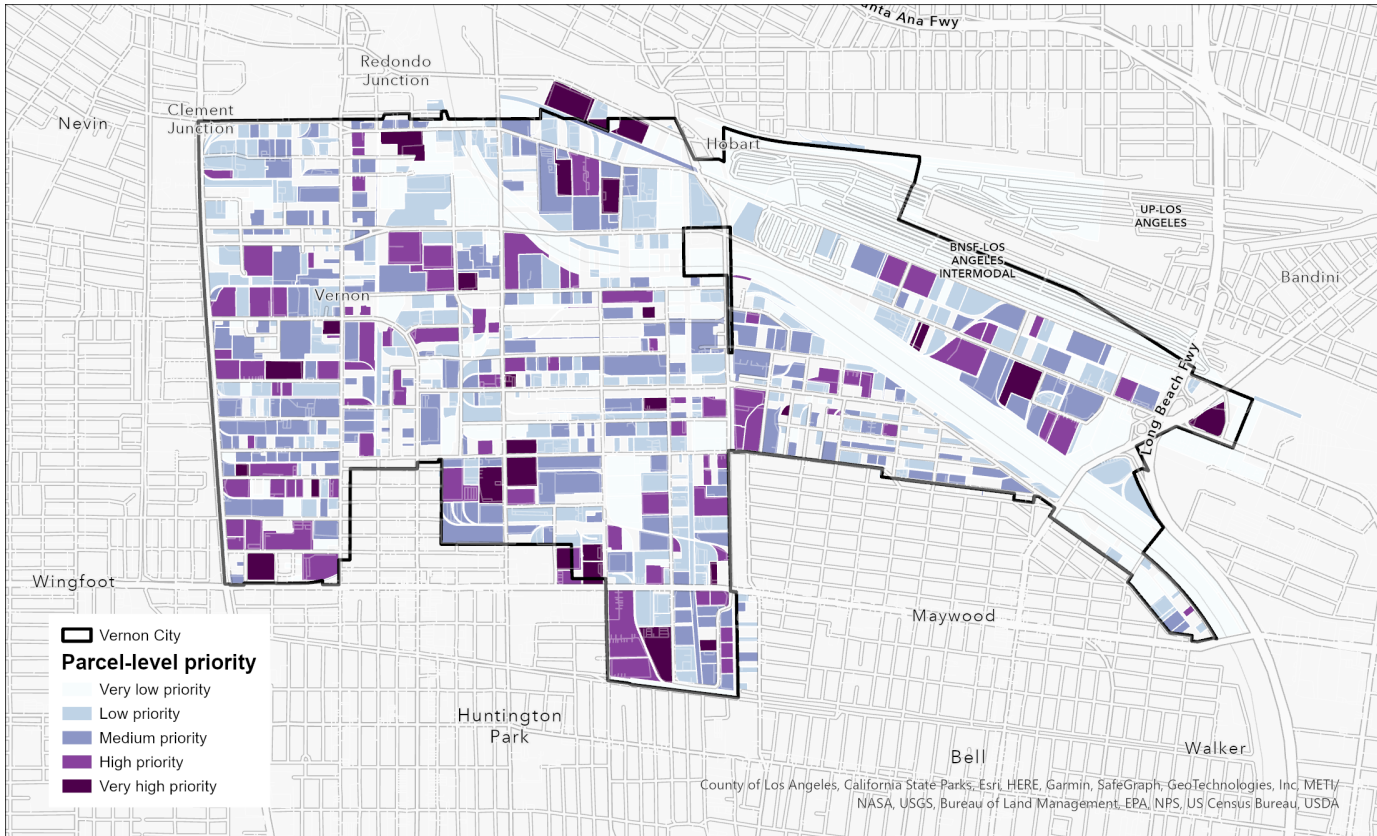
priority map for increasing Vernon's tree canopy, at the parcel level. As shown, while there are high priority parcels throughout the City, many of the high priority parcels for planting trees are in the southwest, north and south central parts of the Vernon, as well as east of the LA River. The lowest priority areas are found in the northwestern and central parts of Vernon.

This priority map can be used alongside the Possible Tree Canopy maps (Figures 6 and 7) to determine best places for tree planting. In addition to the maps, a table was created to provide a comprehensive listing of the priority scores for planting locations for all parcels in the City of Vernon. These are provided in an Excel file along with this report (see Appendix) and can help to guide future plantings by the City.

STUDY FINDINGS

Figure 12.

Final prioritization map of the results from the Vernon Tree Canopy Survey. Collective responses from participants showed their highest and lowest priority parcels for planting trees in the City of Vernon.



Tree planting priority at parcel level for City of Vernon

Credits: University of Vermont Spatial Analysis Laboratory, SavATree Consulting Group, Los Angeles Regional Imagery Acquisition Consortium (LARIAC), Los Angeles County GIS Portal.

STUDY FINDINGS

Perceptions of Urban Forestry in Vernon

In addition to identifying priorities, the survey asked about perceptions of tree planting and care in the City of Vernon. Respondents were given a set of statements regarding the importance of tree planting in Vernon, and barriers that are faced by urban forestry in the city.

Respondents ranked this series of statements on a scale from 1 to 5, where 1 was strongly agree and 5 was strongly disagree. As shown in Figure 13, nearly all participants chose Strongly or Somewhat Agree that the city should make Vernon greener by planting more trees. When asked whether there were barriers to planting and taking care of trees in Vernon, respondents were evenly split, with one-third agreeing that there are barriers, one-third disagreeing, and the final third neither agreeing nor disagreeing.

Those who agreed that there were barriers were asked to provide specific examples in a write-in response. Of those who chose to list barriers, they mostly identified concerns about existing infrastructure and industrial operations, such as: big rig trucks, power lines, underground utilities, too much concrete, and small sidewalks. Barriers to tree care included: lack of watering, trash/pollution, and overall lack of care.

Three participants also provided final remarks, including one participant stating “Bring them here, it’s hot,” one participant seeking advice on where to plant trees and soil contamination, and the third commenting on the positive impact they anticipate trees will bring to Vernon, despite some expected challenges.

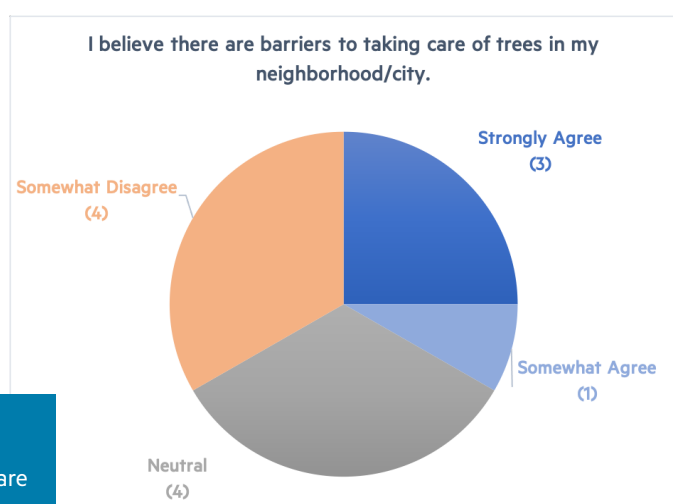
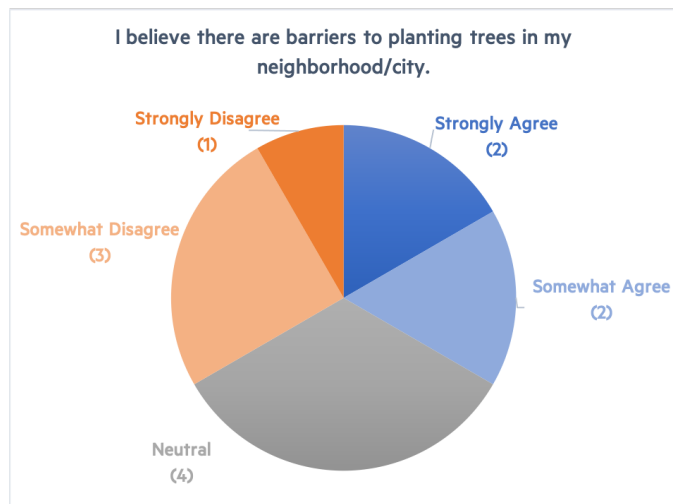
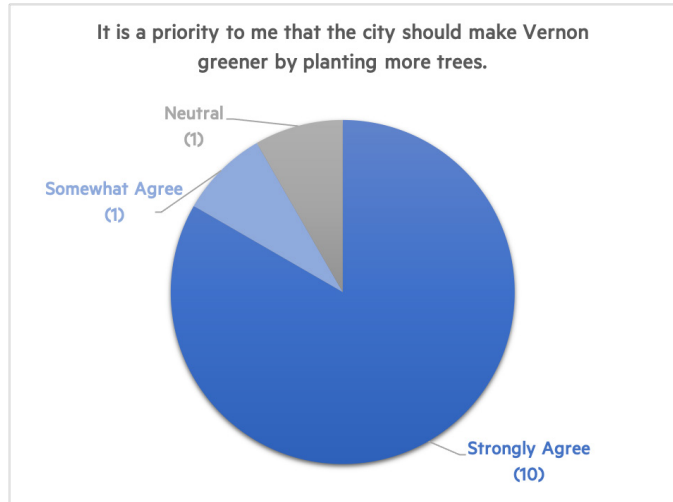


Figure 13. Responses to the Vernon Tree Canopy Survey questions about perceptions of tree planting and care in the city.

SUMMARY & NEXT STEPS

Next Steps

This report shows that the City of Vernon has great opportunity to increase its tree canopy, which at 2% is currently the lowest in all of Los Angeles County. Analysis of the tree canopy data showed that 51% of the land area of the city may be feasible for planting trees. Through the community-based prioritization process, a map was produced displaying the highest and lowest priority parcels for tree planting. This spatially represents the most chosen benefits of trees for survey participants, including Heat, Low Tree Canopy, Air Quality, Pedestrian Routes, and Schools.

As a city zoned exclusively for industry, Vernon faces unique challenges and opportunities compared with other cities in the region. While industrial activities can further the need for trees, the amount of impervious infrastructure leaves little room for them. On the other hand, industrial activities also require large parcels, meaning the decisions of a small number of landowners to plant trees can have a large impact on the city overall.

In the near to medium term, the results can help the City of Vernon focus their planting efforts. By utilizing the Possible Tree Canopy maps alongside the Priority map, City leaders can pursue planting in high priority parcels that also score high on the Possible Tree Canopy - Vegetated map. This may involve reaching out to private property owners through educational campaigns and incentive programs. While hundreds of stakeholders were reached through this project, only 12 chose to

take the Tree Canopy Survey. Thus, gathering additional input from community members would be desirable.

In the longer term, this report and the associated tools can aid in furthering urban forestry planning and initiatives in the city. It is notable that the majority of Possible Tree Canopy is covered by impervious surfaces, and that Land Availability was recognized by many respondents as a barrier to planting more trees. Vernon may consider pursuing state or other funding sources to provide incentives for businesses to replace some of these surfaces with vegetation, including trees.

Vernon's prioritization is part of a regional effort by the project team to conduct prioritizations in the cities of Commerce, Lynwood, Paramount, and Montebello. The work in Vernon adds to this Gateway Cities initiative.

The prioritization approach allowed for the use of a high resolution, high accuracy assessment of tree canopy in the City of Vernon as a foundation of a data-driven community engagement process. This helped to increase community awareness of the importance of urban trees; involve Vernon businesses, City staff, and residents in decision-making regarding the urban forest; and provide maps and other information that can support the city to grow its urban forest. Together, this approach can contribute to a greater sense of stewardship for the trees in Vernon and have an impact on the long-term success and resilience of urban forestry efforts.

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City of Vernon website

ESRI Living Atlas

LandScan USA

Los Angeles County GIS Portal

Los Angeles Regional Imagery Acquisition Consortium (LARIAC)

NASA SEDAC

SavATree Consulting Group

SCAG Open GIS Portal

University of Vermont Spatial Analysis Laboratory

U.S. Census American Community Survey

APPENDIX

Project Team List

Map 1: Existing Tree Canopy in Vernon

Map 2: Possible Tree Canopy in Vernon - Impervious

Map 3: Possible Tree Canopy in Vernon - Pervious

Map 4: Tree Canopy Priority Map for Vernon

Vernon Tree Canopy Survey (English & Spanish)

DATA FILES

Excel: Table of Parcels with Tree Canopy Prioritization Score

KMZ: Vernon Parcel Level Tree Canopy Prioritization



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