Urban Forestry

Tree Planting Prioritization

Prepared by Alan Halter

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Need

Trees provide benefits by removing air pollution, enhancing water quality, sequestering carbon, intercepting rainfall, and mitigating the urban heat island effect, among other services.[1] In order to continue receiving these benefits from trees, we must plant our urban spaces in the face of natural senescence, urban development, and natural factors such as drought. The planting of trees can be planned in such a way that citizens reap the most benefits in areas where those benefits are most needed.

Overview

The City of Austin's Tree Planting Prioritization serves as a decision support tool for locating tree planting areas citywide. The tool uses Geographic Information Systems (GIS) and various datasets to identify and prioritize which areas should theoretically receive tree plantings in the near future. Prioritization is based on the following eight broad categories: public health & safety, air quality, environmental justice, water quality, critical places, forest replenishment, forest preservation & development impacts, and urban heat island (see Table 1 on page 2). These eight categories were determined by programmatic interests and academic research, but may easily be tailored depending on data availability and depending on a department's goals. Within each category exists a set of individual "planting factors" to determine where we should plant trees. Each planting factor was included with a specific rationale and each factor contains relevant GIS data related to that rationale.

[1] Nowak et al., 2006; Nowak, 2002; Nowak & Crane, 2002; Cavanagh et al., 2009; Akbari, 2001; Cardelino & Chameides, 1990; McPherson et al., 2005; Dwyer et al., 1992; Rosenfeld et al., 1998

Table 1: Why Should We Plant Trees?

Category	Rationale	Literature Cited
Public Health & Safety	Exposure to trees can improve our health as the lack of trees has been associated with higher human mortality rates. In some instances, the presence of trees is associated with lower crime rates.	Son 2012; White et al. 2011; Donovan & Prestemon 2012; Bell et al. 2008; Mitchell & Popham 2008; Lovasi et al. 2008; Ulrich 1984
Air Quality	Trees improve urban air quality by removing pollutants from the air. Planting trees near high emission areas may reduce air pollution levels.	Nowak et al. 2006; Nowak et al. 2002; Akbari et al. 2001; Geiger 2005; Nowak 2000; Schwab 1992
Environmental Justice	Low income and minority neighborhoods tend to be afflicted by uneven tree distribution across a city. This results in disparities in quality of life as well as the costs and benefits associated with trees.	Flocks et al. 2011; Conway & Urbani 2007; Heynen et al. 2006; Jensen et al. 2004; Pedlowski et al. 2002; Iverson & Cook 2000
Water Quality	Trees planted in areas with high impervious cover may reduce flooding events reducing costs to traditional gray infrastructure. Trees also work to filter pollutants in our natural water systems.	Cappiella et al. 2005; Nowak et al. 2007; Raciti et al. 2006; Beattie et al. 2000; McPherson 2006; Nisenson 2006; Keating 2002; Herson-Jones et al. 1995
Critical Places	Trees planted near where people live and where people frequent may increase the overall wellbeing of people's lives.	Bell et al. 2008; Mitchell & Popham 2008; Lovasi et al. 2008; Ulrich 1984
Forest Replenishment	Trees are planted in areas that can reasonably accommodate their growth. Within these areas, neighborhoods that have not received plantings from the City or local nonprofits, should be next in line for tree plantings.	Raciti 2006; Grove et al. 2006
Forest Preservation & Development Impacts	Preserving existing trees and planting new trees in urban development hotspots can ensure valuable ecosystem services and tree benefits for the community.	Arendt 1996; Sung 2012; Gill et al. 2007; Alvey 2006; Tyrvainen et al. 2005; McPherson et al. 2005; Weng & Shihong 2004; Bolund et al. 1999
Urban Heat Island	Trees lower temperatures of their surroundings and can offset the urban heat island effect.	Akbari et al. 2002; Donovan & Butry 2009; Streiling & Matzarakis 2003; Rosenfeld et al. 1998; Maco & McPherson 2002

Methods

Many of the methods and data types used in this analysis were adapted from other cities' (Baltimore and NYC) planting prioritization techniques developed in conjunction with the U.S. Forest Service.[2] These studies follow a multicriteria decision analysis approach that identifies multiple stakeholder interests in planting trees, finds GIS data that supports those interests, and assigns weights to the data across a geographic area. The following outlines major steps implemented in this report and adapted from the U.S. Forest Service:

1. Identify tree planting factors
2. Identify programmatic interests[3]
3. Acquire GIS data sets associated with planting factors
4. Analyze the data
5. Standardize scores and assign weights according to programmatic interests[4]
6. Calculate final planting priority score

In all, a total of 31 planting factors were considered to derive priority tree planting areas (see Table 2 on page 4). Each factor was quantified, standardized, and totaled creating a planting priority score for each Census tract. Priority scores can range from 0 to 8 with higher scores representing a higher need for tree planting.

[2] Locke et al. (2010), Locke et al. (2013), and Grove et al. (2006)
[3] Programmatic interests were identified through experiential knowledge. Future planting prioritization efforts should gather interests through an engagement process.
[4] Weights were not assigned for this round of analysis. All planting factors were weighted equally.

Table 2: Planting Factors

Category	Planting Factor	Data Set Used in Analysis
Public Health & Safety	• Age dependency ratio (Dependent population / working-age population)	U.S. Census 2010
	• Obesity risk	Travis County Communities Putting Prevention to Work BRFSS Survey
	• Average mortality rate: diabetes	Texas DSHS Center for Health Statistics Death Data 2004-2008
	• Average mortality rate: heart disease	Texas DSHS Center for Health Statistics Death Data 2004-2009
	• Average mortality rate: chronic lower respiratory disease	Texas DSHS Center for Health Statistics Death Data 2004-2010
	• Crime	Crime Incidents 2009-2011
Air Quality	• Average CO emissions	CAMPO Road Emission Projections 2035
	• Average CO2 emissions	CAMPO Road Emission Projections 2035
	• Average NOx emissions	CAMPO Road Emission Projections 2035
	• Average VOC emissions	CAMPO Road Emission Projections 2035
Environmental Justice	• Environmental Justice Areas (Low Income & Minority)	Environmental Justice Traffic Analysis Zones
	• Toxic Release Inventory	EPA Toxic Release Inventory
Water Quality	• % Impervious Surface	Building Footprints 2006; Transportation Features 2006
	• Average water quality score	Watershed Integrity Scores
	• % creek buffers	Creek Buffers
	• % floodplains	Austin Fully Developed Floodplain
Critical Places	• Schools	Schools
	• Hospitals	Hospitals
	• Libraries	Libraries
	• Rec centers	Recreation Centers
	• Health center	Health Centers
	• Nursing home	Nursing Homes
	• Population density (people per square mile)	U.S. Census 2010
Forest Replenishment	• # trees distributed by PARD	PARD Forestry Annual Planting Numbers
	• # trees distributed by NeighborWoods/TreeFolks	NeighborWoods Tree Delivery Numbers
	• Possible planting space	Possible Planting Space
Tree Preservation & Development Impacts	• Tree removals	Tree Removal Permit Points
	• Building permits	Growth Watch
	• Environmental sensitivity	Vacant Land Inventory
	• Imagine Austin growth centers	Imagine Austin Centers
Urban Heat Island	• Average Surface temperature	Landsat 7 satellite imagery

Scoring and Standardizing | In order to prioritize areas for planting, each Census tract needed to be scored based on the 31 raw data sources. Depending on data production and formatting, raw data are measured differently causing complicated issues for analysis. First, raw data is presented in varying geographies. For example, tree removals are reported by points on a map whereas environmental justice areas are reported by Traffic Analysis Zone polygons. Second, raw data is presented with varying magnitudes or ranges. For example, environmental justice is measured by the presence or absence of an environmental justice area within a Census tract whereas tree removal is measured by the aggregate of tree removal permit points found within a Census tract. Therefore, a Census tract may receive a score of 1 because it contains an environmental justice area, and a score of 50 because it contains 50 tree removal permit points within its boundaries. Varying magnitudes cause problems when trying to compare scores across planting factors because unintended weighting results from the nature of how the raw data was originally captured. Finally, directionality of the data is an issue. Depending on the planting rationale some planting factors are intended to be maximized while others are intended to be minimized. For example, trees should be planted in a Census tract with more tree removal permits in order to replenish benefits lost from forest reduction—tree planting should be maximized here. On the other hand, planting efforts should seek to provide new plantings in areas lacking plantings in recent years, so a Census tract receiving recent park tree plantings should receive a lower score—tree planting should be minimized here and maximized elsewhere.

In order to deal with these three issues, raw data was aggregated, disaggregated, and/or geoprocessed such that a score could be derived for each Census tract. In other words, data was transformed from the source data set (e.g. tree removal permit points) to the target

data set (i.e. Census tracts). Next, individual planting factor scores were standardized in order to account for the fact that each planting factor is measured differently. A Linear Scale Transformation[5] method was used to convert raw data scores into standard scores. A standard size, ranging from 0 to 1, was established from each raw data score. The closer the value is to 1, the more attractive that Census tract is for planting trees. The equations shown below were used to calculate standard scores. The first equation was used for maximizing a planting factor. This equation divides the difference between a given raw score and the minimum score for the planting factor by the score range for the planting factor. The second equation was used for minimizing a planting factor. The equation divides the difference between the maximum score and a given raw score for the planting factor by the score range for the planting factor.

Linear Scale Transformation Equations

$$x'_{ij} = \frac{x_{ij} - x_j^{\min}}{x_j^{\max} - x_j^{\min}}$$

$$x'_{ij} = \frac{x_j^{\max} - x_{ij}}{x_j^{\max} - x_j^{\min}}$$

Source: Malczeski, Jacek. (1999). *GIS and Multicriteria Decision Analysis.*

After individual planting scores were standardized, they were summarized by category (i.e. air quality, public health and safety, etc.) and weighted equally by dividing the total category

[5] A disadvantage of the Linear Scale Transformation method is that the lowest standardized value does not necessarily equal 0 nor does the highest standardized value equal 1, making interpretation of minimum and maximum scores difficult.

score by the number of planting factors per category. This ensured that no one category was overly represented. The resulting category scores were summarized to provide an overall planting prioritization score for each Census tract. Scores range from 0 to 8.[6] Census tracts with values closer to 8 mean they are more attractive for tree planting. See page 9 for a map of Census tracts symbolized by planting priority scores. For an interactive online map visit http://austin.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=4aaf662a57fc4c089e7d95c90a59c5f7. See pages 10-13 for a list of Census tracts sorted by their priority score. Tree planting scores are color symbolized according to priority with higher scores in red representing a greater need for tree planting.

Results

The map on page 7 shows priority areas for tree planting. Areas are delineated by Census tracts and color symbolized according to the priority score. Dark red Census tracts correspond to high priority areas where the need for tree planting is greatest and therefore tree planting efforts should be prioritized highest. Dark green Census tracts correspond to low priority areas where the need for tree planting is lowest.

Table 3 shows the top five highest priority Census tracts for tree planting. These high priority tracts are mostly east of IH-35 and are concentrated in north, south, and east Austin. Planting trees within these Census tracts will theoretically yield the broadest benefits for residents and citizens frequenting these areas.

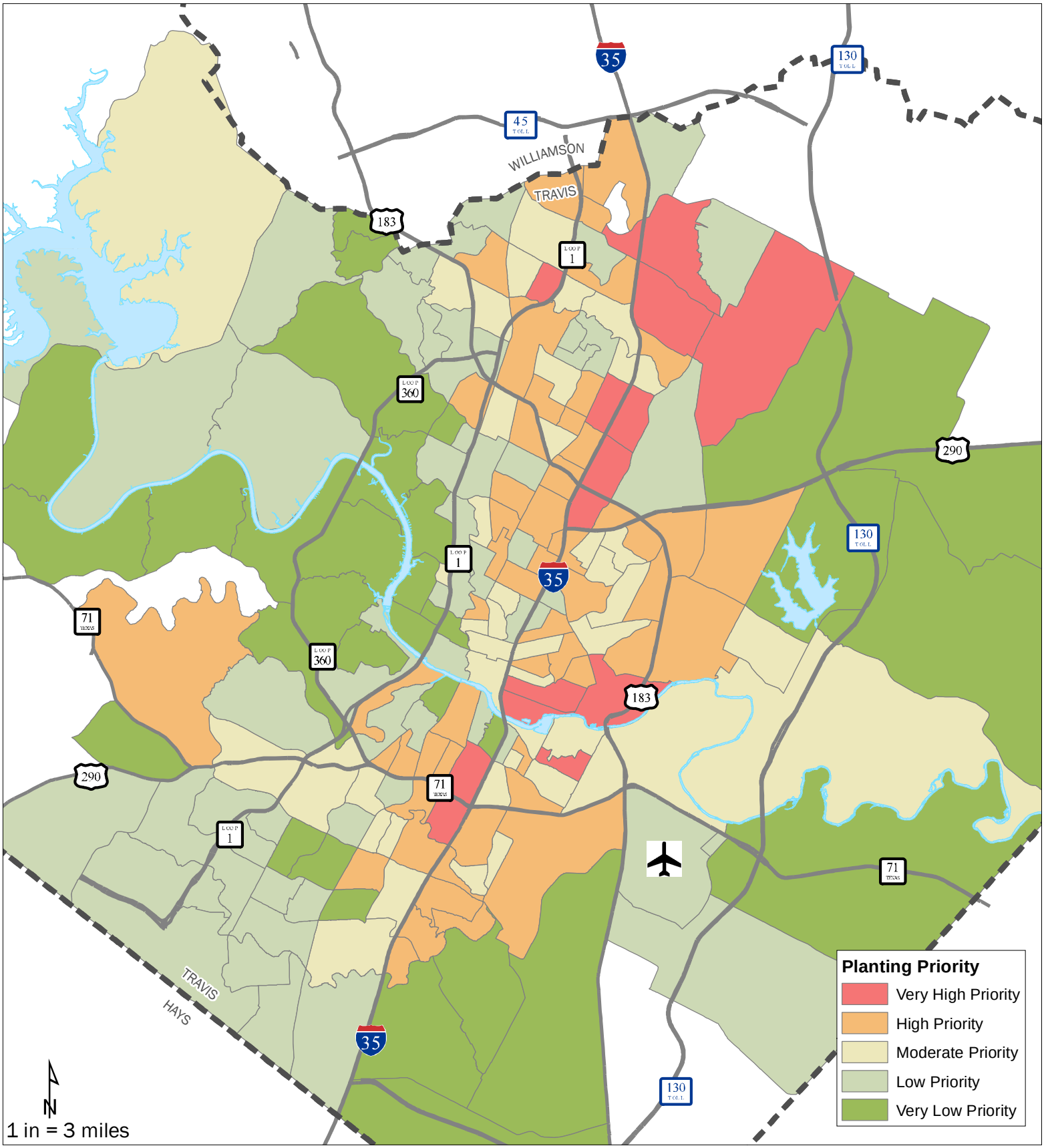
[6] When standardized scores are summed they may theoretically range between 0 and 8 considering there are 8 planting categories, however the minimum score is 1.21 while the maximum score is 4.21. See footnote 5.

Table 3: Top Five Areas for Tree Planting

Rank	Census Tract #	Planting Priority Score	Neighborhood Planning Areas
1	902	4.21	East Cesar Chavez, Holly, Govalle
2	1833	3.93	Windsor Hills
3	1813	3.89	Heritage Hills
4	1823	3.70	North Lamar
5	2111	3.67	Johnston Terrace, MLK, MLK-183, Govalle

Next Steps

The planting prioritization map is dynamic. Annual updates are planned after each planting season (October – March). Updates will consist of 1) re-calculating planting priority scores based on updates to planting factor data sets, 2) incorporating new data sets if deemed necessary, 3) integrating tree planting numbers from the previous planting season, and 4) weighting planting factors based on programmatic interests. Although only conceptual at the moment, a monitoring program will need to be established to evaluate the success and effectiveness of tree planting in accomplishing stated goals.



Tree Planting Prioritization

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Prepared by Alan Halter
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This map shows Census tract boundaries (2010) symbolized by tree planting priority scores. Red corresponds to high priority areas where the need for tree planting is greatest and therefore tree planting efforts should be prioritized highest.

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Table 4: Planting Priority Scores by Census Tract (2010)

Census Tract #	Public Health & Safety	Air Quality	Environmental Justice	Water Quality	Critical Places	Forest Replenishment	Tree Preservation & Development Impacts	Urban Heat Island	Tree Planting Priority Score
101	0.1	0.2	0.0	0.3	0.4	0.7	0.2	0.7	2.6
102	0.1	0.2	0.0	0.4	0.0	0.7	0.2	0.4	2.0
203	0.3	0.1	0.5	0.4	0.3	0.9	0.0	0.8	3.2
204	0.3	0.1	0.0	0.3	0.3	0.8	0.2	0.7	2.6
205	0.3	0.1	0.5	0.4	0.2	0.8	0.1	0.8	3.1
206	0.3	0.1	0.0	0.4	0.5	0.7	0.2	0.6	2.7
302	0.3	0.1	0.5	0.3	0.5	0.7	0.2	0.7	3.2
304	0.3	0.1	0.5	0.3	0.3	0.7	0.1	0.7	3.1
305	0.3	0.0	0.0	0.3	0.2	0.7	0.1	0.7	2.4
306	0.3	0.2	0.5	0.3	0.2	0.8	0.1	0.8	3.0
307	0.3	0.3	0.0	0.3	0.2	0.7	0.1	0.6	2.5
401	0.2	0.1	0.0	0.3	0.5	0.7	0.1	0.7	2.6
402	0.3	0.1	0.5	0.3	0.5	0.7	0.1	0.8	3.2
500	0.2	0.0	0.5	0.3	0.1	0.8	0.1	0.6	2.7
601	0.2	0.1	0.5	0.3	0.1	0.8	0.1	0.7	2.9
603	0.2	0.1	0.5	0.4	0.3	0.8	0.2	0.7	3.1
604	0.2	0.1	0.5	0.4	0.1	0.8	0.2	0.7	2.9
700	0.2	0.1	0.0	0.4	0.4	0.8	0.2	0.7	2.8
801	0.3	0.1	0.5	0.4	0.4	0.8	0.0	0.7	3.3
802	0.3	0.1	0.5	0.4	0.3	0.7	0.1	0.8	3.2
803	0.2	0.1	0.5	0.2	0.2	0.8	0.1	0.8	2.9
804	0.4	0.0	0.5	0.3	0.3	0.6	0.1	0.8	3.1
901	0.4	0.1	0.5	0.3	0.2	0.8	0.1	0.7	3.0
902	0.4	0.0	1.0	0.3	0.6	0.8	0.3	0.8	4.2
1000	0.3	0.2	0.5	0.4	0.6	0.8	0.1	0.5	3.4
1100	0.4	0.1	0.0	0.4	0.3	0.8	0.3	0.6	3.0
1200	0.1	0.1	0.0	0.4	0.2	0.7	0.3	0.6	2.4
1303	0.1	0.1	0.0	0.4	0.0	0.8	0.3	0.5	2.2
1304	0.1	0.1	0.0	0.3	0.3	0.8	0.3	0.7	2.5
1305	0.2	0.1	0.5	0.4	0.3	0.7	0.4	0.6	3.1
1307	0.1	0.1	0.5	0.3	0.5	0.7	0.2	0.7	3.1
1308	0.1	0.1	0.5	0.4	0.3	0.7	0.2	0.7	3.0
1401	0.1	0.1	0.0	0.4	0.3	0.5	0.2	0.6	2.3
1402	0.1	0.2	0.0	0.3	0.2	0.4	0.1	0.5	1.8
1403	0.1	0.3	0.0	0.3	0.0	0.8	0.0	0.7	2.3
1501	0.3	0.1	0.0	0.5	0.2	0.5	0.2	0.7	2.4
1503	0.3	0.1	0.5	0.5	0.2	0.7	0.1	0.8	3.2
1504	0.3	0.1	0.0	0.4	0.2	0.5	0.2	0.8	2.4
1505	0.3	0.1	1.0	0.4	0.2	0.5	0.1	0.7	3.3
1602	0.1	0.1	0.0	0.4	0.2	0.7	0.2	0.5	2.1
1603	0.1	0.1	0.0	0.3	0.2	0.7	0.4	0.5	2.3
1604	0.1	0.0	0.0	0.4	0.3	0.6	0.3	0.3	2.0
1605	0.1	0.1	0.0	0.3	0.0	0.8	0.3	0.5	2.1
1606	0.1	0.1	0.5	0.2	0.0	0.9	0.1	0.8	2.7

Table 4: Planting Priority Scores by Census Tract (2010)

Census Tract #	Public Health & Safety	Air Quality	Environmental Justice	Water Quality	Critical Places	Forest Replenishment	Tree Preservation & Development Impacts	Urban Heat Island	Tree Planting Priority Score
1705	0.2	0.1	0.0	0.4	0.2	0.5	0.1	0.5	1.9
1706	0.2	0.2	0.0	0.4	0.0	0.8	0.0	0.6	2.3
1707	0.3	0.2	0.5	0.4	0.2	0.8	0.1	0.7	3.1
1712	0.2	0.1	0.0	0.6	0.3	0.7	0.2	0.7	2.7
1713	0.1	0.1	0.0	0.4	0.2	0.7	0.1	0.7	2.3
1714	0.1	0.3	0.0	0.3	0.3	0.7	0.2	0.6	2.6
1716	0.1	0.3	0.0	0.3	0.0	0.7	0.2	0.5	2.1
1718	0.1	0.2	0.0	0.4	0.3	0.7	0.1	0.6	2.4
1719	0.1	0.2	0.0	0.4	0.0	0.7	0.1	0.4	1.9
1722	0.3	0.1	0.0	0.4	0.0	0.8	0.1	0.6	2.3
1728	0.2	0.1	0.0	0.4	0.2	0.6	0.1	0.7	2.1
1729	0.1	0.1	0.0	0.3	0.0	0.7	0.0	0.6	1.9
1733	0.2	0.3	0.0	0.3	0.1	0.7	0.1	0.8	2.5
1737	0.1	0.1	0.0	0.4	0.3	0.7	0.1	0.8	2.4
1738	0.1	0.1	0.0	0.5	0.2	0.7	0.1	0.7	2.4
1740	0.2	0.1	0.0	0.4	0.2	0.7	0.1	0.7	2.5
1741	0.1	0.9	0.0	0.4	0.0	0.7	0.1	0.0	2.2
1742	0.1	0.7	0.0	0.3	0.1	0.6	0.1	0.1	2.2
1745	0.1	0.3	0.5	0.3	0.3	0.8	0.0	0.7	3.1
1746	0.2	0.0	0.0	0.3	0.2	0.8	0.1	0.7	2.4
1747	0.4	0.1	0.0	0.3	0.0	0.7	0.0	0.7	2.3
1748	0.2	0.2	0.0	0.5	0.0	0.6	0.2	0.7	2.4
1749	0.1	0.1	0.0	0.5	0.3	0.8	0.2	0.8	2.8
1750	0.2	0.1	0.5	0.4	0.2	0.7	0.2	0.7	2.9
1751	0.1	0.1	0.0	0.4	0.0	0.7	0.0	0.6	1.9
1752	0.1	0.1	0.0	0.5	0.1	0.8	0.0	0.8	2.4
1753	0.3	0.2	0.0	0.4	0.0	0.9	0.0	0.8	2.6
1754	0.3	0.3	0.0	0.4	0.3	0.8	0.1	0.7	2.8
1755	0.3	0.1	0.0	0.4	0.2	0.6	0.2	0.5	2.3
1756	0.3	0.2	0.0	0.3	0.2	0.6	0.0	0.7	2.3
1757	0.2	0.1	0.0	0.4	0.0	0.8	0.2	0.6	2.3
1760	0.1	0.4	0.0	0.3	0.1	0.7	0.2	0.4	2.3
1761	0.1	0.4	0.0	0.3	0.1	0.7	0.2	0.4	2.3
1765	0.2	0.4	0.5	0.3	0.1	0.7	0.2	0.5	2.9
1769	0.1	0.0	0.0	0.4	0.2	0.6	0.0	0.8	2.1
1770	0.2	0.1	0.0	0.4	0.2	0.8	0.2	0.7	2.5
1772	0.2	0.2	0.0	0.3	0.1	0.7	0.2	0.8	2.5
1774	0.2	0.1	0.0	0.4	0.2	0.7	0.2	0.8	2.5
1775	0.2	0.1	0.0	0.4	0.1	0.6	0.3	0.7	2.3
1776	0.1	0.1	0.0	0.6	0.2	0.7	0.1	0.7	2.6
1777	0.2	0.1	0.0	0.5	0.2	0.7	0.0	0.8	2.4
1781	0.1	0.1	0.0	0.3	0.2	0.8	0.0	0.6	2.1
1782	0.1	0.1	0.0	0.4	0.3	0.7	0.0	0.6	2.2
1783	0.2	0.3	0.0	0.3	0.0	0.1	0.1	0.1	1.2

Table 4: Planting Priority Scores by Census Tract (2010)

Census Tract #	Public Health & Safety	Air Quality	Environmental Justice	Water Quality	Critical Places	Forest Replenishment	Tree Preservation & Development Impacts	Urban Heat Island	Tree Planting Priority Score
1784	0.1	0.5	0.0	0.3	0.3	0.3	0.1	0.1	1.7
1785	0.1	0.4	0.0	0.3	0.2	0.7	0.0	0.8	2.5
1786	0.1	0.3	0.0	0.3	0.0	0.8	0.0	0.9	2.5
1804	0.3	0.1	0.5	0.4	0.3	0.8	0.0	0.9	3.3
1805	0.1	0.1	0.5	0.4	0.2	0.7	0.0	0.9	3.0
1806	0.3	0.3	0.5	0.5	0.2	0.7	0.0	0.8	3.3
1811	0.4	0.1	0.5	0.4	0.2	0.8	0.0	0.8	3.2
1812	0.4	0.2	0.5	0.4	0.5	0.8	0.0	0.8	3.6
1813	0.4	0.4	0.5	0.4	0.5	0.8	0.2	0.8	3.9
1817	0.3	0.1	0.0	0.5	0.3	0.8	0.1	0.9	3.0
1818	0.3	0.2	0.5	0.4	0.2	0.7	0.1	0.9	3.2
1819	0.2	0.0	0.5	0.5	0.4	0.8	0.1	0.8	3.4
1820	0.1	0.1	0.5	0.5	0.3	0.8	0.0	0.9	3.2
1821	0.1	0.0	0.5	0.5	0.2	0.7	0.0	0.9	2.9
1822	0.1	0.1	0.5	0.5	0.1	0.8	0.1	0.9	3.0
1823	0.4	0.5	0.5	0.4	0.2	0.8	0.2	0.8	3.7
1824	0.2	0.6	0.0	0.4	0.0	0.7	0.0	0.7	2.7
1826	0.2	0.4	0.0	0.5	0.3	0.8	0.0	0.7	3.0
1828	0.2	0.3	0.0	0.4	0.3	0.7	0.0	0.7	2.7
1829	0.4	0.2	0.5	0.6	0.2	0.8	0.1	0.7	3.5
1832	0.3	0.6	0.0	0.5	0.0	0.7	0.0	0.7	2.7
1833	0.3	0.5	1.0	0.4	0.3	0.6	0.0	0.8	3.9
1834	0.4	0.1	0.0	0.4	0.2	0.7	0.1	0.7	2.5
1835	0.4	0.4	0.5	0.4	0.2	0.7	0.0	0.7	3.3
1839	0.5	0.4	0.5	0.3	0.2	0.9	0.0	0.9	3.7
1840	0.4	0.6	0.5	0.3	0.2	0.7	0.0	0.9	3.6
1841	0.4	0.3	0.0	0.2	0.2	0.5	0.0	0.9	2.5
1842	0.4	0.2	1.0	0.2	0.1	0.7	0.0	0.8	3.4
1843	0.1	0.1	0.0	0.4	0.0	0.7	0.0	0.8	2.3
1844	0.1	0.2	0.0	0.3	0.2	0.8	0.0	0.8	2.4
1845	0.1	0.3	0.0	0.4	0.2	0.8	0.0	0.7	2.4
1846	0.3	0.3	0.5	0.3	0.0	0.7	0.0	0.7	2.9
1847	0.3	0.2	0.0	0.4	0.0	0.7	0.0	0.8	2.5
1848	0.4	0.3	0.0	0.4	0.3	0.8	0.0	0.8	3.0
1849	0.2	0.2	0.5	0.4	0.2	0.9	0.1	0.8	3.2
1850	0.2	0.1	0.0	0.4	0.2	0.9	0.1	0.8	2.7
1851	0.3	0.3	0.5	0.3	0.2	0.7	0.0	1.0	3.1
1856	0.2	0.1	0.0	0.2	0.1	0.6	0.1	0.8	2.1
1857	0.3	0.4	0.0	0.2	0.2	0.7	0.0	0.9	2.6
1863	0.3	0.3	0.5	0.5	0.2	0.7	0.0	1.0	3.5
1864	0.2	0.3	0.5	0.3	0.2	0.7	0.0	1.0	3.1
1901	0.2	0.1	0.0	0.5	0.2	0.7	0.2	0.5	2.4
1908	0.1	0.2	0.5	0.4	0.3	0.7	0.2	0.8	3.1
1910	0.1	0.3	0.0	0.4	0.3	0.5	0.2	0.5	2.4

Table 4: Planting Priority Scores by Census Tract (2010)

Census Tract #	Public Health & Safety	Air Quality	Environmental Justice	Water Quality	Critical Places	Forest Replenishment	Tree Preservation & Development Impacts	Urban Heat Island	Tree Planting Priority Score
1911	0.2	0.3	0.5	0.5	0.2	0.8	0.2	0.6	3.2
1912	0.2	0.2	0.0	0.4	0.1	0.7	0.2	0.2	2.0
1913	0.1	0.1	0.0	0.3	0.0	0.7	0.2	0.4	1.8
1914	0.2	0.3	0.0	0.3	0.0	0.7	0.2	0.6	2.3
1915	0.3	0.1	0.0	0.4	0.4	0.8	0.2	0.7	2.9
1917	0.3	0.2	0.0	0.4	0.0	0.7	0.2	0.5	2.2
1918	0.1	0.1	0.0	0.2	0.3	0.7	0.1	0.3	1.8
1919	0.1	0.1	0.0	0.3	0.2	0.6	0.1	0.6	2.0
2002	0.1	0.0	0.5	0.4	0.0	0.7	0.1	0.7	2.6
2003	0.1	0.1	0.5	0.5	0.3	0.8	0.2	0.7	3.2
2004	0.1	0.1	0.5	0.4	0.2	0.9	0.2	0.9	3.2
2005	0.1	0.1	0.5	0.3	0.5	0.8	0.2	0.7	3.3
2104	0.3	0.1	0.5	0.4	0.0	0.6	0.1	0.7	2.7
2105	0.3	0.1	0.5	0.5	0.2	0.8	0.0	0.9	3.3
2106	0.3	0.0	0.5	0.5	0.3	0.4	0.1	0.8	2.8
2107	0.3	0.1	0.5	0.4	0.3	0.7	0.0	0.6	2.9
2108	0.4	0.1	0.5	0.4	0.3	0.7	0.0	0.6	3.0
2109	0.1	0.1	0.5	0.4	0.4	0.7	0.1	0.7	2.9
2110	0.3	0.0	1.0	0.4	0.2	0.7	0.1	0.7	3.3
2111	0.3	0.1	1.0	0.5	0.2	0.8	0.2	0.6	3.7
2112	0.3	0.1	0.5	0.4	0.2	0.7	0.0	0.7	2.9
2113	0.4	0.1	0.5	0.4	0.3	0.6	0.1	0.6	3.1
2201	0.4	0.1	0.5	0.5	0.1	0.8	0.1	0.6	3.2
2202	0.4	0.1	1.0	0.2	0.4	0.4	0.0	0.7	3.2
2207	0.1	0.3	1.0	0.4	0.3	0.4	0.0	0.3	2.9
2208	0.2	0.1	1.0	0.5	0.2	0.6	0.2	0.6	3.3
2209	0.2	0.1	0.0	0.0	0.1	0.7	0.0	0.8	1.9
2210	0.1	0.2	0.5	0.1	0.0	0.7	0.0	0.2	1.8
2211	0.3	0.2	0.5	0.4	0.0	0.7	0.0	0.7	2.8
2212	0.2	0.1	0.5	0.3	0.1	0.5	0.0	0.4	2.1
2304	0.2	0.2	0.5	0.7	0.0	0.6	0.2	0.4	2.8
2307	0.2	0.2	0.5	0.4	0.2	0.8	0.0	0.8	3.0
2308	0.1	0.1	1.0	0.3	0.2	0.7	0.2	0.7	3.4
2310	0.2	0.1	1.0	0.4	0.0	0.7	0.0	0.5	3.0
2312	0.1	0.1	0.5	0.3	0.2	0.9	0.0	0.7	2.8
2313	0.2	0.1	1.0	0.4	0.0	0.8	0.0	0.6	3.2
2314	0.2	0.1	0.5	0.4	0.2	0.8	0.0	0.7	2.8
2315	0.1	0.0	0.5	0.4	0.2	0.9	0.0	0.8	2.9

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