URBAN FOREST SUSTAINABILITY MATRIX - WORKING DRAFT

Worksheet to Assess the Sustainability of the Knoxville Urban Forest

INDICATORS OF A SUSTAINABLE URBAN FOREST THE TREES		Overall Objective or Industry Standard	Score Levels			Knoxville Today
			Low	**Moderate**	**Good**	
Urban Tree Canopy Cover		Achieve the desired tree canopy cover according to goals set for the entire city and neighborhoods.	No goals are set or tree canopy cover is not on a trajectory to achieving goal.	Canopy is somewhat stable, though not on a trajectory to achieving the established goal.	Canopy goal is achieved or well on the way to achievement.	No canopy goal is currently in place in Knoxville. 38% of Knoxville is covered by tree canopy as of 2018. This is decrease in overall canopy cover from 40% in 2008 (a net loss of 732 acres).
Equitable Distribution of Canopy		Ensure that the benefits of tree canopy are available to all, especially for those most vulnerable within the community. Achieve low variation between tree canopy and equity factors citywide by neighborhood.	Tree canopy is not equitably distributed across the community.	Tree canopy is moderately equitable in distribution across the community.	Tree canopy is equitable in distribution across the community.	Tree canopy across Knoxville neighborhoods range greatly, from 5% to 63%. 25 of the 60 neighborhoods fall below the citywide average.
Streets/Parks (public)	**Age/Size Distribution**	Establish a diverse-sized population of trees across the entire city and for each neighborhood. As age is not possible to determine, an ideal distribution of trees based on general size can be an adequate substitute: Young 0-6" DBH: 40% Establishing 7-17" DBH: 30% Maturing 18-24" DBH: 20% Mature Over 24" DBH: 10%	No data is available OR size distribution does not align with ideal.	City Level - Size distribution generally follows the ideal. Neighborhood Level - Size distribution generally follows the ideal OR neighborhood level data are not available.	Size distribution follows the ideal recommendation at both city-wide and at the neighborhood level.	Age distribution of inventoried trees shows lower than ideal quantities of maturing and mature trees. Trees by management zone show the same trend in general.
	Condition	Possess a detailed understanding of tree condition and potential risk of all trees. For publicly-owned trees (streets, parks), this information is used to direct maintenance actions and maintain public safety.	No current information is available on tree condition or risk.	Information from a partial or sample or inventory is used to assess tree condition and risk.	Information from a current, GIS-based, 100% complete public tree inventory is used to indicate tree condition and risk.	Condition of public trees in Knoxville is complete and used to manage risk.
	Diversity / Pest Vulnerability	To manage a sustainable tree population that is resilient to pests, establish a genetically diverse population across the entire city and for each neighborhood. Industry standards recommend that no more than 30% of any family, 20% of any genus, or 10% of any species dominate the urban forest. Newer standards are recommending no more than 5% of any species."	Data is not available or tree population does not follow the recommended industry standard citywide.	Only one level (family, genus, species) is following recommended standards at citywide or neighborhood levels.	The industry standard recommending no more than 30% of any family, 20% of any genus, or 10% of any species has been met at the citywide or neighborhood levels. .	Public trees do not exceed the recommended diversity threshold for species, genus and family. Trees by management zone show the same trend as well.
	Suitability - Overhead	Trees have room to above ground (trunk, canopy) grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not collected on existing conflicts with overhead utilities.
	Suitability - Ground Level	Trees have room to below ground (roots, soil) to grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not collected on existing conflicts with hardscape or underground utilities.

	Criterion	Description / Ideal				Notes
	Suitability - Soil Conditions	Trees have the quantity and quantity of soils required for health and longevity, providing the maximum services to the community..	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.
	Suitability - Invasives	Invasive species are not hindering existence and regrowth of existing trees and natural areas, .	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is	More than 75% of trees are considered suitable.	Public tree inventory shows 2% invasives, largely callery pears and tree of heaven.
	Suitability - Climate Adaptability	Existing trees are able to adapt to the warming climate, growing to providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	For streets and parks, the species of approximately 75% of trees existing today are predicted to survive (and in some cases thrive) as the climate warms.
Woodlands / Natural Areas (private or public)	**Age/Size Distribution**	Establish a diverse-sized population of trees across the entire city and for each neighborhood. As age is not possible to determine, an ideal distribution of trees based on general size can be an adequate substitute: Young 0-6" DBH: 40% Establishing 7-17" DBH: 30% Maturing 18-24" DBH: 20% Mature Over 24" DBH: 10%	No data is available OR size distribution does not align with ideal.	City Level - Size distribution generally follows the ideal. Neighborhood/Site Level - Size distribution generally follows the ideal OR neighborhood/site level data are not available.	Size distribution follows the ideal recommendation at both city-wide and at the neighborhood/site level.	Data is not available.
	Condition	Possess a detailed understanding of tree condition and potential risk of all trees. For natural areas, this knowledge is important for understanding of the ecological structure and function of areas such as woodlands, ravines, stream corridors, etc.	No current information is available on tree condition or risk.	Partial data are available (select sites), or have been collected in a sample-based "natural areas survey" or similar study.	Information from a current, GIS-based, 100% complete natural areas survey is utilized to document ecological structure and function, as well as usage patterns.	Limited data is available on makeup and condition of woodlands in Knoxville. On woodland areas managed by the City of Knoxville, natural areas are inspected annually for hazard identification and mitigation.
	Diversity / Pest Vulnerability	To manage a sustainable tree population that is resilient to pests, establish a genetically diverse population across the entire city and for each neighborhood. Industry standards recommend that no more than 30% of any family, 20% of any genus, or 10% of any species dominate the urban forest. Newer standards are recommending no more than 5% of any species."	Data is not available or tree population does not follow the recommended industry standard.	Diversity standards are met on at least one level at most open space sites, or data on all sites is incomplete.	The industry standard recommending no more than 30% of any family, 20% of any genus, or 10% of any species has been met.	General species information common in the Knoxville region natural areas is known anecdotally but limited data has been collected to-date.
	Suitability - Overhead	Trees have room to above ground (trunk, canopy) grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available. However, by the nature of woodland areas, little-to-no restrictions on grow space are likely in the majority of sites.
	Suitability - Ground Level	Trees have room to below ground (roots, soil) to grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available. However, by the nature of woodland areas, little-to-no restrictions on grow space are likely in the majority of sites.
	Suitability - Soil Conditions	Trees have the quantity and quantity of soils required for health and longevity, providing the maximum services to the community..	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.
	Suitability - Invasives	Invasive species are not hindering existence and regrowth of existing trees and natural areas, .	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data not available. However, local knowledge indicates significant invasives issue that hinders regrowth of trees.
	Suitability - Climate Adaptability	Existing trees are able to adapt to the warming climate, growing to providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.

All Other Lands (primarily private)	**Age/Size Distribution**	Establish a diverse-sized population of trees across the entire city and for each neighborhood. As age is not possible to determine, an ideal distribution of trees based on general size can be an adequate substitute: Young 0-6" DBH: 40% Establishing 7-17" DBH: 30% Maturing 18-24" DBH: 20% Mature Over 24" DBH: 10%	No data is available OR size distribution does not align with ideal.	City Level - Size distribution generally follows the ideal. Neighborhood/Site Level - Size distribution generally follows the ideal OR neighborhood/site level data are not available.	Size distribution follows the ideal recommendation at both city-wide and at the neighborhood/site level.	Data is not available.
	Condition	Possess a detailed understanding of tree condition and potential risk of all trees. For natural areas, this knowledge is important for understanding of the ecological structure and function of areas such as woodlands, ravines, stream corridors, etc.	No current information is available on tree condition or risk.	Information on condition and risk is available citywide via a bottom-up sample-based assessment of trees.	Information on condition and risk is available both citywide and by neighborhood via a bottom-up sample-based assessment of trees.	Data is not available.
	Diversity / Pest Vulnerability	To manage a sustainable tree population that is resilient to pests, establish a genetically diverse population across the entire city and for each neighborhood. Industry standards recommend that no more than 30% of any family, 20% of any genus, or 10% of any species dominate the urban forest. Newer standards are recommending no more than 5% of any species."	Data is not available or tree population; does not follow the recommended industry standard.	Only one level (family, genus, species) is following recommended standards.	The industry standard recommending no more than 30% of any family, 20% of any genus, or 10% of any species has been met.	Data is not available.
	Suitability - Overhead	Trees have room to above ground (trunk, canopy) grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.
	Suitability - Ground Level	Trees have room to below ground (roots, soil) to grow safely, fully, and for the long term, providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.
	Suitability - Soil Conditions	Trees have the quantity and quantity of soils required for health and longevity, providing the maximum services to the community..	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	No data, however it has been reported common for older neighborhoods to have better soil quality than newly built neighborhoods. Construction has come with soil compaction and lack of quality topsoil.
	Suitability - Invasives	Invasive species are not hindering existence and regrowth of existing trees and natural areas, .	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.
	Suitability - Climate Adaptability	Existing trees are able to adapt to the warming climate, growing to providing the maximum services to the community.	Data is unavailable OR less than 50% are considered suitable.	50% to 75% of trees are considered suitable OR only partial data is available.	More than 75% of trees are considered suitable.	Data is not available.